National Aeronautics and Space Administration

software 2015-16 catalog

TECHNOLOGY TRANSFER PROGRAM

BRINGING NASA TECHNOLOGY DOWN TO EARTH

It was not our intention to publish a software catalog this year.

When we published the first-ever NASA software catalog in 2014, it was mainly a proof of concept, a target for showing that we could compile all available NASA software assets in one place and present them in a format that provided a single point of entry for users interested in using NASA software in their own work.

The idea for this traced back, quite simply, to the rather alarming realization that I didn't know how to find any of our software.

I was giving a talk about NASA technology transfer and our spinoff technologies improving everyday lives. I was also telling the audience that they should look to NASA for solutions to their technical challenges and that we had thousands of patented technologies available for license and software available free of charge.

When someone in the crowd asked where she could find our software, I was stumped.

We started looking at the various Web sites around the agency devoted to software release and determined that, while there were many, most related to specific projects or types of release, like the popular code.nasa.gov that focuses on the subset of NASA software available through open source licenses.

We set out to build a centralized location where all available NASA software could be found. Ultimately, the intention was to build software.nasa.gov, which we did. And this catalog is now available online in a fully searchable database.

Our first step in the process, though, was to get all the content in one place, organize it by application type, and provide plain language descriptions of the various programs. Once we had this content organized, it was a quick leap to a PDF and a print copy.

We printed the software catalog as a proof of concept and to show people that NASA software all existed in one place. Having done this, we turned our attention to the Web site and are now working on designing a repository that will speed the rate at which users can access the software. We are also shortening our software usage agreements and implementing a “click-wrap” agreement to make it truly simple to access these tools.

We are automating processes, managing workflow with process-based metrics, and building the infrastructure necessary to understand the agency’s available assets and serve our vast stakeholder communities. We’re aiming for broad and lasting agency-level solutions.

Meanwhile, we are victims of our own success. As soon as we released the 2014 software catalog, we received hundreds of requests from people asking to be on the mailing list for the 2015-16 catalog. The demand has grown steadily. We had no choice but to update and release a new catalog this year. Because it’s working.

Hundreds of thousands of people have visited the new software.nasa.gov site, and over 100,000 have full copies of the catalog. These new users are keeping us busy! In 2014, we shared over 1,600 NASA software programs with new users, up 18 percent from the year before. Our requests are increasing monthly.

These are great problems to have. We are experiencing a high demand for NASA software, which is consistent with our charge to share these valuable assets as broadly as possible. The software catalog and ancillary products help us bring NASA technology down to Earth.

Daniel Lockney
Technology Transfer Program Executive
Office of the Chief Technologist
NASA Headquarters

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Using the Catalog

Offering an extensive portfolio of software products for a wide variety of technical applications, the NASA software catalog is organized into fifteen broad subject matter categories.

The codes within each category are listed alphabetically. All catalog entries include the software title, the product ID number (known internally as the NASA case number), a short description, and the software's specified release type. Some software descriptions contain links to additional information or downloading options.

Each code listed in the catalog is available at no cost and has been evaluated for access requirements and restrictions:

- **General Public Release** — For codes with a broad release and no nondisclosure or export control restrictions
- **Open Source Release** — For collaborative efforts in which programmers improve upon codes originally developed by NASA and share the changes
- **U.S. Release Only** — For codes available to U.S. persons only, with no further transfer of the software allowed without the prior written approval of NASA
- **U.S. and Foreign Release** — For codes that are available to U.S. persons and (under special circumstances) persons outside of the U.S.
- **U.S. Government Purpose Release** — For codes that are to be used on behalf of the U.S. government
  - **Project Release** — For use under a contract, grant, or agreement
  - **Interagency Release** — For use by U.S. government agencies
  - **NASA Release** — For use only by NASA personnel and contractors

The NASA software catalog is continually updated. Please visit the NASA Technology Transfer Portal for the latest updates and revisions:

technology.nasa.gov

Points of Contact

Each NASA center has a Software Release Authority (SRA) representative ready to assist you with your software requests. Contact information is provided below:

Case Number	NASA Center	Contact Information
ARC-XXXXX	Ames Research Center	arc-sra-team@mail.nasa.gov
DRC-XXX-XXX	Armstrong Flight Research Center	afrc-ipo-softwarecatalogue@mail.nasa.gov
GSC-XXXXX	Goddard Space Flight Center	gsfc-softwarerelease@mail.nasa.gov
HQN-XXXXX	NASA Headquarters	hq-sra-team@mail.nasa.gov
JPL-XXXXX	Jet Propulsion Laboratory	jpl_ott@jpl.nasa.gov
KSC-XXXXX	Kennedy Space Center	ksc-dl-software-request@mail.nasa.gov
LAR-XXXXX	Langley Research Center	larc-sra@mail.nasa.gov
LEW-XXXXX	Glenn Research Center	grc-sra-team@mail.nasa.gov
MFS-XXXXX	Marshall Space Flight Center	msfc-sra-team@mail.nasa.gov
MSC-XXXXX	Johnson Space Center	jsc-techtran@mail.nasa.gov
SSC-XXXXX	Stennis Space Center	ssc-technology@nasa.gov

How to Request Software

The software release process involves only a few simple steps:

1. Search for the software by name at software.nasa.gov.
2. Click on the software name when the results come up.
3. For an open source code, use the link provided to download the software; otherwise, click on the Request Software button.
4. Fill out the Software Usage Agreement questionnaire.
5. Submit request; your request will automatically be sent to the center SRA. The SRA will review your request form, verify that you meet the software's access requirements, prepare a Software Usage Agreement for your signature, and will either email or FAX it to you.
6. Sign the Software Usage Agreement and return it to the SRA.

NASA 2014 Software of the Year Awards

Two NASA software design teams have received the agency's prestigious Software of the Year Award for 2014. One team's software helps determine the structural loads for aircraft and space vehicles. The second package performs nonlinear surface crack analysis to prevent critical structure failures.

NASA 2014 Software of the Year Awards

CBAERO

Ames Research Center Acting Deputy Center Director, Dr. Charles A. Smith, and Ames Inventions and Contributions Board Member, Mary Livingston, present David J. Kinney and Loc C. Huynh with the 2014 Agency Software of the Year Award for their Configuration-Based Aerodynamics (CBAERO) package.

The Configuration-Based Aerodynamics (CBAERO) software package developed by Jeffrey Bowles and David Kinney from NASA's Ames Research Center in Moffett Field, California, and Loc Huynh of Eloret Corp., also in Moffett Field, is used to predict how NASA's Crew Exploration Vehicle, America's exploration, and other aerospace designs will react to high temperatures in a variety of simulated flight conditions.

"I am absolutely delighted that the CBAERO team has been honored with this celebrated award," said Ames Center Director S. Pete Worden. "Their outstanding work has made a significant and lasting contribution to Ames' technology development portfolio and this award adds to our proud legacy."

CBAERO has been transferred to U.S. industry, academia, and government agencies, and includes more than 50 software usage agreements with major U.S. manufacturers of aircraft, helicopters, launch vehicles, and spacecraft.

TASC

Marshall Center Director, Patrick Scheuermann, and Marshall Engineering Director, Chris Singer, present Phillip Allen with the 2014 Agency Software of the Year Award for his Tool for Analysis of Surface Cracks (TASC).

Tool for Analysis of Surface Cracks (TASC) was developed by Phillip Allen, a materials engineer and structural analyst at NASA's Marshall Space Flight Center in Huntsville, Alabama. The software provides a more thorough understanding of surface crack material fracture toughness — essential to prevent failure — for safer aerospace vehicles and structures. Surface cracks are the most common defect found in engineering structures. The results of the surface crack fracture toughness tests and fracture analyses ensure safe operation of nearly all of NASA's flight and ground support hardware.

"This software is a landmark achievement because it reduces the costs for the government and numerous companies in many engineering fields that conduct this fundamental analysis to ensure structures are safe," said Marshall Center Director Patrick Scheuermann. "We are pleased to make this valuable contribution and to share in this prestigious NASA award."

Since its release in January 2014, TASC has been downloaded more than 500 times and is in use by multiple NASA centers, government contractors, aerospace industries, and universities.

In addition to the co-winning teams, judges selected two co-winner runners-up — a team from NASA's Langley Research Center in Hampton, Virginia, for changing the aerospace design paradigm with FUND3D, and a team from the Jet Propulsion Laboratory in Pasadena, California, for their Ensemble software. A group from NASA's Johnson Space Center in Houston, Texas, received an honorable mention for their JSC Engineering Orbital Dynamics (JEOD) 3.0 software.

Every NASA center and facility is invited to participate in the agency's annual Software of the Year competition, which is sponsored by the Office of General Counsel. A Software Advisory Panel with representatives from across the agency reviews the entries and recommends winners to the Inventions and Contributions Board.

The competition allows the agency to recognize and appreciate NASA team members who set high standards for significant software that is creative, usable, transferable, and possesses inherent quality.

Top 20 requested software titles

1

Orbital Debris Engineering Model (ORDEM), Version 3
Environmental Science
JSC MSC-25457-1 Page 87

2

Knife, Version 1.0
Design and Integration Tools
LARC LAR-17481-1 Page 103

3

Copernicus Trajectory Design and Optimization System, Version 4.0
Operations
JSC MSC-25863-1 Page 62

4

OVERFLOW 2: Overset Grid Computational Fluid Dynamics (CFD) Flow Solver with Moving Body Capability
Design and Integration Tools
LARC LAR-17079-1 Page 107

5

NASA Task Load Index (TLX)
Crew and Life Support
ARC ARC-15150-1 Page 116

6

Schedule Test and Assessment Tools (STAT) Suite
Business Systems and Project Management
MSFC MFS-32602-1 Page 21

7

Mac/Linux TetrUSS Computational Fluid Dynamics (CFD)
Design and Integration Tools
LARC LAR-16882-1 Page 103

8

WinPlot Graphical Display System
Data and Image Processing
MSFC MFS-31664-1 Page 156

9

Project Cost Estimating Capability (PCEC)
Business Systems and Project Management
MSFC MFS-33187-1 Page 20

10

Chimera Grid Tools, Version 2.1
Data and Image Processing
ARC ARC-16025-1A Page 139

Are these in your toolkit?

11

PEGASUS 5: Software for Automated Pre-Processing of Overset Computational Fluid Dynamics (CFD) Grids
Data and Image Processing
ARC ARC-15117-1 Page 150

12

OTIS 4: A Trajectory Optimization Computer Code
System Testing
GRC LEW-18319-1 Page 46

13

Earth Global Reference Atmospheric Model (Earth-Gram) 2010
Environmental Science
MSFC MFS-32780-1 Page 81

14

Automated Triangle Geometry Processing for Surface Modeling and Cartesian Grid Generation (Cart3D)
Design and Integration Tools
ARC ARC-14275-1 Page 93

15

Configuration-Based Aerodynamics (CBAERO)
Design and Integration Tools
ARC ARC-15819-1 Page 94

16

Refine
Design and Integration Tools
LARC LAR-16881-1 Page 108

17

ROCet Engine Transient Simulation Software (ROCETS)
Design and Integration Tools
MSFC MFS-31858-1 Page 108

18

NASA Design and Analysis of Rotorcraft (NDARC)
Design and Integration Tools
ARC ARC-16265-1 Page 105

19

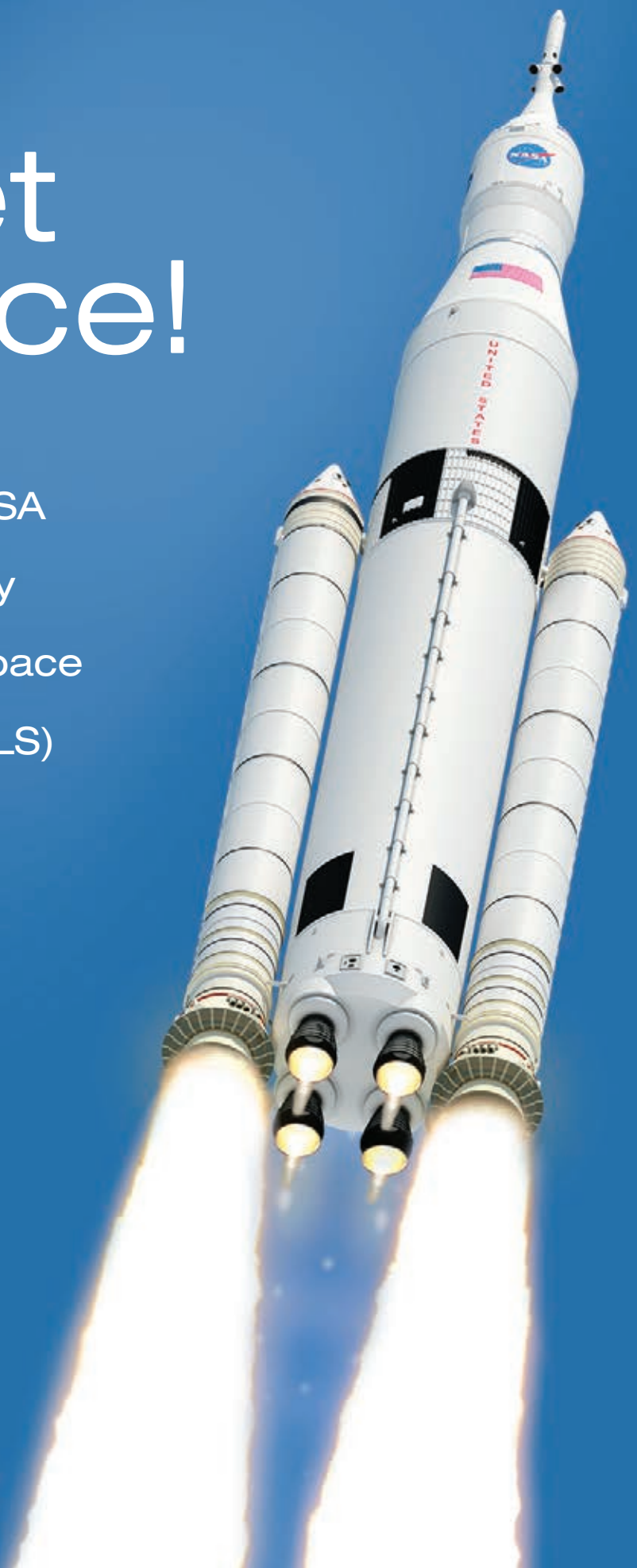
Generalized Fluid System Simulation Program (GFSSP), Version 6.0
Design and Integration Tools
MSFC MFS-33019-1 Page 99

20

Future Air Traffic Management Concepts Evaluation Tool (FACET)
Aeronautics
ARC ARC-14653-1 Page 159

It **is** rocket science!

Software tools NASA engineers use daily in designing the Space Launch System (SLS)



Preliminary Sizing and Design

- INTegrated ROcket Sizing Model (INTROS) Analytical Tool for Design and Sizing of Launch Vehicles, Version 3.0
  MFS-32199-1 . . . . . .Page 101
- Launch Vehicle Analysis (LVA) Tool
  MFS-31694-1 . . . . . .Page 103

Aerodynamic Characterization

- Automated Triangle Geometry Processing for Surface Modeling and Cartesian Grid Generation (Cart3D)
  ARC-14275-1 . . . . . Page 93
- OVERFLOW 2: Overset Grid Computational Fluid Dynamics (CFD) Flow Solver with Moving Body Capability
  LAR-17079-1 . . . . . .Page 107

Aerothermal Analysis

- Aerotherm Chemical Equilibrium (ACE)
  MFS-32300-1 . . . . . Page 92
- Charring Material Ablator (CMA87) Code
  MFS-32299-1 . . . . . Page 94
- GASRAD: A Computer Program for Thermal Radiation from Gaseous Rocket Exhaust Plumes
  MFS-31685-1 . . . . . Page 98

Propulsion

- Generalized Fluid System Simulation Program (GFSSP), Version 6.0
  MFS-33019-1 . . . . . Page 99
- ROCet Engine Transient Simulation Software (ROCETS) . . . . . .
  MFS-31858-1 . . . . . .Page 108
- PHANTOM: A Unified Flow Analysis for Turbomachinery Flows
  MFS-32321-1 . . . . . .Page 107

Loads and Dynamics

- NASA STRuctural ANalysis (NASTRAN)
  LAR-16804-GS . . . . . .Page 105
- ML_POGO Stability Analysis Software
  MFS-33024-1 . . . . . Page 54

Guidance, Navigation, and Control

- Program to Optimize Simulated Trajectories II (POST II)
  LAR-16533-1 . . . . . .Page 107
- OTIS 4: A Trajectory Optimization Computer Code
  LEW-18319-1 . . . . . Page 46
- Marshall Aerospace Vehicle Representation in C (MAVERIC-II)
  MFS-31989-1 . . . . . .Page 103

Materials and Processes

- Tool for Analysis of Surface Cracks (TASC) 2014 NASA Software of the Year Co-Winner
  MFS-33082-1 . . . . . Page 40
- Materials and Processes Technical Information System (MAPTIS-II)
  MFS-32206-1 . . . . . Page 40
- Bearing Analysis Tool (BAT)
  MFS-31864-1 . . . . . Page 93

Project Management

- Schedule Test and Assessment Tools (STAT) Suite
  MFS-32602-1 . . . . . Page 21
- Project Cost Estimating Capability (PCEC)
  MFS-33187-1 . . . . . Page 20
- Athena Software Platform
  MFS-33036-1 . . . . . Page 26

1

business systems and project management

Acquisitions

Business Processes

Property Management

Risk Management

Scheduling

Action Item System — GSC-14482-1

The Action Item System is a Web-based tool that allows users to send and respond to actions from any Internet connection. The software centralizes and organizes all action items for a particular organization or project, enables assignees of an action to respond multiple times and/or forward the action to a more appropriate assignee, notifies individuals via email when an action is nearing or has surpassed its due date, allows initiators to attach files to an action, and allows assignees of an action to return files through the system. Setting up individual user accounts is easily completed through a Web interface.
U.S. Government Purpose Release

Action Item System, Version 2.0 — GSC-16768-1

This Web application allows users to assign and track action items. Helpful emails are distributed when an action is created, updated, or closed, and reminder emails are sent to assignees when an action item deadline is approaching or has passed.
U.S. Government Purpose Release

Astronomer's Proposal Tool (APT) — GSC-14946-1

A vision of the Space Telescope Science Institute, the Astronomer's Proposal Tool (APT) makes the proposal preparation process more intuitive and observatory operations less cumbersome. The software leverages off state-of-the-art technologies and provides modern user support tools.
General Public Release

Audit Tracking Information System (ATIS) — MFS-33070-1

The Audit Tracking Information System (ATIS) provides the audit manager and team with the tools/information needed to perform, manage, and close an audit. All affected personnel have centralized, timely access to system tools and data. The process is automated to the maximum extent practical, improving efficiency and providing information on all aspects of any particular audit.
U.S. Government Purpose Release

Automated Animation Creation Tool (ANIMATOR) — MFS-31690-1

The Automated Animation Creation Tool (ANIMATOR) is a software program developed as a two- and three-dimensional tool for creating Motion Picture Experts Group (MPEG) animation files.
U.S. Government Purpose Release

Automated Document Request System (ADRS) — MSC-25643-1

ADRS tracks document requests. The software has been used by the Logistics Technical Data Center at the NASA Shuttle Logistics Depot (NSLD). In the system's utilization there, users could be anyone with entry to the USA Human Resources System and access to the USA Intranet, including NASA, Boeing North America (BNA), and subcontractor personnel.
U.S. Government Purpose Release

Automated Evaluation System (AES) — GSC-15477-1

Used during the source evaluation board (SEB) process, the Automated Evaluation System (AES) is a database that assists users with organizing evaluations and generating final reports.
U.S. Government Purpose Release

Automated Release Processing (ARP) — MSC-25494-1

The Automated Release Processing (ARP) application supports the release of engineering documentation. It is a Documentum-based client/server application that uses an Oracle® database and a database management system (DBMS) for data storage.
U.S. Government Purpose Release

Automated Support Requirements System (ASRS) MSC-25495-1

The Automated Support Requirements System (ASRS) has been used to manage the support requirements of the program-wide Universal Documentation System (UDS). The software has been used to transmit technical support requirements/responses between NASA and Department of Defense (DOD) centers and agencies that have supported the launch, landing, flight, and payload needs of the space shuttle.
U.S. Government Purpose Release

Bar Code Scanner to Supplement NASA GSFC Property Inventory Process GSC-17055-1

A method to perform an informal property inventory has been developed to supplement the official NASA GSFC Property Inventory. This approach uses a Metrologic/Honeywell Scanpal2 bar code scanner along with Microsoft® Excel® macros to take scanner output and update an organization's database derived from NASA's N-PROP online property management database.
U.S. Government Purpose Release

Board Support Package for the RTEMS Real-Time Operating System on the Motorola MCF5307C3 Processor Board (RTEMS Coldfire BSP) GSC-14987-1

This software package enables the RTEMS Real-Time Operating System (see http://www.rtems.com) to run on the Motorola MCF5307C3 evaluation processor board. The package contains processor startup code, device drivers, and interfaces to RTEMS.
U.S. Government Purpose Release

Can I Buy GSC-14870-1

The Can I Buy tool automates processes used to request and approve procurements. The software allows registered users to create, submit, un-submit, and delete purchase requests. Different capabilities are provided depending on a person's "role." Privileged roles include branch head, assistant branch head, secretary, resource analyst, credit card specialist, and tool administrator. Email is the medium of communication in the system.
U.S. Release Only

Change Request (CR) Pipeline MSC-25032-1

CR Pipeline can be used as a program-wide tool to capture, plan, and prioritize change requests and evaluations.
U.S. Government Purpose Release

Cicero Configuration Management System GSC-16583-1

Cicero is a generic, customizable, Web-based database application designed to facilitate the document change process. In addition to providing a Web site from which approved personnel may download current versions of baselined documentation for their projects, Cicero supports the creation and management of configuration change requests (CCRs). Through Cicero, configured documents may be modified in a controlled fashion.
U.S. Government Purpose Release

Client/Server Automated Work Control System (CEV-AWCS) MSC-25549-1

CEV-AWCS tracks the workflow of thermal protection, from work authorization through manufacture and repair.
U.S. Government Purpose Release

Closed-Loop Accounting Management System (CLAMS) KSC-12289

The Closed-Loop Accounting Management System (CLAMS) is a Web-based application used to disseminate critical processing information to the workforce and provide feedback to management that the information has been received. The tool allows management at any level to accurately track any critical information, and it also serves as a historical database of what information was sent out, to whom, and when it was received. CLAMS has potential application as shareware to companies using Cold Fusion Server software.

U.S. Release Only

Configuration Auditing Tool (CAT) GSC-15309-1

CAT enables the generation of configuration information and the creation of baseline configurable items. Automated and remote interrogation scripts provide configuration information in the form of "as-built" reports. Specific CAT features include a change control tool, a baseline management tool, an auditing tool, a Web baseline information system tool, an automated code preparation and delivery tool, and process daemons.

U.S. Government Purpose Release

Customer Service System (CSS) MSC-25045-1

The Customer Service System (CSS) is an interactive Web-based service request system that will allow customers to request products and services online. The tool helps to minimize the manual steps required and reduce the turnaround time needed to approve and process service requests. CSS provides for authorization of funding, management approval, review of network access, and final authorization for implementation.

U.S. Government Purpose Release

Customer Survey MFS-33069-1

Customer Survey is a generic survey tool that affords the ability to construct, email, and manage surveys. The overhead cost of Customer Survey is extremely low, as the tool exists on a virtual server.

U.S. Government Purpose Release

Data Service Provider Cost Estimation Tool and Comparables Database GSC-14905-1

The Data Service Provider Cost Estimation Tool (CET) and Comparables Database (CDB) package provides NASA's Earth Science Enterprise (ESE) the ability to make lifecycle cost estimates for the implementation and operation of the data service providers that are required to support its science and applications programs. The Data Service Provider CET and CDB package employs a cost-estimation-by-analogy approach. For more information on the package, please visit: http://opensource.gsfc.nasa.gov/projects/CET/index.php

Open Source Release

Electronic Document System (EDS) MSC-25514-1

The Electronic Document System (EDS) is a Web-based application that provides support for local or geographically dispersed users. It is available through common Web browsers (provided the user has a NASA domain account) and requires no installation.

U.S. Government Purpose Release

Electronic Guest Operations (EGO) MSC-25083-1

Electronic Guest Operations (EGO) has been used as an all-encompassing electronic guest management system for tracking guest invitations/RSVPs to space shuttle launches, landings, and receptions. The tool serves as a single application that will maintain guest and mission information, run standard reports, email guests, produce mailing labels, and export data. Via the Internet, invited guests can access EGO Web pages from all over the world to register their attendance intentions, access relevant mission data, and update their contact information. After guest registration, administrative support personnel have used EGO to maintain guest-seating assignments, send email communications, maintain attendance to special receptions, and gather security information for foreign guests. EGO replaces a very paper-intensive process, saves a significant amount in postage costs, and reduces error-prone data entry. The tool has been built with flexibility and customization in mind. Its initial scope was broadened to also serve as the login for people invited to view an International Space Station Friends and Family Web site created by Wyle Life Sciences. The Constellation program also used EGO to invite guests to attend the Pad Abort (PA-1) test flight in 2010.
U.S. Government Purpose Release

Electronic Timecard System KSC-12051

The Electronic Timecard System can be utilized by any business or organization wishing to streamline its payroll department procedures. The automated system minimizes the consumption of paper and eliminates the need for weekly pick-up and delivery of time sheets. The tool also simplifies the daily recording of time worked by employees, and it allows employees to “sign” their “timecards” electronically at the end of each week. Supervisors can review an employee’s electronic timecards daily and sign them electronically.
U.S. Release Only

Engineering Status Reporting Tool (ESRT) GSC-17110-1

ESRT provides a common, directorate-wide system for reporting and tracking engineering issues/concerns in a timely manner. The tool is divided into four modules, one for flight project level issues and others for directorate, division, and branch level concerns. Within each module, issues can be tracked, statuses updated, and actions opened/closed or elevated to the next highest module.
U.S. Government Purpose Release

Fingerprint Cards MSC-25574-1

Security personnel used this application in order to print employee information onto fingerprint cards.
U.S. Government Purpose Release

Florida Refrigerant Online Service Tracking MSC-25498-1

This system allows users to meet state and federal regulatory requirements for tracking Freon.
U.S. Government Purpose Release

Goal Performance Evaluation System KSC-12036

The Goal Performance Evaluation System (GPES) is an innovative interactive software application that implements, validates, and evaluates an organization’s performance by the achievements of its employees. The tool has been used for strategic planning, employee performance management, and center-wide communication. The system is Web-based and uses a relational database to host information.
U.S. Release Only

Goddard Mission Services Evolution Center (GMSEC) Alert Notification System Router (ANSR), Version 3.9 — GSC-15895-1

ANSR is a paging/notification software tool that supports automation within a Mission Operations Center (MOC) utilizing the GMSEC architecture. ANSR is primarily used to notify satellite operators of error conditions, including an unexpected telemetry value. ANSR relies on a reasoning/logic engine and can alert operators through pages, emails, or texts.
U.S. Government Purpose Release

Goddard Opportunities Bulletin Board System (GOBBS) Web Application — GSC-15514-1

GOBBS is a Web-based application that enables managers and supervisors to advertise special employment opportunities to a broader audience. Employees can be grouped organizationally (e.g., all of Division 1) or by skills/experience bases (e.g., engineering, administrative, etc.). Parties interested in a given employment announcement can apply online with minimal effort. GOBBS does not replace Competitive Placement Plan vacancy announcements that require competition-through-merit promotion procedures.
U.S. Government Purpose Release

Google Sift — MSC-25403-1

This NASA Online Directives Information System (NODIS) application interfaces with the Johnson Space Center (JSC) search appliance to display a listing of all documents derived from NASA Policy Directives (NPDs), NASA Procedural Requirements (NPRs), and NASA memoranda that contain the term “center director.” The tool allows the user to click on a document link and view a listing of all directives contained in the selected document and also view detailed information for each directive. The application provides an Excel® report of “accepted” directives.
U.S. Government Purpose Release

Grants Document-Generation System (GDGS) — GSC-15187-1

The GDGS software enables the generation of official grants documents for distribution to appropriate parties. GDGS is written in Cold Fusion and resides on an Oracle® database. The tool includes access security and the Locator and Information Services Tracking (LIST) system.
U.S. Government Purpose Release

Hubble Space Telescope (HST) Guide Star Catalog — GSC-15569-1

This software tracks the distribution of the Hubble Space Telescope (HST) Guide Star Catalog.
U.S. Government Purpose Release

InSpec Automated Review System — GSC-15175-1

InSpec is an automated review system that utilizes the C# language and the .NET framework on the front end and a SQL server on the back end. The tool allows a team to collect all product review comments/input, including any correlating software and documentation. InSpec permits a more efficient review process by enabling a team to focus on important issues rather than inconsequential details.
U.S. Government Purpose Release

Integrated Configuration Data Management (ICDM) Application MSC-25085-1

ICDM was developed to be the official integrated configuration data management (CDM) tool for the Constellation program and its associated projects. The Web-accessible application provides a single, integrated user interface for the change management, versioning, and reporting of Constellation program documents, change requests, and products. Additionally, ICDM includes commonly used canned reports, ad hoc reporting, and some basic configuration status accounting capabilities. While ICDM can support "document-centric" configuration and data management practices, it was built considering the movement toward a "data-centric" philosophy. A document-centric system requires humans to extract data and "massage" it to make it useful in another system; a data-centric system permits the management of data entities at a lower level of granularity than a document. A data-centric architecture: allows for structures and searchable, computer-interpretable data sets; enables more automated, flexible reporting and data aggregation for analysis across business areas; permits data access without having to connect to multiple systems; focuses and streamlines a change evaluation process; and allows for the reuse of data across multiple applications without impacting data quality.

U.S. Government Purpose Release

Integrated Design Capability (IDC) Tool for Management, Administration, and Planning (TMAP) GSC-14836-1

The Integrated Design Capability (IDC) Tool for Management, Administration, and Planning (TMAP) tracks IDC customers/studies for managers of the Instrument Synthesis and Analysis Laboratory (ISAL) and the Integrated Mission Design Center (IMDC). The software can track all aspects of design study administration, as well as all interfaces and communications with IDC management, customers, engineers, and the support team.

U.S. Government Purpose

Intranet-Based Learning (IBL) MSC-25581-1

The Intranet-Based Learning (IBL) system allows employees to access training courses via an Intranet.

U.S. Government Purpose Release

iPhone®/iPad® Mobile Application for the Wallops Research Range: What's Up at Wallops GSC-16682-1

The public has a desire and an expectation to understand the purpose and relevance of NASA missions. This mobile application provides simple, intuitive, dynamic tools that offer an assortment of information to answer a variety of questions: When is the next launch? What is the purpose of it? What should I expect to see? Where should I look? How can I follow along with the countdown?

General Public Release

James Webb Space Telescope (JWST) Next-Generation Integrated Network (NGIN) GSC-14860-1

The Next-Generation Integrated Network (NGIN) is a suite of project management tools deployed on a private Web site and used by James Webb Space Telescope (JWST) project personnel worldwide. NGIN utilizes centralized databases and standardized IT management and security methods, replacing the need for standalone applications for library, configuration, and risk management.

U.S. Government Purpose Release

Johnson Space Center (JSC) Action-Tracking System (JATS) MSC-25659-1

JATS is an action-tracking tool that allows for attachments, multiple assignees, dependent and cloned actions, the export control filtering of attachments, and the delegation of responsibilities to another user. JATS utilizes “grouping” and “roles” so that the system can be tailored to fit an organization’s specific needs. Additional modules have been added to allow correspondence management/tracking and Space Station Review Board action tracking. The legal office action-tracking module can isolate legal documents from the general document repository. JATS also has a full ad hoc search and reporting capability. Reporting features allow hierarchical organizational managers to track and report on the actions of subordinates. The system uses NASA-approved authentication methods and is 508 compliant.

U.S. Government Purpose Release

Johnson Space Center (JSC) Engineering Services iOS App MSC-25458-1

This iOS mobile application highlights some of the innovative technologies developed at NASA JSC and the technical facilities and laboratories used to evaluate these technologies.

U.S. Government Purpose Release

Move Director Site (MDS) MSC-25587-1

MDS primarily tracks flight hardware moves, providing a place for training coordinators and move directors to share information.

U.S. Government Purpose Release

Multiple Activity Data Sharing (MADS) Tool MSC-25488-1

MADS is a collaboration of business support functions hosted on a centralized database system. The tool automates and records daily maintenance work, calculates metrics, tracks and studies trends, and compares and refines estimation approaches for future planning.

U.S. Government Purpose Release

NASA Aircraft Management Information System (NAMIS) MSC-24723-1

The NASA Aircraft Management Information System (NAMIS) is an enterprise resource planning/mission support software suite designed from the ground up to meet both the mission support requirements and the business management requirements of JSC’s Aircraft Operations Division (AOD). The system features tools and processes that: 1) eliminate the risk of conducting flight operations in aircraft with overdue inspections, in aircraft with grounding discrepancies, and in aircraft not properly configured for the mission; 2) provide continuous and positive control of all assets including materials, parts, and equipment that exceed a customer-defined value; and 3) reduce material costs and labor hours. NAMIS includes the data, information, and metrics required to support flight operations management and business decisions, as well as the data required by other systems and external components to support consistent and accurate financial reporting and asset accounting.

U.S. Government Purpose Release

NASA Form 1018 Electronic Submittal System (NESS) GSC-14738-1

The NASA Form 1018 Electronic Submittal System is an automated tool designed to assist in the collection, maintenance, analysis, and distribution of NASA’s industrial property information. The purpose of this Web application is to provide contractors with a method for reporting financial information related to property held in their custody.

U.S. Government Purpose Release

NASA Hazard Management System (HMS) MSC-25694-1

The Web-based, access-controlled NASA Hazard Management System (HMS) provides a centralized repository for hazards regardless of origin and offers the ability to report and manage real-time hazards and controls. The primary mechanism for identifying and documenting hazardous conditions within HMS lies in the creation and management of two types of analysis documents: Hazard Analyses (HAs) and Job Hazard Analyses (JHAs). While these two document types offer different approaches for hazard identification and classification, they both offer controls for mitigating hazards. HMS provides a framework within which HA and JHA documents are created, reviewed, and approved. Once approved, the hazardous conditions identified within a document are considered active. More important, the controls associated with the hazards are then also considered active. HMS includes the mechanisms required to evaluate hazards using standard Risk Assessment Code (RAC) scoring.

General Public Release

NASA Performance Evaluation Profile (PEP) MSC-25681-1

NASA's Performance Evaluation Profile (PEP) program provides a PC-based method for conducting standardized self-assessments of operational and system safety program processes. PEP features software applications and a modified Management Oversight and Risk Tree (MORT) logic diagram to analyze both the strengths and weaknesses of occupational and system safety programs.

General Public Release

NASA Root Cause Analysis Tool (RCAT) HQN-11316-1

The NASA Root Cause Analysis Tool (RCAT) has been designed to facilitate the analysis of anomalies, close calls, and accidents and also identify the appropriate corrective actions to prevent recurrence. The software provides an analyst with a quick, easy-to-use, accurate, and repeatable method to perform and document root cause analysis, identify corrective actions, perform trending analysis, and generate usable data for probabilistic risk assessment. All possible causes of accidents (hardware, software, the environment, weather, natural phenomena, external events, human error) can be incorporated into the timeline and fault/causal factor trees. The software features an intuitive logic diagramming capability and uses standard terminology, definitions, and symbols.

General Public Release

Next-Generation Integrated Network (NGIN), Version 2.0 GSC-17271-1

NGIN 2.0 offers a consolidated product lifecycle management system that encompasses documentation, configuration, change control, and risk management of data associated with a particular product or project, including requirements, control plans, technical review preparations and results, action items, issues, risks, drawings, work order authorizations, and photographs. The technology enables collaboration via the Internet and provides a standardized approach for managing multiple products/projects in a single repository.

U.S. Government Purpose Release

Open-Ticket Request System (OTRS) Software Improvements and Enhancements GSC-14981-1

OTRS is an open-source ticket request system (also well known as a trouble ticket or help desk system) with features to manage customer inquiries typically initiated via telephone calls and emails. The system provides IT support for the ticketing, tracking, and resolution of in-bound inquiries.

U.S. Government Purpose Release

PeopleSoft Financial Data Quality Management (FDM) Integrated Supplier Quality Management System (iQUALITY) MSC-25555-1

The iQUALITY tool integrates and standardizes supplier quality management across an enterprise.
U.S. Government Purpose Release

Performance Improvement Notice (PIN) Tool MSC-25541-1

The Performance Improvement Notice (PIN) Tool enables improvements (suggestions) to be entered and dispositioned via a programmed workflow. Each PIN is accepted or rejected with rationale. If a PIN is accepted, stakeholders are assigned by organization and then roles and responsibilities are defined so that an action plan can be approved and completed.
U.S. Government Purpose Release

Pressure Systems Reporting Tool (PSRT) MFS-32923-1

The Pressure Systems Reporting Tool (PSRT) is an application designed and implemented to support the risk-based management of pressure systems and vessels.
U.S. Release Only

Project Cost Estimating Capability (PCEC) MFS-33187-1

Used to develop cost estimates/models for space systems, this technology combines an Excel® add-in with a simple, robust, and transparent collection of NASA cost-estimating relationships (CERs), statistics, work breakdown structures, and cost-estimating algorithms. The approach's use of native Excel® functionality to provide basic calculations limits the overhead required to maintain a model and affords more visibility to the user with regard to the calculations and equations involved in generating an estimate.
Note: Export control restricted as ITAR
U.S. Release Only

Project Integrated Tracking System (PITS) MSC-25594-1

The Project Integrated Tracking System (PITS) provides for the subcontract management of costs and the tracking of estimates, contract changes, engineering changes, and contract documentation.
U.S. Government Release Purpose

Project Risk Information Management Exchange (PRIMX) GSC-14980-1

The Project Risk Information Management Exchange (PRIMX) provides a centralized source for continuous risk management (CRM) information by combining risk identification, analysis, planning, tracking, control, and communication into a single comprehensive environment that meets the requirements of NASA Procedures and Guidelines (NPG) 7120.5B and 8000.4. The software permits project personnel access to current CRM documentation, gives the status of risk activities, and identifies emerging risks that may influence the formulation development of a given project/program. PRIMX is free-standing network software (not an add-on program) that runs on any Windows® platform.
U.S. Government Purpose Release

Rapidly Deployable Software Process Simulation Model GSC-14869-1

The Rapidly Deployable Software Process Simulation Model provides a fast and cost-effective methodology for predicting project performance, assessing the costs and benefits of process alternatives, and enabling managers to make better decisions when allocating scarce project resources.
U.S. Government Purpose Release

Scenario Scheduler Timeline Execution Application Suite — GSC-16066-1

Scenario Scheduler is a Java software application that is integrated with the Goddard Mission Services Evolution Center (GMSEC) application program interface for use in Mission Operations Centers. The application stores activity lists or "scenarios" for execution in a timeline- and/or event-driven nature. The application is set up via a flat file schedule of activities to perform. Scenario Scheduler is redundant and both execution nodes work together in a prime/backup mode with automatic failover.

U.S. Government Purpose Release

Schedule Test and Assessment Tools (STAT) Suite — MFS-32602-1

The Schedule Test and Assessment Tool (STAT) Suite is a Microsoft® Project® add-in created to assist the scheduling community with the identification, measurement, and rating of key credibility indicators contained within a project or program Integrated Master Schedule (IMS).

General Public Release

Shipping Foam Designer Software — MSC-25515-1

The Shipping Foam Designer Software is an easy-to-use design tool that allows the user to select the proper type and dimensions of shock-attenuating packing foam. A simple graphical user interface is provided. The software was developed in response to a large number of documented cases of critical hardware failures that resulted from drops during shipment.

General Public

Sign Language Interpreter Scheduling System (SLISS) — GSC-14452-1

The Sign Language Interpreter Scheduling System (SLISS) provides a tool for requesting the support of sign language interpreters at NASA-sponsored events. Designated/assigned system administrators have authority to approve or deny requests for services. The system also enables a user to monitor the availability of interpreters.

U.S. Government Purpose Release

Space Operations Learning Center (SOLC) — GSC-16063-1

The Space Operations Learning Center (SOLC) is a highly graphical Web-based learning environment that employs analytical and visualization tools to develop its contents. Currently five SOLC modules have been developed: Space Communication, Flight Dynamics, Information Processing, Mission Operations, and Kids Zone. Each of the first four modules contains three components: Flight Training is a sequence of animation clips combined with text and narration to present learning material at an appropriate age level; Flight License is a short quiz to test and reinforce the knowledge gained from Flight Training; and the Fly It! simulation program allows students to perform a hands-on flight assignment. Kids Zone, which has been designed for younger students, consists of multiple mini-modules. For more information, please visit: http://solc.gsfc.nasa.gov

U.S. Government Purpose Release

Space Telescope Grants Management System — GSC-14740-1

The Space Telescope Grants Management System (STGMS) is an integrated software package that allows the Space Telescope Science Institute (STScI) to electronically administer grants related to the Hubble Space Telescope; the tool also gives grantee institutions and investigators simultaneous electronic access to information and documents connected to those same grants. The flexible, multiplatform system reduces the cost of administering Hubble General Observer (GO), Archival Researcher (AR), Educational Outreach (EO), Initiative to Develop Education through Astronomy and Space Science (IDEAS), and Hubble Fellow (HF) grants.

U.S. Government Purpose Release

Spinoff 2015 iPad® App — GSC-17366-1

This tool is an iPad® version of the Spinoff 2015 publication, featuring multimedia items and shortened versions of Spinoff articles.
General Public Release

Stennis Space Center (SSC) Site Status Mobile Application — SSC-00424

This application provides SSC civil servants, contractors, and tenants the ability to view the Center's weather radar and current site status bulletin from a mobile device. The application also alerts users via push notification when a new site status is posted. The technology is available at the Apple App Store.
General Public Release

Supervisory Survey: Supervisory Feedback Tool — GSC-15534-1

This application consists of an online survey that collects feedback from employees regarding their supervisors. Employees can anonymously review their immediate supervisor, a supervisor above their own immediate supervisor, or a matrixed supervisor. Feedback topic questions cover human resource management, communication, diversity and equal opportunity, and teamwork. The reports function allows supervisors to compare current feedback to feedback from previous surveys.
U.S. Government Purpose Release

Survey Editor and Player Software — GSC-15070-1

The Survey Editor and Player Software provides an automatic way to obtain survey information from stand-alone kiosks in museums, schools, and other public venues. The software can play on multiple machines without the need for individual Macromedia projector licenses for each machine; the Micromedia source code is not released. Survey Editor requires the user to install QuickTime® 6 (available from Apple.com).
U.S. Government Purpose Release

Systems Engineering Education and Development (SEED) Web Application — GSC-17057-1

This technology is a Web-based management application used for the Systems Engineering Education and Development (SEED) program, which is sponsored by the Applied Engineering and Technology Directorate's (AETD's) Systems Engineering Services and Advanced Concepts Branch at Goddard Space Flight Center (GFSC). The program enables the SEED program manager to track and manage the applications and assignments of entry-level systems engineers.
U.S. Government Purpose Release

Task Order Management System (TOMS) — GSC-14702-1

A cost-effective e-Business solution, the Task Order Management System (TOMS) allows for the paperless processing and tracking of virtually any type of government task order contract. The tool provides a standardized user interface into a centralized task order database. TOMS will track a task order from its initiation, through the approval cycle, and out to the vendor and back. The approval cycle function works through email notifications and can be tailored easily to meet the needs of any organization. Completely Web-based, TOMS allows for real-time access and will provide an up-to-the-minute status of each task order.
U.S. Government Purpose Release

Taxonomy Services for Google Search Appliance — MSC-25406-1

This technology allows a user to inject taxonomy metadata into the Google Search Appliance and utilize it.
U.S. Government Purpose Release

TicTacToe Editor and Player Software — GSC-15071-1

An educational knowledge competition game, TicTacToe is a compiled, multiplatform Macromedia projector that is a standalone tool. The software can play on multiple machines without the need for individual Macromedia projector licenses for each machine; the Micromedia source code is not released. TicTacToe requires the user to install QuickTime® 6 (available from Apple.com).
U.S. Government Purpose Release

Tool to Facilitate Capability Maturity Model Integration (CMMI) Appraisals — GSC-14782-1

In addition to providing Capability Maturity Model Integration (CMMI) orientation for the development team, this facilitation tool can reduce the time and energy expended in preparation, collaboration, and execution of CMMI appraisals. The software helps an organization to achieve the appropriate levels of CMMI necessary to reduce costs and keep missions on track.
U.S. Government Purpose Release

Transition and Retirement Information Technology System Tracking Tool (TRIT) — MSC-25470-1

The TRIT system allows for the tracking of IT assets and offers custom disposition applications.
U.S. Government Purpose Release

Virtual System Design Environment (VSDE) Portal Framework — GSC-14724-1

The Virtual System Design Environment (VSDE) system is a Web-based portal framework that offers a knowledge repository and a collaborative environment to serve science and engineering teams with product development throughout a product's lifecycle. The VSDE framework generates a one-stop shop for product design, providing users real-time access to product development data, engineering and management tools, and relevant design specifications and resources.
U.S. Government Purpose Release

Visual Observation Layout Tool (VOLT) — GSC-14510-1

VOLT's visual tools help to automate and plan for coordinated observations among multiple observatories, including the Hubble Space Telescope (HST), the Chandra X-Ray Observatory (Chandra or AXAF), the X-Ray Timing Explorer (XTE), and the Far-Ultraviolet Spectroscopic Explorer (FUSE). Primary users of the software would be scientific observers and investigators and their planning staffs. VOLT's planning coordination tools run in a standalone environment, but they are also capable of operating in an integrated environment (e.g., in the Scientist's Expert Assistant (SEA) or in the Astronomer's Proposal Tool (APT)).
General Public Release

Web-Based Help Management System — GSC-14998-1

Easily deployable, the Web-Based Help Management System provides a simple and effective way of adding extra functionality to a Web site. The system allows non-programmer users to locate "help" using a variety of methods and also permits administrators to easily customize and manage help applications.
U.S. Government Purpose Release

What's Up at Wallops (Android® App) — GSC-16683-1

What's Up at Wallops enables individuals to experience launches and flight projects as spectators. This mobile application provides simple, intuitive, dynamic tools that help to answer such questions as: When is the next launch? What is its purpose? What can I expect to see? Where should I look? How can I follow along with the countdown? For more information, visit: https://play.google.com/store/apps/details?id=gov.nasa.wff.whatsupatwallops&hl=en
General Public Release

2

data servers processing and handling

Algorithms

Data Management

Routers

Servers

Storage

ADROIT Tool for Wirelessly Distributing Multimedia Data to Remote Devices — MSC-24152-1

ADROIT is an innovative software solution that allows complex real-time multimedia data streams to be viewed as information on remote devices. The middleware solution permits access to data at any time using XML and wireless transmissions to Web-enabled handheld devices (e.g., personal data assistants, laptops, netbooks, and smart phones). Because it decreases the number of personnel required to be in a control center, ADROIT reduces operations costs.

U.S. Government Purpose Release

Analog Input Data Acquisition Software — KSC-13203

With the easy-to-use Analog Input Data Acquisition Software, a user can set up a system for monitoring up to five analog input channels. The software requires LabVIEW runtime engine 8.0 (a free download from ni.com) to run the executable.

U.S. Release Only

Application Program Interface (API) for the Orion Aerodynamics Database (Cap Aero) — MSC-24819-1

Programmed in C, CAP Aero was developed to provide software developers an easily implemented, fully self-contained method for accessing the Crew Exploration Vehicle's Aerodynamic Database. No special functions (file read/write, table lookup, etc.) are required on the host system other than those included with a standard ANSI C installation. CAP Aero reads files of aero-data tables formatted as specified in the document, "Aerotab Data File Format." The aerodynamic coefficients and forces calculated by the program follow the equations cited in the document, "Formulation of the Orion Aerodynamic Database."

U.S. Government Purpose Release

Application Research Toolbox (ART) — SSC-00181

Application Research Toolbox (ART) algorithms and models allow a user to perform a suite of simulations and statistical trade studies on remote sensing systems. ART can synthesize coarser spatial resolution image sets from high spatial resolution image sets and can also synthesize multispectral image products from hyperspectral image products.

General Public Release

Athena Software Platform — MFS-33036-1

The Athena platform is designed to be a single-point source for acquiring, assessing, archiving, and disseminating scientific and technical information. The platform ensures successful performance, increases safety, and saves resources.

U.S. Government Purpose Release

Ballast: Balancing Load Across Systems — ARC-16443-1

Ballast is a tool for balancing user load across Secure Shell Handler (SSH) servers. The system includes a load-balancing client, a lightweight data server, scripts for collecting system load, and scripts for analyzing user behavior. Because Ballast is invoked as part of the SSH login process, it has access to user names. This capability, which is not available in traditional approaches, enables Ballast to perform user-specific load balancing. In addition, Ballast is easy to install, induces near-zero overhead, and has fault-tolerant features in its architectures that will eliminate single points of failure. Download the software at: http://people.nas.nasa.gov/~kolano/projects/ballast.html

Open Source

BugView — ARC-16790-1

Bugview is a Web-based graphical user interface (GUI) service that provides software developers and analysts the ability to configure and execute off-the-shelf static code analysis tools and securely manage imported code releases and analysis results. The service: 1) presents a single interface from which multiple static code analysis tools can be configured and executed; 2) offers a means to automate consistent periodic analysis of each code release; 3) affords the capability to track code changes and identified code issues through progressive build releases: and 4) provides tools for identifying and rejecting false-positive results.

Open Source

Bundle Protocol Software Library, Version 1.0 — GSC-16816-1

The Bundle Protocol (BP), a key piece of the planned Interplanetary Internet, is an international standard produced by the Consultative Committee for Space Data Standards (CCSDS). Basically, BP is given bundles to deliver, and it delivers them to their specified destination using the appropriate route. For example, the route might be from a Mars Rover to a Mars Orbiter to a ground station on Earth to a mission control center. For each hop along the way, BP asks for assistance from the appropriate lower- level protocol. Generally, the lower-level protocol is responsible for providing reliable delivery across one hop, while BP manages the bigger picture (i.e., getting bundles across all the required hops). The Bundle Protocol Software Library implements the Bundle Protocol using a software architecture that is simple and fast enough to be attractive to Goddard mission designers. It has been developed for the Laser Communication Relay Demonstration (LCRD) mission and the Disruption Tolerant Network (DTN) group. The library is useful for any organization (commercial or otherwise) interested in being a part of the Interplanetary Internet.

U.S. Government Purpose Release

C3 — ARC-16731-1

Built in Python/Django and very customizable, C3 acts as a platform through which one can easily launch collaborative Web sites. Plug-ins can be enabled to extend functionality.

U.S. Government Purpose Release

CAPTools-based Automatic Parallelizer Using OpenMP (CAPO) — ARC-14487-1

CAPO analyzes a Fortran program and inserts OpenMP directives into the code to improve its performance on a parallel machine. The tool relies on accurate inter-procedural data-dependence information currently provided by CAPTools, which was developed at the University of Greenwich.

Download the software at: http://people.nas.nasa.gov/~hjin/CAPO/

Open Source

Clickworkers: Distributed Human Scientific Analysis — ARC-15318-1

The Clickworkers system consists of a Web server and client-side scripts that execute on a browser. The technology allows thousands of distributed volunteer participants ("clickworkers") to create a science database by visually examining an image, classifying its features (e.g., craters), and/or measuring its properties (e.g., size, location, etc.). Each clickworker is presented with a small piece of a problem at one time (e.g., a single image or a small subset of a map). A consensus may be computed by clustering the responses of multiple clickworkers who have analyzed the same piece of a problem; the consensus can be weighted based on the quality of an individual clickworker's previous work.

U.S. and Foreign Release (Academic)

Code for Embedding the Python-Scripting Language Within Stata Statistical Software — MSC-25491-1

This code facilitates the usage of the Python scripting language within Stata statistical software. Its core functionality comes from a C plug-in to Stata that can be used to run Python scripts or interactive Python sessions. A few Python files and .ado files (files in Stata's scripting language) are provided for extending basic functionality.

U.S. Government Purpose Release

Code for Testing User-Written Commands in Stata Statistical Software — MSC-25670-1

This NASA-developed tool helps users of Stata statistical software test their own Stata code. Two different programs make testing Stata commands easier, faster, and more reliable.
U.S. Government Purpose Release

Code for Working with .dta Format Files in the Python Programming Language — MSC-25658-1

This NASA code helps users work with and manipulate .dta format files in the Python programming language.
U.S. Government Purpose Release

CODE: A Software Framework for Control and Observation In Distributed Environments — ARC-14672-1

CODE is a framework for the control and observation of resources, services, and applications. The technology supports the secure and scalable transmission of observed information to other programs, and it enables the secure execution of actions on remote computer systems. Download the software at: http://www.nas.nasa.gov/Resources/Software/Open-Source/code.html
Open Source

Computational Fluid Dynamics (CFD) Extraction Tool for TecPlot from Data Parallel Line Relaxations (DPLR) Solutions — MSC-24982-1

This innovation is a TecPlot macro computer program that processes data from Data Parallel Line Relaxations (DPLR) solutions in TecPlot format. The tool converts SI units into British units. The macro can also process surface solutions.
U.S. Government Purpose Release

Coordinated Data Analysis Workshop Web (CDAWeb) — GSC-14292-1

The CDAWeb software and the CDAWeb service built on this software have been developed and continue to be enhanced and maintained by the Space Physics Data Facility. The technology has supported NASA/Office of Space Science programs dealing with the connections between the Sun and the Earth. CDAWeb software is essentially a set of Interactive Data Language (IDL) scripts that act as the engine of the system. Please visit: http://cdaweb.gsfc.nasa.gov/cdaweb/istp_public/
Open Source

CriticalThreads: A Low-Level Parallelization Architecture for Critical Applications — MSC-25719-1

CriticalThreads is a multi-threading architecture library utilizing POSIX threads. The technology distributes parallel sections of code to multiple critical-application CPUs. CriticalThreads trades some of the smart task-scheduling and resource friendliness of OpenMP and Intel's Thread Building Blocks (TBB) in order to achieve the smallest parallelization overhead possible.
U.S. Government Purpose Release

Data Access Toolkit (DAT), Release 1.0 — GSC-17291-1

DAT is a software application that performs trending, archiving, and data management functions (1) to analyze the performance of the observatory through state of health monitoring using all collected housekeeping data and (2) to manage the storage and distribution of all mission data files.
U.S. Government Purpose Release

Distributed System Integrated Labs Communications Adapter (DSILCA) — GSC-15846-1

Providing interoperability between Constellation systems at the hardline and baseband external interfaces, DSILCA is a communications adapter that converts non-C3I-compliant data and interfaces into C3I-compliant data and interfaces.
U.S. Government Purpose Release

Distributed System Integrated Labs Communications Adapter Set (DSIL CAS) GSC-15501-1

DSIL CAS affords Constellation's Distributed System Integration Laboratories the ability to connect geographically separated labs. The tool provides interface conversions from subscriber identification modules (SIMs) and offers a command, control, communications, and intelligence (C3I) compatibility test bed.
U.S. Government Purpose Release

Distributed System Integrated Labs Interface User (DSILIU) GSC-15847-1

DSILIU provides interface conversion to Ethernet to allow nationwide connectivity over the NASA Integrated Services Network (NISN) or other high-bandwidth interagency network.
U.S. Government Purpose Release

Domain Name System (DNS) Graphical User Interface (GUI) Software MSC-25624-1

Combining a client graphical user interface with a server process, this NASA software provides the capability for updating a system's DNS settings from an operator's console.
U.S. Government Purpose Release

Dyper: Dynamic Perimeter Enforcement ARC-16444-1

Dyper protects a site from unauthorized network flows. The tool offers dynamic perimeter enforcement by providing a general-purpose mechanism for maintaining least-privilege network security policies while still supporting the full utilization of multiport protocols. Dyper requires no changes to software or practices outside of the perimeter and only minimal changes inside. Download the software at: http://people.nas.nasa.gov/~kolano/projects/dyper.html
Open Source

Earth Observing System (EOS) Clearing House (ECHO) GSC-14726-1

The Earth Observing System Clearing House (ECHO) affords the Earth science community more flexibility in accessing and sharing data and services. As a metadata clearinghouse, ECHO supports iterative query data access. As a service broker, ECHO decentralizes data-manipulation tools and supports the interoperability of distributed functions. For more information, please visit: http://ti.arc.nasa.gov/opensource/projects/echo/
Open Source

Earth Observing System (EOS) Data Gateway (EDG) GSC-14938-1

The Earth Observing System Data Gateway (EDG) provides the Earth science community with a single interface that will search for data granules from distributed data archives. The innovation enables users to explore, discover, and order available data from geographically distributed providers. For more information, please visit: http://opensource.gsfc.nasa.gov/projects/edg/index.php#software
Open Source

ECS Metadata Validator GSC-15018-1

The ECS tool validates an XML document based on the Bulk Metadata Generator Tool (BMGT) granule or collection schema. The software will generate reports that list all invalid elements.
U.S. Government Purpose Release

EEPROM File System (EEFS) GSC-16852-1

EEFS provides a file system abstraction for EEPROM or PROM memories that is simple, efficient, and reliable. EEFS can be used for embedded systems that require a file tool to access data from EEPROM, PROM, or RAM memory when the resources to deploy a full file system (such as the MSDOS) are not available. The technology can also be used in systems requiring the ability to dump, patch, and diagnose files. Download the software at: http://opensource.gsfc.nasa.gov/projects/eefs/index.php
Open Source

Engineering DOUG Graphics for Exploration (EDGE) MSC-24663-1

EDGE is a real-time 3D graphics-rendering package based on the Dynamic On-board Ubiquitous Graphics (DOUG) graphics engine. It combines key elements from graphics software tools developed for space shuttle and International Space Station (ISS) programs and adapts them for integration with other engineering simulations and facilities. The tool allows drop-in integration with the NASA Trick Simulation Environment and provides a fusion of 3D graphics and simulation outputs.
General Public Release

Engineering Units Generator (EUGEN) SSC-00151-1

EUGEN consists of three computer programs that preprocess digitized sensor output during rocket-engine tests at Stennis Space Center (SSC). The technology creates individual processed data files (one file per transducer per test run), converting raw voltage to meaningful measurements such as pressure or temperature.
General Public Release

File Exchange Interface (FEI 5) JPL-40075

The File Exchange Interface (FEI) service offers secure file transaction, storage, transportation, and management services. The tool is implemented with the latest Java technologies for maximum portability and supports a 64-bit file system for very large file transfers over secure socket connections. While database-driven for file transactions and user access management, FEI offers an interactive client software suite for managing administration and general use.
U.S. Government Purpose Release (Project)

Fortran Unit Testing Framework (fUnit), Version 1.0 LAR-17081-1

The fUnit software provides a framework for unit-testing Fortran 90, 95, and 2003 code.
Open Source

GRAVITE Investor-led Processing System (IPS) GSC-17261-1

GRAVITE [Government Resources for Algorithm Verification, Independent Testing, and Evaluation] IPS is a core GRAVITE component for ingesting, archiving, distributing, and processing. Ingest/archive denotes the ability to receive data from sources that are then validated and verified for long-term archiving. Distribution is the ability to supply data to stakeholders. Processing denotes the ability to routinely examine data by automatically running a set of specified algorithms for each instrument.
U.S. Government Purpose Release

HDF-EOS2 and HDF-EOS5 Compatibility Library GSC-15008-1

This software library provides uniform access to HDF-EOS2 and HDF-EOS5 files through one set of application program interface (API) calls. Without the library, programs would have to be written twice to cover both HDF-EOS2 and HDF-EOS5 files. Please visit: http://opensource.gsfc.nasa.gov/projects/HDF-EOS2/index.php
Open Source

HDF-EOS5 Validator GSC-15015-1

This software allows generators of HDF-EOS data products to encode product requirement specifications in XML. The tool will then mechanically check product files against those requirements. For more information, please visit: http://opensource.gsfc.nasa.gov/projects/Validator/index.php
Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Metadata Updater (HEMU) GSC-15010-1

HDF-EOS Metadata Updater (HEMU) enables users to modify metadata inside an HDF-EOS file (either HDF-EOS2 and HDF-EOS5). The tool can be used to extract metadata from a dataset to a text file that can then be modified with any text editor; replace metadata with text from an external file; or update metadata with text from an external file. For more information, please visit: http://opensource.gsfc.nasa.gov/projects/hemu/index.php

Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Web Server GSC-15011-1

This shell script chains together existing data usability group tools to: extract ODL metadata from an HDF-EOS file; convert the metadata to XML; reformat the XML into HTML; publish the HTML and the original HDF-EOS file to a Web server and an OPeNDAP server; and reformat the XML and submit it to the Earth Observing System Clearing House (ECHO). For more information, please visit: http://opensource.gsfc.nasa.gov/projects/heserve/index.php

Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) XML Document-Type Definitions and Schemas GSC-15016-1

An XML standard has been developed for the HDF-EOS5 file format using document-type definitions and schemas. Users can transform HDF5 files into XML format and vice versa. For more information, please visit: http://opensource.gsfc.nasa.gov/projects/XML_DTD_Schemas/index.php

Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Data Extractor (HEEX) GSC-15009-1

The Hierarchical Data Format Earth Observing System (HDF-EOS) Data Extractor (HEEX) is a tool that enables users to extract HDF-EOS data to binary or ASCII data formats in HTML or XML index. The software can be used for both HDF-EOS2 and HDF-EOS5, and it automatically recognizes the two formats.

Open Source

Identity Management Service for SensorWebs GSC-16268-1

The Identity Management Service allows users to delegate their authority for executing workflows. The tool creates a single sign-on script that enables the execution of multiple actions in different domains, thereby linking various sensors and their data processing together in a cohesive manner while traversing secure boundaries.

U.S. Government Purpose Release

IND 2.1: Creation and Manipulation of Decision Trees from Data ARC-14529-1

Decision trees are commonly used in artificial intelligence and statistical pattern recognition. A tree is “grown” from data using a recursive-partitioning algorithm. IND re-implements parts of existing standard prediction algorithms, offers experimental control suites, and also introduces new, more sophisticated methods for growing decision trees. Download the software at: http://ti.arc.nasa.gov/opensource/projects/ind/

Open Source

Information Sharing Protocol Logger (ISPLOGR) MSC-25610-1

Written in C, this software program provides the capability of recording Information Sharing Protocol (ISP) data into a Source Independent Telemetry Format (SITF) file. ISPLOGR uses command-line arguments to specify output file names and other required parameters. Once the SITF file is defined, it can be used as input to other available ISP software for data playback.

U.S. Government Purpose Release

Information Sharing Protocol VCR (ISPVCR) MSC-25608-1

Written in Tcl/tk, the ISPVCR software program provides the capability to record and play back Information Sharing Protocol (ISP) data via Source Independent Telemetry Format (SITF) files. A graphical user interface starts and stops recording and playback and also specifies output file names.
U.S. Government Purpose Release

Innovative eXtensible Information Modeler (XIM) for Data Modeling MSC-24575-1

This flexible Web service application facilitates data modeling in business cases in which requirements are incomplete or are constantly evolving. Key elements of the software include: a schema-less database for modeling flexibility, a core service-layer architecture for business rule and database encapsulation; an XIM application library; a custom model-view controller framework; and a Flex & Reg software development tool. Since the XIM core is domain-independent, each application is an embodiment of XIM with its own business rules and additions to the core service layer.
U.S. Government Purpose Release

Interactive Graphical SCADA System (IGSS) XML Adaptor for the James Webb Space Telescope (JWST) GSC-15422-1

Built for the James Webb Space Telescope (JWST), this adaptor is a major component of the Interactive Graphical SCADA System (IGSS). The technology allows a database to be translated from XML into a variety of output products, including other XML files, ASCII files, and both HTML and/or Microsoft® Access® formats.
U.S. Government Purpose Release

Interface Software for Nivis ISA100.11a Gateway MSC-25409-1

This software implements an interface with the Nivis ISA100.11a gateway using the ISA100.11a Gateway Service Access Point (GSAP).
U.S. Government Purpose Release

Jitter Controller Software MSC-24814-1

Developed for the Constellation program, Jitter Controller Software helps manage the relationships between phase jitter crest factor, frequency jitter crest factor, and cycle-to-cycle crest factor. Written in LabVIEW, the code calls Agilent drivers to write to generator hardware. Although not well documented and originally intended to be disposable, the software has been reused.
U.S. Government Purpose Release

Kameleon Software Suite: the Kameleon Converter GSC-15440-1

Developed at the Community Coordinated Modeling Center (CCMC), the Kameleon Software Suite addresses the difficulty in analyzing and disseminating the varying output formats of space weather model data. Employing a comprehensive standardization methodology, Kameleon allows heterogeneous model output to be stored uniformly in a common science data format. The converted files contain both the original model output as well as additional metadata elements to create platform-independent and self-descriptive data files. Kameleon facilitates model data dissemination, data reuse, and code reuse.
U.S. Government Purpose Release

LACE Task Manager (LTM) GSC-15154-1

LTM is a simple scheduler for commodity computing clusters. The software will also retain information about the number of jobs being submitted and how long a user must wait in a queue.
U.S. Government Purpose Release

Mercury Shopping Cart Interface (MSCI) GSC-14940-1

MSCI affords access to a wide variety of interface components for the Earth Observing System Data and Information System Clearing House (ECHO). The tools are being made available for re-use in other client development efforts.

U.S. Government Purpose Release

Metadata Check GSC-15012-1

Metadata Check is a command-line tool to check Earth Observing System (EOS) metadata with a metadata descriptor. For more information, please visit: http://opensource.gsfc.nasa.gov/projects/metacheck/index.php

Open Source

Method and Program Code for Improving Machine Efficiency in the Computation of Nearly Singular Integrals MSC-25640-1

This innovation provides a method for improving machine efficiency in the computation of nearly singular integrals. The code has been applied to computational electromagnetics (CEM) problems and could have application to a variety of computational modeling disciplines.

U.S. Government Purpose Release

mREST Interface Specification and Software Package MSC-25721-1

REST, or Representational State Transfer, is a term used to describe an architectural style for networked systems. mREST is an implementation of the REST architecture specific to the management and sharing of data in a system of logical system elements (LSEs). (An LSE is any definable object that provides data and can include either hardware or software components.) mREST provides a standard framework so that a system of disparate LSEs can be integrated easily to accomplish the goals of a complete system.

U.S. Government Purpose Release

Multi-threaded Copy Program (MCP) ARC-16494-1

MCP is a high-performance file copy utility that achieves performance gains through parallelization. Multiple files and parts of single files are processed in parallel using multiple threads on multiple processors. The program employs the OpenMP and MPI programming models. Download the software at: http://mutil.sourceforge.net

Open Source

NASA Technology Transfer System (NTTS) Search and Reporting Application Programming Interface ARC-16697-1

The NASA Technology Transfer System (NTTS) Search and Reporting application programming interface (API) uses various logical operators to query well-structured Extensible Markup Language (XML) data. The algorithm is capable of providing search results maintaining one-to-many relationships, and it will perform set operations that include Union, Intersection, and Difference. Output can be retrieved in XML or comma-separated value (CSV) format. The interface will provide content search criteria within a context or scope, dynamically interpret operations based on data type, and perform set operations in combination with logical operations.

U.S. Government Purpose Release

NASA UNIX Tool Kit — KSC-12269

The NASA UNIX Tool Kit contains three components that all work together to form a single technology for UNIX administration: (1) Secure, Web-Based UNIX System Administration Tools (KSC-12269) ease the administration of a large, distributed UNIX system, providing a secure mechanism for creating, modifying, locking, and deleting users. (2) The second component of the software kit is the Client/Server to Create, Modify, and Query VERITAS File System Quotas on an NFS-Mounted File System with a Secure Web-Based Interface (KSC-12268). In this technology, the client (which exists on an internal secure platform with a secure interface) can be accessed from any authorized platform capable of running a Web browser. The server software exists on a UNIX platform configured with the VERITAS file system. (3) The Web-Based IP Address Tool (KSC-12271) provides an easy-to-use system for maintaining IP address information for a network of computers.

U.S. Release Only

Netmark eXtensible DataBase, Data Access and Retrieval Composition (XDB3-DARC) — ARC-16119-1B

This innovation will query using a suite of operators in the Netmark/XDB query language to retrieve elements based on the absolute value of tags in the XML source. In an earlier version of the software, element retrieval was based solely on "full-text" term searches of the tags and their values. Download the software at: https://sourceforge.net/projects/darcxdb3/

Open Source

Nivis ISA100.11a Radio Driver Software for TI Microcontroller — MSC-25408-1

Through a serial peripheral interface (SPI) port, this software allows a microcontroller to interact with a Nivis VN210 radio running an ISA100.11a stack.

U.S. Government Purpose Release

Open GeoSocial Consumer Application — GSC-17162-1

This software interface provides a social and collaborative environment to allow end-users (such as GEOSS users) to discover, visualize, and access Earth science information on demand from simple browsers and share the resulting products with their friends and/or community of interest through social networks. Download the software at: http://opensource.gsfc.nasa.gov/projects/gsca/index.php

Open Source

Performance Logging Services (PLS) — KSC-12343

Working in real time and using very little memory and CPU, Performance Logging Services (PLS) is an innovative software-performance monitoring tool that tracks statistics on timing and buffer usage. To assist in troubleshooting, PLS will start or stop other software tools when performance requirements are out of specification. The technology has been used in the Checkout and Launch Control System on NASA's Space Shuttle Program.

U.S. Release Only

Power User Interface (PUI) — GSC-14939-1

Developed in response to the unique needs of the Earth science community, the Power User Interface (PUI) provides a quick, concise, streamlined mode for users to order data granules. Two versions of PUI are available: one is a Web-based middleware application and the other is a UNIX command-line mode client. Both implementations utilize PUI modules to perform order functions in conjunction with external systems. The command-line approach works with Earth Observing System Clearing House (ECHO) metadata and order-entry process services. The Web-based middleware works with ECHO as well as with the Mercury Shopping Cart, an open-source order-service component provided separately by the Oak Ridge National Laboratory (ORNL) through the Department of Energy (DOE).

U.S. Government Purpose Release

RAYGUN: A fast Generic Geometry Ray-Casting Tool — MSC-25668-1

RAYGUN performs a time-optimized ray cast against a generic geometry definition. A standalone utility, the tool includes a development library that can be used in other programs.
U.S. Government Purpose Release

Regional Application Center Software (RODIN) — GSC-14368-1

The RODIN software can be used for end-to-end earth science imagery and spatial data capture, processing, storage, indexing, search, retrieval, and delivery. The system is scalable and extensible due to its agent-based message-passing architecture.
U.S. Government Purpose Release

Remote Memory Access Protocol Target Node — GSC-16467-1

This NASA technology provides SpaceWire design users with support for executing remote memory access protocol (RMAP) read and write commands. The target IP core is a VHDL description suitable for implementation in a field-programmable gate array (FPGA) or an application-specific integrated circuit (ASIC).
U.S. Government Purpose Release

Rocket Plume Spectroscopy Simulation for Hydrocarbon-Fueled Rocket Engines — SSC-00281

Enhancements and modifications to a code developed for plume spectral data analysis in 1994 have made the original computer program applicable to the space shuttle main engine and the Diagnostic Test-bed Facility Thruster (DTFT). The new code can now handle the non-uniform wavelength intervals at which spectral computations are made.
U.S. Government Purpose Release

Semantic Text Mining and Annotation for Information Extraction and Trend Analysis Tool (STAT) — MSC-24614-1

The Semantic Trend Analysis Tool uses linguistic analysis software and an ontology to extract new dimensions in data records that contain natural language text fields. Text fields in problem report data records (e.g., discrepancy reports, problem reports, corrective-action reports, and software change reports) might contain information that is critical to finding trends and groupings of recurring problems. STAT overcomes problems with scoping by linking up meaningful phrases that could be separated by text (e.g., “not aligned” versus “not completely aligned”). STAT’s use of hierarchical ontologies overcomes the limitations of data codes, which are flat, closed, and have small sets of values that are often difficult to interpret. The ontology organizes aerospace terminology in hierarchies of types of problems, properties, objects, and functions. The tool identifies and tags types of problems and equipment mentioned in text fields, thereby providing new data files for record keeping. These new data files support text mining and clustering, report generation, browsing, and search at various levels of abstraction.
U.S. Release Only

Shared Memory Framework for Distributed Processing of Models and Simulation on a Linux Host with Virtual Machines — MFS-32970-1

This NASA innovation implements distributed model processes with shared memory data exchange across virtually hosted operating systems.
U.S. Release Only

Simple Subset Wizard — GSC-16375-1

The Simple Subset Wizard (SSW) makes searching for granules easier. The tool unites the search function with various subsetters to deliver a single, simple, seamless process. SSW uses OpenSearch to query the Earth Observing System Clearing House (ECHO) for granules and then employs individual subset agents to submit requests.

U.S. Government Purpose Release

Simple, Scalable, Script-based Science Processing Archive (S4PA) — GSC-15877-1

Simple, Scalable, Script-based, Science Processing (S4P) Archive (S4PA) is a disk-based archiving system for remote sensing data. The tool can be used for new data transfer, data preprocessing, metadata generation, and data archival. Services provided include data access control, data subscription, metadata publication, and data recovery. All data are archived on readily available disk drives, with FTP and HTTP being the primary modes of data access. S4PA includes a graphical user interface for monitoring and reconfiguring system operation. Please visit: http://disc.sci.gsfc.nasa.gov/additional/techlab/s4pa

Open Source

Software Suite to Support In-Flight Characterization of Remote Sensing Systems — SSC-00393

This software suite processes ground truth data sets efficiently and consistently so that they may be used for in-flight characterizations on a number of commercial remote sensing systems.

General Public Release

SpF: A Software Framework for Pseudospectral Numerical Simulation at Extreme Scales — GSC-16918-1

Applications based upon pseudospectral algorithms share many characteristics and common challenges to developers pushing the limits of high performance computing. Each investigation team generally tackles these challenges independently and reaches various plateaus of performance that are well below those that are theoretically and demonstrably achievable. At the same time, pseudospectral algorithms have many unique characteristics that limit the applicability/efficacy of many software frameworks used by the high performance computing community. Such characteristics include “transposes” (large redistributions of data across an entire computing platform), nontrivial computational domains (e.g. spherical harmonic modes), little or no nearest-neighbor communication, and high computational intensity (DGEMM, FFT, etc). The goals of SpF (Spectral Framework) are to: (1) reduce complexity and duplication of effort across multiple investigation teams, (2) achieve near optimal scalability on existing computing architectures, (3) provide automation for domain decomposition and load balancing that circumvent hardwired constraints in existing applications, (4) provide automated and optimized global data “transpososes” that dominate compute time for large problems, (5) provide access to optimized numerical libraries including libraries implemented on hardware accelerators, and (6) provide a flexible/optimized input/output layer.

U.S. Government Purpose Release

STAMiNA — JPL-45213

Utilizing STAMiNA, a simulation tool for the Advanced Sensors Collaborative Technology Alliance Microsensor Network Architecture, users can define: (1) mission environment, including terrain features; (2) a sensed object set, including multiple threat objects; (3) sensor placements, their modalities, and their abilities to sense different object types; (4) threat object trajectories; (5) sensing and sensed data dissemination for information fusion; and (6) various network configurations and formations between sensors to examine the coupling of sensing and communication. With these features, STAMiNA provides an overall system-level performance of different sensor network architectures under different parametric conditions.

U.S. Government Purpose Release

Standard Autonomous File Server (SAFS) GSC-14409-1

SAFS automatically manages the large data files that are the result of mission-specific data functions. The tool also permits timely customer access to these files without interfering with the assets involved in data acquisition and processing. SAFS operates as a standalone solution, monitoring itself and providing fail-over processing to enhance reliability. When multiple projects overlap, the system prioritizes file transfers by bandwidth sharing or transfer-interruption methods. Automated Web reporting offers a near-real-time status of system availability, file latency, and customer file distribution.
U.S. Government Purpose Release

State Chart Autocoder JPL-47810

This NASA technology automatically generates code from UML/SysML state-machine models specified in the MagicDraw modeling tool. Input is saved as XML data files, and output is provided by the state-machine implementation code in C, C++, Python, or Promela. A test suite validates output products, and a test harness allows a developer to execute and animate a model with a graphical state-machine monitor. This monitor can run as either a standalone tool or as an Eclipse plug-in to MagicDraw.
U.S. Government Purpose Release

Storeplex, Version 1.0 SSC-00156-1

Storeplex provides quick, reliable data extraction from tape recorders. The technology offers batch-file operation, employs either a command-line or graphical user interface, and affords the ability to control play-back time to within one-hundredth of a second of the time specified by the user.
General Public Release

Synchronization, Archival, Validation, and IP Exchange (Save) ARC-16445-1

Save is a high-availability framework that manages IP addresses shared between multiple servers. It also monitors the health of those servers to determine which one should be actively servicing requests at any given time. Synchronization mechanisms allow configuration files to be kept consistent between systems and also allow commands to be executed across all servers of a particular type. Archival mechanisms provide automatic version control of configuration files to aid in recovery in case of errant configuration. Download the software at: http://people.nas.nasa.gov/~kolano/projects/save.html
Open Source

Synchronous Communications Bus 1553 GSC-16265-1

This application programming interface acts as a synchronous communications mechanism to pass data, allowing both sides of a transaction to communicate over the bus.
U.S. Government Purpose Release

System for Authoring and Integrating Domain Models Plans and Procedures MSC-25669-1

This software framework enables subject matter experts to develop their own domain models interactively. The technology provides interfaces to external Web sources, and it includes ontological reasoners that keep model data consistent internally. Output files, written in the Web Ontology Language (OWL), are readable by planner and procedure executive computer applications.
U.S. Government Purpose Release

Time Series Product Tool (TSPT) SSC-00261

Developed in MATLAB, this custom-designed software tool creates and displays superior quality Normalized Difference Vegetation Index (NDVI) images that can be used in the rapid regional surveillance of crops, forests, and other vegetative surfaces.
U.S. Government Purpose Release

Unified Incident Command and Decision Support (UICDS) GSC-15756-1

For the National Information Sharing System (NIMS) and the National Response Framework (NRF), UICDS middleware offers file sharing and decision support among the many commercial and government incident-management technologies used across the country to prevent, respond to, and recover from natural and technological events and acts of terrorism.

U.S. Government Purpose Release

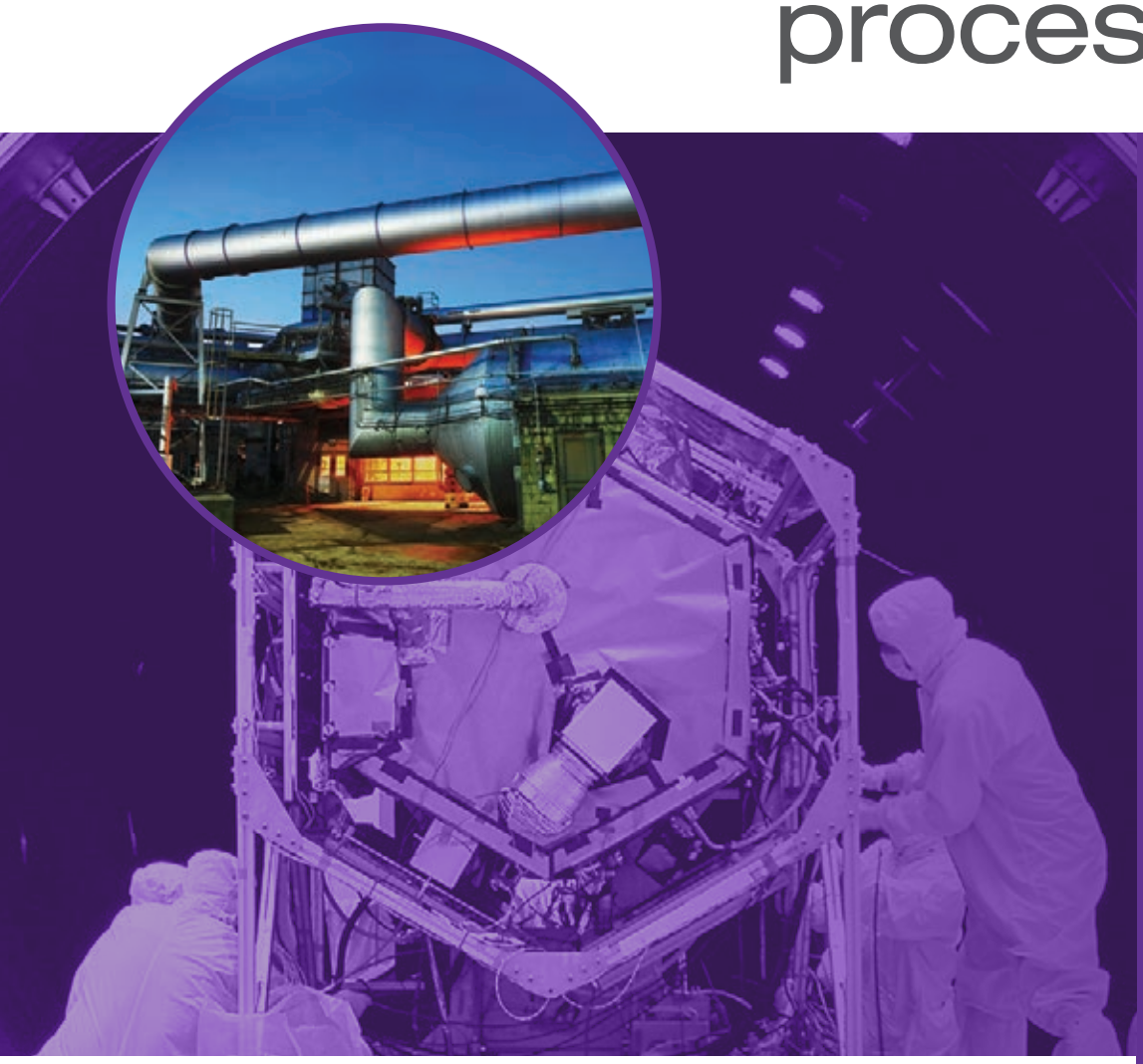
User-Friendly Metadata GSC-15014-1

The User-friendly Metadata (UFM) tool functions as a filter. The tool accepts an ODL file as input and generates a simple HTML representation of the ODL as output. Command-line options provide a user with the ability to modify the program's functionality. Please visit: http://opensource.gsfc.nasa.gov/projects/UFM/index.php

Open Source

3

materials and processes



Parts

Manufacturing

Production Processes

Composites

Acoustic Emission Analysis Applet (AEAA) Software — LEW-19032-1

Post-processing software has been developed at NASA that is tailored for novel analysis of composite pressure vessels acoustic emission (AE) data. The software can be used with data acquired from Digital Wave, Inc., and Mistras Group (Physical Acoustics, Inc.) hardware.
U.S. Release Only

EXOS Software (Improved) — MSC-24803-1

This innovation improves EXOS software by enabling the modeling of fabrics, mixtures, and porous materials. The tool also provides the ability to accept hex mesh geometries.
U.S. Government Purpose Release

Maskless Creation of Small Structures with Selective Deposition of Gold Nanoparticles (GOLD BLACK) — GSC-15734-1

GOLD BLACK helps to combat the condensation of gold particles adjacent to the path of an illumination beam.
U.S. Release Only

Materials and Processes Technical Information System (MAPTIS-II) — MFS-32206-1

The Materials and Processes Technical Information System (MAPTIS-II) is an information technology that offers a number of services for acquiring, processing, and disseminating information about materials, materials properties, materials processes, and manufacturing. Content includes materials test results from legacy systems, design allowables, and other online products. The MAPTIS-II technology provides ready access to accurate data using standard computers, software, and the Internet.
U.S. Government Purpose Release

Ray-Tracing Math Model — KSC-12835

The Ray-Tracing Math Model will predict the intensity of infrared heat energy that can be projected from a halogen lamp or a cluster of lamps. While NASA utilized the tool in the space shuttle main engine, the application can be extended to accommodate other optical and acoustic ray-tracing applications. The current version of the technology assumes ideal parabolic surfaces and reflectors.
U.S. Release Only

Shuttle Infrared Image Analysis Software (SIRIAS) — GSC-14852-1

The SIRIAS software and related processes provide subsurface information on a sample undergoing thermography. This information (which is comparable to that which would be gained from taking an MRI) has been generated solely from using infrared images taken by a Commercial Orbital Transportation Services (COTS) camera and MATLAB processing.
U.S. Government Purpose Release

Surface Crack Potential Difference (SCPD) Software — MFS-32848-1

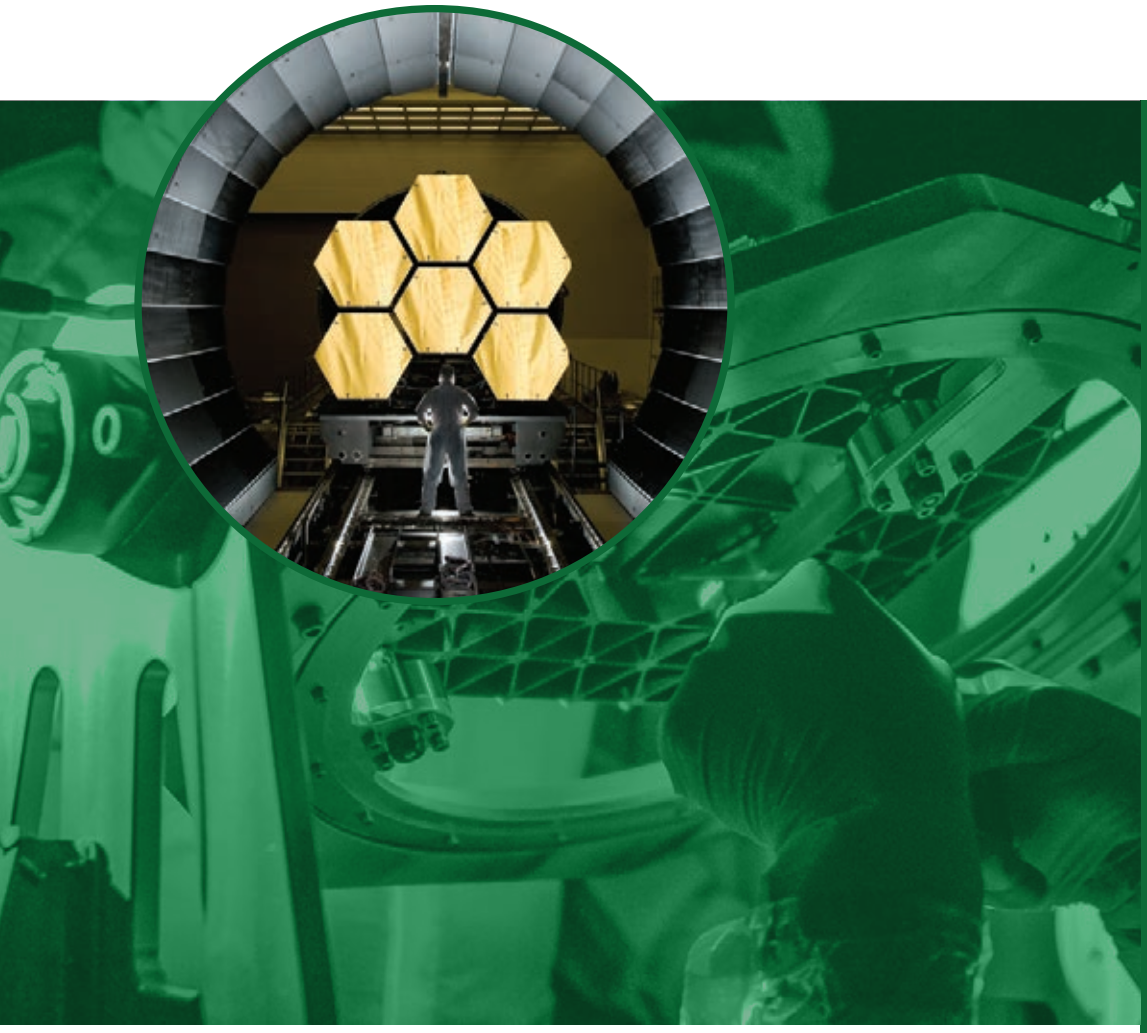
The Surface Crack Potential Difference (SCPD) monitoring software provides the precise relationship between a crack measurement signal and the size of an arbitrary semi-elliptical crack.
U.S. Government Purpose Release

Tool for Analysis of Surface Cracks (TASC) — MFS-33082-1

Created using the commercial math analysis software MATLAB, TASC enables the easy computation of nonlinear J-integral solutions for surface-cracked plates in tension by accessing and interpolating between the 600 nonlinear surface crack solutions documented in NASA/TP-2011-217480. The only required inputs to the program are the surface crack dimensions, plate cross-section dimensions, and material properties. TASC provides a convenient and easy-to-use interface for the solution set that allows a novice user to obtain a fast and reliable fracture toughness solution. Download the software at: http://sourceforge.net/projects/tascnasa/
Open Source

4

system testing



Acoustics

Shock

Vibration

Thermal Vacuum

Leak and Pressure Testing

Test Criteria

Test Management and Planning

Aerodynamic Testing

Acoustic Propagation and Emulation Toolset (APET) LAR-17761-1

The Acoustic Propagation and Emulation Toolset (APET) is a framework code uniting several acoustic methodologies for the propagation and measurement of source noise audibility at farfield observers, accounting for the effects of the atmosphere, weather, terrain, and spherical spreading. Currently, APET consists of a modified version of the Rotorcraft Noise Model (RNM, Version 7) coupled with the newly developed Spectral Attenuation Method (SAM) that contains the Ray Tracing Program (RTP) and two versions of a Greens Function Parabolic Equation (GFPE) code. A third component of APET is an audibility prediction scheme based on the work of Abrahamson, initially called I Can Hear It Now (CHIN) and further developed by Wyle Labs as AUDIB.
U.S. Release Only

Advanced Subsonic and Supersonic Propeller-Induced Noise (ASSPIN) Prediction Program LAR-17590-1

ASSPIN is a computer program that predicts the noise generated by propellers operating at subsonic, transonic, or supersonic helical tip speeds in either single-rotation or counter-rotation mode. The format of blade surface pressure data obtained from aerodynamic codes for ASSPIN input is generally not compatible with that required by ASSPIN. The ASP_Tools suite provides the capability to manipulate blade geometry and surface pressure data to produce proper ASSPIN input. In addition, the ability to parse ASSPIN output files and obtain specific output variables is provided.
U.S. Release Only

AirShow, Version 1.1.1 LEW-17228-1

The AirShow software package enables 3D visualization of computational meshes and computed flow-field data associated with computational fluid dynamics (CFD). The program displays structured grid blocks and computational grid planes.
U.S. Release Only

Arbitrary Accuracy Nonlinear Euler Solver LEW-17465-1

This NASA-developed code is the first in the world to solve the nonlinear Euler equations to at least 15th-order accuracy in space and time in two dimensions. It is capable of even higher order accuracy if sufficient computer precision is available.
U.S. Release Only

ASSPIN Input/Output Data Manipulation Tools (ASP_Tools) LAR-17591-1

ASSPIN is a computer program that predicts the noise generated by propellers operating at subsonic, transonic, or supersonic helical tip speeds in either single-rotation or counter-rotation mode. The format of blade surface pressure data obtained from aerodynamic codes for ASSPIN input is generally not compatible with that required by ASSPIN. The ASP_Tools suite provides the capability to manipulate blade geometry and surface pressure data to produce proper ASSPIN input. In addition, the ability to parse ASSPIN output files and obtain specific output variables is provided.
U.S. Release Only

Automated Camera Calibration Software (ACCS) JPL-41312

Using collected metrology data, the ACCS system significantly increases the efficiency of the entire camera calibration process, resulting in reduced costs and turnaround time. Even in extreme conditions, the tool performs calibrations with minimal user input.
U.S. Government Purpose Release

Booster Launch Operations Center (BLOC) Custom Software MSC-25367-1

The Booster Launch Operations Center provided NASA with real-time monitoring of the space shuttle's integrated testing while it was in the Vehicle Assembly Building (VAB) or on the launch pad. USA Design Engineering manned the facility and used this software to monitor the solid rocket booster subsystems (i.e., Range Safety, Electrical and Instrumentation, and Thrust Vector Control) using a data feed from the main firing room.
U.S. Government Purpose Release

CARES/LIFE — LEW-16018-1

This NASA software was developed to predict the reliability and life of structures made from advanced ceramics and other brittle materials (e.g., glass, graphite, and intermetallics).

U.S. Release Only

Coldfire SDN Hardware Diagnostics — GSC-15478-1

The Coldfire SDN Diagnostics Software is a flexible framework used to exercise, test, and debug custom hardware. The tool can be used on multiple NASA projects and can be customized using different processors and interfaces. This version of the technology is configured for the Coldfire processor on the SDO SDN processor boards.

U.S. Government Purpose Release

Community Noise Test Environment (CNoTE) — LAR-17560-1

The Community Noise Test Environment (CNoTE) system is a combination of commercial off-the-shelf computer hardware and software and NASA/contractor-developed software. The function of the system is to simulate community noise events (e.g., aircraft flyover noise) in a virtual audio and visual environment for the purpose of soliciting subjective responses. The system is composed of an AuSIM, GoldMiner audio server for audio simulation, a graphics computer for visual simulation, a controller computer for staging events, and a portable computer for entering subjective responses. The audio is played back over commercially available headphones, and the graphics may be rendered on various commercially available devices including CRT monitors, head-mounted displays, and CAVE immersive environments.

U.S. and Foreign Release

Coupled Structural, Thermal, Acoustic, Electromagnetic (CSTEM) Analysis — LEW-17052-1

CSTEM is a UNIX executable for coupled structural, thermal, acoustic, and electromagnetic analysis and optimization.

U.S. Release Only

Defect Detection and Prevention (DDP) — JPL-20741

DDP evaluates criticality by generating a tree of failure modes and a tree of requirements and then evaluating the impact of each failure mode on each requirement.

U.S. Government Purpose Release

Development of Automated Structural Health Monitoring and Qualification Methods and Software for Composite Overwrapped Pressure Vessels — MSC-25421-1

NASA has integrated industry-standard and new, novel analysis methods for assessing the structural health of composite overwrapped pressure vessels (COPV). By significantly increasing throughput, the software has the ability to provide real-time assessments. Adaptive analysis methods have been incorporated into the technology to provide modal analyses at specified points of a structure's life (e.g. loading, unloading, and dwells), thereby increasing the tool's utility and ease of use for acoustic emission testing.

U.S. Government Purpose Release

Fan Broadband Noise Prediction Code — LEW-17279-1

This NASA-developed technology predicts the dipole and quadruple noise that results from the interaction of anisotropic homogeneous turbulence with a rotor or stator.

U.S. Release Only

Fast Scattering Code (FSC), Versions 3.1 and 3.2 — LAR-17828-1

The Fast Scattering Code (FSC) is a computer program designed to predict the scattered acoustic field that results from the interaction between a known incident sound and arbitrary three-dimensional surfaces immersed in a potential background flow. The technology is based on the equations of time-harmonic, linearized acoustics and employs equivalent sources for solving an exterior Helmholtz equation boundary value problem (BVP). The incident sound can be generated by the FSC using a collection of simple point multipoles (monopoles and dipoles), or it can be provided by the user from other prediction codes. Predictions for high-frequency/large-scale combinations yield linear systems with millions of unknowns and memory requirements beyond the capabilities of most advanced computer systems to date. The computational engine of the FSC has been totally redesigned to alleviate the frequency limitations of the code by employing numerical algorithms that drastically reduce computer resource utilization and take advantage of multiprocessor platforms.

U.S. Release Only

Geophysical Finite Element Simulation Tool (GeoFEST) — GSC-14846-1

Consisting of approximately 7,000 lines of C source code, GeoFEST is a two- and three-dimensional finite element package for modeling solid stress and strain in geophysical and other continuum domain applications. The software runs on diverse UNIX derivatives.

U.S. Government Purpose Release

Geophysical Finite Element Simulation Tool (GeoFEST), Version 4.3(P) — GSC-14847-1

Consisting of approximately 11,000 lines of C source code, GeoFEST (Version 4.3P) is a two- and three-dimensional finite element package for modeling solid stress and strain in geophysical and other continuum domain applications. The software runs on diverse UNIX derivatives. GeoFEST's computational engine employs Crout factorization for the direct inversion of the finite element matrices (as well as conjugate gradient for an iterative solution option). Data formats can be adapted to accommodate visualization and graphically oriented input/output. Physics models supported by the code include isotropic linear elasticity and both Newtonian and power-law viscoelasticity via implicit/explicit quasi-static time stepping. In addition to triangular, quadrilateral, tetrahedral, and hexahedral continuum elements, GeoFEST supports split-node faulting, body forces, and surface tractions.

U.S. Government Purpose Release

GRAPE.107 — LEW-16851-1

GRAPE is a two-dimensional elliptic grid generation code to be used with isolated airfoils. This modified version of the software (with application for turbomachinery blades) can generate grids for the RVCQ3D turbo-machinery analysis code.

U.S. Release Only

High-Speed Data Viewer — MFS-31700-1

The High-Speed Data Viewer computer software was developed for viewing high-frequency data recorded in the East and West Test Areas at Marshall Space Flight Center (MSFC).

U.S. Release Only

IceVal DatAssistant — LEW-18343-1

This NASA-developed technology provides an improved mechanism for managing the large volume of data generated and utilized in performing icing research.

U.S. Release Only

Integrated Structural Analysis and Test Program — GSC-14775-1

This technology offers an innovative way of integrating analysis/test data to facilitate the mechanical verification of space systems. The technology automates repetitive processes, provides faster pre-test analysis and test reporting, facilitates test planning, and improves test execution.
U.S. Government Purpose Release

International Space Station (ISS) Systems Integration Laboratory (ISIL) — MSC-24341-1

This NASA-developed software provides an open-source framework that consolidates ISS laboratory test functions. The technology automates the start-up process of the large ISIL test rig (including configuration validation) and provides test engineers with Web access to recorded test data for post-test analysis.
U.S. Government Purpose Release

Jet Noise Prediction Code (JeNo) — LEW-18199-1

JeNo is a Fortran 90 computer code that calculates the far-field sound spectral density produced by axisymmetric jets at user-specified observer locations and frequency ranges. The user must provide a structured computational grid and also input a mean flow solution from a Reynolds-Averaged Navier Stokes (RANS).
Note: Software Restricted by Export Control
U.S. Release Only

Jet Noise Prediction Code (JeNo), 2.5D — LEW-18199-2

JeNo is a Fortran 90 computer code that evaluates the far-field turbulence-generated noise in non-axisymmetric jets. The propagation Green's function is calculated along a user-specified azimuthal angle (line of sight), but source volume integration is carried out in 3D. The user must provide a structured computational grid in a polar coordinate system and also input a mean flow solution from a Reynolds-Averaged Navier Stokes (RANS).
U.S. Release Only

Lag Model: A Turbulence Model for Attached and Separated Flows — ARC-14645-1

This NASA-developed technology includes a set of partial differential equations that augment the Reynolds-Averaged Navier-Stokes equation. By providing a mechanism that allows flow history to affect turbulence stresses, Lag Model mimics underlying physical processes to provide an improved turbulence model for flows with separation.
U.S. Government Purpose Release

LEWICE Ice Accretion Software, Version 3.2.2 — LEW-18573-1

LEWICE contains an analytical ice accretion model that evaluates the freezing process thermodynamics that occur when super-cooled droplets impinge on a body. Both atmospheric parameters (i.e., temperature, pressure, and velocity) and meteorological parameters (i.e., liquid water content, droplet diameter, and relative humidity) are used to determine the shape of the ice accretion.
U.S. Release Only

LINFLUX, 3D Linearized Unsteady Aerodynamic Analysis — LEW-17346-1

LINFLUX is a three-dimensional, linearized, unsteady aerodynamic analysis (and code) that can be used to predict the aero-acoustic/aero-elastic responses of axial-flow turbo-machinery blade rows to aerodynamic/structural excitations.
U.S. Release Only

MERIDLN — LEW-16369-1

MERIDLN is a Fortran program for calculating velocities/streamlines of axial-, radial-, or mixed-flow turbomachinery or annular ducts on the hub-shroud mid-channel stream surface.
U.S. Release Only

MGBK Jet Noise Prediction Code — LEW-17062-1

The physics-based MGBK code predicts subsonic and low-supersonic jet mixing noise and shock noise. Predictions are in the form of far-field sound pressure level (SPL) and frequency spectra on an arc or a sideline.
U.S. Release Only

Multiple Kernel Anomaly Detection (MKAD) Algorithm — ARC-16462-1

In offline mode, MKAD performs automated anomaly detection on large heterogeneous data sets that contain both discrete symbols and continuous data streams. Download the software at: http://ti.arc.nasa.gov/opensource/projects/mkad/
Open Source

Multiple Pure Tone (MPT) Noise Code — LEW-17386-1

The MPT noise prediction procedure is based on uniform-rotor computational fluid dynamics (CFD) analysis of BPF tonal content in conjunction with engineering (statistical) correlation information of blade-to-blade non-uniformity effects.
U.S. Release Only

NDE Wave & Image Processor (NDEWIP), Version 3.0 — LEW-18640-1

The NDE Wave & Image Processor software application has been created to provide a state-of-the-art, comprehensive, integrated science-based tool for the advanced visualization, processing, and analysis of NDE and health-monitoring waveform- and image-based data. With NDEWIP, the user has access to a complete post-processing capability in a single tool. Although the software has been developed for the NDE professional, the technology could be used for any other RF signal or image processing and analysis application.
U.S. Release Only

NESSUS 6.2C — LEW-18229-1

The NESSUS 6.2C computer program is a set of separate but related modules for solving a wide range of component and system probabilistic and reliability problems, including finite element analysis, heat transfer analysis, geometry generation, and ceramic material property generation.
U.S. Release Only

OTIS 4: A Trajectory Optimization Computer Code — LEW-18319-1

OTIS 4 is a Fortran program designed to simulate and optimize trajectories of launch vehicles, aircraft, missiles, satellites, and interplanetary vehicles. The software is restricted by export control.
U.S. Release Only

OXIMAP: A Model for the Oxidation of C/SiC Composite Structures — LEW-18212-1

The OXIMAP software has been used to analyze the oxidation behavior of carbon-fiber-reinforced composite structures.
U.S. Release Only

PathDroid — ARC-17293-1

PathDroid is an extension of the open source Java Pathfinder (JPF) verification framework that checks binary Android® applications for absence-of-software defects (such as unhandled exceptions and dead-locks). Download the software at: http://babelfish.arc.nasa.gov/hg/jpf/jpf-pathdroid
Open Source

Payloads and Components Real-Time Automated Test System (PACRATS) — MFS-31383-1

The PACRATS data acquisition program allows test engineers to acquire, display, store, and retrieve test data.
U.S. Release Only

PCSTAGE — LEW-16325-1

PCSTAGE is simple computational simulation of multi-stage turbo-machinery blade-to-blade flows on a surface of revolution.
U.S. Release Only

PMESH — LEW-18402-1

The PMESH grid-generation program produces three-dimensional blade-passage meshes for the computational fluid dynamics (CFD) modeling of advanced single- or counter-rotation turboprops and propfans.
U.S. Release Only

Propulsion Diagnostic Method Evaluation Strategy (ProDiMES), Version 1.0 — LEW-18371-1

The Propulsion Diagnostic Method Evaluation Strategy (ProDiMES) provides a standard benchmarking problem and a set of evaluation metrics to enable comparison of candidate aircraft engine gas-path diagnostic methods. The MATLAB-based tool enables users to develop and evaluate diagnostic methods independently.
U.S. Release Only

Quick Charge-Coupled Device (CCD) Design Code for Centrifugal Compressor — LEW-17452-1

This NASA-developed technology provides a rapid preliminary assessment of the design geometry and the design-point performance of centrifugal compressors. The analysis is based on a one-dimensional flow model with correlations for the following losses: inlet guide vane, rotor inlet shock, incidence, clearance, blade loading, skin friction, disk friction, recirculation, vaneless diffuser skin friction, and vaned diffuser. With input performance, the code can operate in design mode; with input geometry, the code can operate in analysis mode.
U.S. Release Only

Radial Turbine Off-Design (RTOD) Performance Code — LEW-14060-1

The RTOD code predicts the performance of a single-stage radial-inflow turbine (with either radial or swept rotor blades) as a function of pressure ratio, speed, and stator setting.
U.S. Release Only

RAT-EDA — LEW-18321-1

This NASA-developed technology is a MATLAB-language computer program for exploratory data analysis. Through the fast post-processing of measured time-series Raman spectral data, RAT-EDA reveals thermochemical properties and turbulent-chemistry interactions in combustion. The computer program deduces probability density functions of combustion temperatures using user-selected super-pixel regions for each major species (e.g., O2, N2, CH4, CO2, or H20).
U.S. Release Only

Rotor-Stator Interaction (RSI) Broadband Noise Prediction Code — LEW-18131-1

RSI is a Fortran computer code for calculating the spectrum of broadband noise produced by the interaction of fan-rotor wake turbulence with fan-exit guide vanes (i.e., the stator). Provided with incident-turbulence characteristics, the code computes the spectra of acoustic power upstream and downstream of the stator on a mode-by-mode basis at each frequency of interest. Target frequencies are arbitrary and need not be harmonics of a fan's blade-passing frequency.
U.S. Release Only

Rotorcraft Noise Model (RNM), Version 7 — LAR-17753-1

The RNM simulation model calculates community noise, computing time histories of noise for arbitrary vehicle flight operations. The technology accommodates multiple noise sources (e.g., rotors and engines), each represented by a sphere of spectral data at a reference distance. Propagation to the ground accounts for spherical spreading, atmospheric absorption, ground impedance effects, and limited weather effects.
General Public

RTD Radial-Inflow Turbine Conceptual Design Code — LEW-17453-1

The RTD code executes a conceptual design for a single-stage radial-inflow turbine. A mean-line analysis is performed for the locations having constant radius over the blade span. Constant span-fraction sectors are used at the rotor exit. The analysis can account for stator end-wall clearance flow and swept rotor blades. The loss model includes stator and rotor passage losses, trailing-edge losses, vaneless space loss, disk-friction loss, and rotor-exit clearance loss.

U.S. Release Only

RVCQ3D.406 — LEW-16851-2

RVCQ3D is a two-dimensional computational fluid dynamics (CFD) analysis code for turbo-machinery (e.g., compressors, turbines, and mixed-flow machines). The technology solves Navier-Stokes equations on a blade-to-blade surface of revolution using explicit finite-difference techniques. Three differencing schemes are available: central differences, AUSM+, and H-CUSP. Three turbulence models are also available: Baldwin-Lomax, Cebeci-Smith, and Wilcox 2006 K-Omega.

U.S. Release Only

sBOOM: An Advanced Sonic Boom Propagation Tool — LAR-18012-1

Very useful in the development of supersonic cruise aircraft, this NASA-developed propagation tool predicts sonic-boom ground signatures by numerically solving the Augmented Burgers equation. Efficient and accurate, sBoom can predict shock thicknesses, thereby improving the frequency spectrum of ground signatures. Because shock rise times are computed and not empirically adjusted or corrected, the tool affords more accurate loudness calculations than comparable linear-theory methods.

U.S. Release Only

SCISEAL — LEW-16330-1

This computer program has been used to study the fluid dynamic forces in SEALS.

U.S. Release Only

SmaggIce UNIX, Version 2.0 — LEW-17399-2

The SmaggIce software toolkit can be used to create structured grids for single- or multi-element 2D iced airfoils in preparation for computational fluid dynamics (CFD) analysis. Software tools will measure ice shape characteristics, add artificial ice shapes, prepare an ice surface for gridding, perform domain decomposition, create and modify grids, analyze grid quality, and output grids for subsequent input into flow solvers.

U.S. Release Only

SmaggIce Windows, Version 2.0 — LEW-17399-1

The SmaggIce software toolkit can be used to create structured grids for single- or multi-element 2D iced airfoils in preparation for computational fluid dynamics (CFD) analysis. Software tools will measure ice shape characteristics, add artificial ice shapes, prepare an ice surface for gridding, perform domain decomposition, create and modify grids, analyze grid quality, and output grids for subsequent input into flow solvers.

U.S. Release Only

Soft Decision Analyzer (SDA) — MSC-24798-1

The Soft Decision Analyzer (SDA) hardware, firmware, and software system performs real-time closed-loop statistical analysis of single- or dual-channel serial digital RF communications systems operating in very low signal-to-noise conditions. The technology can instrument a live system and correlate observations with frame, code word, and packet losses, as well as Quality of Service (QoS) and Quality of Experience (QoE) events.

U.S. Government Purpose Release

Software for Compumotor 6K Series Controller — GSC-14744-1

This software controls a multi-axis motor system via a Compumotor 6K Series controller. Capable of running a two-motor system with encoders, the software can be used to issue individual commands to a controller for troubleshooting purposes, set position targets for the encoders, receive encoder feedback, turn over control of a motor system to a joystick or other device, and record positional data from encoders to an external file.

U.S. Government Purpose Release

Solar Array Verification and Analysis Tool (SAVANT) — LEW-17681-1

The powerful, yet easy-to-use SAVANT quick-engineering code calculates the expected radiation damage to solar cells in Earth orbit. The tool contains ten types of solar cells and four types of cover glass. Radiation damage calculations are based on the Displacement Damage Dose method developed at the Naval Research Laboratories.

U.S. Release Only

Sound Lab (SLAB), Version 5 — ARC-14991-1

SLAB is a software-based, real-time, virtual acoustic-environment rendering system designed to study spatial hearing in environments such as concert halls, listening rooms, virtual reality, aviation spatial information displays, and video game sound effects. Download the software at: http://ti.arc.nasa.gov/opensource/projects/slab-spatial-audio-renderer/

Open Source

SWIFT, Version 4.0 — LEW-17635-2

SWIFT is a multi-block computational fluid dynamics (CFD) analysis code for turbo-machinery. The software, which solves Navier-Stokes equations using explicit finite-difference techniques, can be used for linear cascades, isolated blade rows, or multistage machines. Three differencing schemes are available: central differences, AUSM+, and H-CUSP. Three turbulence models are also available: Baldwin-Lomax, Cebeci-Smith, and Wilcox 2006 K-Omega.

U.S. Release Only

System Identification Programs for AirCraft (SIDPAC) — LAR-16100-1

Written in MATLAB, SIDPAC is a collection of over 300 programs that perform a wide variety of tasks related to system identification applied to aircraft. SIDPAC includes tools for experiment design, data analysis, kinematic consistency checking, static and dynamic modeling, simulation, numerical integration and differentiation, smoothing, filtering, finite Fourier transformation, statistical modeling and evaluation, optimization, parameter estimation, model accuracy quantification, model validation, and more.

General Public Release

Systematic Sensor Selection Strategy (S4) Software — LEW-18815-1

The Systematic Sensor Selection Strategy (S4) optimally selects a sensor suite from a larger pool of candidate sensors based on their performance in a diagnostic system. S4's user-defined fault-diagnostic approach considers conflicting objectives including cost, weight, and reliability.

U.S. Release Only

TCGRID, Version 4.0 — LEW-17635-1

TCGRID is a three-dimensional grid-generation code for turbo-machinery blades. The software can generate single- or multi-block grids that are compatible with several computational fluid dynamics (CFD) analysis codes, including SWIFT and ADPAC.

U.S. Release Only

TD2 Axial Turbine Design and Performance Code — LEW-11029-1

TD2 performs a streamline analysis that can use meridional velocity gradients to control the radial distribution of work and flow for multistage, multishaft, cooled/uncooled axial-flow turbines. The effects of streamline slope and curvature are included in the radial equilibrium. Hub and tip radii are specified at inlet, at exit, and between each blade row, and velocity diagrams for each stage can be individually controlled. An internal loss correction determines blade-row total-pressure-loss coefficients along the streamlines.
U.S. Release Only

Tempest — LEW-17294-1

Tempest was created to provide Internet/Intranet connectivity to real-time embedded applications.
U.S. Release Only

Time-Accurate, Sectored, One-Dimensional Reactive Code for Simulation, Prediction, and Control of Combustion Instabilities — LEW-17677-1

This sectored one-dimensional model utilizes a simplified computational fluid dynamics (CFD) algorithm to simulate combustion and acoustic processes (including instabilities) in combustors with complex shapes. Utilizing modest computational resources, the code produces realistic results and is well suited for controls development.
U.S. Release Only

Tone Fan Noise Design/Prediction System (TFaNS), Version 1.4 — LEW-17063-1

TFaNS predicts tone noise emanating from a fan stage, including the effects of reflection and transmission by the rotor and stator and by the duct inlet and nozzle.
U.S. Release Only

Tone Fan Noise Design/Prediction System (TFaNS), Version 1.5 — LEW-17063-2

TFaNS predicts tone noise emanating from a fan stage, including the effects of reflection and transmission by the rotor and stator and by the duct inlet and nozzle. Version 1.5 upgrades include: the SOURCE3D subprogram's ability to perform transmission-loss calculation for modes scattering into themselves; the inlet and aft radiation codes' use of infinite envelope elements in the far-field; and the AWAKEN subprogram's use of a new Acoustic Wake/Turbulence File format.
U.S. Release Only

TSONIC — LEW-16851-3

The TSONIC Fortran program calculates the transonic velocity on the blade-to-blade stream surface of a turbo-machine.
U.S. Release Only

Vehicle Acoustic Environment Prediction Program — MFS-31904-1

The Vehicle Acoustic Environment Prediction Program was developed in 1988 and used in Phase A acoustic environments for engine testing in flight vehicles at liftoff.
U.S. Government Purpose Release

WOPWOP — LAR-16680-GS

WOPWOP is used for helicopter main-rotor noise prediction. The user must input measured air loads.
U.S. Release Only

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propulsion

Propellants

Cryogenics

Engine and Motor Performance Analysis

ACD Aerodynamic Design of Multistage Axial-Flow Compressors — LEW-17448-1

ACD is an analysis code used for the aerodynamic design of multistage axial-flow compressors. The technology provides velocity diagrams on the streamlines at the blade-row edges. Blade elements are defined by centerline curve and thickness distribution, and blade-element inlet and outlet angles are established through empirical incidence and deviation-angle adjustments to the velocity diagrams. Blade elements can be stacked to provide the full blade design.
U.S. Release Only

ACOD Multistage Axial-Flow Compressor Off-design — LEW-17449-1

A companion tool to Glenn Research Center's ACD software (LEW-17448), ACOD is streamline analysis code for predicting the off-design performance of multistage axial-flow compressors. Flow, blading, and loss are modeled similarly to ACD.
U.S. Release Only

Advanced Ducted Propfan Analysis Code (APAC) — LEW-16768-1

Developed by the Allison Engine Company under contracts with Glenn Research Center, ADPAC solves tightly coupled internal/external flows through future-concept short-duct turbofan engines.
Note: Software Restricted by Export Control
U.S. Release Only

Axial-Flow Turbine Off-Design (AXOD) Performance — LEW-16323-1

AXOD computes the flow and efficiency of multistage axial-flow turbines as functions of speed and pressure ratio. The technology uses a span-line analysis with simple radial equilibrium. The loss model includes blade-row inlet losses, blade-row losses, and stage-test losses. Coefficients are selected to match the known design-point performance, and the internal model provides the off-design performance.
U.S. Release Only

BLAYER — LEW-16851-4

BLAYER is a Fortran program used for calculating compressible laminar and turbulent boundary layers in arbitrary pressure gradients.
U.S. Release Only

Boundary-Layer Matrix Procedure Kinetic (BLIMPK) Modernization and Upgrade — MSC-25641-1

Written in Fortran, BLIMPK solves boundary-layer equations for arbitrary chemically reacting gases. NASA, the Department of Defense, and industry have all used the software in the design and evaluation of rocket nozzles and reentry spacecraft.
U.S. Government Purpose Release

Broadband Fan Noise Prediction System (BFaNS) — LEW-17307-1

BFaNS computes the broadband noise generated by a turbofan engine's fan stage. Noise sources can include turbulence impingement and boundary-layer turbulence convection.
U.S. Release Only

Centrifugal Off-Design Performance (CCODP) Compressor — LEW-17450-1

CCODP is a one-dimensional off-design performance prediction code used for centrifugal compressors. Correlations account for the following types of loss: inlet guide vane, impeller incidence, shock, skin friction, blade loading, trailing edge, clearance, vaneless and vaned diffuser friction, recirculation, and disk friction.
U.S. Release Only

Chemical Equilibrium Applications (CEA) LEW-17687-1

The CEA program calculates chemical equilibrium product concentrations from any set of reactants and determines thermodynamic and transport properties for the product mixture. Built-in applications account for theoretical rocket performance, Chapman-Jouguet detonation parameters, shock-tube parameters, and combustion properties.

U.S. Release Only

CMPSTK Multi-Stage Axial-Flow Compressor Off-Design LEW-17451-1

Developed for studying variable geometry effects at the conceptual design level, CMPSTK is a combination of the STGSTK and CMPGEN computer codes. STGSTK predicts multistage axial-flow compressor off-design performance using mean-line stage stacking, and CMPGEN estimates design-speed flow range and efficiency ratios.

U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation (C-MAPSS) LEW-18315-1

Written in a combination of MATLAB and Simulink, C-MAPSS provides a realistic simulation of a large commercial turbofan engine. The technology includes a number of graphical user-interface screens that allow point-and-click operation.

U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation (C-MAPSS), Version 2 LEW-18315-2

Version 2 of C-MAPSS provides a transient simulation of a large commercial turbofan engine with a realistic engine control system. Written in a combination of MATLAB and Simulink, the software supports easy access to health, control, and engine parameters through a graphical user interface. Retaining the convenience and user-friendliness of the original, Version 2 includes three actuators (as compared to one) and offers an improved controller as well as added actuator and sensor dynamics.

U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation 40k (C-MAPSS40k) LEW-18624-1

Developed in the MATLAB/Simulink environment, C-MAPSS40k is a high-fidelity transient simulation of a generic commercial turbofan engine with a 40,000-pound thrust. The nonlinear physics-based component-level model operates up to Mach 0.8 over a wide ambient temperature range and executes faster than real time. The model can be run from the command line or by using a graphical user interface.

U.S. Release Only

Compressible Flow Toolbox LEW-17898-1

The Compressible Flow Toolbox is a set of algorithms that solve classical compressible equations for isentropic flow, fanno flow, Rayleigh flow, normal shock, oblique shock, and expansion. Implemented in the MATLAB programming language, the technology can be used in the analysis of one-dimensional steady flow with constant entropy, with friction, with heat transfer, or with supersonic Mach numbers.

U.S. Release Only

Computational Fluid Dynamics (CFD) Seal Analysis Code LEW-16582-1

This technology is a computer program designed for the study of fluid dynamic forces.

U.S. Release Only

Computed Tomography Cylinder Unwrapper/Re-slicer Software (CT-CURS), Version 2 LEW-19031-1

CT-CURS is a dedicated unwrapping/re-slicing software tool for computing tomography data from cylindrical and partially cylindrical structures. The technology can be used as a complement to vendor software or can be utilized as a completely standalone visualization program.
U.S. Release Only

CORBASec LEW-17214-1

This technology has been used for distributed aerospace propulsion simulations.
U.S. Release Only

Cryogen Storage Integrated Model (CryoSIM) MFS-33071-1

CryoSIM provides input power and dry mass estimates for insulation and hardware used in in-space applications to maintain cryogens in storage. System heat load estimations and associated propellant loss masses can also be generated.
U.S. Government Purpose Release

CSPAN Axial-Flow Compressor Conceptual Design Code LEW-16074-1

This span-line analysis technology uses isentropic simple radial equilibrium to determine a flow path.
U.S. Government Purpose Release

Extended Testability Analysis (ETA) Tool LEW-18795-1

ETA extends the analysis capabilities of Qualtech Systems' Testability Engineering and Maintenance System (TEAMS), a technology that enables a user to qualitatively model and analyze fault propagation.
U.S. Release Only

Gaseous Nitrogen (GN2) Orifice Mass-Flow Calculator MSC-24873-1

This calculator has been used to determine GN2 high-pressure tank-source depletion rates for the Space Shuttle Orbiter Water Spray Boiler (WSB), and it has also been used to gauge the ability of GN2 consumables to support APU lubrication cooling during entry.
U.S. Government Purpose Release

ML_POGO Stability Analysis Software MFS-33024-1

This technology models the coupled structural/propulsion (pogo) stability of a liquid-propellant rocket.
U.S. Release Only

Model5 Reusable Solid Rocket Motor (RSRM) Ignition Model MSC-25205-1

This program has been used to: (1) generate realistic random pairs of RSRM ignition transients and (2) provide thrust-differential and pressure-rise rate envelopes.
U.S. Government Purpose Release

Modular Aero-Propulsion System Simulation (MAPSS) LEW-17674-1

MAPSS is a flexible turbofan engine simulation environment that provides easy access to health, control, and engine parameters through a graphical user interface. The technology can be used as a simulation environment for developing and testing advanced control algorithms, or it can run transient simulations or generate state-space linear models for creating a piecewise linear controller.
U.S. Release Only

Morpheus Engine Geometry Calibration Using Image Processing and Parameter Estimation — MSC-25500-1

This novel video-image processing application calibrates the geometry of a thrust-vector-controlled engine. For offline calibration, Morpheus will read a video taken from an iPhone® camera; for offline calibration, the software will read a video from a Webcam.
U.S. Government Purpose Release

Propellant Feed System Analytical Tool (PFSAT) — MSC-25181-1

The PFSAT parametric analytical tool predicts heat leaks into cryogenic propellant distribution lines. The technology can also be used to determine the optimum orifice diameter for an optional thermodynamic vent system.
U.S. Government Purpose Release

Propellant Slosh Analysis for the Solar Dynamics Observatory (SDO) — GSC-15118-1

This software tool provides an equivalent mechanical model that approximates fluid slosh effects by analogy to the movements of a point-mass pendulum, which is an important component for simulating propellant slosh dynamics as part of an entire attitude determination and control system.
U.S. Government Purpose Release

SNAP, Version 2.3 — LEW-17816-1

SNAP is an N-body high-fidelity propagation program that can model the trajectories of the planets, the Sun, and virtually any natural satellite in the solar system.
U.S. Release Only

Snewt Software for Hypersonic Aerodynamics Estimation — MSC-24812-1

This engineering tool estimates hypersonic aerodynamic coefficients and pressures on the surface of a vehicle traveling at speeds above Mach 5. The software requires the user to supply a computer model of the vehicle's outer mold as well as free-stream parameters including vehicle orientation and Mach number. A substantial improvement over other available programs, Snewt easily generates a computer representation of the vehicle being studied, eliminates little-used solution options, and utilizes an updated version of the Fortran computer language.
U.S. Government Purpose Release

STAN5 — LEW-13009-1

This computer program computes general two-dimensional turbulent boundary-layer flow using finite difference techniques. Without requiring any modifications to the program code, STAN 5 can handle a wide range of boundary-layer problems. The technology has been used extensively at Stanford University.
U.S. Release Only

TURBAN Turbomachine Design Code — LEW-17454-1

TURBAN analysis is performed at the arithmetic mean diameter. The stage velocity diagrams are either all similar (therefore have the same work factor) or are determined from an input stage work split. All stages have the same stator exit angle. Stage-by-stage tailoring of the velocity diagrams is not allowed.
U.S. Release Only

V072 Rotor Wake/Stator Interaction Noise Prediction — LEW-17065-1

The V072 computer code predicts noise from rotor wake/stator interactions. The technology can perform compressor rotor wake prediction only, rotor/stator or fan/FEGV interaction only, fan/core stator interaction only, and both fan/FEGV and fan/core stator interactions.

U.S. Release Only

WOBBLE — LEW-17325-1

This technology computes the tone noise associated with propellers and predicts axial and circumferential directivity. The acoustic model is exact and accounts for all unsteady sources.

U.S. Release Only

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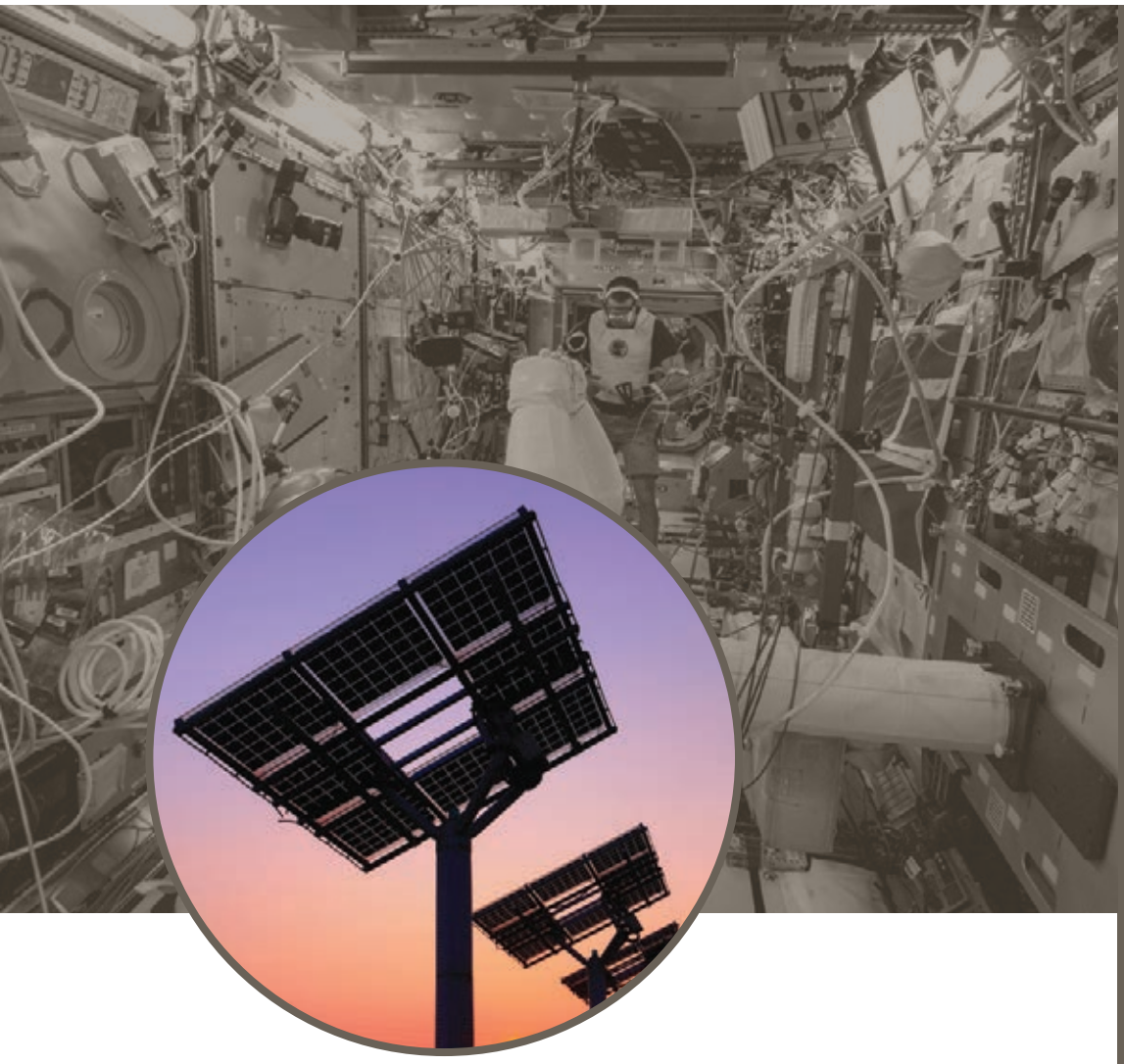
electronics and electrical power



Solar Arrays

Batteries

Cabling

Grounding

Converters

Electrical Analysis

Automated Safe-to-Mate (ASTM) Software — GSC-15180-1

The Automated Safe-to-Mate Software allows for fast, safe, and reliable check-out testing of connector interfaces for both critical flight hardware and companion ground support equipment (GSE). The tool can check an entire connector or even multiple connectors at one time, retaining electronic records that can be saved for later review.

U.S. Government Purpose Release

International Space Station (ISS) Power Planning and Analysis Tool (PLATO) — MSC-24669-1

PLATO is a preflight and real-time analysis software that combines existing and new power resource planning tools into a single application. The software reduces the number of personnel required to manage International Space Station (ISS) electrical power systems by enabling a PHALCON specialist to generate all short-term, flight-specific, and long-range power planning products.

U.S. Government Purpose Release

Packet to Electrical Ground Support Equipment (EGSE) Interface Converter, Version 4.0 — GSC-16586-1

Developed using platform-independent language, this interface converter packet allows already-existing EGSE equipment to be supported on Windows and UNIX operating systems. The software is set up and controlled using XML-formatted files that define interface connections and data content.

U.S. Government Purpose Release

Physics-Model-Based Wiring Fault Detection Toolbox for MATLAB — ARC-17046-1

Providing a toolbox of functionality for MATLAB, this NASA-developed software detects precursor wiring faults (e.g., chafing) in shielded impedance-controlled cabling using measurements from off-the-shelf, time-domain reflectometry or vector-network analyzer hardware. The technology combines high-fidelity analytical physics models for signal propagation with fast Bayesian inference algorithms for intrinsic cable and fault-parameter retrieval. Download the software at: http://ti.arc.nasa.gov/project/wiring/

Open Source

Power Quality Impedance Tester Software — MSC-25353-1

The Power Quality Impedance Tester Software and the Frequency-Response Analyzer (FRA) combined deliver a complete frequency-response measurement system. The software runs on any personal computer using Microsoft Windows XP/2007. Data, displayed on a graphical user interface, can be saved to a text file.

U.S. Government Purpose Release

SOLARA Rapid International Space Station (ISS) Power Availability Simulator — MSC-24623-1

SOLAR is a Java-based tool that leverages commercial off-the-shelf software (Satellite Toolkit) and an existing ISS electrical power system model (SPEED) to rapidly perform thousands of power availability simulations.

U.S. Government Purpose Release

Two-Stage, Direct-Current (DC) Superconducting Quantum Interference Device (SQUID) Amplifier System — GSC-14863-1

Designed for cryogenic detector-readout applications, this integrated amplifier system consists of two input SQUID and two output-array designs. Niobium shield assemblies for the amplifiers are based on a modular chip package design and help to enhance mechanical robustness and reduce sensitivity to microphonics. Programmable feedback loop electronics offer the user a considerable degree of flexibility and greatly simplify operation.

U.S. Government Purpose Release

7

operations

Ground Software

Telemetry

Command and Control

Global Positioning Systems

Extra-Vehicular Activity

Radio

Communications

Advanced Spacecraft Integration and System Test Software (ASIST) Front-End Data Systems/Digital History Data Store (FEDS/DHDS) Software GSC-14446-1

This spacecraft ground system can be configured in a variety of ways and used for box-level development and testing, satellite integration and testing, and post-launch mission operations. The technology utilizes a single, industry-standard protocol to ease integration with other products, and it employs commercial off-the- shelf, government off-the-shelf, and public domain software to form a single, cohesive system.
U.S. Government Purpose Release

Advanced Spacecraft Integration and System Test Software (ASIST), Front-End Data Systems/Digital History Data Store (FEDS/DHDS) Software, Updated GSC-15832-1

From component development to integration, testing, and mission operations, this NASA technology provides a single spacecraft ground system for processing spacecraft telemetry and command data throughout the lifecycle of a program. The technology is applicable to all missions with telemetry that (1) conforms to the AOS recommendations of the Consultative Committee for Space Data Systems (CCSDS) and (2) meets CCSDS telecommand standards.
U.S. Government Purpose Release

Advanced Technology Microwave Sounder (ATMS) Antenna Beam Analysis Software GSC-16784-1

The ATMS software calculates instrument beam pointing and polarization state. Input is taken in the native MI Technologies MI-3000 antenna measurements system database format and should include sets of azimuth/elevation RF radiation pattern cuts (at multiple phi rotations) or discrete frequencies.
U.S. Government Purpose Release

Alert Notification System Router (ANSR), Version 3.9.3 GSC-16518-1

Version 3.9.3 of the ANSR implements three bug fixes. The software application provides user notifications through paging and email. Page directives can contain text and/or attachments and can be sent to paging devices via the WCTP protocol, to email devices via the SMTP protocol, and to SMS devices via third-party email-to-SMS gateways. ANSR provides page escalation and tracking, offers a built-in redundancy capability, and interacts with other applications through GMSEC interfaces. The technology has been approved for use in operational environments.
U.S. Government Purpose Release

Altimeter Noise, Electromagnetic Bias (EMB), and Associated Software GSC-14664-1

This NASA software analyzes radar altimeter data to assess instrument performance. The technology estimates noise on range measurements, estimates corrections for electromagnetic bias (EMB), and performs statistical analysis of a variety of parameters.
U.S. Release Only

Automated 3D Damaged Cavity Model Builder for Lower Surface Acreage Tile on Orbiter MSC-25177-1

This quick, accurate, automated technology has been used to perform 3D thermal analysis of damaged lower surface acreage tiles/structures beneath damaged locations on the Space Shuttle Orbiter. The tool's 3D model builder creates both TRASYS geometric math models and SINDA thermal math models to simulate an idealized damaged cavity.
U.S. Government Purpose Release

Autonomous eXplorer Control System (AXCS) ARC-16721-1

AXCS enables smartphones and other mobile devices to be utilized as a ground-based test bed for operations in extreme environments. For NASA, the technology is currently being used to evaluate hardware for balloon launches. The software's tool kits provide environmental and situational measurements, command and data handing (CD&H) functions, events timing, data logging, and communications with external devices. Download the software at: https://github.com/cboshuizen/AXCS

Open Source

Autonomous Precision Landing Navigation (APLNav) System MSC-24721-1

The APLNav system provides a simple, cost-effective, reliable, and proven optical terrain navigation tool for planetary landing applications. Passive optical digital cameras are used to create surface images that are rendered against a digital elevation model. The system is derived from the digital scene-mapping and area correlation navigation method that has been employed by cruise missiles for decades.

U.S. Government Purpose Release

Bit-Wise Parallel Algorithms for Correlation in a Real-Time Software Radio Receiver GSC-14703-1

This efficient, general-purpose microprocessor uses correlation algorithms to receive multiple code-division access signals. By using pseudo-random number codes and eliminating the need for a specially designed correlator chip, the tool offers improved flexibility when compared to previous technologies.

U.S. Government Purpose Release

CalSimHydro JPL-48235

This Web-based, Google Earth-enabled interactive interface provides a tool for configuring, running, viewing, and downloading the results of a CalSim 3.0 Hydrology Preprocessor program. The software allows the user to (1) interact with a map of water budget areas (WBAs) and display data for a selected WBA in tabular form or as a time series plot; (2) edit input and run a CalSim 3.0 Hydrology Preprocessor; and (3) compare results with base-run output and download the output file. CalSimHydro will be delivered to the California Department of Water Resource (DWR) and released as a part of the CalSim 3.0 system.

U.S. Government Purpose Release

CodeIt Software GSC-14742-1

The simple, flexible CodeIt Software provides test patterns usable in the development and verification of spacecraft telemetry components, spacecraft telemetry systems, and ground support equipment. Data encoding schemes include Reed Solomon Encoding and Convolutional Encoding.

U.S. Release Only

Command, Control, Communications, and Intelligence (C3I) Delay/Disruption-Tolerant (DTN) Networking Software LEW-18493-1

This code is a DTN implementation of the Constellation Program's C3I software.

U.S. Government Purpose Release

Command, Control, Communications, and Intelligence (C3I) Networking Software LEW-18494-1

This implementation of the Constellation Program's C3I software has provided an environment for the prototype testing of a variety of networking protocols.

U.S. Government Purpose Release

Command, Control, Communications, and Intelligence (C3I) Voice Exchange Software LEW-18495-1

This implementation of the Constellation Program's C3I software has provided an environment for the prototype testing of a variety of voice exchange components.

U.S. Government Purpose Release

Consultative Committee for Space Data Systems (CCSDS) File Delivery Protocol (CFDP) Software Library, Version 3.1 — GSC-14993-1

This library provides for the reliable transfer of large data blocks to and from spacecraft. It implements the international standard CFDP protocol, can be used from mission to mission, and supports both ground and flight software,

U.S. Government Purpose Release

Copernicus Trajectory Design and Optimization System, Version 4.0 — MSC-25863-1

Copernicus 4.0 is a new release of the Copernicus spacecraft trajectory design and optimization software system. The new release contains many new features, including: full Windows 7® compatibility, a new redesigned graphical user interface (GUI), numerous new numerical methods, and assorted usability enhancements. The v4.0 release also includes many bug fixes and stability improvements. It represents a significant new version of Copernicus.

U.S. Government Purpose Release

Core Command and Data Handling (CC&DH) Component — GSC-15087-1

Helping to establish an instrument application development foundation for the James Webb Space Telescope (JWST) project, the Core Command and Data Handling (CC&DH) flight software is based on a layered architecture. The technology routes packets (commands, telemetry, and events) to and from a flight application and helps provide for generic flight computer health/safety, telemetry checking, and autonomous operation.

Note: ITAR-Sensitive Code

U.S. Government Purpose Release

Core Command and Data Handling (CC&DH) Library — GSC-15197-1

Containing no source code, this library is a binary, executable release of the Core Command and Data Handling (CC&DH) Component.

U.S. Government Purpose Release

Debris Examination Using Ballistic and Radar-Integrated Software (DEBRIS) — MSC-24827-1

DEBRIS provides the rapid and accurate C-band/X-band radar analysis to assess debris-related threats posed to ongoing missions. Jointly developed by Johnson Space Center (JSC) and the United States Air Force (USAF), the system is composed of two applications: the primary DEBRIS tool, which observes the initial 150 seconds of a flight, and the Automated Radar Debris Examination Tool (ARDENT), which observes the flight time segment between 150 and 480 seconds.

U.S. Government Purpose Release

DF Library (DFLIB), Version 1.X — MSC-25683-1

The DF Library (DFLIB) is a collection of software application programming interfaces (APIs) that provide convenience-function capabilities unique to a mission control center (MCC). These APIs allow the conversion of the DDD:HH:MM:SS time format to/from a floating point number; provide an X Windows® pop- up message generator and an X Windows file-selection interface; and include ISP computation interface functions and macros.

U.S. Government Purpose Release

Distributed Guidance and Control System for Satellite Constellations — GSC-14990-1

This satellite constellation control system minimizes the energy used for maneuvers.

U.S. Government Purpose Release

Flexible Docking Tool for Real-Time, Planning Missions MSC-24801-1

This flexible software tool improves rendezvous planning for a vehicle visiting the International Space Station (ISS). Features include a telemetry processing function, a relative motion function, a targeting function, a vector view, and two- and three-dimensional graphics. The technology's modeling capability ensures that a vehicle stays within desired coordinates.

U.S. Government Purpose Release

Flight Dynamics Planning and Analysis (FDPA) Subsystem Software MSC-24638-1

The FDPA subsystem's data pre-processing, flight simulation and analysis, and data post-processing capabilities have enabled accurate operations assessments of the International Space Station and the space shuttle. Assessments are performed in a sequential manner using graphical user interface menus and name-list statements to define required input and desired output.

U.S. Government Purpose Release

Global Positioning System (GPS) Enhanced Onboard Navigation System (GEONS) GSC-14687-1

GEONS processes data from standard GPS receivers, communication equipment, and/or attitude sensors to produce accurate, absolute, relative onboard navigation solutions in real time. Navigation products from GEONS support additional autonomous functions, including onboard maneuver control, science viewing, and relative navigation for formation keeping.

U.S. Government Purpose Release

Global Positioning System (GPS) Enhanced Orbit-Determination Experiment (GEODE) GSC-14354-1

The GEODE development effort consisted of providing reliable navigation products from available Space Products Platform 2000 data and delivering prototype boards for inclusion in the Guidance, Navigation, and Control Center's Formation Flying Test Bed (FFTB).

U.S. Government Purpose Release

Global Positioning System (GPS) Receiver Analysis Tool (RAT) MSC-24649-1

RAT reads telemetry information from a GPS receiver and determines the receiver's performance. As a telemetry-input file is read, an analyst can see the plotted satellites and telemetry information change in animated form. The analyst can halt the animation and generate high-quality PostScript images of the plot suitable for importing into post-flight reports.

U.S. Government Purpose Release

Global Positioning System (GPS) Satellite Geometry Analysis Tool (GPSGEM) MSC-24625-1

GPSGEM evaluates satellite geometry for a given Earth-fixed location or trajectory, provides a listing of all GPS satellites in view, and extrapolates a vehicle's trajectory even if two satellites are removed. The tool's navigation controllers offer insight into expected GPS constellation performance and assess implications for the ascent abort and entry phases of a flight. With GPSGEM output, analysts can determine if GPS constellation geometry is robust enough to support vehicle GPS receiver state solutions and/or accurate enough for a safe landing even if one or two satellites fail.

U.S. Government Purpose Release

Global Precipitation Measurement (GPM) Spacecraft Flight Software (FSW), Version 4.2.3 — GSC-16669-1

GPM's spacecraft flight software (FSW) controls and coordinates all aspects of the spacecraft's operation in nominal and anomolous conditions. It distributes commands to, and collects data from, all spacecraft subsystems and the science instruments; controls high-gain antenna pointing to TDRSS satellites; and manages communications with the ground controllers in real time to receive commands (during SSA contacts) and send housekeeping telemetry data during SSA and MA contacts. The GPM FSW sends science data using the Class-2 CCSDS File Delivery Protocol (CFDP); monitors the health of most orbiter subsystems and takes corrective actions when necessary; and controls the pointing of the spacecraft/instruments to the earth's surface, the orientation of the solar arrays to collect power, and the pointing of the high-gain antenna to communicate with TDRSS. The software uses the propulsion system to perform orbit station keeping and re-entry upon mission completion, implements a safehold controller, and can perform "yaw maneuvers" to re-orient the spacecraft velocity vector by 180 degrees. The GPM FSW uses Goddard's Operating System Abstration Layer (OSAL) and the Core Flight Executive (cFE) software. Ten Core Flight System (CFS) applications were co-developed by GPM and Code 582 and are now available in the Code 582 library for future mission use.

U.S. Government Purpose Release

GNSS-Inferred Positioning System and Orbit Analysis Simulation Software (GIPSY-OASIS) — JPL-19636

GIPSY-OASIS is widely used for geophysical and global positioning system research.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Alert Notification System Router (ANSR) — GSC-15592-1

The Alert Notification System Router (ANSR) is a software application that provides user notifications through paging and email. Page directives can contain text and/or attachments and can be sent to paging devices via the WCTP protocol, to email devices via the SMTP protocol, and to SMS devices via third-party email-to-SMS gateways. ANSR provides page escalation and tracking, offers a built-in redundancy capability, and interacts with other applications through GMSEC interfaces. The technology has been approved for use in operational environments.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center GMSEC) Alert Notification System Router (ANSR), Version 4.0 — GSC-17233-1

ANSR is an alert notification system providing paging and email services. Using call chains and call trees, ANSR supports call acknowledgement and call escalation allowing for multiple contingencies. As a central point of alarm configuration, notification, and reporting, it also provides a graphical configuration tool, a console-based monitoring tool, and a Web-based log viewer.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture — GSC-15142-1

From development through operations, the GMSEC Architecture provides a secure, scalable, extensible ground and flight system for existing and future missions. The technology enables quick and easy integration of functional mission-unique components. Standardized messaging provides communication among applications.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Revised GSC-15576-1

The GMSEC API provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The technology normalizes middleware behavior and supports multiple platforms and languages.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 2.5 GSC-15696-1

Version 2.5 of the GMSEC API includes several enhancements to the original. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 2.6 GSC-15778-1

Version 2.6 of the GMSEC API enhances and improves earlier implementations. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 3.2 GSC-16207-1

Providing mechanisms to manage cyber-attack risks, the security extension included in Version 3.2 of the GMSEC API offers message-level information confidentiality and integrity. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture, Revision 2 GSC-15577-1

Revision 2 of the GMSEC Architecture incorporates a variety of enhancements and improvements to the original version. From development through operations, the technology provides a secure, scalable, extensible ground and flight system for existing and future missions. Standardized messaging provides communication among applications.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Compliance Test Suite GSC-16074-1

The Compliance Test Suite includes both message publisher and message validator applications. The publisher feature provides a variety of predefined, displayable, and selectable messages. The validator reads a selected message and validates it against a corresponding XML schema. Detailed warnings and errors can be accessed with a double click on any specific message.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Criteria Action Table (CAT) GSC-15531-1

Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Criteria Action Table (CAT), Version 5.0 GSC-15611-1

Using its publish/subscribe capabilities, Version 5.0 of the Criteria Action Table implements a client/server architecture that communicates over the GMSEC bus. Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Criteria Action Table (CAT), Version 5.4.1 GSC-16853-1

Ported over customized-heartbeat-destination code from GREAT Event Analyzer 2.14, this version of the Criteria Action Table permits external monitor attribute strings to be substituted for unevaluated internal attribute strings. Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Criteria Action Table (CAT), Version 5.5 GSC-17185-1

The Criteria Action Table is a real-time decision-making component. Using predefined criteria (rules), CAT will ingest messages in real-time, analyze the content and context, and determine if the predefined criteria has been met. If so, an associated set of predefined actions is automatically triggered. Pre-defined actions can also be disabled. A decision-making, action-triggering component, such as CAT, can contribute to system-wide situational awareness, provide system-wide process orchestration, and enable system automation.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Environmental Diagnostic Analysis Tool (GEDAT) GSC-15529-1

GEDAT offers single-point, centralized visual representation of GMSEC-architected systems to allow users to identify and diagnose problems, failures, and errors quickly and efficiently. The tool provides status at a glance and delivers audible and visual alerts to signal various critical conditions as they occur.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Environmental Diagnostic Analysis Tool (GEDAT), Version 1.1 GSC-15848-1

Version 1.1 is an update to the original GEDAT tool. The technology displays numerous network components residing on one or more GMSEC buses; each component performs message-based communications using the publish/subscribe model. GEDAT offers single-point, centralized visual representation of GMSEC-architected systems to allow users to identify and diagnose problems, failures, and errors quickly and efficiently. The tool provides status at a glance and delivers audible and visual alerts to signal various critical conditions as they occur.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Environmental Diagnostic Analysis Tool (GEDAT), Version 2.0 GSC-16276-1

Version 2.0 of GEDAT features: a new tree-table display with selective filtering to support large-scale environments; added displays for CPU, memory, network resource graphing/plotting, server configuration, and message statistics; filtered search capabilities; improved menu-bar navigation capabilities; automatic elevation of errors or critical events; and user-configurable notification timeout monitoring.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Message Bus (MB) GSC-15141-1

Providing an alternative to costly commercial solutions, this user-configurable, easy-to-install middleware implementation supports all GMSEC Architecture and application interface messaging capabilities. NASA has used the technology during the development, testing, and integration of GMSEC-compliant components.

Open Source

Goddard Mission Services Evolution Center (GMSEC) Message Bus (MB), Revision 2 GSC-15575-1

This technology offers a variety of enhancements to the original GMSEC Message Bus. Providing an alternative to costly commercial solutions, the NASA-developed user-configurable, easy-to-install middleware implementation supports all GMSEC Architecture and application interface messaging capabilities. NASA has used the technology during the development, testing, and integration of GMSEC-compliant components.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Parameter Display Tool GSC-16073-1

This technology is a GMSEC-compliant software component that enables users to create and view a display page consisting of parameter and telemetry mnemonic values. Both text and color are used to delineate status.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Remote Application Service Provider (GRASP) GSC-16172-1

The GRASP application connects to the GMSEC bus, operating behind a firewall in a secured environment. The technology filters GMSEC messages based on subject and sends permitted messages to their destinations outside the control center. Both transmission protocol and encryption are configurable.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 1.8 (Enhanced) GSC-16581-1

The enhanced 1.8 version of GREAT enables Event Analyzer and Event Archive to support Oracle®. The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 2.3 GSC-16851-1

Version 2.3 of GREAT enables users to (1) archive real-time messages for multiple databases in parallel and (2) still be able to retrieve/display historical messages from a single database. The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 3.0 GSC-17234-1

GREAT is a toolkit for event/log messages, supporting single and multiple satellite systems. It provides real-time message display and message archive and retrieval. GREAT is useful as a debugging tool for monitoring real-time activity as reported by all other components and retrieving and also analyzing historical events.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Scalable Integrated Multi-Mission Support System (SIMSS) Simulator, Release 2.0 GSC-16039-1

This technology allows SIMSS to accept GMSEC-standard messages via the GMSEC message bus service.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Secure Application Programming Interface (API) Module, Version 1.0 GSC-16926-1

This software is an information assurance design for a satellite command and control (C2) system prototype that places security requirements on the GMSEC API. At a high level, this tool supports access control, confidentiality, and integrity when working with the Apache ActiveMQ middleware. This software is related to Version 3.2 of the GMSEC API (GSC-16207-1), which includes an abstraction that allows extensions with custom security features including message content encryption and digital signatures.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Secure Application Programming Interface (API) Module, Version 2.0 GSC-16929-1

This tool is an updated version of the Compat C2 extensions for the GMSEC API. Two key innovations have been added: support for WebSphere MQ and a variety of logical changes to conform to DOD coding requirements. This software is related to Version 3.5 of the GMSEC API (GSC-16207-1), which includes an abstraction that allows extensions with custom security features including message content encryption and digital signatures.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Secure Application Programming Interface (API), Release 3.5 GSC-17028-1

The GMSEC architecture is a comprehensive flight and ground system architecture that spans the full mission lifecycle. Software components use the GMSEC Architecture API to connect to a middleware software messaging bus that is responsible for message routing and delivery. The API and middleware combine to free the components from having to know where other components exist and what data they need. The API combined with the GMSEC message standards allow a component to be GMSEC-compliant and provide it with plug-and-play capability. Using standard messages for functionality helps the GMSEC environment achieve the goal of application interchangeability, by which standardized components can be easily exchanged without affecting other GMSEC components. For a component to be considered GMSEC-compliant, it must use the standard set of messages with the GMSEC API. The strength of the GMSEC API is that it allows changing middleware without impacting the GMSEC components or component interfaces. The API standardizes the interface to the middleware for the GMSEC component and normalizes the middleware behavior. The API supports multiple middleware, platforms, and languages. The API interface to the middleware ensures similar behavior from a large selection of commercial off-the-shelf middleware. API users can switch middleware without changing the components' underlying code. The GMSEC API also provides access to all the standard middleware messaging capabilities including publish/subscribe and request/reply. This software release contains major enhancements to previous releases of the GMSEC API, including greater reliability and enhanced usability. For example, this release includes a new feature which allows users to determine quickly and easily if their current operations environment has been correctly configured to use GMSEC.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) SystemAgent — GSC-15585-1

Utilizing a middleware-based architecture, this software provides computer host-agent health information to other GMSEC components. The technology will also execute directive commands received through GMSEC and monitor-specified log files.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) SystemAgent, Version 2.0 — GSC-15747-1

Version 2.0 of SystemAgent will obtain the following network resource information from a message/middleware server (i.e., TIBCO SmartSocket): network port bandwidths in Kbps, the number of bytes sent/received over the port, and the number of messages sent/received over the port.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) VCR — GSC-15589-1

This software will record all GMSEC-published/received messages (or a subset of those messages) and play them back at the same rate.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT) — GSC-15530-1

GREAT is a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, the technology greatly increases the operational value of system event logs and provides for increased operational efficiency.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 1.8 — GSC-16224-1

Version 1.8 of GREAT enables FOTs to monitor current mission-system status remotely. The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Trending Analysis and Plotting System (TAPS), Version 6.5 — GSC-15842-1

While the prototype TAPS system does not process and store telemetry data, it will request data from a server, generate trending products, and send requested products over an information bus using GMSEC messages.

U.S. Government Purpose Release

Integrated Test and Operating System (ITOS) — GSC-14012-1

The ITOS is a generic software system for controlling spacecraft and spacecraft components during development, testing, and operation in orbit. Inexpensive, portable, and highly configurable, the system runs under a variety of UNIX operating systems (e.g., Solaris, FreeBSD, and Linux) on workstations or personal computers.

U.S. Government Purpose Release

Integrated Test and Operations System (ITOS) Modifications — GSC-14806-1

A major update to the original system, this modification archives, displays, and analyzes telemetry; sends telecommands; and executes user-defined procedures for controlling tests and operations.

U.S. Government Purpose Release

Integrated Test and Operations System (ITOS), Release 7.3 — GSC-15090-1

This modification incorporates new enhancements and updates to the Integrated Test and Operations System.
U.S. Government Purpose Release

Integrated Test and Operations System (ITOS), Release 8 — GSC-16025-1

This ITOS modification features a new-events system that includes tools to allow the user to create old-style log files and manage the log database.
U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS) — GSC-15532-1

ITPS is a comprehensive trending and plotting tool for the storage, extraction, and analysis of spacecraft housekeeping telemetry data.
U.S. Government Purpose Release

Integrated View (IView), Version 1.1.2 — MSC-25625-1

The Integrated Viewer (IView) is a Web-based electronic tool used to execute Onboard Short-Term Plan Viewer (OSTPV) activities. The software serves as a consolidated user interface, integrating information from OSTPV, the International Procedure Viewer (IPV), and the Automated Stowage Note (ASN) tool.
U.S. Government Purpose Release

International Procedure Viewer (IPV), Version 3.1 — MSC-25612-1

This Web-based viewer offers a suite of tools to create electronic procedures, maintain libraries, and provide a backup viewing capability for standalone clients. IPV utilizes XML-formatted documents to display procedures and allows connectivity to the Automated Stowage Note (ASN) and the European Space Agency Portable Work Station Laptop Application.
U.S. Government Purpose Release

Interoperable Remote Component (IRC) — GSC-14308-1

IRC provides robust interactive and distributed control/monitoring of remote instruments. The IRC architecture combines the processing capabilities of Java with the power of XML to express hierarchical data in a human-readable, platform-independent format. For additional information, please visit: http://opensource.gsfc.nasa.gov/projects/IRC/index.php
Open Source

Java Application Shell (JAS) — GSC-14769-1

The JAS core program framework allows any Java 2 interactive application to be built as a set of plug-ins. The tool reduces development and testing time and greatly enhances code reuse.
U.S. Government Purpose Release

Java Astrodynamics Toolkit (JAT) — GSC-14912-1

The Java Astrodynamics Toolkit (JAT) is a collection of Java components that aid flight dynamics engineers in performing space mission design; trajectory optimization; and spacecraft navigation, attitude-determination, and control systems analysis. Current capabilities include orbit propagation, orbit determination, maneuver planning, spacecraft attitude simulation, and 3D orbit and attitude visualization.
Open Source

Joint-Execution Package Development and Integration (JEDI) Application — MSC-25099-1

JEDI is the primary tool used by all International Space Station control centers to create and approve messages for astronauts and flight control teams. JEDI messaging enables ground and crew personnel to update specific tasks or procedures quickly and efficiently.
U.S. Government Purpose Release

Lightwire GSC-14759-1

Lightwire is a passive retro-modulated communications tool that reduces data rates. The system transmits a carrier beam to a reflector that modulates the infinite carrier and returns the beam back.
U.S. Government Purpose Release

Maestro Science Activity Planner for Mars JPL-45871

The Maestro Science Activity Planner (Maestro) provides an intuitive interface to the Mars Exploration Rovers Mission, combining cutting-edge visualization with sophisticated planning and simulation capabilities.
U.S. Government Purpose Release

Method for Automatic Optimization of Yaw Maneuvers for Orbiting Space Vehicles MSC-25656-1

This software provides a simplified analytical solution for yaw maneuver optimization. The approach is applicable to the International Station (ISS) as well as other orbiting space vehicles.
U.S. Government Purpose Release

Mission Display (MDX) System JPL-35238

The Mission Display (MDX) System can be used to visualize a wide variety of raster scan data, including IFSAR images and DEM. The technology enables the user to view very large data sets (greater than 2 gigabytes per image) and offers several ways to combine information from different data sets into a single display window.
U.S. Government Purpose Release

Modeling-Error-Driven Performance-Seeking Direct Adaptive Control ARC-16235-1

This software uses a novel, stable, discrete, time-adaptive law that implements flight control to target damages/modeling errors in a direct adaptive-control framework. The baseline controller uses dynamic inversion with proportional integral augmentation. This methodology will investigate conditions for stability as well as performance.
U.S. Government Purpose Release

Modular Integrated Solution Toolkit (MIST) GSC-15337-1

The Modular Integrated Solutions Toolkit (MIST) is a software system designed to provide low- and medium-fidelity simulation of spacecraft telemetry and commands for ground system testing. The technology consists of a simulation architecture, simulation middleware, a user interface, and a library of functional elements.
U.S. Government Purpose Release

Multi-Purpose Attitude and Pointing System (MAPS), Version 7.1 MSC-25522-1

The Multipurpose Attitude and Pointing System (MAPS) has been used for attitude development and line-of-sight analysis since 1991. Version 7.1 of the software allows the user to model any motion-control system without post-processing or manually modifying data.
U.S. Government Purpose Release

NASA Caution and Warning Tool for International Space Station (ISS) Partners MSC-24697-1

Making it easier to communicate and coordinate evaluation and resolution activities, this software enables industry partners to receive the same caution and warning (C&W) data displays that ISS flight control teams receive. The technology allows all parties to consult from the same perspective. Status information is communicated to subscribers via XML message transmissions.
U.S. Government Purpose Release

Orbital Communications Adaptor (OCA) Management System (OCAMS) MSC-24833-1

OCAMS is a simulation-to-implementation, multi-agent system-development methodology that combines ethnography, participatory design, multi-agent simulation, and agent-based systems integration. Employing the Brahms programming language, the technology automates tasks, leverages network infrastructure to distribute information, and links arbitrary hardware and software systems to teams of people on Earth and in space.

U.S. Government Purpose Release

Planning Products Change Request (PPCR) Application MSC-24807-1

For the International Space Station (ISS) mission plan, this comprehensive change-request management tool offers built-in workflow processes to track condition-related information and thousands of tasks and activities. The technology allows planners to view a summary of all of the changes for any one mission day, even though the changes may have been received via multiple PPCRs and from various other flight controllers and disciplines.

U.S. Government Purpose Release

Positional Login (POSLOGIN) MSC-25483-1

In the Mission Control Center at Johnson Space Center, the operational support of International Space Station missions requires around-the-clock monitoring by flight controllers and support staff. POSLOGIN has been developed to ensure that processes remain in place and continue to be executed during shift changes.

U.S. Government Purpose Release

ROBUS-2 Fault-Tolerant Broadcast Communication System for Modular Avionics LAR-17264-1

ROBUS-2 is a time-division, multiple-access broadcast communication system that uses a time-indexed communication schedule for medium-access control. The technology provides guaranteed fault-tolerant services that include: message broadcast (Byzantine Agreement), dynamic communication schedule update, time reference (clock synchronization), and distributed diagnosis (group membership).

Open Source

Sasquatch Footprint Predictor MSC-25513-1

Sasquatch is used to predict flight paths and landing regions (i.e., footprints) to ensure that an aircraft's payload will land in a safe, obstacle-free region of a drop zone.

U.S. Government Purpose Release

Scheduling and Planning Interface for Exploration (SPIFe) ARC-15795-1A

The SPIFe interface allows plans to be generated under complex constraints and reduces the number of team members necessary to achieve mission goals. The technology, consisting of a set of plugins built using the Java Eclipse Rich Client Platform (RCP), complies with the standards of the Ensemble project. SPIFe software offers several novel controls and visualizations for task planning and a generalized application interface for communicating with planning engines.

U.S. Government Purpose Release

Scheduling, Training Administration and Records (STAR) System ARC-16336-1

This technology is a next-generation, Web-based training management system for crews, instructors, and flight controllers. Replacing the Training Administration Management System (TAMS), the Flight Operations Curriculum Administration System (FOCAS), and approximately 100 other disparate tools, STAR provides integrated curriculum development and documentation, customized training plans, personnel and facilities scheduling, training event feedback, and other training resources.

U.S. Government Purpose Release

Secure Multi-Channel Optical Communication Module GSC-14856-1

This optical communications module integrates the following components: a fiber-coupled laser transceiver array using laser-diode sources and GRIN collimator lenses; a dichroic splitter and lenslet array interfaced with a CCD (or CMOS) focal-plane array (used for multiple-beam centroid tracking); a MEMS micro-mirror array (used for multiple transmitter-beam steering and multiple receiver field-of-view selectivity); and an under-filled entrance/exit pupil of a telephoto lens or telescope. The optical technology is supported by adjunct electronics and digital signal-processing functions that enable full-duplex communications with and tracking of multiple sources/terminals.

U.S. Government Purpose Release

Space Link Extension Forward Command Link Transmission Link (CLTU) Service (User Side) GSC-15168-1

This software enables the user to (1) transfer command data from a mission control center to a ground station for uplink to a spacecraft and (2) then monitor the processing of each command from the ground station. The technology uses the Space Link Extension (SLE) Forward CLTU Service protocol, which is defined by the Consultative Committee for Space Data Systems (CCSDS).

U.S. Government Purpose Release

Space Link Extension Return Channel Frames (SLE-RCF) Service Software Library (User Side) GSC-15458-1

This software library enables a mission control center to receive telemetry frames from a ground station. The technology implements the SLE-RCF protocol as defined by the Consultative Committee for Space Data Systems (CCSDS). Software routines can be reused from mission to mission.

U.S. Government Purpose Release

Space Telecommunications Radio System (STRS) Compliance Tools LEW-18562-1

These tools aid in ensuring software compliance with the NASA-developed Space Telecommunications Radio System (STRS) architecture. The technologies support waveform application portability and upgradability and avoid the costs and risks associated with using software-defined radios.

U.S. Government Purpose Release

Telemetry and Science Data Software System GSC-15793-1

The Telemetry and Science Data Software System was designed to ease testing verification, assist in debugging system anomalies, and perform both trending data analysis and advanced science analysis.

U.S. Government Purpose Release

Telemetry and Science Data Software System, Updated GSC-16035-1

The Telemetry and Science Data Software System was designed to ease testing verification, assist in debugging system anomalies, and provide both trending data analysis and advanced science analysis.

U.S. Government Purpose Release

Tracking and Data Relay Satellite (TDRS) Simulator (TSIM) GSC-16845-1

TSIM provides a ground-based capabilities simulation of the first-generation Tracking and Data Relay Satellite (TDRS).

U.S. Government Purpose Release

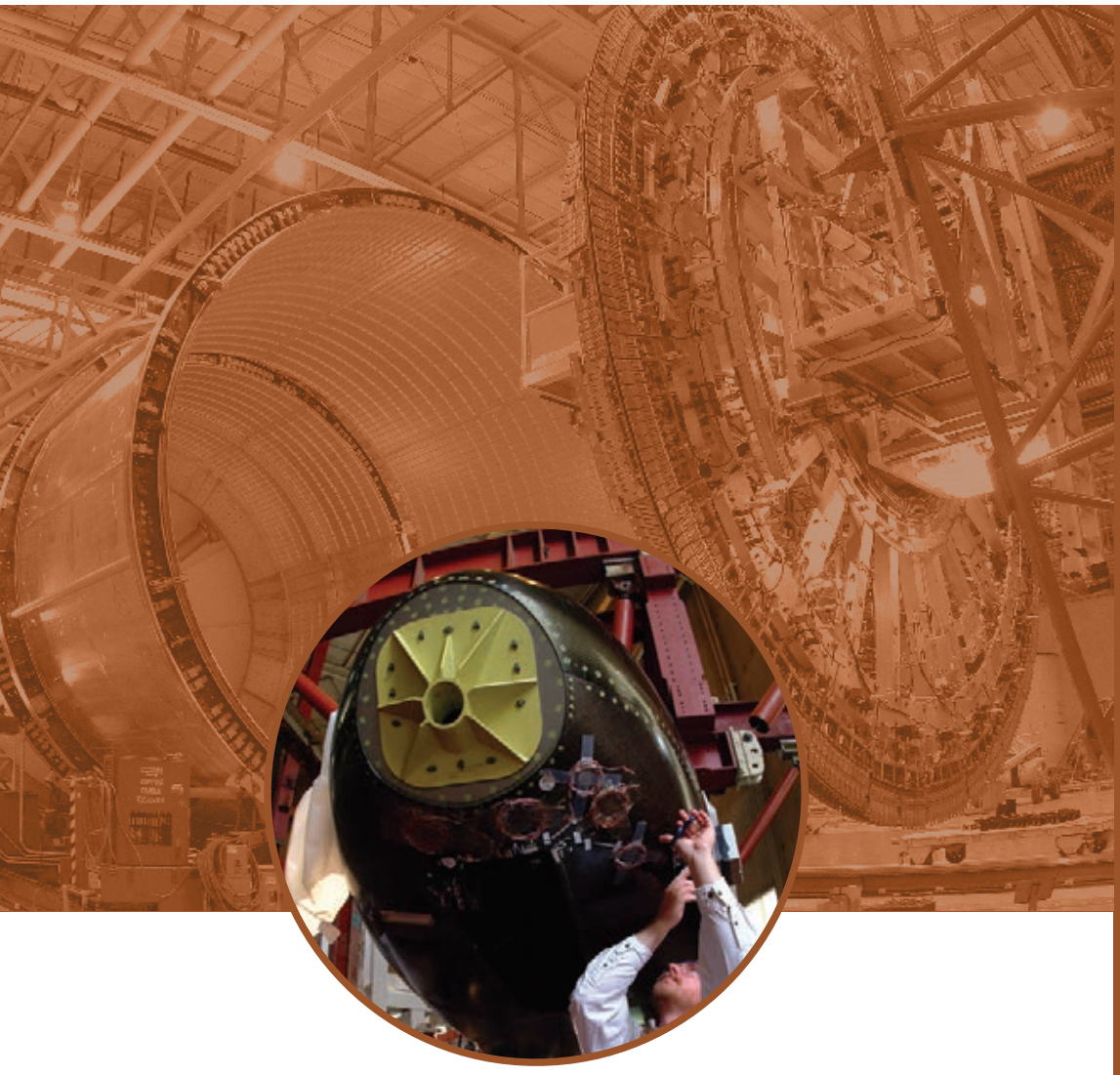
Visiting Vehicle Ground Trajectory Tool MSC-24763-1

This targeting tool provided the ability to perform planning and real-time operations for the visiting International Space Station (ISS) vehicle group.

U.S. Government Purpose Release

8

structures and mechanisms



Deployables

Structural Loading Analysis and Design

AESOP-STAB Ablation Modeling and Optimization Program, Version 3.1 — MSC-25566-1

To help maximize payload capability, AESOP-STAB determines the minimum weight of an n-layer thermal protection system (TPS) material subject to temperature constraints. Originally developed in the 1970s, code modifications include enhanced environment input options, solution routines, and material response capabilities. To use the program, the user must define the thermal model, select the desired optimization procedure(s), define all thermo-physical properties for each material, and provide the desired boundary conditions (i.e., heating rates and back wall conditions). AESOP-STAB was designed to make the preparation of input data as simple as possible.

U.S. Government Purpose Release

Beyond Low-Earth Orbit (LEO) Architecture Sizing Tool (BLAST) — MSC-25505-1

A user-friendly, configurable spacecraft sizing tool, BLAST provides a shareable, re-creatable, and rigorous end-to-end multi-element architecture framework that has been used to generate mass data for in-space, beyond low-Earth orbit (LEO) transportation vehicles and architectures. Offering a novel approach to modeling, BLAST couples extensive MER research with the ability to assess mission changes instantaneously by analyzing sensitivity sweeps of several parameters at once.

U.S. Government Purpose Release

Data Transfer Between Dissimilar Meshes (DTBDM), Version 2.0 — LAR-16371-1

Designed to automate an otherwise labor-intensive process, DTBDM puts the aerodynamic loads output of a computational fluid dynamics (CFD) package into the structural model of an aircraft to allow for deflection calculations.

U.S. Release Only

Development and Evaluation of an Order-N Formulation for Multi-Flexible Body Space Systems — MSC-25539-1

This NASA-developed tool is a generic, recursive order-N algorithm for systems with rigid or flexible bodies, in tree- or closed-loop topology, with N being the number of bodies of the system.

U.S. Government Purpose Release

Half-Cycle Crack Growth — DRC-010-044

This NASA-developed software program predicts the operational flight life of critical aero-structural components. The tool offers a reliable method for calculating theoretical fatigue crack growths that could lead to catastrophic structural component failures. The program builds upon and integrates Armstrong's proven half-cycle and closed-form aging theories and is especially accurate because it considers every half- cycle of loading spectra for specific structural components. The program works by reading test data files and determining maximum and minimum loads of each half-cycle of random loading spectra in order to calculate theoretical crack growth. The innovation is an improvement on traditional prediction software (and in particular on visual inspections) because it considers mini-amplitude stress loading and half-cycles based on the duty cycle of a particular component or structure.

U.S. Release Only

HCDstruct — LAR-18313-1

This MATLAB routine generates a scalable finite element model suitable for hybrid wing-body (HWB) structural analysis and optimization. HWB geometry structure is based on a vehicle sketch-pad (VSP) surface model of an aircraft and a FLOPS-compatible parameterization of the center body and wing structure. Optimization and weight calculation are based on a Nastran finite element analysis of the primary structural components.

U.S. Release Only

Piping Stress Analysis Software KSC-11692-1

The Piping Stress Analysis Software calculates the stress, working pressure, or required pipe-wall thickness for a given application in a simple, straightforward manner. The program allows the user to select a specific material from a database of commonly used materials or to create a customized database for an unlisted material. Pipes can be analyzed according to several sets of requirements, including the ASME/ANSI B31.1 and B31.3 piping codes and the JIC hydraulics code. Both standard and SI metric versions are available.
U.S. Release Only

Planetary Balloon Design Software GSC-15112-1

Planetary Balloon is an algorithm for sizing lobed balloons in any generalized environment on any planet. By including the effects of circular lobes with load tapes, skin mass, and hoop stress in the lobed bulges, the NASA-developed tool determines an accurate balloon shape of practical construction, including the room-temperature cut pattern for the gore shape.
U.S. Government Purpose Release

Trajectory Software Application Deorbit Opportunities Processors (TSA/DOPS) MSC-24639-1

Originally developed for the space shuttle and the International Space Station, TSA/DOPS allows multiple users to collaborate in the design and development of spacecraft deorbit opportunities. Once key parameters and variables have been entered, software algorithms generate useful information regarding sun-angle violations and ascending nodes.
U.S. Government Purpose Release

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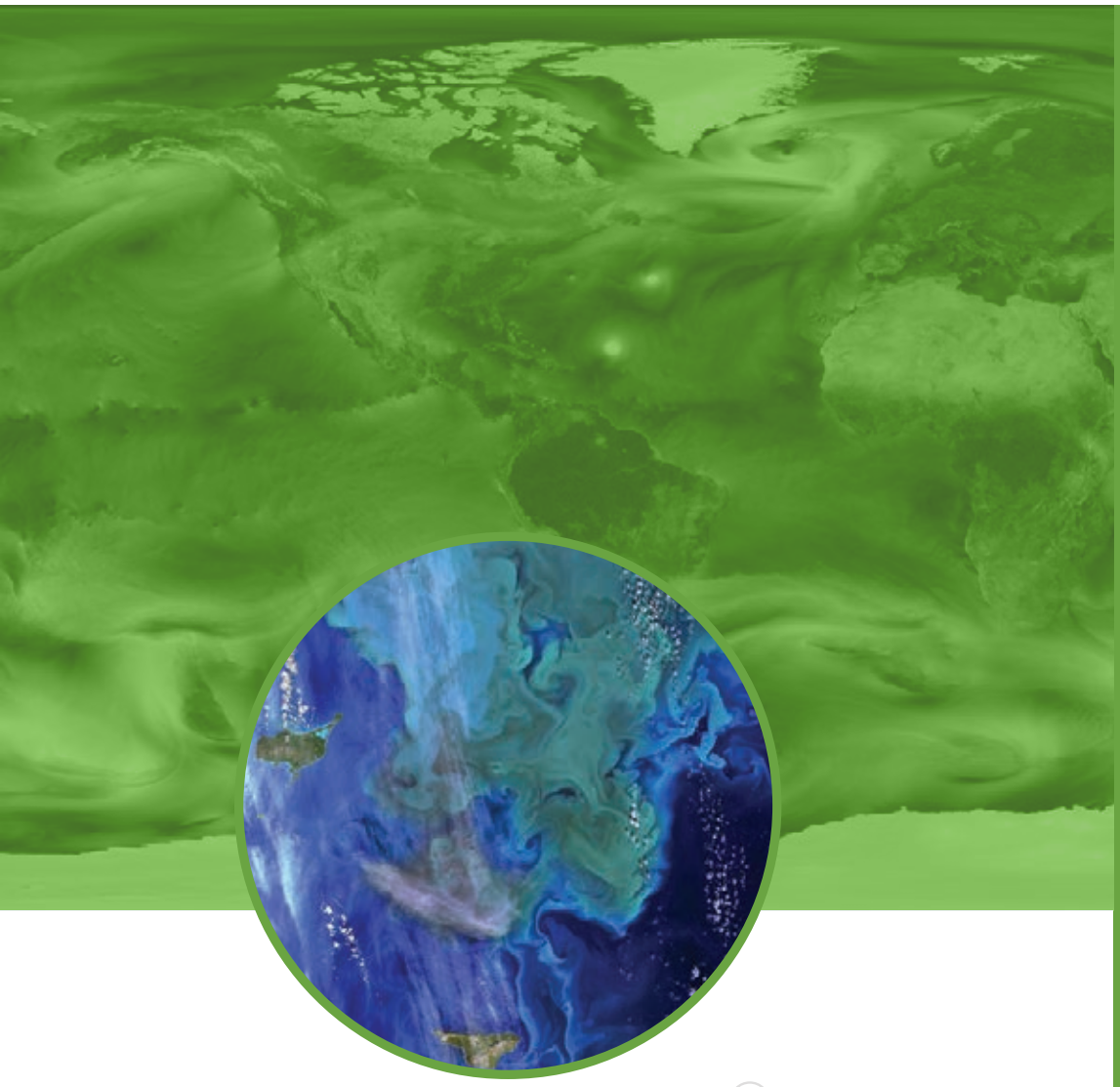
environmental science

earth • air • space • exoplanet



Terrestrial Environments

Planetary Atmospheric Modeling

Radiation Shielding

3D Visualization Software for Mission Science Operations (Viz) ARC-14933-1

The Viz package provides situational awareness, science analysis, and data understanding capabilities for planetary exploration mission science operations. Affording a modular and extensible visualization environment, the technology couples network and plug-in interfaces with a 3D scene graph database and an interactive 3D viewer.

U.S. Government Purpose Release

Active-Response Gravity Offload System (ARGOS Horizontal Software) MSC-25394-1

ARGOS provides a simulated environment to test robotic systems and humans in reduced gravity, including microgravity and lunar and Martian environments. Generation 1 of the technology repurposed a commercial off-the-shelf load management system as a proof of concept. Generation 2 utilizes a fully custom design with expanded system capabilities for speed and load capacity.

U.S. Government Purpose Release

Advanced Land Image Assessment System (ALIAS) GSC-15185-1

ALIAS supports radiometric and geometric multispectral image processing for the Advanced Land Imager (ALI) instrument onboard NASA's Earth Observing-1 (EO-1) satellite. The radiometric subsystem characterizes and (where possible) corrects: detector operability; gain; bias; coherent, impulse, and random noise; signal-to-noise ratios; saturation levels; striping and banding; and the stability of detector performance. Geometric processing functions support: sensor alignment calibrations; sensor chip assembly alignments; modulation transfer function characterizations; image-to-image characterizations; and geodetic accuracy assessments. Please visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/Alias/index.php

Open Source

AutoChem GSC-14862-1

AutoChem is a suite of programs that can be used as an automatic-code-generation symbolic differentiator and analysis/documentation tool for atmospheric chemical modeling and data assimilation. Written in Fortran 90, the technology is flexible, adaptable, and has been employed in a wide variety of kinetic applications. AutoChem is also applicable to combustion modeling, metabolism modeling, and interstellar chemistry.

U.S. Release Only

BUMPER Micrometeoroid and Orbital Debris Risk Assessment Tool, Version 3.0 MSC-25474-1

BUMPER is the primary risk analysis program used by NASA to provide safe and reliable operation of spacecraft exposed to the impacts of micrometeoroid/orbital debris (MMOD). BUMPER 3.0 is a major update to BUMPER-II released in the early 1990s.

U.S. Government Purpose Release

Contamination Mass Transport Analysis Software GSC-15193-1

This software package models molecular contamination transport from outgassing and propulsion systems; contaminant backscatter from the orbital environment; and particle redistribution during launch and on-orbit operations.

U.S. Government Purpose Release

Crisis Mapping Toolkit (CMT), Version 1 ARC-17472-1

The Crisis Mapping Toolkit (CMT) is a collection of tools for processing geospatial data (images, satellite data, etc.) into cartographic products that improve understanding of large-scale crises, such as natural disasters. The cartographic products produced by CMT include flood inundation maps, maps of damaged or destroyed structures, forest fire maps, population density estimates, etc. CMT is designed to rapidly process large-scale data using Google Earth Engine and other geospatial data systems. Download the software at: https://github.com/bcoltin/CrisisMappingToolkit

Open Source

Data Validation User Interface (DVUI) GSC-15097-1

DVUI is a navigation/discovery client on the Earth Observing System Clearinghouse (ECHO). The technology enables scientists to search, visualize, and order data tools necessary for validating Moderate-Resolution Imaging Spectroradiometer (MODIS) land products.
U.S. Government Purpose Release

DocBUILDERsolo GSC-15149-1

DocBUILDERsolo is a Java desktop application that allows users to create Earth science metadata. Providing both online and offline work environments, the technology offers portability, customization, and versatility. Key features include a visual checklist to indicate completeness; multiple document support; built-in coordination of keyword lists; a built-in spell checker; and optional writing templates.
U.S. Release Only

Earth Global Reference Atmospheric Model (Earth-Gram) 2010 MFS-32780-1

Earth-Gram 2010 is an open-source Fortran computer code that can run on a variety of platforms including PCs and UNIX stations. The model provides values for atmospheric parameters such as density, temperature, winds, and constituents for any month and at any altitude and location within the Earth's atmosphere. Versions from 1999 and 2007 are also available. More information can be found at: http://see.msfc.nasa.gov/tte/model_gram.html
U.S. Release Only

Electric Propulsion Interactions Code (EPIC) MFS-32165-1

EPIC is an interactive computer toolset that enables the construction of a 3D spacecraft model and the assessment of a variety of interactions between the model's subsystems and the plume from an electric thruster. EPIC unites different computer tools to address the many complexities associated with spacecraft/plume interaction processes. More information can be found at: http://see.msfc.nasa.gov/ee/model_epic.html
U.S. Release Only

ElectroStatic Return of Contaminants Tool (Updated) MFS-32011-1

The ElectroStatic Return of Contaminants (ESR) tool is a first-generation computational code created for the purpose of computing the return characteristics of spacecraft-generated contaminants. The code computes the Debye sheath (if necessary), the returned contaminant mass rate, returned mass flux, returned mass ratio, return velocity, and surface sputter (where applicable). To help the user, default values have been supplied for all program inputs. More information can be found at: http://see.msfc.nasa.gov/sc/model_esr.html
U.S. Release Only

Emission of Solar Protons (ESP) Model MFS-31315-1

The Emission of Solar Protons (ESP) Model is a computer model of the solar proton environment. The model predicts total solar proton fluence levels for interplanetary space in the energy range of 1 to 300 MeV, which is the range required for both solar cell and electronics applications. More information can be found at: http://see.msfc.nasa.gov/ire/model_esp.html
U.S. Release Only

Flood Dashboard GSC-16275-1

This technology aggregates SensorWeb-enabled airborne, ground sensor, and model data related to floods.
U.S. Government Purpose Release

General EQFlux — GSC-14791-1

The Windows® EQFlux computer program converts solar-cell damage resulting from hard-particle radiation into the equivalent fluence on MeV electrons. Please visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/eqflux/index.php

Open Source

General Mission Analysis Tool (GMAT), Revision 2012a — GSC-16565-1

GMAT is a software system for mission analysis and trajectory optimization, estimation, and prediction. The technology can be used to design spacecraft trajectories, optimize maneuvers, perform orbit determination, visualize and communicate mission parameters, and understand a mission's trade space. Please visit the following URL for more information: http://open.nasa.gov/blog/2012/06/12/general-mission-analysis-tool/

Open Source

GeoCam, Version 2 — ARC-16088-1A

GeoCam is a geospatial system for disaster response that consists of (1) low-cost consumer hardware (i.e., a digital camera or cell phone, position/orientation sensors, and an optional embedded controller) and (2) a Web-based workflow that enables images and other geo-referenced data to be shared and viewed in a variety of ways. GeoCam includes software that computes image location and provides for geo-rectification, KML-formatted geospatial data generation, image management, and geo-referenced data sharing. Download the software at: http://github.com/geocam

Open Source

GEOS-5 Global Change Master Modeling Software — GSC-15354-1

GEOS-5 is a next-generation circulation model. Developed using the Earth System Modeling Framework (ESMF) for its internal architecture, the technology represents a new paradigm for systems development. Please visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/GEOS-5/

Open Source

GEOS2WRF and MERRA2WRF Processing Tools — GSC-16065-1

GEOS2WRF and MERRA2WRF are data preprocessing tools for the Weather Research and Forecasting (WRF) limited-area weather model.

U.S. Government Purpose Release

Global Change Master Directory's MD9 Distributed Java-Based Directory Search Software System — GSC-14999-1

Version 9 of the Global Change Master Directory (GCMD) is a Java-based software system used to provide Earth science data and services. The MD9 software provides a three-tiered, object-oriented architecture that affords lightweight clients access through remote method invocation (RMI).

U.S. Government Purpose Release

Global Precipitation Measurement (GPM) Operational Simulator (GO-SIM) Core — GSC-16262-1

GO-SIM core provides a software-only simulator capability for executing GPM systems. The technology loads and runs different versions of spacecraft flight software, integrates with the Wind River workbench, and executes faster than real time.

U.S. Government Purpose Release

Global Precipitation Measurement (GPM) Operational Simulator (GO-SIM) Instrument Simulations — GSC-16264-1

These software-only science instrument simulations satisfy the GPM bus controller and allow flight software to operate as it would under normal conditions.

U.S. Government Purpose Release

Global Precipitation Space and Ground Radar Comparison Software — GSC-15469-1

Designed to support a prototype validation network for the Global Precipitation Measurement (GPM) space-flight mission, this space and ground radar comparison software collects data from the Precipitation Radar instrument flying on the Tropical Rainfall Measuring Mission (TRMM) spacecraft. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/GPM/

Open Source

Google Earth Offline Cache Pre-Loader (GEOCP), Version 1 — ARC-16089-1

GEOCP enables disaster responders to utilize Google Earth quickly in the field, where Internet connectivity may be sporadic or even unavailable. Download the software at: http://ti.arc.nasa.gov/m/groups/intelligent-robotics/geocp.zip

Open Source

HDFView Plugin — GSC-14948-1

This Java-language software plug-in to HDFView provides an interface for two versions of hierarchical data formats (HDF 4 and HDF 5). Please visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/HDF/index.php

Open Source

Integrated Space Weather Analysis (iSWA) System — GSC-16291-1

This Web-based dissemination system for NASA-relevant space weather information combines forecasts based on the most advanced space weather models and concurrent space environment information.

U.S. Government Purpose Release

Interactive Spacecraft Charging Handbook With Integrated, Updated Spacecraft Charging Models (ISCCH), Version 3.1 — MFS-31675-1

The ISCCH is an interactive, Web-based multimedia product that offers updated and integrated spacecraft charging models. The software guides the non-expert using the power of sophisticated analysis tools. More information can be found at: http://see.msfc.nasa.gov/ee/model_charging.html

U.S. Release Only

International Polar Orbiter Processing Package (IPOPP) — GSC-15570-1

IPOPP is the primary software package that enables the direct-readout community to process, visualize, and evaluate Earth science data from the Aqua and Terra missions. The technology will also be used in the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) and related missions. Please visit the following URL for more information: http://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=165&type=software

Open Source

Invasive Species Forecasting System (ISFS) Applications/QuickMap — GSC-15761-1

QuickMap is a simple OS X drag-and-drop application that automates an ISFS model run. Input consists of presence/absence point location data in the form of a text file. Output includes a diagnostic report that provides statistical details about the model and its resulting predictive surface.

U.S. Release Only

Invasive Species Forecasting System (ISFS) Architecture and Operation — GSC-15767-1

This technology supports the ISFS canonical modeling workflow, a set of sequential atomic steps necessary for computing a predictive spatial model.

U.S. Release Only

Invasive Species Forecasting System (ISFS) Command Interpreter (iShell) GSC-15765-1

This iShell technology is a command interpreter and script host that provides a traditional user interface to ISFS Core Services for UNIX and UNIX-like systems.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Core Services (iCore) GSC-15764-1

These file-conversion programs implement the ISFS canonical modeling workflow.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Framework GSC-15766-1

These programs, data, utilities, and documentation are required to create and run tailored site- and user-specific ISFS applications. By providing a skeleton for the software components common to all ISFS tools, the technology enables developers to build customized applications more quickly and at lower costs.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Predictors/GSENM GSC-15763-1

ISFS Predictors are site-specific environmental, remote sensing, and related data sets used as independent, covariate predictor variables in ISFS model runs.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Programs/SWLR GSC-15762-1

These statistical routines participate in the processing chain of ISFS Core Services.
U.S. Release Only

Investigation of Helioseismic Waves and Magnetic Variations Associated With Solar Flares GSC-14694-1

Using SOHO/MDI, YOHKOH, and RHESSI data, this project utilized the analysis of magnetic field variations to investigate energy release and transport in solar flares.
U.S. Government Purpose Release

J-Track 3D Satellite Tracking Application MFS-32013-1

J-Track 3D is a projection that displays numerous satellites in orbit around the Earth. The technology provides a set of Java components integrated with Web pages, back-end processes, and an SQL database and scripts to provide a suite of satellite tracking services. Features include optional ground trace and orbit trace. An interactive Web page can be found at: http://science.nasa.gov/realtime/jtrack/3d/JTrack3D.html/
U.S. Release Only

James Webb Space Telescope (JWST) Wavefront Sensing Software GSC-15399-1

This software package implements an image-based phase-retrieval algorithm. Using a variable number of irradiance measurements collected in defocused planes as input, the software is capable of determining optical wavefront information. In addition to the JWST, the technology is applicable to other segmented telescope systems.
U.S. Government Purpose Release

Kepler Community Data Analysis Tools ARC-16805-1

The Kepler archive contains time-series data calibrated and reduced from detector pixels. The pipelined reduction includes the removal of time-series trends systematic to a spacecraft and its environment. Download the software at: http://keplergo.arc.nasa.gov/PyKE.shtml
Open Source

Land Information System (LIS) Software, Version 6.1 — GSC-16290-1

LIS can be used (1) as a problem-solving environment for hydrologic research to enable accurate global water- and energy-cycle predictions, or (2) as a decision support system to generate useful information for disaster, water resource, and agricultural management; numerical weather prediction; and air quality and military mobility assessment. Extensible interfaces allow the incorporation of new domains, land surface parameters, meteorological inputs, data assimilation, and optimization algorithms. Please visit the following URL for more information: http://lis.gsfc.nasa.gov/

U.S. Government Purpose Release

Land Information System (LIS) Verification Toolkit (LVT) — GSC-16017-1

LVT is a high-resolution land surface modeling and data assimilation system that enables the evaluation, analysis, and comparison of outputs generated by the Land Information System (LIS).

U.S. Government Purpose Release

LidarVis, Version 1.0 — ARC-15569-1

LidarVis is a software program for visualizing distribution data collected from lidar. The technology provides advanced query capabilities that enable scientists to locate characteristic-specific distributions.

U.S. Government Purpose Release

Living With a Star: Space Environment Test Beds (LWS-SET) Carrier Simulator — GSC-14907-1

This technology simulates the data interfaces between the SET carrier and experimenters. Flag encoding and decoding capabilities are included for transmitted or received data. CRC error-checking encoding and decoding capabilities are also included. The software connects to other programs over serial port connections.

U.S. Government Purpose Release

Low-Altitude Trapped Radiation Model, Version 1 — MFS-31309-1

Accurate models of the Earth's trapped energetic proton environment are required for both piloted and robotic space missions. As astronomical and remote sensing detectors become more sensitive, proton flux can induce unwanted backgrounds in the instrumentation. The Low-Altitude Trapped Radiation Model, based on nearly 20 years of data from the TIRO/NOAA weather satellites, predicts the integral omin-directional proton flux in three energy ranges: >16, >36, and >80 MeV. The model contains a true solar cycle variation and accounts for the secular variation in the Earth's magnetic field. More information can be found at: http://see.msfc.nasa.gov/ire/model_low_altitude.html

U.S. Release Only

Lunar e-Library — MFS-32430-1

The Lunar e-Library database provides an accessible, searchable set of technical references on the lunar environment, lunar studies, and past lunar missions. This DVD knowledge base contains 1,100 (PDF) items with an emphasis on documents produced during the Apollo/Saturn era. Full text is available for 870 documents, and abstracts with source information are included for 230 documents that are copyrighted or have limited distribution. More information can be found at: http://see.msfc.nasa.gov/dmia/LunarELibrary.html

U.S. Release Only

Magnetogram Forecast (Mag4) — MFS-32802-1

Forecasting from a magnetogram of a sunspot active region, this algorithm predicts solar eruptions anticipated within the next 24 to 48 hours. The technology essentially transforms available solar scientific data into forecasting tools for severe space weather conditions.

U.S. Release Only

Mars Global Reference Atmospheric Model (Mars-GRAM) 2010 — MFS-33158-1

Mars-GRAM is an engineering-level atmospheric model widely used for diverse mission applications, including systems design, performance analysis, and operations planning for aerobraking, entry descent and landing, and aerocapture. More information can be found at: http://see.msfc.nasa.gov/tte/model_Marsgram.html

General Public Release

MATLAB-Based Solar System Ephemeris Toolbox — KSC-12544

This set of MATLAB functions has been used to generate state data (position and velocity) for the Sun, the Earth's moon, and all of the other planets in the solar system. Provided by the Jet Propulsion Laboratory's Solar System Dynamics Group, the technology uses Chebychev polynomial fits of numerical integration results for solar system motion. Essentially, the toolbox functions as the MATLAB equivalent of JPL Fortran routines used to construct binary ephemeris files, verify correct installation, and generate state data.

General Public Release

Meteoroid Engineering Model (MEM), Version 1.0 — MFS-32205-1

The MEM model can be used to describe the meteoroid environment anywhere in the inner solar system. Incorporating a physics-based approach rather than traditional empirical fits, the model provides important information necessary for spacecraft survivability, including meteoroid directionality and velocity distributions. More information can be found at: http://www.nasa.gov/offices/meo/software/mem_detail.html

U.S. Release Only

NASA Forecast Model Web (NFMW) Map Service — GSC-15276-1

NFMW reads weather forecast models outputs; subsets the data to the region of interest; interpolates the data to the specified size; generates a visualization of the data using colors, contour lines, or arrows; and sends the visualization to the client. More information can be found at: http://opensource.gsfc.nasa.gov/projects/NFMW/

Open Source

NASA Marshall Engineering Thermosphere (MET) Model 2007 — MFS-33038-1

MET-2007 consists of a computer program and subroutines. For altitude ranges up to 2,500 kilometers, the technology provides information on atmospheric properties as a function of latitude, longitude, time, solar flux, and geomagnetic indices. The model outputs the following parameters: exospheric temperature, local temperature, atmosphere constituent number densities, average molecular weight, total mass density, and total pressure. More information can be found at: http://see.msfc.nasa.gov/tte/model_met.html

U.S. Release Only

NASA Unified Weather Research and Forecasting (WRF) — GSC-16234-1

At NASA, WRF is being used to study: the precipitation processes associated with several high-impact weather events; aerosol impact on area climate and water cycles over monsoon regions; the influence of land surface heterogeneity and soil moisture gradients on land-atmosphere interactions; explicit simulations of hurricanes; and interactive chemistry-aerosol processes.

U.S. Government Purpose Release

NASA World Wind Java (WWJ) Software Development Kit (SDK) and Web Mapping Services (WMS) Server — ARC-15166-1A

NASA World Wind is an intuitive software application supporting the interactive exploration of a variety of data presented within a geospatial context. The technology offers a 3D graphics user experience with seamless, integrated access to a variety of online data sources via open-standards protocols. Download the software at: http://worldwind.arc.nasa.gov/java/

Open Source

NASA/Air Force Spacecraft Charging Analyzer Program (NASCAP-2K), Version 4.1 — MFS-32056-1

NASCAP-2K is the next-generation spacecraft charging analysis code. The technology is a comprehensive update to the original NASCAP spacecraft charging codes written twenty years ago. A collaboration of NASA and the U.S. Air Force Research Lab (AFRL), the software builds upon the Air Force's DynaPAC charging algorithms and will replace 3D spacecraft charging codes for all environments. More information can be found at: http://see.msfc.nasa.gov/ee/model_nascap.html

U.S. Release Only

Neo-Geography Toolkit (NGT), Version 2 — ARC-16341-1A

NGT is a collection of automated processing tools that can transform raw geospatial raster data from remote sensing instruments into useful cartographic products, including visible image base maps and topographic models. Download the software at: https://github.com/neogeographytoolkit/stereopipeline

Open Source

Neptune Global Reference Atmospheric Model (Neptune-GRAM), Version 1.0 — MFS-32296-1

From surface to orbital altitudes, this Fortran-based program provides engineering estimates of density, temperature, pressure, and winds for the Neptune atmosphere. More information on the Space Environments & Effects (SEE) Program can be found at: http://see.msfc.nasa.gov/

U.S. Release Only

Obs4MIPS — GSC-16848-1

This technology is a front end to the Climate Model Output Rewriter (CMOR2) software package. The technology converts a variety of standard data formats (e.g., netcdf3, netcdf4, Grads control files, and MATLAB data files) to allow publication on the Earth System Grid Federation (ESGF) data node.

U.S. Release Only

Ocean Processing Software for NASA's Moderate-Resolution Imaging Spectrometer (MODIS) Combined Ocean Color — GSC-14518-1

These software programs process MODIS Level 1B satellite data and retrieve geophysically important measurements of the world's oceans. The programs use EOS toolkit support routines and HDF-EOS file structures and are written in C and Fortran 90.

U.S. Release Only

Orbital Debris Engineering Model (ORDEM), Version 3 — MSC-25457-1

ORDEM offers flux as a function of debris size and year. The technology can be operated in spacecraft mode or telescope mode. An upgraded user interface uses project-oriented organization and provides graphical representations of numerous output data products.

General Public Release

PolyMap/NetView — GSC-14771-1

The PolyMap/NetView set of software tools (1) populates and extracts geospatial data from an Oracle® database and (2) converts geospatial data between different file formats. New data sets can be created on the fly.

U.S. Government Purpose Release

Portable Airborne Laser System (PALS) — GSC-14906-1

PALS is a small, portable airborne lidar profiling system created using off-the-shelf, commercially available components. The technology is composed of four subsystems: a laptop computer running LabVIEW; a charge-coupled device (CCD) video camera system; a differential global positioning system; and a laser transmitter/receiver.

U.S. Release Only

Radiation Environment Array Charge Transport (REACT) MFS-32001-1

The REACT detector array charge collection model is useful in the design of optical sensor missions. \More information can be found at: http://see.msfc.nasa.gov/dt/model_react.html

U.S. Release Only

Real-Time Display of Global Earth Science Data for Informal Education (Earth Today) GSC-14926-1

Earth Today (ET) is an autonomous exhibit that displays near-real-time satellite data to the public. The technology features attractive visualizations of sea-surface temperature (SST); SST anomalies; GOES IR water vapor, and GOES IR clouds.

U.S. Government Purpose Release

SAIC Algorithm Test Bed for Asteroid Detection (SALTAD), Version 1.5 GSC-16050-1

Composed of a series of C-language models, the SALTAD software package processes multi-frame image data to detect moving asteroids in a star-cluttered background. The software is highly modularized for interfacing with existing near-Earth asteroid search facility software.

U.S. Release Only

Satellite Contamination and Materials Outgassing Knowledgebase (SCMOK), Version 3.0 MFS-32183-1

SCMOK is a combination of the ASTM E1559 and Space QCM flight databases. Approximately 200 contamination/space environmental effects papers/reports are available, including LDEF papers for the three post-retrieval conferences and also papers related to POSA, MIR, and the International Space Station. The information can be accessed and searched using Acrobat. More information can be found at http://see.msfc.nasa.gov/nec/db_contam.html

U.S. Release Only

Sea-Viewing Wide-Field-of-View Sensor (SeaWiFS) Data Analysis (SeaDAS) GSC-14719-1

SeaDAS is a comprehensive package for processing, displaying, analyzing, and ensuring the quality control of all SeaWiFS data products. The technology also provides processing, display, and analysis capabilities for other satellite sensors, including the Ocean Color and Temperature Sensor (OCTS), the Coastal Zone Color Scanner (CZCS), the Modular Optoelectronic Scanner (MOS), and the Moderate-Resolution Imaging Spectroradiometer (MODIS).

U.S. Government Purpose Release

SensorWeb GSC-15535-1

This technology enables a network of heterogeneous sensors to work as a cohesive whole. Users can specify a series of actions, data aggregations, and fusion operations with the details of the implementations hidden.

U.S. Government Purpose Release

SensorWeb Campaign Manager Application Programming Interface (API) With Client GSC-16059-1

This Java code application enables machine-to-machine access between a client platform and the Campaign Manager application programming interface.

U.S. Government Purpose Release

Service Algorithm Visualization and Networking Tool (SAVANT) for Web Services GSC-14785-1

The SAVANT graphical tool creates “visual programs” of Web service operations. Users can produce processing flowcharts; drag arrows to connect parameters between operations; and specify processing flow order.

U.S. Government Purpose Release

SHARM: the Software Solving the Monochromatic Radiative Transfer Problem in Planetary Atmospheres Using Spherical Harmonics Method — GSC-14838-1

SHARM has been used to generate look-up tables and develop advanced algorithms of aerosol retrieval and atmospheric correction of Landsat Enhanced Thematic Mapper Plus (ETM+) images.
U.S. Government Purpose Release

Simple Thermal Environment Model (STEM) User's Guide — MFS-31728-1

Helpful in the thermal analysis of near-Earth spacecraft, the STEM User's Guide is a Fortran-based program that provides engineering estimates of top-of-atmosphere albedo and outgoing longwave radiation. More information on the Space Environments & Effects (SEE) Program can be found at: http://see.msfc.nasa.gov/
U.S. Release Only

Space Physics Data Facility (SPDF) Web Services — GSC-14730-1

These Web services provide a distributed programming interface to a portion of the Space Physics Data Facility (SPDF) software. The technology conforms to all applicable Web service specifications of the World Wide Web Consortium. Please visit the following URL for additional information: http://spdf.gsfc.nasa.gov/
Open Source

Space Weather Android® App — GSC-16321-1

Developed for the Community Coordinated Modeling Center, this Android® application displays space weather information. Users can swipe between space weather data products to see the latest available data; pan and zoom to see a detailed view of any particular product; rearrange and add space weather data products to the application layout; and browse a data catalog by category. Please visit the following URL for more information: https://play.google.com/store/apps/details?id=gov.nasa.gsfc.iswa.NASASpaceWeather
General Public Release

Space Weather iPhone® App — GSC-16226-1

Developed for the Community Coordinated Modeling Center, this iPhone®/iPod® touch application displays space weather information. Users can swipe between space weather data products to see the latest available data; pan and zoom to see a detailed view of any particular product; rearrange and add space weather data products to the application layout; and browse a data catalog by category. Please visit the following URL for more information: https://itunes.apple.com/us/app/nasa-space-weather/id422621403?mt=8
General Public Release

Spacecraft Materials Selector (SMS) Expert System — MFS-31328-1

The SMS knowledge base is a preliminary design tool that provides estimates of environmental exposures and/or materials performance. Inputs may launch date, altitude, inclination, mission duration, and certain characteristics of satellite motion. More information can be found at: http://see.msfc.nasa.gov/mp/model_sms.html
U.S. Release Only

Terrestrial Observation and Prediction System (TOPS) — ARC-16197-1

Integrating satellite, aircraft, and ground sensor data with weather/climate models, TOPS produces operational nowcasts and forecasts of ecological conditions. Helping to mitigate potential negative impacts, the technology determines the appropriate socio-economic and resource management approach necessary for handling fluctuations within the biosphere. Please visit the following URL for more information: http://ecocast.arc.nasa.gov/topwp/
U.S. Release Only

The Charge Collector (TCC), Version 2.1 — MFS-32019-1

TCC is a compilation of spacecraft charging tools including design guidelines and a variety of information from government/industry/academic databases and reports. More information can be found at: http://see.msfc.nasa.gov/ee/db_chargecollector.html

U.S. Release Only

Thermal Protection System Sizing (TPSSZR) Using Sinda/Fluint — ARC-15016-1

TPSSZR is an automated thermal protection system (TPS) distribution and sizing analysis code for analyzing space vehicles at the conceptual-design level. The technology automatically generates TPS stackups and aerothermal environment files, maintains consistent material properties descriptions, and has the capability to simultaneously evaluate multiple nominal and abort flight trajectories.

U.S. Government Purpose Release

Titan Global Reference Atmospheric Model (Titan-GRAM), Version 1.0 — MFS-32297-1

Titan-GRAM is a Fortran-based program that provides engineering estimates of density, temperature, pressure, and winds for the Titan atmosphere. More information on the Space Environments & Effects (SEE) Program can be found at: http://see.msfc.nasa.gov/.

U.S. Release Only

Trapped Proton Model (TPM) — MFS-31329-1

TPM determines the differential omnidirectional proton flux from 1 to 100 MeV. At high altitudes, the model is based on CRRESPRO developed by AFRL; at low altitudes, the model is based on data from the TIROS/NOAA (POES) low-altitude polar-orbiting satellites. The model contains a true solar cycle variation and also contains sub-models for quiet and active magnetospheric states. More information can be found at: http://see.msfc.nasa.gov/ire/model_tpm.html

U.S. Release Only

Trapped Radiation Models: Uncertainties for Spacecraft Design — MFS-31319-1

The focus of Trapped Radiation Models software development effort was to help spacecraft and payload designers to account for uncertainties in predictive models of the Earth's trapped radiation environment. A tool was needed for more accurately determining radiation requirements and risks, which are essential elements for producing less expensive, more reliable spacecraft. More information can be found at: http://see.msfc.nasa.gov/ire/model_traprad.html

U.S. Release Only

Venus Global Reference Atmospheric Model (Venus-GRAM) 2005, Version 1.0 — MFS-32314-1

Venus-GRAM 2005 is a Fortran-based program that provides engineering estimates of density, temperature, pressure, and winds for the Venus atmosphere. More information can be found at: http://see.msfc.nasa.gov/tte/model_Venusgram.html

General Public Release

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design and integration tools

Vehicle/Payload Modeling and Analysis

Component and Integrated System Simulation

Advanced Life Support Sizing Analysis Tool (ALSSAT), Version 12.0 — MSC-25510-1

The Advanced Life Support Sizing Analysis Tool (ALSSAT) is a computer model for sizing and analyzing designs of environmental-control and life support systems (ECLSS) for spacecraft and surface habitats involved in the exploration of Mars and the Moon. It performs conceptual designs of advanced life support (ALS) subsystems that recycle air and water and process wastes in order to reduce the need for resource resupply. ALSSAT is a means of investigating combinations of such subsystems' technologies and thereby assists in determining the most cost-effective technology combination available. Using the Microsoft® Excel® spreadsheet software with Visual Basic programming language, ALSSAT has been developed to perform multiple-case trade studies based on the calculated ECLSS mass, volume, power, and Equivalent System Mass, as well as parametric studies by varying the input parameters. ALSSAT's modular format is specifically designed for the ease of future maintenance and upgrades.

U.S. Government Purpose Release

Aerospike Design and Performance Tool (ADAPT) — MFS-33098-1

The ADAPT computer code designs and analyzes the performance of linear, annular, or plug-cluster aerospike engines. ADAPT can automatically evaluate aerospike nozzle performance over a wide variation of independent design variables, and it can be used in concert with other built-in analysis techniques to optimize aerospike nozzles over an entire flight envelope. Any propellant system can be modeled. Outputs of the code include files that contain the thruster/spike contour and a summary output file for each thruster/spike design point, as well as vacuum and delivered performance data for the thruster and the entire thruster/spike module. One-dimensional performance data are also included for both the thruster and aerospike so that efficiencies and comparisons may be made.

U.S. Release Only

Aerotherm Charring Material Thermal and Ablation Program (CMA02) — MFS-31980-1

The Aerotherm Charring Material Thermal and Ablation Program (CMA02), developed from the public domain CMA87S code, is an implicit, finite-difference computational procedure for computing the one-dimensional transient transport of thermal energy in a three-dimensional isotropic material.

U.S. Release Only

Aerotherm Chemical Equilibrium (ACE) — MFS-32300-1

The Aerotherm Chemical Equilibrium (ACE) code was developed for predictive thermal/ablative analysis of rocket nozzle liner materials. The tool offers versatility in calculating quantities of importance to a broad variety of thermochemical processes.

U.S. Release Only

Architecture Adaptive Computing Environment (ACE) — GSC-14911-1

The Architecture Adaptive Computing Environment (ACE) is a parallel computing language, compiler, and runtime library. The purpose of ACE is to allow a programmer to more easily write parallel programs for a wide variety of parallel computer architectures.

Open Source

Assert-Based Unit Test Tools — GSC-16689-1

The ut-assert unit test tools provide a unit test framework and a collection of utilities that are designed to facilitate unit testing. These tools implement an assertion-based testing philosophy that requires the developer to explicitly write verification statements that assert whether a condition is true or false. This approach is much different than the Flight Software Branch's historical approach to unit testing that creates a log file that requires developer analysis in order to determine whether a test passed or failed. In order to use the tools, a developer populates the framework with his unit tests and links with the ut-asssert library to create an executable. Download the software at: http://opensource.gsfc.nasa.gov/projects/ut-assert/index.php

Open Source

Automated Mission Planning and Scheduling (AMPS) System, Version 2 — GSC-15852-1

Five major components comprise the AMPS solution: (1) a C-language integrated production system (CLIPS) inference engine; (2) a graphical user interface (GUI); (3) a common object request broker architecture (CORBA); (4) a special functions component; and (5) a data component. CLIPS resolves currently active goals and objectives into a plan; a dynamic scheduler algorithm then expands the plan into a full schedule, adjusting it as needed.

U.S. Government Purpose Release

Automated Triangle Geometry Processing for Surface Modeling and Cartesian Grid Generation (Cart3D) — ARC-14275-1

Cart3D is a high-fidelity inviscid analysis package for conceptual and preliminary aerodynamic design. It allows users to perform automated computational fluid dynamics (CFD) analysis on complex geometry. The package includes utilities for geometry import, surface modeling and intersection, mesh generation, and flow simulation. Cart3D is highly automated so that geometry acquisition and mesh generation can usually be performed within a matter of minutes on most modern UNIX workstations or PCs.

U.S. Government Purpose Release

Bearing Analysis Tool (BAT) — MFS-31864-1

The Bearing Analysis Tool (BAT) allows detailed design of rolling element bearings rocket engine turbopumps and other applications. It includes a graphical user interface that greatly reduces the effort required to define analytical models for simulation and design.

U.S. Release Only

Boundary-Layer Integral-Matrix Procedure (BLIMP) — MFS-23348-1

The Boundary-Layer Integral-Matrix Procedure (BLIMP) software provides fast, highly accurate solutions to gas-phase boundary-layer flow problems encompassing a broad range of boundary conditions. The tool is capable of obtaining accurate and economical solutions to governing differential equations of momentum, energy, and species.

U.S. Government Purpose Release

Brahms: A Multiagent Simulation/Execution Environment for the Brahms Multiagent Language — ARC-15654-1

Brahms is a multiagent programming language for modeling people and systems in a conceptual world. Brahms language gives users the ability to model the behavior of human organization, communication, and teamwork, as well as human-machine interaction.

U.S. Government Purpose Release

Campaign Manager (or GeoBPMS) — GSC-16267-1

The Campaign Manager (also known as GeoBPMS) is a type of Workflow Chaining Service (WfCS) that is intended to standardize methods to orchestrate multiple sensors in heterogeneous environments. Users can script sensors that reside in various secure domains using an intuitive interface. Campaign Manager can create a customized, low-cost data processing pipeline for sensor tasking, data acquisition, data processing, and distribution.

U.S. Government Purpose Release

Configuration-Based Aerodynamics (CBAERO) ARC-15819-1

CBAERO is a software tool for the prediction of the conceptual aero-thermodynamic environments of aerospace configurations. The vehicle geometry is defined using unstructured, triangulated surface meshes. For subsonic Mach numbers, a fast, unstructured, multi-pole panel code is coupled with a streamline tracing formulation to define the viscous surface solution. For supersonic and hypersonic Mach numbers, various independent panel methods are coupled with the streamline tracing formulation, attachment line detection methods, and stagnation-attachment line heating models to define the viscous aero-thermal environment.
Note: CBAERO is also available to U.S. Academia without a government purpose.
U.S. Government Purpose Release

Charring Ablator Response (CHAR) Code MSC-25599-1

The CHarring Ablator Response (CHAR) Code is a 1D, 2D, and 3D ablation, thermal analysis, and porous flow solver primarily used to predict the response of ablative thermal protection systems during atmospheric entry. The software can be executed on serial and massively parallel computing platforms.
U.S. Release Only

Charring Material Ablator (CMA87) Code MFS-32299-1

The Charring Material Ablator (CMA87) code is a predictive software program that performs thermal and ablative analysis of rocket nozzle liner materials. The software is written in ANSI-standard Fortran 77 and uses standard mathematical functions found in common linkable object libraries on most high-end workstations and/or PC platforms.
U.S. Release Only

CMA92FLO Aerotherm Charring Material Thermal Response Ablating Program MFS-31355-1

The CMA92FLO Aerotherm Charring Material Thermal Response Ablating Program is an implicit finite-difference computational procedure.
U.S. Release Only

CMA93FLO Aerotherm Charring Material Thermal Response Ablating Program MFS-31767-1

In this version of the Aerotherm Charring Material Thermal Response Ablating Program, developed for NASA by Aerotherm, a line of code was altered so the program would read input data from a previous file rather than waiting for operator input from an interactive terminal.
U.S. Release Only

Computational Fluid Dynamics (CFD) Utility Software Library ARC-14467-1A

A collection of utility programs and reusable subroutine libraries supports computational fluid dynamics, particularly on multiblock structured grids. The technology is applicable to all flight regimes: subsonic, transonic, supersonic, and hypersonic. Download the software at: http://sourceforge.net/projects/cfdutilities
Open Source

Computational Fluids Laboratory 3-Dimensional (CFL3D) LAR-16003-1

CFL3D is a structured-grid, cell-centered, upwind-biased, Reynolds-Averaged Navier-Stokes (RANS) code. It can be run in parallel on multiple grid zones with point-matched, patched, overset, or embedded connectivities. Both multigrid and mesh sequencing are available in time-accurate or steady-state modes.
U.S. Release Only

CORSAIR Three-Dimensional Unsteady Viscous Flow Analysis/WILDCAT Two-Dimensional Unsteady Viscous Flow Analysis, Version 35.05.01.01 — MFS-31622-1

CORSAIR is a three-dimensional unsteady Navier-Stokes analysis used for solving flows in rotating turbomachinery components. CORGRD is the grid generator written to accompany the CORSAIR analysis. The grid generator produces overlaid O-H grids for rotating turbomachinery components, including those with tip clearance and varying endwall radii. WILDCAT is the two-dimensional counterpart of CORSAIR.
U.S. Government Purpose Release

Data Parallel Line Relaxation Code (DPLR), Version 4 — ARC-16021-1A

The DPLR software package is a suite of CFD tools for the computation of supersonic and hypersonic flows in chemical and thermal nonequilibrium. Included in the package are 2D/axisymmetric and 3D structured grid finite volume Navier-Stokes codes, a pre-processor, and a post-processor. The code supports implicit boundary conditions, generalized multi-block topologies, grid alignment to flow features, and generalized chemical kinetics and thermodynamic property databases.
U.S. Government Purpose Release

Decelerator System Simulation (DSS) — MSC-24014-1

DSS software predicts and analyzes the dynamics of a load of cargo dropped with parachutes from an aircraft, from the first motion in the aircraft until the payload reaches the ground. The system, which comprises a Microsoft Windows version paired with Excel, is easier to use than the UNIX system-based version.
U.S. Release Only

Design Process Integration (DPI) — KSC-12294

Design Process Integration (DPI) is a systems engineering approach using an integrated database. It provides checklist-type data input forms to assure compliance with contractual requirements and also provides a common database repository for the information behind the released design drawings.
U.S. Release Only

Distributed Intelligent Agents for Information Management and Sharing (DIAMS) — ARC-14654-1

DIAMS is a network of collaborative agents that facilitate information access, management, and sharing. Personal agents store collections of information relevant to a person or group. The information is organized by the user in a graph structure, and a collection browser is provided that decomposes the graph structure into a hierarchy for ease of display. Personal agents extend the user's graph structure by (a) automatically extracting keywords from the graph nodes, (b) forming a network of information that may be browsed by the user, and (c) exchanging information in this process and suggesting new information sources to the user. Finally, a matchmaker agent is provided to assist in the discovery of other personal agents.
U.S. and Foreign Release (Academic)

Disturbance-Optics-Controls-Structures (DOCS) Toolbox — GSC-15019-1

The DOCS Toolbox is a software tool for performing integrated modeling for multidisciplinary analysis and design. The tool allows the definition of subsystem/component models, including structural models, control system models, optical sensitivities, and disturbance models. The component models are automatically coupled together to create a math model of the complete coupled physical process using techniques that maximize the numerical conditioning while maintaining modeling accuracy.
U.S. Government Purpose Release

DSMC Analysis Code (DAC) Software for Simulating Rarefied Gas Dynamic Environments — MSC-23445-1

Innovators at NASA's Johnson Space Center have developed software that is an easy-to-use implementation of the Direct Simulation Monte Carlo (DSMC) method that can be applied to a broad base of low-density flow problems. Its built-in flexibility, automation, and intuitiveness, combined with the potential of its parallel processing capabilities, provides an easy-to-use, high-performance solution for analyzing rarefied flows.
U.S. Release Only

EDLFLOW-F: A Next-Generation High-Order High-Fidelity All-Speed Time-Accurate Flow Solver for Simulating Fluid Flows — ARC-16349-1

EDLFLOW-F solves the unsteady three-dimensional equations for compressible flow using a fourth-order Runge-Kutta integration scheme and a sixth- and/or tenth-order compact differencing scheme for spatial derivatives. Deforming geometry simulations can be carried out using this solver. The technology can also be used in a low-order mode as a Reynolds-Averaged Navier-Stokes (RANS) solver. Any flow regime (from incompressible flow to hypersonic flow about arbitrary geometries) can be simulated using EDLFLOW-F.
U.S. Government Purpose Release

EO-1 Sensor Observation Service (EO-1 SOS) — GSC-16272-1

The EO-1 sensor web links together ground and space-based instruments to enable autonomous collaborative observation collections for any number of phenomena of scientific interest. The EO-1 Sensor Observation Service (SOS) provides a method to discover and retrieve EO-1 data sets based on Open GeoSpatial Consortium (OGC) Sensor Web Enablement (SWE) standards.
U.S. Government Purpose Release

EO-1 Sensor Planning Service (EO-1 SPS) — GSC-16271-1

The EO-1 sensor web links together ground and space-based instruments to enable autonomous collaborative observation collections for any number of phenomena of scientific interest. The EO-1 Sensor Planning Service (SPS) provides a method to post a task request for EO-1 and also to obtain tasking feasibilities.
U.S. Government Purpose Release

eProc Electronic Procedure System for Spacecraft Glass Cockpits (eProc System) — MSC-25186-1

Crew members have the ability to perform all display tasks manually or with electronic procedures. This electronic procedure system, referred to as eProc, is designed as a powerful alternative to reduce crew workload. eProc assists crew members by highlighting vehicle states on a display and cueing up appropriate displays, pop-ups, and commands. eProc is also linked to fault messages, so that crew members can quickly access procedures to any message that appears on the fault summary or log displays.
U.S. Release Only

Exploration Visualization Environment (EVE) — LAR-17782-1

The Exploration Visualization Environment (EVE) is a simulation, visualization, and analysis system designed to integrate engineering data with a virtual environment in support of the design and planning of space-based missions. Through the integration of time-dependent data with detailed graphical models within a full-scale three-dimensional solar system, the analyst can gain valuable insight into the correlation of data with simulation events. EVE provides a rich set of navigation tools (both in time and space) to enable the user to analyze the data.
U.S. Government Purpose Release

ExPRESS Logistics Carrier Suitcase Simulator Software — GSC-15813-1

The ExPRESS Logistics Carrier Suitcase Simulator Software simulates the ExPRESS Logistics Carrier Flight Software and the ExPRESS Logistics Carrier hardware interfaces for experiments. Analog and digital channels are supported by a custom SAB PCI card that allows the user to configure each of the analog and digital channels to the experiment.

U.S. Government Purpose Release

FCOD Rapid Prototyping Lab Generic Display Software (FCOD Generic Displays) — MSC-25185-1

This software permits the user to interact with and understand the user interface for a generic "glass" spacecraft cockpit. Based on standards developed by NASA for the Orion spacecraft, it simulates various phases of flight and various malfunction situations to help users understand operating a spacecraft exclusively through computer screens instead of a large number of physical switches, gauges, and other controls.

U.S. Government Purpose Release

Finite-Rate Chemistry, Overset-Grid, Dual-Time Combustion-Reentry Code — ARC-15601-1

This technology modifies the OVERFLOW code for finite rate and equilibrium chemistry by substituting the perfect gas model built into the code with a model assuming a gas made up of a mixture of thermally perfect gases. Four extra field variables were added, corresponding to pressure, temperature, coefficient of thermal conductivity, and the new pressure derivative X.

U.S. Government Purpose Release

Flight Dynamics Simulation of a Generic Transport Model — LAR-17625-1

This software is a flight dynamics simulation of a transport aircraft. It implements general rigid body equations of motion for the vehicle dynamics and draws aerodynamic forces from a standard coefficient expansion implemented as table lookups. Dynamics of actuator servos and bandwidth of sensors are also included. The simulation is coded in Simulink, a model-based environment using a commercial simulation package from Mathworks, Inc. The software is not stand-alone; it must be run from inside this commercial environment, making use of numerical libraries for basic operations as well as the overall time-stepping and numerical integration routines.

U.S. Release Only

Formation Flying Orbit Propagation — GSC-14720-1

This software provides robust methods of analysis for multiple spacecraft mission design. The technology allows the user to choose between several dynamics models, an appropriate numerical integrator, and many high-fidelity models.

U.S. Government Purpose Release

Freespace Simulation Environment — GSC-15480-1

The Freespace Simulation Environment is a collection of software applications for the design and analysis of complex system dynamics. It uses a shared memory workspace and inherent multi-processor architecture to parallelize and process data from simulations.

U.S. Government Purpose Release

Fully Implicit Ablation and Thermal (FIAT), Program, Version 2.6 — ARC-15779-1

FIAT is a computer program developed for simulation of one-dimensional thermal energy transport in a multilayer stack of isotropic materials and structures that can ablate from the front surface and decompose in depth. The implicit solution algorithm and general solution technique make the program very stable and robust for application to reusable launch vehicles as well as to planetary entry probes that use newly developed, lightweight ceramic ablators.

U.S. Government Purpose Release

Fully Implicit Ablation and Thermal (FIAT) Analysis Program, Version 3 (Unrestricted) — ARC-15779-1A

FIAT v3 simulates one-dimensional thermal energy transport in a multilayer stack of isotropic materials and structures that can ablate from the front surface and decompose in depth. The implicit solution algorithm and general solution technique make the program very stable and robust for application to both robotic and crewed vehicles entering a planetary atmosphere from space. For input, the code reads material property information from a database file.

U.S. and Foreign Release

FUN3D, Version 10.0: Mixed Elements Capability — LAR-17058-1

This technology solves for the aerodynamic flow field velocity vectors around any vehicle in three dimensions. The Version 10.0 release incorporates a Mixed Elements Capability.

U.S. Release Only

functional Availability Simulation Tool, Enhanced Release (fASTER) — MSC-24823-1

fASTER is a Monte Carlo simulation tool that assists the International Space Station (ISS) Program with determining logistics support resources by simulating a multitude of different operational scenarios of the ISS configuration (during and following assembly). This allows for the impacts of complex program resource restrictions and constraints (e.g., crew maintenance time, carrier upmass capability, and sparing postulate) to be assessed and reported.

U.S. Government Purpose Release

GASRAD: A Computer Program for Thermal Radiation from Gaseous Rocket Exhaust Plumes — MFS-31685-1

GASRAD is a computer code for predicting incident thermal radiation from defined plume gas properties in either axisymmetric or cylindrical coordinate systems. It predicts plume-induced radiation using band models. Radiation is integrated over a hemisphere above the receiver.

U.S. Release Only

General Maneuver Program (GMAN), Release 2001.01 — GSC-14638-1

The General Maneuver Program (GMAN) was developed to provide a digital program to compute both orbital and spin-axis re-orientation maneuver parameters for various spacecraft. Specifically, GMAN computes the detailed maneuver scenarios necessary to achieve desired orbit and attitude maneuvers.

U.S. Government Purpose Release

General Mission Analysis Tool (GMAT) — GSC-17177-1

The General Mission Analysis Tool (GMAT) is a software system for trajectory optimization, mission analysis, trajectory estimation, and prediction. Analysts use GMAT to design spacecraft trajectories, optimize maneuvers, perform orbit determination, visualize and communicate mission parameters, and understand a mission's trade space. GMAT contains models of real-world objects such as spacecraft and thrusters, and analysis "objects" such as propagators, plots, and reports. These objects are used in a mission sequence in which the user employs commands supported by the system to model mission events and perform estimation. GMAT also contains external utilities to perform specialized analyses, including detection of eclipse and line-of-sight events. Download the software at: http://opensource.gsfc.nasa.gov/projects/GMAT/index.php

Open Source

General Mission Analysis Tool (GMAT), Version 2011A — GSC-16228-1

GMAT is a software system for trajectory optimization, mission analysis, trajectory estimation, and prediction. Analysts use GMAT to design spacecraft trajectories, optimize maneuvers, perform orbit determination, and visualize and communicate mission parameters. The system contains models of real-world objects such as spacecraft and thrusters, as well as analysis "objects" such as plots and reports. These objects are used in the mission sequence wherein the user employs commands supported by the system to model missions and perform estimation. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/GMAT/index.php

Open Source

General-Use Nodal Network Solver (GUNNS) — MSC-25468-1

GUNNS is a flow system modeling software package that combines nodal analysis and the hydraulic-electric analogy to simulate fluid, electrical, and thermal systems. It has a reusable component and system design that allows integration with a graphical user interface (GUI) and provides the capability for rapid GUI- based simulator development, ease of maintenance, and associated cost savings.

U.S. Government Purpose Release

Generalized Computer-Based Computation of Venturi and Orifice Pressure Drops — SSC-00161-1

This is a set of computer program routines that calculates and determines pressure drops and recoveries through standard venturis, nozzle-venturis, and orifices, for cavitating, choked, non-cavitating, and un-choked flow conditions for liquids, gases, and supercritical fluids. It can determine which of these flow conditions will occur.

General Public Release

Generalized Fluid System Simulation Program (GFSSP), Version 5.0 (Educational Version) — MFS-32929-1

The Generalized Fluid System Simulation Program (GFSSP) is a general software tool that can perform complex fluid flow analysis in a wide variety of applications, including those related to chemical processing, gas processing, power plants, hydraulic control circuits, and various kinds of fluid distribution systems. Example problems can be used effectively as a teaching aid to students as part of their senior undergraduate or graduate coursework.

U.S. Release Only

Generalized Fluid System Simulation Program (GFSSP), Version 6.0 — MFS-33019-1

The Generalized Fluid System Simulation Program (GFSSP) is a general software tool that can perform complex fluid flow analysis in a wide variety of applications, including those related to chemical processing, gas processing, power plants, hydraulic control circuits, and various kinds of fluid distribution systems. The tool models liquid fuel phase changes that include compressibility and mixture thermodynamics and allows the user to apply and vary "what-if" effects of external influences.

U.S. Government Purpose Release

Generic Reusable Aerospace Software Platform (GRASP) — GSC-15695-1

The purpose of GRASP is to provide a generic operating-system-independent framework for creating multi-process real-time applications. In the modular GRASP architecture, all operating system and hardware interfaces are isolated within GRASP libraries. The application developer uses GRASP interface libraries and device drivers to interact with external hardware. Should a new hardware item require a driver, that development would be part of GRASP and would be added to the GRASP interface libraries and become available for future projects. GRASP application software is developed by using the GRASP template, which offers access to the services GRASP provides. The templated generic code handles process initialization, thread creation, inter-process messaging, process health monitoring, data logging, data distribution, etc., with hooks that provide for subsystem tailoring. Using GRASP allows application developers to concentrate on mission specifics, reducing development time, cost, and risk.

U.S. Government Purpose Release

Global Modeling Initiative (GMI) Software — GSC-15363-1

The Global Modeling Initiative (GMI) is a state-of-the-art, modular 3D chemistry and transport model (CTM) that can be used for assessment of the impact of various natural and anthropogenic perturbations on atmospheric composition and chemistry, including, but not exclusively, the effect of aircraft.

U.S. Government Purpose Release

Goddard Dynamic Simulator (GDS) — GSC-15340-1

The Goddard Dynamic Simulator (GDS) is used to test both software and hardware flight systems. GDS software integrates the dynamics equations of motion for a spacecraft, models environmental forces acting on the spacecraft, models spacecraft components such as reaction wheels, thrusters, star trackers, other actuators and sensors, and instruments.

U.S. Government Purpose Release

Goddard Mission Services Evolution Center Architecture Application Programming Interface (GMSEC API) — GSC-15143-1

The GMSEC Application Programming Interface (API) supports and enhances GMSEC architecture concepts. It is an isolation layer that allows GMSEC architecture users to change out commercial off-the-shelf and government off-the-shelf information or message buses without any software changes to the GMSEC components. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/GMSEC_API_30/index.php

Open Source

Goddard Mission Services Evolution Center Architecture Application Programming Interface (GMSEC API), Version 3.0 — GSC-15900-1

The GMSEC Architecture API isolates the middleware from the components and normalizes middleware behavior. Using the standard messages along with the GMSEC API allows a component to be GMSEC compliant.

U.S. Government Purpose Release

Goddard Satellite Data Simulation Unit — GSC-15874-1

The Goddard Satellite Data Simulation Unit (SDSU) is a comprehensive unified system of multi-sensor satellite instrumental simulators. Skill of weather forecasting models can be evaluated in terms of satellite-observed multi-sensor radiance levels. Alternatively, the remote sensing community can more readily utilize atmospheric model simulations to develop and test their retrieval algorithms for application of Earth science.

U.S. Government Purpose Release

Goddard Trajectory Determination System (GTDS), Release 2001.01 — GSC-14639-1

The Goddard Trajectory Determination System (GTDS) is a collection of related computer programs that provide operational support for Earth, lunar, and interplanetary missions and serve as a research and development tool.

U.S. Government Purpose Release

Grid Sequencing Software for Structured Computational Fluid Dynamics (CFD) Grids, Version 1.0 — SSC-00167-1

This software enables a user with a structured grid to generate any number of refined and/or coarsened grids. Any grid refinement/coarsening ratio can be used (not just integer ratios), and the user is allowed to specify the grid ratio to use. The software can also generate restart files on any of the original, coarsened, or refined grids from any existing restart file/grid file pair. A graphical user interface is included.

U.S. Government Purpose Release

GTM_Polysim-Nonlinear GTM Aircraft Polynomial Simulation in MATLAB, Version 2.0 — LAR-17595-1

The GTM_POLYSIM is a nonlinear simulation of the Generic Transport Model (GTM) aircraft at a 5.5-percent scale. The simulation software is a collection of scripts and programs written and executed in the MATLAB computing environment.

U.S. Release Only

Implicit Finite-Difference Code for a Two-Equation Turbulence Model for Three-Dimensional Flows (KEM) — ARC-16271-1

This semi-implicit finite-difference code solves the transport equations for the turbulence kinetic energy and its dissipation rate in generalized curvilinear coordinates in three dimensions. The finite difference equations are solved using the Beam-Warming approximate factorization algorithm.

U.S. Government Purpose Release

Integrated Lunar Information Architecture for Decision Support (ILIADS), Version 3.0 — GSC-16210-1

ILIADS 3.0 provides the data management capabilities to access CxP-vetted lunar data sets from the LMMP-provided Data Portal and the LMMP-provided OnMoon lunar data product server. (LMMP stands for Lunar Mapping and Modeling Project.) It also provides specific quantitative analysis functions to meet the stated LMMP Level 3 functional and performance requirements specifications that were approved by the CxP.

U.S. Government Purpose Release

Integrated Modeling Environment — GSC-14827-1

The Integrated Modeling Environment is a tool to integrate people, processes, and data. The technology incorporates life cycle management, configuration management, visualization tools, and collaboration tools. Key functionality includes creating, managing, and developing modeling analyses over their entire life cycles; publishing model and analysis information for availability and reuse throughout the user community; and managing legacy information without regard to original formats, database organizations, or computing platforms.

U.S. Government Purpose Release

INTegrated ROcket Sizing Model (INTROS) Analytical Tool for Design and Sizing of Launch Vehicles, Version 3.0 — MFS-32199-1

The INTegrated ROcket Sizing Model (INTROS) is used to perform conceptual and preliminary design sizing and trade and sensitivity studies for launch vehicles. Sizing is done in terms of establishing architectural breakdown structures and related geometry and mass properties.

U.S. Government Purpose Release

Integrated Science Instrument Module (ISIM) Hardware Models — GSC-17039-1

The Integrated Science Instrument Models (ISIM) hardware models are Wind River Simics Device Modeling Language (DML) models for the ISIM Command and Data Handling (ICDH) electrical components; Housekeeping card (HK), Bus Interface Card (BIC), and Focal Plane Array Processor (FPAPs). The models allow the ISIM flight software to be executed within a COTS emulator product, Wind River Simics.

U.S. Government Purpose Release

Interface Between STAR-CCM+ and 42 for Enhanced Fuel Slosh Analysis — GSC-17081-1

STAR-CCM+, a commercially available computational fluid dynamics (CFD) code, is linked with this software tool to 42, a user-friendly NASA in-house flight simulation program, to enable the modeling of fuel slosh as a part of the 42 flight simulation.

U.S. Government Purpose Release

International Space Station (ISS) Onboard Emergency Simulator Software — MSC-25520-1

This technology enables onboard crewmembers to receive more effective training during regularly scheduled emergency drills onboard the ISS.

U.S. Government Purpose Release

James Webb Space Telescope Independent Verification and Validation Simulation and Test (JIST) Core — GSC-16739-1

JIST executes James Webb Space Telescope (JWST) test procedures, exercises the flight software subsystems, injects hardware and software faults, and integrates additional tools to support test objectives. The components, models, and interfaces can be reused on other missions that utilize similar interfaces and components.

U.S. Government Purpose Release

James Webb Space Telescope Independent Verification and Validation Simulation and Test (JIST) RT Logic T501 Emulator — GSC-16740-1

The T501 emulator, developed in support of the JIST environment, receives software commands via TCP/IP packets and converts them for the James Webb Space Telescope (JWST) test bed's hardware.

U.S. Government Purpose Release

James West Space Telescope Independent Verification and Validation Simulation and Test (JIST) Solid State Recorder (SSR) Simulator — GSC-16741-1

The James Webb Space Telescope (JWST) IV&V Simulation and Test (JIST) Solid State Recorder (SSR) Simulator is a component of the JIST system and is responsible for simulating basic SSR functionality. The primary purpose of the SSR Simulator is to assist in performing independent verification and validation (IV&V) of the flight software. The SSR simulator is a software-only simulator that provides the necessary interface to the JWST flight software and typically simulates SSR management functions. Specific functions include playback, record, and normal telemetry transmission. The SSR simulator is also equipped with many different configurations that can be initialized using command line arguments. The SSR Simulator has reuse potential on future missions that utilize a SSR.

U.S. Government Purpose Release

JavaGenes Genetic Graphs — ARC-14293-1

JavaGenes is a genetic algorithm code written in Java. It evolves graphs using genetic software techniques and has applications in designing drugs, circuits, or any other system that is easily represented by graphs. Download the software at: http://ti.arc.nasa.gov/opensource/projects/javagenes/

Open Source

JavaGenes-Scheduler: Evolutionary Software for Earth-Observing Satellite Scheduling — ARC-15103-1

JavaGenes-Scheduler is a general purpose evolutionary system designed to compare techniques for scheduling observations. It was originally developed for scheduling observations made by Earth-observing satellites. JavaGenes-Scheduler uses a simple, earliest-first scheduler to insert observations into the timeline in permutation order. Download the software at: http://alglobus.net/NASAwork/JavaGenes

Open Source

Johnson Space Center Engineering Orbital Dynamics (JEOD), Version 3.0 — MSC-25730-1

The JEOD software package is a collection of computational mathematical models used to accurately represent the dynamic state of a spacecraft in a planetary environment. Version 3.0 contains innovations in a number of technical areas.

U.S. Government Purpose Release

Knife, Version 1.0 — LAR-17481-1

The Knife library calculates the boolean subtraction of arbitrary watertight triangular polyhedrals in order to make near-field sonic boom predictions.
U.S. Release Only

Langley Stability and Transition Analysis Code (LASTRAC) — LAR-16260-1

LASTRAC is a C++ code that analyzes compressible boundary-layer stability and performs transition prediction using the state-of-the-art Linear Stability Theory (LST) or Parabolized Stability Equations (PSE) methods.
U.S. Release Only

Launch Vehicle Analysis (LVA) Tool — MFS-31694-1

The Launch Vehicle Analysis (LVA) Tool is a software program that integrates ground and flightload analysis with direct-solution structural and thermal analysis. A typical solution can be obtained, starting from scratch, in thirty to sixty minutes, and subsequent runs can be done in less than two minutes.
U.S. Government Purpose Release

LAURA.5 — LAR-17673-1

LAURA.5 is a structured, multi-block, computational aerothermodynamic simulation code. It provides a major refactoring of the original LAURA code in a modular structure utilizing Fortran 95. The technology shares gas physics modules, MPI modules, and some fundamental data set modules with the unstructured-grid code FUN3D.
U.S. Release Only

Low-Order Potential Flow Panel Code (PMARC), Version 14 — ARC-14407-1

PMARC is a potential flow panel code to numerically predict flow fields around complex three-dimensional geometries. PMARC contains several features that allow the study of both steady and unsteady motions, including problems involving relative motion.
U.S. Government Purpose Release

Mac/Linux TetrUSS Computational Fluid Dynamics (CFD) Software — LAR-16882-1

The most awarded software in the history of NASA, TetrUSS is a suite of computer programs used for fluid dynamics and aerodynamics analysis and design. The software is widely used in other government organizations, the aerospace industry, academia, and non-aerospace industries such as automotive, bio-medical, and civil engineering.
U.S. Release Only

Managed Automation Environment for Simulation, Test, and Real-time Operations (MAESTRO) Software, Pre-release — MFS-32601-1

MAESTRO is a suite of tools that assist in the setup, configuration, control, and operation of a simulation/test laboratory. The software was designed to fit into the NASA Constellation design philosophy by being command, control, communication, and information (C31) compliant.
U.S. Government Purpose Release

Marshall Aerospace Vehicle Representation in C (MAVERIC-II) — MFS-31989-1

Marshall Aerospace Vehicle Representation in C (MAVERIC-II) is a generic low-to-high-fidelity six-degree-of-freedom vehicle flight simulation program.
U.S. Government Purpose Release

Marshall Aerospace Vehicle Representation in C (MAVERIC-X) MFS-31673-1

Marshall Aerospace Vehicle Representation in C (MAVERIC-X) is a generic low-to-high-fidelity six-degree-of-freedom vehicle flight simulation program that facilitates the rapid development of flight simulations for launch vehicles and spacecraft. It was designed to accommodate multi-staged vehicles, powered serially or in parallel, with multiple engines, tanks, and cargo elements.
U.S. Release Only

MBJEOD: An Integrated Multibody and Orbital Dynamics Simulation Module MSC-25732-1

MBJEOD combines the power of MBDyn (multibody dynamics software) and JEOD (orbital dynamics software) to form an integrated multibody orbital dynamics simulation capability.
U.S. Government Purpose Release

Method and System for Procedure Development and Verification by Formal Specifications Derived Mechanically from Informal Procedure Descriptions GSC-15043-1

Based on a unique method for generating a formal model from the informally expressed requirements of a computer-based system and subsequently automatically generating code that implements those requirements in a way that is guaranteed to be correct, this technique allows for the analysis, validation, and verification of complex procedures and scripts.
U.S. Government Purpose Release

Method for Quickly Approximating Center of Pressure and Projected Area from Computer Models of Structures (CPCalc) GSC-14690-1

CPCalc simplifies the approximation of the center of pressure (CP) and projected area of a spacecraft using images of the computer-aided design (CAD) models that can be generated using numerous CAD tools. The technology requires little input and is flexible enough to be useful for many applications that require quick approximations of projected area and centroid for complex shapes.
U.S. Government Purpose Release

Micrometeoroid and Orbital Debris (MMOD) Shield Ballistic Limit Analysis Program MSC-24582-1

This technology evaluates proposed shield configurations for probability and depth of penetration if hit by orbital debris. The software enables a user to calculate preliminary dimensions of a shield configuration (thickness, density, and spacing) and then analyze the performance of the user-defined shield configuration over a range of relevant in-orbit impact conditions.
U.S. Release Only

Mission Control Technologies (MCT) ARC-15256-1A

MCT builds software from small pieces that can be assembled by end users to create integrated functionality. Applications are eliminated in favor of compositions of “live objects” that can be combined in different ways for different users and missions as required, in contrast to the more traditional software development method of pre-determining functionality and building a monolithic application. Download the software at: https://github.com/nasa/mct
Open Source

Model Development for Exhaust Plume Impingement Effects on Launch Stand Design (PLIMP/LSD) MFS-26283-1

A two-phase Navier Stokes code has been developed to improve plume and plume impingement methodology. An easy-to-use thermal response model enables designers to evaluate the plume impingement load on a structure more rapidly and to evaluate the necessary modifications more rapidly.
U.S. and Foreign Release

Monocoque Tank Analysis Spreadsheet System (MonTASS), Version 2.0 — MFS-31223-1

The Monocoque Tank Analysis Spreadsheet System (MonTASS) computer program enables rapid analysis and preliminary design of structural domes and truncated sections of cones. MonTASS performs both design and analysis functions and can be used to analyze nonpressurized conical structures.
U.S. Release Only

Multicomponent Ablation Thermochemistry (MAT) Program — ARC-15308-1

MAT implements a general theory for ablation thermochemistry of thermal protection materials with multiple surface species. The theory includes the capability for simultaneous ablation, pyrolysis, surface-element constraints, nonequilibrium surface reactions, and material failure.
U.S. Government Purpose Release

Multidimensional, Multiphysics Computational Heat Transfer Analysis Software (UNIC) — MFS-32554-1

The Multidemensional, Multiphysics Computational Heat Transfer Analysis Software (UNIC) solves transient, coupled, and simultaneous conjugate heat transfer solutions commonly encountered in rocket engine and launch vehicle component design and analysis.
U.S. Release Only

NASA Design and Analysis of Rotorcraft (NDARC) — ARC-16265-1

NDARC software is an aircraft system analysis tool that supports both conceptual design efforts and technology impact assessments of rotorcraft that meet specified requirements. The architecture of the NDARC code accommodates configuration flexibility, a hierarchy of models, and ultimately multidisciplinary design, analysis, and optimization. ***Note:*** NDARC is also available to academia worldwide
U.S. Release Only

NASA Operational Simulator (NOS) Common — GSC-17146-1

The NASA Operational Simulator (NOS) Common software is a collection of libraries and applications that have been developed to support the development and maintenance of pure software spacecraft emulators and associated technologies. The NOS Common software applications were designed to be project agnostic and flexible to support any implementation. The most notable utilities include the NOS logging and NOS utils libraries. The NOS logging library is a lightweight and easy-to-use logging framework. The NOS utils library is an all-purpose library to house various generic solutions to common development problems. These include generic pooling mechanism, a specialized threading pool, and a custom assert mechanism. The threading pool allows cross-platform thread management to any application or library with very low user interaction. The custom-assert mechanism has been designed so that certain error-checking implementations are removed during compile time under release configurations.
U.S. Government Purpose Release

NASA Operational Simulator (NOS) Motion (NMotion) — GSC-17145-1

The NASA Operational Simulator (NOS) Motion (NMotion) is a suite of software that is utilized to support the building and testing of test system software components at the NASA Independent Verification and Validation (IV&V Program). NMotion provides an automation framework for performing full integration and system testing on NOS based systems.
U.S. Government Purpose Release

NASA STRuctural ANalysis (NASTRAN) — LAR-16804-GS

NASTRAN is a finite element analysis program that was originally developed for NASA in the late 1960s under U.S. government funding for the aerospace industry. The software suite provides engineers a comprehensive simulation solution for insight into structural behavior. NASTRAN source code is integrated in a number of different software packages, which are distributed by a range of companies.
U.S. Release Only

NASA.rb (formerly fUnit) GSC-15137-1

NASA.rb (formerly fUnit) is a collection of Fortran modules that provide a framework for automating the construction, execution, and reporting of unit tests for Fortran software applications. Support is provided for several aspects of unit testing that are peculiar to scientific technical computing including distributing J parallel applications and parameterized behavior.

Open Source

NEQAIR, Version 14.0: Non-equilibrium Radiative Transport and Spectra Program ARC-15262-1B

Version 14.0 of NEQAIR is a line-by-line radiation code that computes spontaneous emission, absorption, and stimulated emission due to transitions between various energy states of chemical species along a line of sight. NEQAIR enables the calculation of: (1) non-equilibrium or equilibrium populations of excited energy levels for atomic and diatomic molecules; (2) optical radiation emitted and absorbed by atomic and diatomic rotational lines along a line of sight or across a shock tube; (3) transport of optical radiation through a non uniform gas mixture to a solid surface; and (4) detailed spectra at points along a line of sight and at a surface and plots them.

U.S. and Foreign Release

NetworKing: Space Communications and Navigation SCAN) App ARC-16778-1

The NetworKing Game is an educational, interactive 3D game in which the player develops a space communication network. As he builds his network infrastructure, client spacecraft are attracted to the network, generating income and allowing the player to build further. As the player expands his robust communication network, fortunate and unfortunate events occur. The game can be downloaded at: http://www.nasa.gov/multimedia/3d_resources/scan.html

General Public

Nozzle Aero Thermochemistry (NAT) Computer Code MFS-31961-1

The Nozzle Aero Thermochemistry (NAT) code was developed as a part of the Nozzles Work Package of the Solid Propulsion Integrity Program (SPIP). NAT gave solid rocket motor (SRM) analysts the capability to accurately determine heating conditions throughout SRM muzzles and supplied nozzle designers the ability to design nozzle liner components with greater confidence.

U.S. Government Purpose Release

Numerical Integrator Library GSC-14735-1

This software provides robust methods of analysis for distributed groups of spacecraft that are acting collectively to achieve a common goal. The design allows the user to choose between several dynamics models, an appropriate numerical integrator, and many high fidelity environment models.

U.S. Release Only

Open Geospatial Consortium (OGC) Compatible Publish/Subscribe Service, Basic (OPSB) GSC-16270-1

The OPSB provides a method for users to define subscriptions and receive notifications when data products are ready. The technology is based on OGC standards and is a type of Web Notification Service (WNS).

U.S. Government Purpose Release

Open Scheduling and Planning Interface for Exploration (OpenSPIFe) ARC-15795-1B

The Open Scheduling and Planning Interface for Exploration (OpenSPIFe) is an integrated planning and scheduling toolkit based on hundreds of hours of expert observation, use, and refinement of state-of-the-art planning and scheduling technology for several applications within NASA. It was designed from the ground up with the needs of the operational user in mind, and it presents unique solutions to a number of problems common in other commercial and homegrown systems. Download the software at: https://github.com/nasa/OpenSPIFe

Open Source

OVERFLOW 2: Overset Grid Computational Fluid Dynamics (CFD) Flow Solver with Moving Body Capability — LAR-17079-1

OVERFLOW 2 is a computer code for simulating viscous, compressible fluid flow about complex aerodynamic configurations. The technology solves the Reynolds-Averaged Navier-Stokes equations using structured, overset computational grids. It includes the capability for simulating multiple moving bodies acting under prescribed or aerodynamically forced motion. OVERFLOW 2 is a merge of the previously developed OVERFLOW 1.8 and OVERFLOW-D codes.

U.S. Release Only

Parallel Adaptive Mesh Refinement Library (PARAMESH) — GSC-14626-1

PARAMESH offers parallel support with adaptive mesh capability for a large class of models on distributed memory machines. This package of Fortran 90 subroutines provides an application developer with an easy route to extend an existing serial code using a logically Cartesian structured mesh into a parallel code with adaptive mesh refinement.

U.S. Release Only

PHANTOM: A Unified Flow Analysis for Turbomachinery Flows — MFS-32321-1

PHANTOM is a unified, three-dimensional, unsteady Navier-Stokes analysis used for solving flows in rotating turbomachinery components operating in liquids or gases. Working fluids could be air, liquid or gaseous hydrogen, liquid or gaseous oxygen, kerosene, or others. The flow may be incompressible (e.g., a fuel pump in a liquid-fueled rocket engine) or compressible (e.g., the turbine that drives that fuel pump).

U.S. Release Only

Plume Impingement Effect (PLIMP) — MFS-26292-1

Plume Impingement Effect (PLIMP) can be used to simulate the impingement of rocket engine exhaust on nearby spacecraft surfaces.

General Public Release

Polynomial-Based Nonlinear Simulation of a Generic Transport Model (GTM) Aircraft — LAR-17462-1

A nonlinear six-degree-of-freedom simulation for a generic transport model aircraft was created using MATLAB. The simulation and 3D displays run in real time in response to pilot inputs using contemporary desktop personal computer hardware; the simulation can also be run in batch mode. The technology includes the full nonlinear dynamics of the bare airframe with a scaled direct connection from pilot inputs to control surface deflections.

U.S. Release Only

Porous Material Analysis Toolbox (PATO) Based on OpenFoam — ARC-16680-1

PATO is a modular analysis platform specifically implemented to test physics-based models for porous materials submitted to high-temperature environments or other unusual conditions. PATO is a C++ library implemented in the OpenFOAM framework. The governing equations implemented in the different modules are volume-averaged forms of the mass-, momentum-, and energy-conservation equations for porous media.

U.S. and Foreign Release (Academic)

Program to Optimize Simulated Trajectories II (POST II) — LAR-16533-1

POST II is a multibody, 3D to 6D simulation that calculates trajectories for all aeronautical and space flight vehicles. Its outputs are used to optimize control settings for flight. The technology has been used on the Mars Exploration Rover, Genesis, HyperX , and other programs. POST II can support multiple vehicles in a single simulation, each with independently defined environment, vehicle, and attracting body characteristics.

U.S. Government Purpose Release

Propulsion System Controller Checkout (PCOC) Software — MFS-32259-1

The Propulsion System Controller Checkout (PCOC) Computer served as the electrical ground support equipment for FASTRAC engine avionics. The PCOC software that executed on the computer provided a window into engine operation, as well as main propulsion system operation and thrust vector control system operation. The software displayed a graphical representation of the FASTRAC engine and associated MPS, offering visual indications of tank levels, valve positions, propellant locations, and engine ignition.
U.S. Government Purpose Release

Reactive and Multi-Phase (RAMP2) Computer Program — MFS-31602-1

The RAMP2 computer program predicts nozzle flowfields of supersonic and rocket nozzle performance. The tool is capable of multi-phase flowfield analysis including high-altitude plumes. Code enhancements account more accurately for variable oxidizer/fuel ratios.
U.S. Release Only

Realtime Evaluation and Analysis of Consolidated Health (REACH) — GSC-14492-1

The REACH tool provides concise, intuitive visualizations of health models for multiple spacecraft. It helps mission operations staff quickly identify and diagnose risks to the health and safety of multi-platform and satellite constellation missions. Client-side visualizations make anomalies in the model stand out, drawing the operator's attention to the most serious problems.
U.S. Government Purpose Release

Refine — LAR-16881-1

Refine is a 3D tetrahedral grid adaptation framework that is implemented with an object-oriented flavor in the C language. Most functionality is wrapped into Ruby scripting language extensions for use in test-first programing and unit testing. The technology has application to aerodynamic simulations of aircraft.
U.S. Release Only

Reusable Object-Oriented Software Package That Implements Instrument Command Building and Argument Validation — GSC-15166-1

This object-oriented software package provides a collaboration of classes that together may be used to implement a robust instrument commanding scheme for use in instrument test equipment. The classes have built-in argument validation and a robust exception handling mechanism.
U.S. Government Purpose Release

RMC Code — MFS-32290-1

The RMC code computes radiation from solid rocket motor flow fields. Each receiver specified in the surface input is selected in sequence. Radiation is computed for each spectral interval requested, and radiation results are summed for output. The computation for each spectral band begins with conversion of plume properties to optical properties for that band; rays from the receiver surface are generated in random directions to intersect the plume.
U.S. Government Purpose Release

ROCet Engine Transient Simulation Software (ROCETS) — MFS-31858-1

The ROCet Engine Transient Simulation (ROCETS) software consists of a library of rocket engine component software modules for combustion chambers, nozzles, turbines, pumps, valves, lines, etc. The tool can be used to analyze both steady-state and transient performance under various operating conditions in a variety of environments.
U.S. Release Only

Savors: A Scalable Aural-Visual Environment for Security Event Monitoring, Analysis, and Response — ARC-16186-1

Savors is a tool for security event monitoring, analysis, and response. The technology scales to real-world environments and uses high-end computing resources on-demand to compile behavior profiles that point to anomalous behavior. Auralization allows both monitoring and analysis to be performed in parallel and draws attention to critical events in one tool when utilizing another. Remote data access and response capabilities across distributed resources are enabled using grid computing that provides a secure, single sign-on environment. Download the software at: http://people.nas.nasa.gov/~kolano/projects/savors.html

Open Source

SCaN Optical Link Budget Tool — LEW-19225-1

A calculational procedure has been designed and implemented in software that enables the specification and design of a space-based optical communications system. The resulting optical link budget essentially accounts for the communication power flow through the entire optical communications channel (from the transmitter to the receiver) and yields design specifications for the optical system necessary to assure reliable data transmission with desired operational metrics such as data rate, link margin, etc. The link budget takes into account all the sources of deleterious noise that enters into the communications process, such as electronically generated noise in the optical detector and stray optical irradiance from external sources. The link budget has the capability of being interfaced with the orbital element calculations of the Satellite Tool Kit (STK) to allow the dynamic description and evolution of optical link operation from any space-borne satellite within the solar system to and from the Earth.

U.S. Release Only

Software for Hybrid Airship Steady Flight Analysis and Preliminary Design — ARC-16503-1

This software helps designers of hybrid airships to understand the effects of aerodynamic and thruster performance on steady-state flight mechanics. The software is capable of producing a large number of useful plots and requires only basic geometric, mass, and aerodynamic data to describe the vehicle. The resultant plots and plotting script are compatible with a widely used and freely available plotting package.

U.S. Government Purpose Release

Solenoid Inductance Calculator — KSC-12253

The Solenoid Inductance Calculator can be used to compute the inductance approximation of a cylindrical solenoid of arbitrary dimensions. The technology's calculation method (1) uses magnetic vector potential to provide a more precise estimate of inductance and (2) is not limited to a specific range of coil geometry values.

U.S. Release Only

Space Shuttle Ascent/Entry Trainer (AET), Version 5 — MSC-25252-1

Version 5 of the Space Shuttle Ascent/Entry Trainer (AET) is a simulation software package that has been used to model NASA's space shuttle in both ascent and entry scenarios in order to train astronauts. Functionally, the AET handles operator inputs to the hand controllers and to virtual switches on the computer monitor, and it provides feedback to the operator via the computer monitor in the form of simulated out-the-window graphics and emulated display and control panels.

U.S. Government Purpose Release

Space Station Multi-Rigid Body Simulation (SSMRBS) — MSC-25738-1

The SSMRBS innovation uses a commercial off-the-shelf software package to generate the equations of motion (EOM) used in a simulation. The EOM generated and solved in the simulation is based on an Order-N algorithm.

U.S. Government Purpose Release

Spacecraft Trajectory Analysis and Mission Planning Simulation (STAMPS) Software — MSC-24958-1

STAMPS has been used to simulate either three- or six-degrees-of-freedom cases for all shuttle flight phases using translated HAL flight software or generic GN&C models. Single or multiple trajectories can be simulated for use in optimization and dispersion analysis. The technology includes math models for the vehicle and environment and a C version of shuttle onboard flight software.
U.S. Government Purpose Release

Station Spacewalk Game App — ARC-16779-1

This video game features simulations of extravehicular activities (EVAs) conducted by NASA astronauts on missions to the International Space Station. The game can be downloaded at: http://www.nasa.gov/multimedia/3d_resources/station_spacewalk_game.html
General Public

Station/Orbiter Multibody Berthing/Docking Analysis Tool (SOMBAT) — MSC-25528-1

SOMBAT is a multibody dynamics and control system simulation tool. It provides an integrated software environment to perform kinematic and dynamics analysis of space structures and robotic manipulators, including their control elements. The multibody system can consist of an arbitrary number of rigid and flexible bodies in an open-loop topology. The dynamics equations of a given system are generated in a computationally efficient and optimized form in SOMBAT using a symbolic code generator.
U.S. Government Purpose Release

Stochastic Electromagnetic Design and Optimization Method (ADSS) — ARC-15568-1

ADSS implements a stochastic design method with a novel representation and performance evaluation measure to automatically generate antenna designs.
U.S. Government Purpose Release

System/Observer/Controller Identification Toolbox (SOCIT), Macintosh Version — LAR-15241

SOCIT is a collection of functions, written in MATLAB language and expressed in M-files, that implements a variety of modern system identification techniques. For an open-loop system, it features functions for identification of a system model and corresponding forward and backward observers directly from input and output data. For a closed-loop system, SOCIT identifies an open-loop model, an observer, and corresponding controller gain directly from input and output data.
U.S. Release Only

Thermal Insulation System Analysis Tool (TISTool) — KSC-13561

The Thermal Insulation System Analysis Tool has been updated with more test data from the Cryogenics Test Laboratory and has been converted to Fortran 95 to allow for easier distribution.
U.S. Release Only

Total Verification System and C++ Based Verification Test Bench — GSC-16013-1

This technology verifies complex space flight digital designs in a more thorough manner than was previously possible while offering cost savings and reduced schedule time. The software combines a custom-designed GSE unit, the Total Verification System, along with a powerful test bench environment that uses C++. Together, these elements allow a high level of code reuse between all the phases of the design and test cycle.
U.S. Government Purpose Release

Transport Class Model (TCM) Aircraft Simulation Software — LAR-18322-1

This six-degree-of-freedom, flat-earth dynamics, non-linear, and non-proprietary aircraft simulation is a representation of a generic mid-sized twin-jet transport aircraft.
General Public Release

Trick High-Level Architecture (HLA) Framework for Facilitating IEEE 1516 Simulation Integration — MSC-24544-1

This framework removes the complexity of adhering to the Institute of Electrical and Electronics Engineers (IEEE) 1516-2000 High-Level Architecture (HLA) standards for simulation interoperability. The framework is data driven and includes a simple application programming interface (API), making it relatively easy to enhance an existing Trick simulation into a distributed simulation.

U.S. Government Purpose Release

Trick Simulation Environment — MSC-24492-1

This technology upgrades a generic simulation toolkit for constructing and running simulations, providing richer features and making the software more user-friendly. The Trick Simulation Environment is a set of software utilities that allows users to rapidly develop, integrate, and operate simulations based on the specific requirements of their application problem domains. Simulation applications range from personal computer desktop trainers to full-scale robotics hardware-in-the-loop facilities and virtual reality systems.

U.S. Release Only

Uncertainty Quantification Toolbox (UQTools) — LAR-17855-1

UQTools is a MATLAB-based software package designed to efficiently analyze dynamic systems subject to parametric uncertainty. UQTools accepts uncertainty models based upon both probabilistic and non-probabilistic definitions, and it realizes several complementary methods for performing a variety of uncertainty quantification tasks.

U.S. Release Only

Unsteady Flow Analysis Toolkit (UFAT) — ARC-14800-1

UFAT is a software program for analyzing time-dependent flow fields. The technology automatically processes large-scale computer simulations to reveal salient flow features (e.g., vortices and shock waves) with little or no human interventions. UFAT effectively reduces the analysis time of multi-gigabyte datasets from weeks to hours using state-of-the-art particle tracking and feature detection algorithms.

U.S. Release Only

Upwind Parabolized Navier-Stokes Solver (UPS) for Supersonic and Hypersonic Flow Simulation, Version 6.1 — ARC-15250-1

This software provides a means for simulating supersonic and hypersonic flows efficiently and accurately (under certain restrictions). The parabolized Navier-Stokes (PNS) equations are solved using an upwind finite-volume algorithm that is implicit in the marching direction. The solver includes models for turbulent flow and equilibrium- and finite-rate air chemistry.

U.S. Government Purpose Release

USM3D — LAR-16670-GS

USM3D is a tetrahedral unstructured flow solver that has become widely used in industry, government, and academia for solving aerodynamic problems. Since its first introduction in 1989, USM3D has steadily evolved from an inviscid Euler solver into a full viscous Navier-Stokes code. The technology has been a part of the NASA TetrUSS system.

U.S. Release Only

Variable O/F Ratio Method of Characteristics Program for Nozzle and Plume Analysis (MOC Program) — MFS-31901-1

This software was developed for solving 2D and asymmetric inviscid supersonic flow fields. The newer modifications provide better runtime error handling, enhanced mesh control accuracy near the nozzle exit plane, and additional start line control options.

U.S. Release Only

Vehicle Sketch Pad (VSP) LAR-17491-1

The Vehicle Sketch Pad (VSP) is an aircraft geometry tool for rapid evaluation of advanced design concepts. Fast and accurate geometry modeling allows the designer to use more complex analysis methods earlier in the design process and reduces reliance on empiricism in conceptual design. VSP includes tools to model and export the internal structural layout.

Open Source

Virtual Satellite Platform (VirtualSat Pro) GSC-14824-1

The Hammers Company has developed a virtual satellite (VirtualSat) platform environment. In this environment, enhanced functionality and autonomy of navigation, guidance, and control systems are provided by a virtual satellite simulating its dynamic behavior.

U.S. Government Purpose Release

Web Coverage Processing Service (WCPS) GSC-16273-1

The Web Coverage Processing Service (WCPS) is an instantiation of an Open Geospatial Consortium (OGC) standard Web service that provides the user the ability to define an algorithm that will be applied to data from a sensor. This can occur in any environment in which a WCPS service can exist. Capabilities include (1) an algorithm generation service, which allows the user to create the algorithm in a generic language, test it against simulated data, and then upload it to the target environment, and (2) a runtime component that enables the user to run the algorithm against the live sensor data to create customized data products.

U.S. Government Purpose Release

Weka-to-Web Coverage Processing Service (WCPS) Translator GSC-16274-1

This translator enables a user to develop an algorithm via the Weka data mining tool and then translate the output to be compatible input to WCPS. It is designed to run in an elastic compute cloud.

U.S. Government Purpose Release

Windows Semi-Markov Range Evaluator (WinSURE) LAR-16059-1

This package is used by aerospace flight software developers to predict the reliability of flight-critical computer processes.

U.S. Release Only

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crew and life support

Biological Sensors

Food

Medical

Biological Analysis

Crew Support

Basic Human Model and Cognition

Acute Radiation Risk and BRYNTRN Organ Dose (ARRBOD) Projection GUI — MSC-24789-1

This graphical user interface (GUI) provides integrated input and output manipulations for ARRBOD's BRYNTRN and SUMDOSE computer codes (written in Fortran) and the Acute Radiation Risk (ARR) Probabilistic Response Model (written in C).

U.S. Government Purpose Release

Atomistic Simulation of Complex DNA DSBs and the Interactions with the Ku70/80 Heterodimer — MSC-25180-1

This software assisted in the development of molecular dynamics simulations on a series of DNA duplexes with various complex lesions. The tool helped to investigate the effects of such lesions on the structural integrity and stability of DNA after it had been insulted by infrared radiation.

U.S. Government Purpose Release

Automated Behavior and Cohesion Assessment Tools — MSC-25508-1

This software effort has supported the conceptual design of a system to monitor crew health unobtrusively, identify potential abnormalities, and provide feedback to astronauts and flight surgeons.

U.S. Government Purpose Release

Bayesian Sleep Fusion — MSC-25622-1

Bayesian Sleep Fusion estimates a subject's actual sleep status over time by applying data fusion algorithms to data sets collected from multiple sleep data sources, including actigraphy, sleep diaries, direct observation, sleep schedules, work schedules, performance testing, and neurobehavioral testing. Particular embodiments assign data-error characteristics to each source, determine the likelihood of accurate correct sleep status reporting from each source, and apply Bayesian analysis to each source-specific likelihood to determine an overall sleep status estimate.

U.S. Government Purpose Release

Human Factors Analysis Support Tool (H-FAST), Version 2.0 — MSC-25653-1

H-FAST increases human factors awareness among design engineers, facilitates communication between human factors engineers and design engineers, and promotes the application of human factors best practices early in the design cycle. H-FAST also offers detailed guidance regarding human factors evaluations and provides the capability to store these evaluations.

U.S. Government Purpose Release

Human Research Roadmap (HRR) — MSC-25662-1

HRR is a Web-based, publicly accessible central repository of research being conducted to mitigate the human health risks involved in spaceflight missions. The tool provides detail on approaches, individual research efforts, and intended technology development activities.

U.S. Government Purpose Release

Integrated Cognitive Assessment Tool: Combining Person, System, and Mission — MSC-24791-1

In short, the Integrated Cognitive Assessment Tool yields quantified measurements of a person's cognitive ability to perform a specific job in space. The software integrates traditional cognitive performance measurements with assessments of the systems/missions in which an individual must operate.

U.S. Government Purpose Release

Integrated Medical Model (IMM) MSC-25090-1

The Integrated Medical Model (IMM) is a decision-support tool for spaceflight mission planners and medical system designers. The tool assesses risks, provides rationale for in-flight medical capabilities, and designs medical systems for specified space flight missions. Offering an evidence-based approach, IMM optimizes resources within operational constraints.

U.S. Government Purpose Release

Interface Anywhere: A Prototype Interface for the Development of a Gesture and Voice System MSC-25672-1

The Interface Anywhere prototype can be used to develop and test gestures, voice commanding, and other alternative control inputs in a space habitat (e.g., an Environment Control and Life Support System).

U.S. Government Purpose Release

Kidney Stone Detection Using a Combined Method of B-Mode and Doppler Ultrasound, UW C4C Reference No. 45493 MSC-25189-1

This NASA algorithm first detects the outlier within a Doppler signal ensemble and then weights the magnitude of the outlier by the magnitude of the B-mode at the same point in space. Thresholding, color scaling, and spatial filtering are applied to output detection, and the information is overlaid onto the B-mode image in real time.

U.S. Government Purpose Release

Man-Machine Integration Design and Analysis System, (MIDAS) Version 5 ARC-16050-1A

MIDAS is a 3D rapid-prototyping human-performance modeling environment that facilitates the design, visualization, and computational evaluation of complex man-machine system concepts in simulated operational environments. The tool links a virtual human to a computational cognitive structure that represents human capabilities and limitations. MIDAS operates on a Microsoft® Windows®-based PC platform. An easy-to-use graphical user interface makes the software an accessible tool for designers; no expertise in computer science, programming, or human performance modeling is required.

U.S. and Foreign Release

Method for Relating Team Skills to Game Mechanics MSC-25442-1

Three engaging prototype games have been developed to help exploration crews refresh their team skills. The elements of constructs and skills taxonomy have been mapped into a subset of game mechanics to serve as a set of requirements for game design.

U.S. Government Purpose Release

Multi-Attribute Task Battery (MATB-II) LAR-17835-1

MATB-II is a computer-based task battery designed to facilitate research in human multiple task performance with consideration for the effects of automation. The tool includes five component tasks: system monitoring, tracking, communications monitoring, and resource management. A scheduling window provides preview of anticipated workload, and component tasks can be automated or manual. Coded in C++, MATB-II has been tested on the Windows XP® Service Pack 3, Windows® Vista, and Windows® 7 operating systems.

General Public Release

Multi-Attribute Task Battery (MATB II) Event File Builder (EFBt) LAR-17840-1

This standalone application allows a researcher to create and edit event files for the NASA MATB II task battery through a graphical interface. A scheduling window provides a preview of anticipated workload. Component tasks can be automated or manual. EFBt generates event files in XML code; files can be coded and edited in a standard XML editor.

General Public Release

NASA Task Load Index (TLX) ARC-15150-1

The NASA Task Load Index (TLX) provides multi-dimensional ratings of overall workload based on a weighted average of six subscales: mental demands, physical demands, temporal demands, performance, effort, and frustration.

General Public Release

Network-Form Game Software Library (libnfg) ARC-16764-1

The libnfg software library describes how humans interact with their environment and with other humans. The tool provides Monte Carlo analysis of user-specified network-form games, which are flexible modeling methodologies that combine Bayes nets and game theory to model complex systems. Download the software at: https://sites.google.com/site/ritchielee/files

Open Source

New Regime of Ultrasound Imaging of Strong Scatterers in Tissue Using Envelope-Based Beam Forming MSC-25190-1

Sacrificing resolution quality, this tool improves the contrast between a kidney stone and other tissue in an ultrasound image.

U.S. Government Purpose Release

New Ultrasound Imaging Regime for Improved Size Measuring of Hard Concretions Present in Soft Tissues Based on Observation of Ultrasound Shadow on a B-Mode Image MSC-25187-1

This NASA-developed technology improves kidney-size determination through ultrasound.

U.S. Government Purpose Release

POSTPROC User-Interactive Software for the Analysis of Human Physiological Data ARC-15287-1

POSTPROC offers researchers and clinicians user-friendly software for processing and analyzing human physiological data. Measurements include electrocardiography, electromyography, respiration, beat-to-beat blood pressure, skin temperature, blood volume pulse, skin conductance levels, and cardiovascular dynamics derived from impedance. The customized application runs under DADiSP/2002, a commercially available engineering spreadsheet from DSP Development Corporation.

U.S. Government Purpose Release

Real-Time Kidney Stone Tracking Algorithm MSC-25192-1

A software component of the Rolling Stones prototype, this algorithm uses focused ultrasound to clear stones from a kidney. The tool processes a series of B-mode images to track a region of interest, offers visual feedback of position location to the user, and targets a stone for automated adaptive pushing. The algorithm uses a colored display scheme to report a confidence estimation of stone location.

U.S. Government Purpose Release

Relativistic Ion Tracks (RITRACKS) MSC-25076-1

Relativistic Ion Tracks (RITRACKS) was developed to provide a better understanding of the initial interactions of heavy ions with matter. A Monte-Carlo code simulates the production of radiolytic species in water and follows the different types and energies of simulated ion tracks.

U.S. Government Purpose Release

Semantic Language and Tools for Reporting Human Factors Incidents — MSC-25200-1

This NASA software development effort seeks to combine semantic Web technologies with automated assistive technologies to aid users in finding relationships among incidents. Phase I defined a semantic language for incident reporting in XML and designed a technology approach for authoring and utilizing incident reports represented in XML. Phase II consists of implementing the software and evaluating its effectiveness.

U.S. Government Purpose Release

Spaceflight Dietary Intake — MSC-25693-1

This technology allows a crew to record dietary intake quickly and accurately.

U.S. Government Purpose Release

Spinal Ultrasound Just-in-Time Training Tool — MSC-25501-1

Augmenting/reducing required Earth-based training and enhancing ultrasound-image reproducibility, this NASA-developed tool provides crewmembers with a review of anatomical landmarks and experimental protocols.

U.S. Government Purpose Release

Spine Elongation Prevention and Exercise Device for Microgravity Environment — MSC-25654-1

This technology is being designed to prevent the spinal column lengthening and spinal column bone loss that can occur in a microgravity environment.

U.S. Government Purpose Release

Ultrasound Technique to Separate Hard Objects from Tissue by the Long-Lasting Reverberation in Hard Objects — MSC-25188-1

The ultrasound imaging of hard objects creates a reverberant signal, whereas imaging tissue does not. This technology development effort has sought to exploit that difference to improve kidney stone detection.

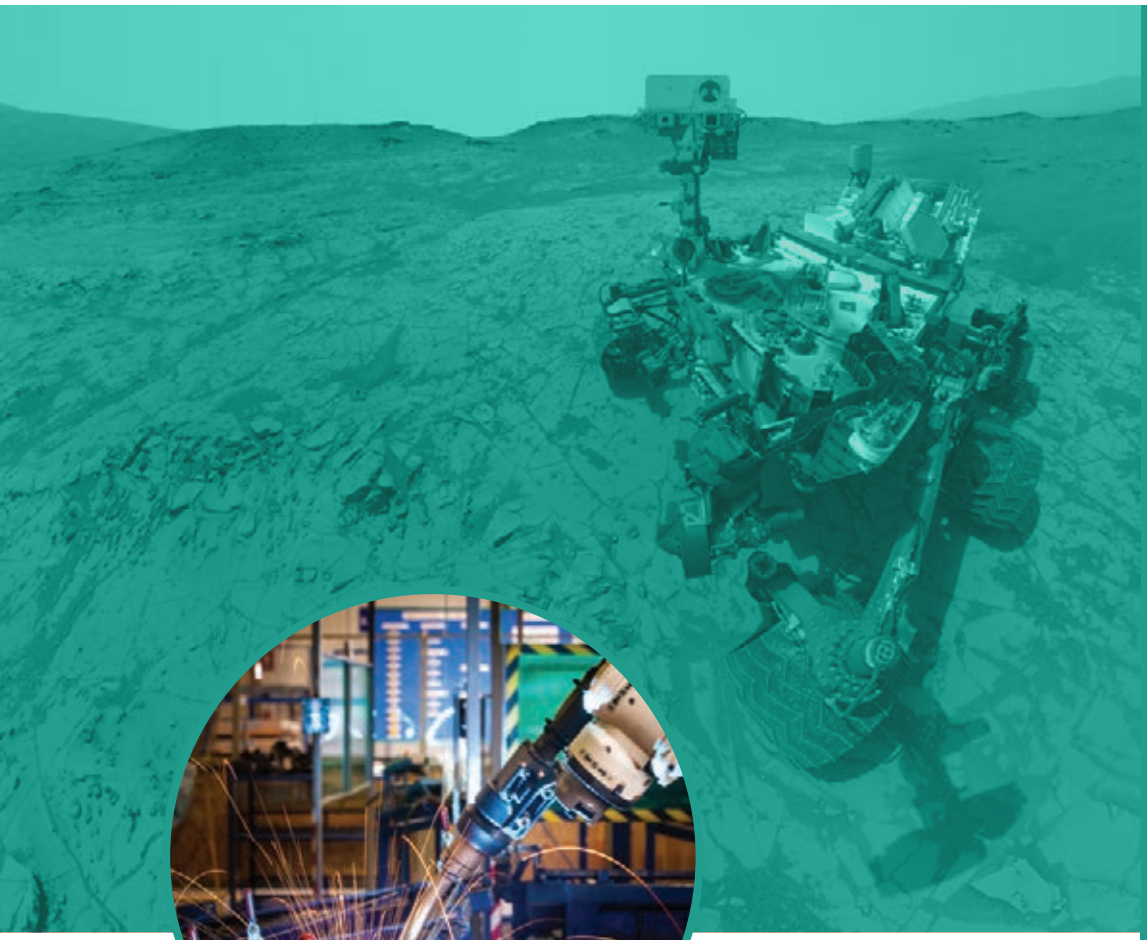
U.S. Government Purpose Release

Virtual Team Training Engine and Evaluation Framework — MSC-25445-1

This technology offers a framework for constructing virtual training scenarios rapidly, executing those scenarios, and measuring their effectiveness. Output from the scenario design tool is directly imported into a 3D virtual team-training engine that allows players to engage from a variety of platforms. The after-action review feature offers relevant, on-the-fly training material that will further educate each player in areas that warrant improvement.

U.S. Government Purpose Release

12 autonomous systems



Robotics

Automated Systems

Systems Health Monitoring

ACCoRDs Conflict-Detection (CD3D)/Conflict-Resolution (CR3D) Algorithms — LAR-17878-1

Written in Java and C++ and based on the Airborne Coordinated Conflict Detection and Resolution mathematical framework, CD3D and CR3D are prototype implementations of state-based conflict-detection and conflict-resolution algorithms for a 3D airspace.

Open Source

Adaptive Sensor Fleet (ASF) — GSC-15033-1

The Adaptive Sensor Fleet is a supervisory control system that uses a collection of heterogeneous robotic platforms to perform observations of dynamic environments. Goals can include: supervisory fleet management of robotic platforms (coordination); analysis of environmental science data for use in the decision-making process (collaboration); optimal path planning and re-planning; identification of science phenomena; and adaptation to dynamic or unknown environments.

U.S. Government Purpose Release

Aircraft VOrtex Spacing System (AVOSS) Wake Vortex Prediction Algorithm — LAR-16401-1-NP

The AVOSS Wake Vortex Prediction Algorithm provides time histories of position and circulation strength for a pair of aircraft wingtip vortices. Physical aircraft parameters such as weight, wingspan, and airspeed, along with profiles of ambient winds, temperature, and turbulence, are used as input to the algorithm. The output is a file with lateral and vertical position and circulation strength over a period of time for each wingtip vortex. The algorithm is a semi-empirical, analytic model of wake behavior. Predictions can be generated on the order of seconds, making the algorithm useful for real-time wake avoidance.

U.S. Release Only

Automated Evaluation Software (AES) Web Application — GSC-16544-1

AES allows source evaluation boards to enter, modify, and rate vendor proposals against a request for proposal (RFP). Created using modern Java enterprise technologies, the tool provides Microsoft® output and dynamic report generation. The user interface is compatible with both Internet Explorer and Firefox. A Tomcat application server makes the application robust, fast, and reliable.

U.S. Government Purpose Release

Automated Nonconformance System — SSC-00054

The Automated Nonconformance System records and tracks rocket engine inspections and repairs. The technology will also perform audits, ensuring that hardware is not shipped until it is properly processed and documented.

U.S. Government Purpose Release

Automated Segmentation of Insulin Granules from Scanning Electron Micrographs (SEM) of Rat Pancreatic Beta Cells — GSC-15074-1

This technology offers a data-driven image-processing approach that provides rapid and accurate determination of granule numbers, locations, and potential gradients in a pancreatic beta cell under different experimental conditions.

U.S. Government Purpose Release

Automation Framework Designed for Flight Dynamics Products Generation (XFDS) — GSC-15618-1

This software framework automates the generation of flight dynamics products by providing a unified and consistent graphical interface to various tools. The technology coordinates the execution of applications such as Satellite ToolKit, FreeFlyer, and MATLAB; allows for the embedding of Perl code; provides a mechanism for passing messages between a collection of XFDS processes; and allows GMSEC messages to be sent and received. Automation configuration is stored in text files and can be edited directly or by using graphical editors implemented for each tool.

U.S. Government Purpose Release

Collaborative Communication Framework for Multi-Agent Systems GSC-15123-1

Adaptable and self-organizing, this agent-awareness technology employs a virtual 3D concept to apply a framework to the NASA Goddard Space Flight Center (GSFC) tetrahedron structure developed under the Autonomous Nano Technology Swarm (ANTS) program and the Super Miniaturized Addressable Reconfigurable Technology (SMART) architecture program.
U.S. Government Purpose Release

Conflict Prevention Bands LAR-17874-1

Conflict prevention information has been assembled into prevention bands that advise a crew on maneuvers that should not be taken, helping to ensure that an aircraft's path is free of conflicts with other aircraft.
Open Source

Extendable Uniform Remote Operations Planning Architecture (EUROPA), Version 2.1 ARC-15936-1

EUROPA is a general-purpose, reusable, artificial intelligence software system. The tool generates plans for performing complex activities in parallel. Functionality includes the capability of verifying that a plan satisfies all constraints. Download the software at: http://code.google.com/p/europa-pso/wiki/EuropaWiki
Open Source

Formation Flying Test Bed (FFTB) GSC-15116-1

The Formation Flying Test Bed (FFTB) at NASA's Goddard Space Flight Center (GSFC) provides a hardware-in-the-loop test environment for formation navigation and control. A message-oriented middleware architecture and a software crosslink for inter-spacecraft ranging have been added to the FFTB.
U.S. Government Purpose Release

Gold Standard Test Set (GSTS) GSC-15873-1

The GSTS ground support equipment verifies that a command, control, communications, and intelligence (C3I) system complies with the interoperability standards for radio links and Ethernet interfaces. The technology, which does not check content, has been used to verify the interoperability protocols (language only) between Constellation systems.
U.S. Government Purpose Release

Hazards Analysis Management Tool (HAMT) GSC-16846-1

HAMT uses a single software tool to increase the efficiency and effectiveness of hazard analyses. Composed of a Microsoft® Access® front-end (that contains the user interface) paired with a Microsoft Access back-end (that stores analysis data), the software can be used to enter, edit, and report information throughout the hazard analysis lifecycle.
U.S. Government Purpose Release

Jet Propulsion Laboratory (JPL) Stereo Vision Software Suite (JPLV) JPL-18593

JPLV provides a set of libraries and utilities for basic robotic vision, including stereo ranging and camera calibration. Primarily intended for vision system users rather than vision system developers, the suite hides most implementation details behind a high-level application user interface. No specialized computer-vision knowledge is required.
U.S. Government Purpose Release

JLAB Tracking Tool (JTRAK) GSC-16806-1

The JLAB Tracking Tool (JTRAK) is a Web-enabled database tool designed to automate the tracking of configured items for the James Webb Space Telescope (JWST) Integrated Ground Support System (IGSS) and Integrated Test Support System (ITSS). JTRAK is accessed via a Web browser interface to the mysql database, which indexes configured items on multiple servers as well as a document directory containing items stored on the local server. The browser interface requires user authentication. All users must be validated by the HST Network and are assigned one of three access levels: ADMIN (all access), POWER (read/write documents), or REGULAR (read-only, non-ITAR documents).
U.S. Government Purpose Release

Lightweight Workflow Engine: A Server for Executing Generic Workflows GSC-16083-1

The Lightweight Workflow Engine (LWWE) is a server that provides support for automation and orchestration of task execution. Tasks can be scheduled based on dependencies of other tasks' statuses, time, and external process execution (such as scripts often used in running scientific models).
U.S. Government Purpose Release

Livingstone 2 (System for Automated Diagnosis and Discrete Control of Complex Systems) and Skunkworks (Suite of Supporting Development and Runtime Tools) ARC-14725-1

Livingstone 2 is a reusable artificial intelligence (AI) software system designed to assist spacecraft, life support systems, chemical plants, or other complex systems in operating robustly with minimal human supervision, even in the face of hardware failures or unexpected events. The technology diagnoses the current state of a spacecraft or other system and recommends commands or repair actions that will allow the system to continue operations. A re-engineered version of the Livingstone diagnosis system that was flight-tested onboard the Deep Space One spacecraft in 1999, Livingstone 2 contains significant enhancements to robustness, performance, and usability. Skunkworks is a suite of software tools that support the rapid deployment of model-based representations of complex systems for Livingstone2 via a visual model builder/tester and two graphical user interface tools that provide status information during testing. Download the software at: http://ti.arc.nasa.gov/opensource/projects/livingstone2/
Open Source

Mission Analysis Low-Thrust Optimizer (MALTO) JPL-43625

MALTO is a software tool for preliminary design and optimization of low-thrust interplanetary trajectories. The tool is easy to use, has robust convergence, and can handle many intermediate encounters.
U.S. Government Purpose Release

Mission Simulation Toolkit (MST) ARC-14932-1

MST offers a simulation framework to support research in autonomy for remote exploration. The system allows developers to test models in a high-fidelity simulation and then evaluate system performance against a set of integrated, standardized simulations. Download the software at: http://ti.arc.nasa.gov/opensource/projects/mission-simulation-toolkit/
Open Source

Model-Based Diagnosis Engine For Stochastic Hybrid Systems (HyDE) ARC-15570-1A

HyDE is a model-based diagnostic engine capable of detecting and isolating discrete (possibly multiple) faults in physical systems. The current version of HyDE has been implemented in C++. Please visit the following URL for more information: http://ti.arc.nasa.gov/tech/dash/diagnostics-and-prognostics/hyde-diagnostics/
Note: Also available to academia without a government purpose
U.S. Government Purpose Release

Motion Imagery and Robotics Application (MIRA) MSC-25164-1

MIRA integrates spacecraft monitoring and control (SM&C), the Asynchronous Messaging Service (AMS), and the Delay-Tolerant Network (DTN) into a single integrated protocol system capable of running on an International Space Station (ISS) payload computer.
U.S. Government Purpose Release

Mystic Low-Thrust Trajectory Design and Visualization Software JPL-43666

Mystic provides very high-fidelity optimization of low-thrust spacecraft trajectories for mission design. The software can be used for general body-centered trajectories, interplanetary trajectories, and trajectories that combine body-centered and interplanetary trajectory legs. Mystic will also provide navigational/operational support for low-thrust spacecraft.
U.S. Government Purpose Release

NASA Tensegrity Robotics Toolkit (NTRT), Version 1 ARC-17093-1

The NASA Tensegrity Robotics Toolkit (NTRT) is a collection of C++ and MATLAB software modules for the modeling, simulation, and control of Tensegrity Robots. Tensegrity Robots are a biologically inspired approach to building robots based on the tension networks of tensegrity structures, which have no rigid connections between elements. The NTRT was created to enable: the rapid co-exploration of structures and controls in a physics-based simulation environment; the development of tensegrity robotics algorithms such as structural analysis, kinematics, and motion planning; and the validation of the algorithms and controls on hardware prototypes of the tensegrity robots. Download the software at: http://ti.arc.nasa.gov/tech/asr/intelligent-robotics/tensegrity/ntrt
Open Source

Pandora Operation and Analysis Software GSC-16080-1

This NASA-developed software controls Pandora instruments in the field to make them operationally autonomous. The software has a graphical interface that ensures that all functions are easily accessible to the user. The software can reduce raw data into a preliminary scientific product for quick-view purposes.
U.S. Government Purpose Release

Perl Data Tools GSC-14388-1

This set of Perl scripts allows a software engineer to build systems to fully automate tasks. All tools are free, portable, and easy to understand and maintain. Prior technologies have utilized expensive databases, complicated client-server code (C, C++, and Java), and hard-to-control and hard-to-maintain rule-based systems.
U.S. Government Purpose Release

Planetary Observer Planning Software (POPS) JPL-45418

The POPS application suite performs mission design analysis of a spacecraft orbiting a terrestrial planet. POPS is not intended for the study of hyperbolic or interplanetary orbits, although some limited hyperbolic capabilities exist.
U.S. Government Purpose Release

Planning and Control Toolkit for Dual-Arm Manipulation MSC-25463-1

A suite of planning and control algorithms enables NASA robots to perform complex manipulations in a coordinated way (both autonomously and when operating under remote supervision).
U.S. Government Purpose Release

Robot Application Programming Interface Delegate (RAPID), Version 2 — ARC-16368-1A

RAPID is a software reference implementation framework for remote operations. The technology promotes interoperability between robot software modules and includes a standard programming interface and data distribution middleware. RAPID facilitates integration of experimental robot software modules created by a distributed development team; improves the compatibility and reusability of robotic functions; and offers speed prototype robot development in a wide range of configurations and environments. Download the software at: https://sourceforge.net/projects/robotapi/

Open Source

Room Alert Adapter, Version 1.0 — GSC-16167-1

This adapter translates room-alert Simple Network Management Protocol (SNMP) messages, allowing GMSEC-compliant components to receive/monitor alarms or sensor values issued from a room-alert device.

U.S. Government Purpose Release

Runway Incursion Prevention System (RIPS) Software — LAR-16544-1

The objective of RIPS is to improve runway incursion avoidance and detection capabilities. The real-time software system has been developed for use on aircraft operating on or near airport surfaces. RIPS improves the following elements of situation awareness for pilots: own-ship position awareness, traffic awareness, route awareness, route deviation detection, and runway incursion detection. The software system supports the first three elements by providing information to pilots via a Head-up Display (HUD) and an Electronic Moving Map (EMM) display. The last two elements are supported by monitor functions within the system that, on detection, generate audible alerts that are presented on the HUD and EMM displays.

U.S. Release Only

Simple, Scalable, Script-Based Science Processor for Missions (S4PM) — GSC-14841-1

S4PM is a set of Perl scripts that implement a data-driven processing system that executes science algorithms automatically as new data arrive. S4PM includes a graphical user interface for monitoring algorithms and the overall system for failures. The Perl scripts can currently process data from the Moderate Resolution Imaging Spectroradiometer and the Atmospheric Infrared Sounder, but the technology can be extended to process data from other missions if desired. Please visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/s4pm/

Open Source

Small Body Navigation and Topography (SBN&T) — JPL-41647

SBN&T provides an integrated program for the spacecraft navigation and determination of small-body dynamics, shape, and high-resolution topography. Multiple-image stereography and photoclinometry are used to construct high-resolution topographic and albedo map centers treated as control points. These landmark maps are re-illuminated and correlated with images to act as body-fixed navigation tie-points.

U.S. Government Purpose Release

Speed Control Law for Aircraft Merging in the Terminal Area — LAR-17167-1

This software application uses airplane-to-airplane data-link information to calculate a speed command that allows an airplane to merge behind and then follow another airplane. This speed guidance provides a precision-spacing capability that could reduce an air traffic controller's tactical workload while increasing aircraft efficiency in terminal areas (i.e., increases landing rates/reduces delays) at busy airports during periods of high demand.

U.S. and Foreign Release

SQL RAMS: Upgrade of the Legacy Rocketdyne Automated Management System (RAMS) — SSC-00207-1

This technology upgrades and expands the efficiencies of the Rocketdyne Automated Management System (RAMS), which has been used to streamline the maintenance procedures of ground support equipment (GSE) at Stennis Space Center test sites. AMS improves work instruction accuracy, documents availability, and offers an overall work control system that has enhanced productivity and product quality.

U.S. Government Purpose Release

Strategic Conflict Resolution (Stratway) — LAR-17876-1

Stratway modifies a four-dimensional (latitude, longitude, altitude, and time) flight plan to ensure a conflict-free trajectory. This type of resolution is strategic in that it resolves conflicts over long time horizons, perhaps over several hours.

Open Source

TurboTech Technical Evaluation Automated System — GSC-15554-1

Using an "interview" process through which an evaluator answers a series of questions, TurboTech simplifies and semi-automates the more structured portion of a technical evaluation. The software also provides definitions and plug-in paragraphs to assist in writing evaluations.

U.S. Government Purpose Release

13

vehicle management

space • air • ground

Flight Software

Spacecraft Processes

Command and Data Handling

Instrument Management

Advanced Spacecraft Integration & System Test Software (ASIST), Version 20.0 GSC-16783-1

With initial development beginning in the early 1990s, a government/contractor team has produced a spacecraft ground system capable of being utilized through all phases of a spacecraft's life, including box-level development and testing, satellite integration and test, and post-launch mission operations. The system uses a single, industry-standard protocol to ease integration with other products and includes COTS, GOTS, and public domain software. The technology is composed of several parts: the Advanced System for Integration and Spacecraft Testing (ASIST) is the user-interface, providing the user with the ability to view and analyze telemetry, send commands, and automate tests; the Front End Data System reads telemetry from spacecraft, distributing requested data packets to subscribing clients and controlling the forward (command) link to the spacecraft; the Digital History Data Store (DHDS) archives the raw telemetry received from the spacecraft and distributes historical telemetry data to clients. This system can be configured in a number of ways. For small labs, a single ASIST workstation may be used; in I&T or mission operations, the configuration may include up to 31 ASIST workstations. All configurations provide the user with the same standard interface to their flight hardware.
General Public Release

Alternative Flight Software Trigger Paradigm: Applying Multivariate Logistic Regression to Sense Trigger Conditions Using Inaccurate or Scarce Information MSC-25684-1

Helping Guidance, Navigation, and Control (GN&C) engineers to develop robust flight software tools, this innovation allows an autonomous vehicle to trigger certain actions.
U.S. Government Purpose Release

Automated Planning and Scheduling Environment (ASPEN) JPL-41986

ASPEN automates space mission planning and other tasks that involve the reasoning of time, states, resources, and actions.
U.S. Government Purpose Release

Autonomous Flight Safety System GSC-15549-1

The Autonomous Flight Safety System replaces the human element of range safety operations and reduces reliance on expensive down-range assets. The system provides a highly reliable platform consisting of multiple navigation sensors and flight computers.
U.S. Release Only

Autonomous Landing Hazard-Avoidance Technology (ALHAT) Scanning Lidar-Based Simulation for Mars Landing JPL-21220

The ALHAT simulation tool provides an efficient software model and a set of algorithms in C++ code for performing scanning lidar-based hazard detection and avoidance.
U.S. Government Purpose Release

Basic Operational Robotics Instructional System (BORIS) MSC-24850-1

BORIS is an introductory robotics training system for flight crews, flight controllers, and robotics instructors. The technology combines forward and inverse kinematic algorithms to simulate joint and end-effector motion together with a multi-body dynamics model, a moving-object contact model, and X Windows®-based graphical user interfaces.
U.S. Government Purpose Release

Command Management System (CMS) GSC-14798-1

The CMS is an essential element of the Mission Operations Center (MOC) for NASA's scientific satellites. The system enables efficient and safe operation of commanding functions for a given mission. On the ground, the CMS has the prime responsibility of coordinating the collection and merging of spacecraft and instrument commands from various sources and performing functions related to the management and use of stored command processor memory onboard a spacecraft.
U.S. Government Purpose Release

Component Object Model (COM+) Simulation Architecture with Application to Tethers and Formation Flying — GSC-14970-1

The COM+ spacecraft simulation architecture enables the user to build COM components that can be assembled into a spacecraft simulation without the need for re-compiling or re-linking. The advantages of using COM components result directly from their ability to be dynamically plugged into and unplugged from a spacecraft simulation. This type of architecture provides for rapid assembly by enabling components (representing the environment, sensors, actuators, dynamics, and control) to function as distributed processes across networks.

U.S. Government Purpose Release

Core Flight Executive (cFE) — GSC-16232-1

The Core Flight Executive (cFE) provides software bus, time, event, executive, table, and file services, and it defines the application programming interface (API) for each set function. Applications subscribe to cFE services at runtime, making system modifications easy. Facilitating rapid prototyping, new applications can be compiled, linked, loaded, and started without requiring the entire system to be rebuilt. ***Note:*** Version 5.0 and 6.0. Download the software at: http://opensource.gsfc.nasa.gov/projects/cfe/index.php

Open Source

Core Flight Executive (cFE) Application Programming Interface (API) — GSC-15157-1

The cFE API specifies function name, required parameters, and function return information.

Open Source

Core Flight Executive/Core Flight System (cFE/CFS) Evolution for Multi-Core Platforms — GSC-16857-1

This development effort modified cFE/CFS flight software components to enable them to run on a multi-core processor or an embedded operating system that supports multi-core processors (e.g., VxWorks 6 and Linux). Modified components included: the Operating System Abstraction Layer (OSAL), the Core Flight Executive (cFE), and parts of the Core Flight System (CFS). These modifications did not add any additional application functionality to the OSAL or the cFE.

U.S. Government Purpose Release

Core Flight System (CFS) CFDP, Version 2 — GSC-16125-1

The CFDP application provides the capability to transmit and receive files to/from the ground. Tables are used to allow flexibility in specifying directory priorities and configurations.

U.S. Government Purpose Release

Core Flight System (CFS) Checksum Application, Version 2 — GSC-15996-1

Checksum (CS) is one of the reusable applications that makes up the Core Flight System (CFS). The technology performs memory integrity management by verifying the contents of critical flight memory regions. Unexpected changes in memory (i.e., due to an SEU) are reported to ground operators.

U.S. Government Purpose Release

Core Flight System (CFS) Data Storage (DS) Application, Version 2 — GSC-16126-1

The DS application provides the ability to store data (i.e., messages) into files. Tables are used to provide the flexibility for specifying messages.

U.S. Government Purpose Release

Core Flight System (CFS) File Manager (FM) Application, Version 2 — GSC-16007-1

FM provides the user commands to perform the following operations: copy file, move file, rename file, delete file(s), close file, concatenate file, decompress file, delete directory contents, create directory, remove directory, obtain file information, obtain open file listing, and obtain directory listings.

U.S. Government Purpose Release

Core Flight System (CFS) Health and Safety Application, Version 2 — GSC-16151-1

The plug-and-play CFS Health and Safety application is compatible with the Core Flight Executive (cFE) and uses the Operating System Abstraction Layer (OSAL), both of which were developed by Goddard Space Flight Center in order to provide a reusable, platform-independent, mission-independent, layered architecture for hosting applications. The technology can be used for any government or commercial spacecraft. Please visit the following URL for additional information: http://sourceforge.net/projects/coreflightexec/files/cFE-6.1.1/

U.S. Government Purpose Release

Core Flight System (CFS) Housekeeping (HK) Application, Version 2 — GSC-16127-1

The CFS Housekeeping application provides the ability to organize data from various packets into new packets in order to best utilize the telemetry bandwidth available for a mission.

U.S. Government Purpose Release

Core Flight System (CFS) Limit Checker (LC) Application, Version 2 — GSC-16010-1

The Limit Checker (LC) application is responsible for monitoring telemetry values.

U.S. Government Purpose Release

Core Flight System (CFS) Memory Dwell Application, Version 2 — GSC-16012-1

The Memory Dwell application telemeters the contents of table-defined addresses at a table-defined dwell rate. Addresses can be processed using symbols if the target processor/operating system includes symbols.

U.S. Government Purpose Release

Core Flight System (CFS) Memory Manager Application, Version 2 — GSC-16011-1

The Memory Manager application processes commands, generally from the ground, in order to dump the contents of a memory location, dump the contents of a range of memory locations, load a memory location with specified data, load a range of memory with specified data, or fill an area of memory with the specified fill pattern. Operations can be performed on non-volatile, volatile, and memory mapped I/O.

U.S. Government Purpose Release

Core Flight System (CFS) Scheduler Application, Version 2 — GSC-16123-1

The Scheduler application uses a one-second major timeframe, which is divided into a designer-determined collection of equally divided minor timeframes. The technology is configurable and table-driven to provide greater flexibility.

U.S. Government Purpose Release

Core Flight System (CFS) Software Bus Network (SBN) Application, Version 1.0 — GSC-16917-1

The SBN serves as a plug-in to the cFE framework to transfer messages across process/processor interfaces. The technology has three primary functions: to establish and maintain a connection to each peer over available process/processor interfaces; to distribute and maintain a subscription message database for each peer; and to distribute messages to peers that have subscribed to message identifiers.

U.S. Government Purpose Release

Core Flight System (CFS) Stored Command (SC) Application, Version 2 — GSC-16009-1

The CFS SC application provides the ability to execute onboard absolute-time and relative-time command sequences. The technology offers a generic implementation that can be configured by a user to fit the needs of a specific mission.

U.S. Government Purpose Release

Data Trending and Analysis System, Version 4.0 — GSC-14751-1

The client/server-based Data Trending and Analysis System, which can be exported to Excel® or to a text file, archives and then analyzes spacecraft health and safety telemetry. The system provides various tools for viewing, plotting, and analyzing engineering data, and it allows for selective sub-setting of data for analyzing specific points of interest. An optional tool for power system analysis is also provided.
U.S. Government Purpose Release

Experiment in Onboard Synthetic Aperture Radar (SAR) Data Processing With Radiation Hardening by Software on Tilera Multicore Processor — GSC-15757-1

This standard C-language implementation of Synthetic Aperture Radar (SAR) data processing is distributed over many cores of a Tilera processor and employs novel Radiation Hardening by Software (RHBS) techniques designed to protect component processes and their shared application memory from the single-event upsets expected in the space environment. The source code includes calls to Tilera application programming interfaces and a specialized Tilera compiler for producing a Tilera executable.
U.S. Government Purpose Release

Formation Flying System for Unmanned Aerial Vehicles (UAVs) and Satellites — MFS-33193-1

Using a distributed mesh network communication architecture, this system facilitates formation flying by providing a framework for the exchange of information among multiple vehicles. By exchanging pertinent data, various vehicles can perform as a single formation deployment shape without direct control from the ground. The technology's generic design affords applicability to an array of vehicle types, including UAVs and satellites.
Note: Export control restricted
U.S. Release Only

General Mission Analysis Tool (GMAT) — GSC-15132-1

Fully platform independent, GMAT has been designed for intuitive use from both a graphical user interface and a script language similar to MATLAB. The technology's propagation abilities allow for the coupled dynamics of multiple spacecraft in multiple flight regimes.
U.S. Release Only

GOES-R Flight Software — GSC-17071-1

The GOES-R Flight Software contains the software components required to operate the GOES-R satellite. Capabilities include guidance, navigation, controls, and propulsion (GNC&P) algorithm implementation; electronic power system (EPS) algorithm implementation; thermal control algorithm implementation; autonomous fault detection and correction (FDC) capabilities; command processing; telemetry processing; stored command processing; instrument payload Interfaces; BusIO command and control for MIL-STD-1553B bus interfaces; a layered driver architecture for GOES-R-specific hardware interfaces and wrapped VxWorks 6.6 operating system capabilities; and an executive application management capability. The GOES-R Flight Software also contains modified BAE RAD750 SUROM startup capabilities, modified BAE SpaceWire SUROM startup capabilities, and BAE SpaceWire ASIC Embedded MicroController (EMC) software. Finally, the GOES-R Flight Software contains a non-flight, self-test software (SELTS) component that allows for closed-loop execution of the flight software during integration and test activities on the GOES-R spacecraft.
U.S. Government Purpose Release

International Space Station (ISS) Robotics Planning System (RPS) Software Suite — MSC-25639-1

The RPS suite is used by Robotics Flight Controllers to show graphical representations of ISS robotics arm activities following flights. The technology is also used as an independent graphical simulation for pre-flight robotics activities.
U.S. Government Purpose Release

Lunar Reconnaissance Orbiter (LRO) Spacecraft Flight Software GSC-16103-1

LRO Spacecraft Flight Software controls and coordinates all aspects of the Orbiter's operation in nominal and anomalous conditions. It distributes commands to, and collects data from, all spacecraft subsystems and all seven instruments; communicates with the ground controllers in real time to receive commands and send housekeeping telemetry data through the S-band RF links; sends science data using the class-2 CCSDS File Delivery Protocol (CFDP) over the Ka-band RF link; and monitors the health of various Orbiter subsystems and takes corrective actions as necessary.
U.S. Government Purpose Release

Magic Bullet Adaptive Intelligent Vehicle Health Management (AIVHM) System GSC-15147-1

Based on treatment learning and Bayes classification technology, the "Magic Bullet" Adaptive Intelligent Vehicle Health Management (AIVHM) system offers a novel adaptive control system for sounding rockets.
U.S. Government Purpose Release

Magnetosphere Multi-Scale (MMS) Spacecraft Flight Software GSC-16471-1

This spacecraft flight software was developed to support unique multi-satellite MMS mission requirements. The technology interfaces to a sensor/actuator complement that includes a star sensor and Digital Sun Sensor, Accelerometer, and Thruster hardware to implement the functionality for determining and controlling spacecraft attitude and orbit.
U.S. Government Purpose Release

MAVEN Flight and Ground Software GSC-16866-1

This software includes the flight code embedded in the flight processor on the spacecraft; the simulation models and executive code that executes in the Spacecraft Test Lab; the simulation models and executive code that executes in the SoftSim test bed; unit-level test code; test scripts to execute test runs in the test beds; and the software used to test avionics boards and support ATLO testing.
U.S. Government Purpose Release

Mercury Laser Altimeter (MLA) Onboard Science Algorithms Reusable Software GSC-14876-1

By using range information provided by a spacecraft and noise counts from instrument hardware, the MLA science algorithms control the altimeter by dynamically modifying hardware inputs for the gain, the threshold, the channel disable flags, the range window start location, and range window width. The technology has three major modes of operation: fixed, range-driven, or self-adaptive.
U.S. Government Purpose Release

Multi-Mission Attitude Determination System (ADS-MATLAB) GSC-14471-1

This multi-mission GUI-based attitude determination system is implemented in MATLAB. The technology includes a user-developed front-end, a data adjuster that transforms raw telemetry to vectors in body coordinates, a direct-match and pattern-match star identification module, a single-frame (QUEST) attitude estimator, an onboard computer/ground attitude comparison tool, and a set of sensor calibration utilities.
U.S. Government Purpose Release

Multi-Mission Three-Axis Stabilized Spacecraft (MTASS) Attitude Determination and Sensor Calibration System GSC-15811-1

Unlike single-purpose ground support systems, which attempt to reduce costs by reusing software specifically developed for previous missions, this development effort is an intermediate step in the progression to a single fully generalized mission support system that could be used for numerous missions.
U.S. Government Purpose Release

Multiple-Force Vector and Field Detection and Measurement Through a Flexible Medium MSC-25704-1

This innovation can be used as a tactile human-machine input device or as a tool to improve the grasping quality of robot manipulators. Incipient slip, sample stiffness, and tangential force vector parameters are extracted and used in high-level control algorithms to drive a robotic arm.

U.S. Government Purpose Release

NanoSat Launch Adapter System (NLAS) ARC-16732-1

NLAS maximizes the efficiency of satellite launch opportunities. The technology acts as a "spacer" between the rocket and the primary spacecraft. NLAS consists of three main subsystems: the Adapter, the Dispenser, and the Deployment Sequencer. Each subsystem can be configured to meet the specific needs of a given launch.

U.S. Government Purpose Release

Onboard Short-Term Plan Viewer (OSTPV), Version 4.0 MSC-24832-1

Innovators at NASA Johnson Space Center have developed a Web-based application to support the International Space Station (ISS) program's real-time operations. The Onboard Short-Term Plan Viewer (OSTPV) contains the integrated ISS mission schedule in use at NASA Mission Control Center (MCC) and onboard the ISS. OSTVP displays all ISS activities (onboard and on the ground) in an integrated timeline.

U.S. Government Purpose Release

Operating System Abstraction Layer (OSAL) GSC-14921-1

The OSAL library isolates embedded application software from a Real-Time Operating System (RTOS). The technology provides a well-defined, generic interface to RTOS services; a generic interface to hardware services; and an implementation for several current RTO systems. By using the library, an embedded application can remain portable among multiple operating systems on multiple platforms. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/osal/

Open Source

Orion Guidance, Navigation & Control Flight Software MSC-25615-1

The Orion Crew Exploration Vehicle's onboard Guidance, Navigation & Control (GN&C) flight software has been developed to a class-A, human-spaceflight-ready standard. The technology uses a MATLAB/Simulink tool suite to embrace a model-based development approach.

U.S. Government Purpose Release

Range Data Acquisition Computer (RADAC) System GSC-14974-1

The Range Data Acquisition Computer (RADAC) system is used to process flight vehicle metric data for real-time display in the Wallops Flight Facility Range Control Center (WFF RCC) and Mobile Control Center (MCC). It is an integral part of the overall Range Control/Range Safety System used to contain impacting debris from flight vehicle operations. As part of an upgrade effort, a modular software object library was developed to implement required vehicle tracking data filtering and tracking data source management functionality. The library has been constructed in such a way as to easily accommodate future implementations and integration of other, more exotic filtering techniques. Developed using modern object-oriented software practices in ANSI-compliant C++, the library can be hosted within an application running on virtually any computing platform.

U.S. Government Purpose Release

Range Safety Algorithm Software Module for an Autonomous Flight Safety System — GSC-15594-1

This software library was developed to mitigate the public safety risks of hazards associated with the flight of expendable launch vehicles and other unmanned flight vehicles. The software encapsulates the various constructs and algorithms required to accomplish Time Space Position Information (TSPI) data management from multiple tracking sources. At its core, the technology evaluates various user-configurable rule sets that govern the qualification of TSPI data sources; provides a pre-launch autonomous hold-launch function; performs flight-monitoring/flight-termination functions; and provides end-of-mission safing.
U.S. Government Purpose Release

Range Safety Flight Elevation Limit Calculation Software (ElLimits) — GSC-16692-1

The ElLimits program is used to configure launch-phase range safety flight control lines for guided missiles. The user specifies the extents and resolution of a grid in the vertical plane oriented along the launch azimuth. At each grid point, the program computes the maximum velocity vector flight elevation that can be permitted without endangering a specified back-range location. Vertical plane x-y limit lines are derived from the flight elevation limit data by numerically propagating “streamlines” through the grid.
U.S. Government Purpose Release

ROAMS Rover Analysis and Modeling Software — JPL-30722

ROAMS is a planetary rover simulation software package. The technology consists of mechanical models of a rover, instrument arms, actuators and sensors, power resources, terrain interactions, and onboard software.
U.S. Government Purpose Release

Rock Identification Toolkit (RockIT) — JPL-41133

RockIT is an interactive tool used by mission scientists to identify and characterize rocks and rock distributions.
U.S. Government Purpose Release

Software Applications for the Control and Management of the Amine Swingbed Experiment — MSC-25526-1

This disclosure covers the following software components: the Swingbed Loader Computer Software Configuration Item (CSCI), the Swingbed Control Module (CSCI), and the Swingbed Ground Controller. As a whole, the Amine Swingbed Experiment is investigating the removal of carbon dioxide from the International Space Station breathing environment via a system of vacuum-regenerated amine pressure swing absorption reaction beds. Please visit the following URL for additional information: http://www.nasa.gov/mission_pages/station/research/experiments/Amine_Swingbed.html
U.S. Government Purpose Release

Space Network Access System (SNAS) — GSC-16844-1

SNAS is a single, universally accessible, standards-based, and full-featured customer interface for performing Tracking and Data Relay Satellite System (TDRSS) planning, scheduling, and real-time service monitoring and control. The technology consolidates the functionality of multiple legacy customer interface systems into a single tool. SNAS is the primary access system for managing TDRSS resources.
U.S. Government Purpose Release

Spacecraft Parameter Database Tool (PDBT) — GSC-16779-1

PDBT manages the GOES-R Spacecraft Parameter Database. The technology is a Web-based application for creating and maintaining spacecraft files required for setting flight software parameters associated with test and operations. PDBT controls the format of the files, the content of the files, and configuration management of the files relative to both the flight software (FSW) build cycle and the spacecraft test and operation phases.
U.S. Government Purpose Release

SpaceWire Link-and-Switch Implementation GSC-14734-1

NASA's Goddard Space Flight Center has developed a unique SpaceWire link-and-switch implementation. The design enables high- and low-rate communication between avionics over a network architecture. This significant advancement helps reduce the complexity of communication over satellite architecture applications and other spaceflight systems while improving speed and reliability.
U.S. Release Only

SpaceWire PCI Card Windows Driver Software GSC-15173-1

This software allows the SpaceWire PCI card to be integrated into a Microsoft® Windows® operating environment. The PCI card supports the SpaceWire protocol and connects to spacecraft instruments and subsystems designed with SpaceWire interfaces.
U.S. Government Purpose Release

SpaceWire Reliable Data Delivery Protocol (RDDP) Software GSC-15402-1

The RDDP software provides virtual channelization, reliable data delivery, and fire-and-forget functions on a single SpaceWire link. The technology runs in a microcontroller used in Power PC single-board flight computers.
U.S. Government Purpose Release

StatusMon: Space Shuttle Main Engine (SSME) Status Monitor and Failure ID (FID) Decoder MFS-32410-1

StatusMon reads a network data stream in real time, monitoring engine status parameters for changes.
U.S. Release Only

Swift Burst Alert Telescope (BAT) Engineering Flight Software GSC-15242-1

The BAT engineering software controls and coordinates all aspects of the instrument's operation in nominal and anomalous conditions. It distributes commands to, and collects data from, all instrument subsystems, including the power system, the 16 detector blocks, the digital signal processor, and the science data processing software. The technology also communicates with the Swift spacecraft to receive commands from the ground and send all instrument telemetry data. In addition, the software monitors the health of various instrument subsystems and takes corrective actions when necessary.
U.S. Government Purpose Release

Systems and Methods for Determining Spacecraft Orientation GSC-14666-1

This technology provides a method for determining spacecraft attitude based upon observed star locations. The software incorporates a priori spacecraft attitude files, a star catalog, a desired time interval for data, desired maximum magnitude for catalogued stars and observed stars with time tags, and associated vector coordinates and magnitudes.
U.S. Government Purpose Release

Wilkinson Microwave Anisotropy Probe (WMAP) Command and Data Handling Flight Software GSC-14964-1

Functioning as the sole interface between MAP spacecraft/instrument subsystems and ground operations equipment, this technology provides a command decoding and distribution system, a telemetry/data handling system, and a data storage and playback system. It also performs the onboard processing of attitude sensor data and generates commands for the attitude control actuators in a closed-loop fashion.
U.S. Government Purpose Release

Worldview: Satellite Imagery Browsing and Downloading Tool GSC-17111-1

Worldview is a software tool designed for interactively browsing and downloading imagery from NASA's Earth-observing satellites. Building upon a set of open-source mapping and user interface libraries, it provides an environment to visually discover interesting phenomena as observed by NASA satellites, then download the data for further analysis. It was originally designed to address the needs of the near-real-time applications community to provide relevant information for time-critical scenarios such as wildfire and flood management. As such, satellite imagery can be viewed in Worldview within four hours of observation and in its highest, or native, resolution. Download the software at: http://opensource.gsfc.nasa.gov/projects/worldview/index.php

Open Source

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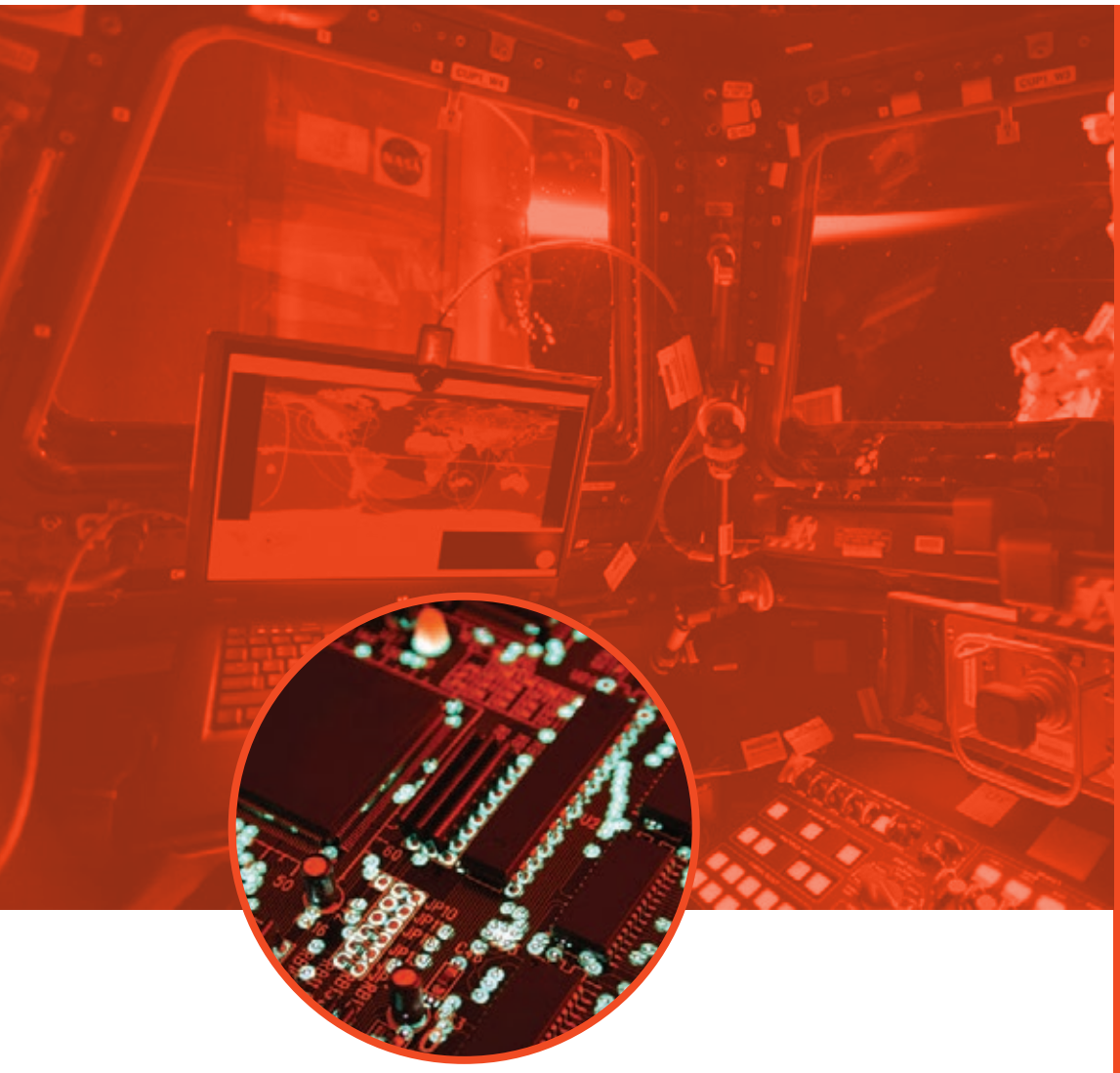
data and image processing



Algorithms

Data Analysis

Data Processing

3D Solid Models of Scientific Data for Education and Outreach — GSC-14897-1

Converting 3D topographical data into a format suitable for rapid prototyping, this technology has been used to construct models of the Martian topography with data from the Mars Orbiter Laser Altimeter (MOLA).
U.S. Government Purpose Release

3DGRAPE/AL, Version 2 — LAR-16415-1

Offering increased fidelity over other packages available in the public domain and sold by private companies, 3DGRAPE/AL (3D Grids about Anything by Poisson Equations with Upgrades from Ames and Langley) provides the latest state-of-the-art software to generate structured volume grids for computational fluid dynamics (CFD) analyses. Aerospace uses include analysis of aircraft and spacecraft in fluid flight regimes.
U.S. Release Only

Advanced Photon Counting System (APCS) — GSC-14880-1

The APCS card is a complete highly integrated photon counting system.
U.S. Government Purpose Release

ARAJ Low-Density Parity Check (LDPC) Codes — JPL-43949

This software provides a construction method for protograph-based Low Density Parity Check (LDPC) codes that simultaneously achieve low iterative decoding thresholds and linear minimum distance. The technology can be used for various code rates. Proposed codes may have either fixed input block or fixed output block sizing. Both cases provide rate compatibility. In fact, one encoder and one decoder can support different code rates.
U.S. Government Purpose Release

Augmentation of Virtual Space Physics Observatory Services to Expand Data Access Capabilities — GSC-14924-1

This technology is a combination of three features/capabilities: (1) process and computer programs to perform ad-hoc queries based on interactive mathematical analysis of time series data stored in distributed, heterogenous, digital data archives; (2) new computer programs and improvements to existing computer programs to provide integrated data discovery, data retrieval, and display of time series data stored in distributed, heterogenous, digital data archives; and (3) improvements to, and new applications of, the Xerlin XML Modeling Tool to provide metadata creation and metadata repository management capabilities for the Virtual Space Physics Observatory.
U.S. Government Purpose Release

AutoBayes: Automatic Design of Customized Analysis Algorithms and Programs — ARC-16276-1

AutoBayes uses extended Bayesian networks, a powerful symbolic system, and algorithm schemas to automatically generate efficient and customized programs for data analysis. It generates a standardized design document containing a graphical representation of the Bayesian network and of the details regarding the code's generation. Download the software at: http://ti.arc.nasa.gov/opensource/projects/autobayes
Open Source

AutoFilter: Automatic Generation of Customized State Estimation Code with Kalman Filters — ARC-16297-1

AutoFilter is a software tool that automatically generates efficient and customized code for navigation and state estimation using Kalman filter algorithms. The input for the tool is a detailed, high-level description of the problem's process, noise, and measurement models as well as software interface descriptions and architectural details. Using its powerful symbolic system and algorithms schemas, AutoFilter symbolically calculates all required matrices and produces code tailored toward the specific problem.
U.S. Government Purpose Release

Automated IR Image Damage Detection Algorithm with Quantitative Error Threshold — GSC-15170-1

This innovation uses IR images of samples with conductive heat gradients to perform qualitative damage detection within a given error budget.
U.S. Release Only

AutoPost — MFS-32925-1

AutoPost can process any configuration of test data as needed. The tool can combine a series of data parameters into a single parameter.
U.S. Release Only

BALFIT: A Multivariate Regression Analysis Tool — ARC-15804-1A

BALFIT is designed for the automated regression analysis of wind tunnel strain-gage balance calibration data. Related strain-gage balance data analysis tasks are also supported. In addition, BALFIT performs an automated regression analysis of more general multivariate data sets at a basic level.
U.S. Release Only

CertWare Safety Case Workbench Software — LAR-18067-1

This technology contributes several core modules to support safety case models and offers a service-based application programming interface that enables new model-processing capabilities to be plugged into the workbench.
Open Source

Chimera Grid Tools, Version 2.1 — ARC-16025-1A

The Chimera Grid Tools software package contains a collection of software tools for performing geometry processing, surface and volume grid generation, grid manipulation and diagnostics, flow solver input preparation, multi-body dynamics input preparation and animation, flow solution visualization, debris trajectory analysis input preparation, strand grid and AMR Cartesian grid visualization, flow solution post-processing analysis including forces and moments computation, and convergence history visualization.
Please visit the following URL for additional information: http://people.nas.nasa.gov/~wchan/home.html
U.S. Release Only

Code for Finding the Argmin and Argmax of a Data Variable in Stata Statistical Software — MSC-25718-1

This technology is used to find the argmin and argmax of a data variable within a Stata data set. The argmin and argmax in this case are the observation numbers at which the data variable achieves its minimum and maximum values (rather than the values themselves). Besides calculating and returning the argmin and argmax (i.e., observation number), the code returns the minimum and maximum values for reference, and upon request, returns the values of other data variables at the same observation numbers.
U.S. Government Purpose Release

Code for Finding the Running Maximum, Minimum, and Range of a Data Variable in Stata Statistical Software — MSC-25722-1

This technology is used to create a data variable that contains the running maximum, minimum, and range (maximum minus minimum) of another variable in a Stata data set. The code can also conceptually divide a data set according to values of other variables and calculate the running maximum, minimum, or range separately within each division.
U.S. Government Purpose Release

Configurable Real-Time Analysis System (CRANS) Software Program, Version 7 — MSC-25673-1

CRANS provides status of an avionics system utilizing an expert system for standard failure and correction options for potential failures. The program provides a means of representing logically interconnected items in a matrix format.

U.S. Government Purpose Release

Constellation PRACA Extension of the Bugzilla Application — ARC-16033-1

The Constellation PRACA I-1 system is a modified version of an open-source, Web-based defect tracking tool called Bugzilla. Bugzilla allows software developers to document and track outstanding bugs in their products; in the Constellation PRACA I-1 system, these core capabilities have been extended to provide the necessary functionality and usability defined in the PRACA processing requirements. Download the software at: http://www.bugzilla.org/download/

Open Source

Core Hierarchical Segmentation (HSEG) Software Package — GSC-15855-1

This version of HSEG is not subject to patent restrictions. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/HSEG/

Open Source

Data Compression for Time-Series and Spectral Data — GSC-14820-1

This general-purpose data compression algorithm has been developed using Chebyshev polynomials to preserve the necessary information for quantitative scientific analysis. The algorithm is computationally simple yet provides compression factors much greater than two. The method is suitable for the compression of science data (e.g., spectral data, particle or photon count rate data, and magnetometer data) from many types of space instruments.

U.S. Government Purpose Release

Decomposition of Higher Order Transfer Functions (TFNS) Into a Sum or Product of Lower Order Transfer Functions — GSC-14868-1

This program decomposes higher order transfer functions into a sum or product of lower order transfer functions (first, second, or third order) that can be implemented directly by a single operational amplifier in standard configurations such as the modified Sallen-Key or Chebychev. (MATLAB, one of the most versatile computer-aided analysis and design tools for control and signal processing, does not possess this capability.) Decompositions are not done arbitrarily since the poles of transfer functions, in general, exist as complex pairs.

U.S. Government Purpose Release

Digital Elevation Model Maker (DEMmaker) — MSC-24722-1

This software suite produces data products containing surface shape, reflectivity, and geomorphology for a desired planetary surface. The technology produces seamless sets of digital elevation models (DEMs) at virtually any resolution or size to provide the desired levels of terrain feature detail as a spacecraft approaches a planetary surface. The innovation enables researchers to study a wide variety of problem domains, as the DEMs incorporate observed data as well as mathematical models of planet morphology.

U.S. Government Purpose Release

Direct Solve Image-Based Wavefront Sensing — GSC-15208-1

This technology solves for the wavefront directly from a single image and does not require defocusing or a nonlinear iterative algorithm.

U.S. Government Purpose Release

Discontinuous-Galerkin Spectral-Element Solver (Eddy) ARC-17373-1

Eddy is a fundamental research code for advancing spectral methods for complex geometry. This software is intended to enable researchers to collaborate through a common framework which enables three-dimensional simulations on practical problems. Areas of interest include advanced numerical algorithms, computational optimization, scale-resolving turbulence models, and high-order mesh generation.
General Public Release

DthData Armstrong Time-History Software Utility DRC-012-024

A standalone command-line-driven utility program, DthData processes time-history format data files generated by the Armstrong Core Simulation Software.
U.S. Release Only

DthDiff Armstrong Time-History Difference Software Utility DRC-012-025

A standalone command-line-driven utility program, DthDiff is used to compare two Armstrong time-history format data files generated by the Armstrong Core Simulation Software.
U.S. Release Only

Elimination of Parameter Input Requirement for Elliptic Grid Generation Methods in Engineering ARC-14710-1

This software implements an enhanced method of elliptic grid generation.
U.S. Government Purpose Release

Enhanced Graphics for Extended Scale Range GSC-14819-1

Conventional computer graphics algorithms exhibit anomalies when rendering scenes containing simultaneously displayed objects differing enormously in scale and distance from the viewer. The Extended Scale Range software employs a dynamic repartitioning of the distance scales of scene objects during rendering to eliminate almost all such problems in a way compatible with implementation in software, in vertex and pixel shaders, and in hardware accelerators.
U.S. Government Purpose Release

Ethernet-to-HRDL Conversion Design GSC-16513-1

The International Space Station (ISS) uses a fiber-optic High Rate Data Link (HRDL) standard for transferring data. Those designing ISS experiments, however, may prefer an Ethernet interface. This design allows ISS instruments to keep their Ethernet interface by converting the Ethernet data format into a format compatible with the ISS.
U.S. Government Purpose Release

Fault-Tolerant Digital Signal Processing (DSP) GSC-15050-1

This software combines the popular Internet Protocol (IP) with high-speed switching fabrics to create a hardware-independent routing environment for software radio. The flexible routing provided by this network layer allows signal streams to be dynamically routed (and rerouted) between computational elements, allowing software radio designers to build flexible and fault-tolerant signal processing chains for many applications and hardware implementations. Conventional IP implementations cannot meet the performance requirements of software radio data streams. The innovation in this research stems from the unique combination of software radio development requirements, advances in network and transport layer designs to support high-speed switching fabrics, and the inherent capabilities provided by IP.
U.S. Government Purpose Release

FFTW-Based Symmetric Transforms GSC-14712-1

This software implements 1D and 2D symmetric transforms (sine, cosine, quarter-wave sine, and cosine) using FFTW.
U.S. Government Purpose Release

FilePlottingTools LAR-18314-1

This Excel® plugin written in VB.net allows rapid post-processing of thermal analysis data from text files or from SINDA-formatted SAV files. The software can be adapted to other data formats as well.
Open Source

Finite Element Computer Code for the Analysis of Composite Shell Structures GSC-14756-1

Used to predict the deformation of thin aerospace structures made of isotropic or fiber-reinforced composite materials, this technology utilizes the finite element method (a numerical technique) as part of the formulation.
U.S. Government Purpose Release

Flow Solver for Incompressible 2D Rectangular Domains GSC-15111-1

This software solves the Navier-Stokes equations for the incompressible flow utilizing finite differencing on a uniform staggered grid. The domain must be rectangular, but it may have a rectangular walled region within the domain. The technology can solve a large variety of classical fluid flow problems: L-shaped cavity, channel flow, or wake flow past a square cylinder, etc. The code uses fourth-order Runge Kutta time-stepping and overall second-order spatial accuracy.
U.S. Government Purpose Release

Flow Solver for Incompressible 2D-Driven Cavity GSC-15107-1

This software solves the Navier-Stokes equations for the incompressible 2D-driven cavity flow problem. The code uses second-order finite differencing on a staggered grid. The equations are solved using the Chorin projection method, and the resulting intermediate Poisson equation is efficiently solved using the fast Fourier transform. Time-stepping is done using fourth-order Runge Kutta for stability at high Reynolds numbers. Features include check-pointing, periodic field snapshots, ongoing reporting of kinetic energy and changes between time steps, time histories at selected points, and optional streakline generation.
U.S. Government Purpose Release

Gamma-Ray Large Area Space Telescope (GLAST) Anti-Coincident Detector (ACD) Electronic Ground System Equipment (EGSE) Software GSC-14802-1

GLAST ACD EGSE is a suite of graphical user interface applications and test scripts built on a software framework provided by the GLAST LAT project at the Standford University Linear Accelerator Center (SLAC). It was developed to configure, control, and test ACD hardware during integration and test operations.
U.S. Government Purpose Release

Geo-Correction for Airborne Platforms (GCAP), Version 1.0 GSC-16786-1

The GCAP software was developed to provide the user with the ability to geo-reference a raster image using the Inertial Measurement Unit data. The output image is then further processed by other software functions to generate higher-level data products such as flood, fire, water, and oil classifications.
U.S. Government Purpose Release

Geometry Manipulation Protocol (GMP) for Computational Fluid Dynamics (CFD) Applications, Version 1.0 ARC-15193-1

GMP serializes datatypes between XML and ANSI C data structures to support CFD applications. The library currently provides a description of geometric configurations, general moving-body scenarios (prescribed and/or 6-DOF), and control surface settings. Download the software at: http://ti.arc.nasa.gov/opensource/projects/gmp/
Open Source

Global Assimilative Ionosphere Model (GAIM) JPL-40584

GAIM is used to estimate the three-dimensional electron density distribution of the Earth's ionosphere as a function of time. To achieve high accuracy for users, the software accepts a wide variety of ionospheric measurements as input and produces output either in real time or in post-processing. The software can also generate predictions of the electron density structure for several hours or days into the future.
U.S. and Foreign Release

GPS Occultation Analysis System (GOAS) JPL-30596

GOAS processes atmospheric and ionospheric occultation data obtained from low-Earth-orbiting global positioning systems transmission receivers. The technology obtains input from a variety of receiver types and satellites and outputs full atmospheric and ionospheric retrievals.
U.S. and Foreign Release

Ground and Space Radar Volume Matching and Comparison Software GSC-15738-1

This software enables easy comparison of ground- and space-based radar observations for validation purposes. It can be accessed at: http://opensource.gsfc.nasa.gov/projects/GSRadar/
Open Source

Hierarchical Data Format-Earth Observing System (HDF-EOS) to NetCDF Converter GSC-15007-1

This C-language computer program accepts a set of scientific data/metadata from an Earth Observing System (EOS) satellite and converts it from the format in which it was created and delivered into another format for data processing and exchange on Earth. The converter can be downloaded at: http://www.hdfeos.org/software/convert_hdfeos5.php
Open Source

Highly Scalable Matching Pursuit Signal Decomposition Algorithm (MPD) ARC-16345-1

MPD is a powerful and effective iterative algorithm for signal decomposition and feature extraction. The technology decomposes any signal into linear combinations of its dictionary elements, or "atoms." Download the software at: https://c3.nasa.gov/dashlink/resources/125/
Open Source

HiMAP: Portable 3-Level Super-Modular Parallel High-Fidelity Multidisciplinary Analysis Process ARC-14504-1

HiMAP solves static and dynamic problems by tightly coupling the Euler/Navier-Stokes flow solutions with modal/finite-element structural solutions using built-in moving grids.
U.S. Government Purpose Release

Hypatheon-Searchable Database Capability for Formalized Mathematics LAR-18232-1

The Hypatheon suite of software tools provides a searchable database capability for the specialized domain of formalized mathematics. The technology is designed to be a companion to a specific tool called PVS, which supports an emerging type of advanced software verification intended for safety-critical systems. Hypatheon aims to enhance PVS users' productivity by first indexing the mathematical theories rendered in the PVS specification language, then making their contents searchable by an interactive software tool.
Open Source

Image Processing Software Environment (QuIP) ARC-16295-1

The QuIP interpreter, a software environment for QUick image processing, uses an interactive scripting language designed to facilitate use by non-expert users through features such as context-sensitive automatic response completion. The package includes a number of script packages that implement high-, medium-, and low-level functions (e.g., analysis of eye images for human gaze tracking, feature tracking, and image filtering). The environment also includes facilities for displaying images on screen, drawing and overlaying graphics, and constructing graphical user interfaces using the scripting language.
Download the software at: http://opensource.arc.nasa.gov/
Open Source

Image-Adapted Visually Weighted Quantization Matrices for Digital Image Compression (DCTune) ARC-12015-1

This image compression software eliminates redundant and invisible image components using a discrete cosine transform (DCT). Each DCT coefficient is used to determine the perceived image quality and the bit rate of the image being compressed.
U.S. Government Purpose Release

Image-Based Wavefront Sensing for Space Optics Control GSC-15121-1

This test bed incorporated a phase-retrieval camera coupled to a three-mirror Vertex (3MV) test bed at Goddard Space Flight Center. Presented actuator calibration, supercomputing architectures for image-based wavefront sensing, and timing results are based on various algorithm implementations using a cluster of 64 TigerShare TS101 digital signal processors.
U.S. Government Purpose Release

Implementation of the Proper Orthogonal Decomposition of a Multivariate Time Series GSC-15103-1

This software ingests a time series of data fields and derives the temporal and spatial eigenfunctions. These temporal eigenfunctions can then be used to form a linear combination of the data fields equal to the spatial eigenfunctions. The code is written so that the number of data fields is not an issue.
U.S. Government Purpose Release

Incorporating Edge Information into HSeg GSC-17195-1

This innovation is a further development of the HSeg (Hierarchical Segmentation) software. This and other previous versions of HSeg consider only global region feature information in the region growing decision process. In this innovation local edge information is also considered in the region growing decision process. This innovation includes three variations on how the edge information is considered. The motivation behind this innovation is that this previous version of HSeg often separates large and apparently homogeneous areas into more than one region with region boundaries that do not correspond to any apparent object boundary. It is shown that the new versions of HSeg incorporating edge information into the region merging process overcome this problem.
U.S. Government Purpose Release

Inductive Monitoring System (IMS), Version 5: System Health Monitoring Software That Learns System Behavior from Data ARC-15058-1A

IMS software utilizes techniques from the fields of model-based reasoning, machine learning, and data mining to build system monitoring knowledge bases from archived or simulated sensor data. The technology automatically analyzes the nominal system data to form general classes of expected system sensor values; these classes are used to build a monitoring knowledge base. When monitoring a system, IMS simply checks to see how well the incoming sensor data fit into the classes derived from the training data.
U.S. Government Purpose Release

Inference Kernel for Open Static (IKOS) Analyzers: A High-Performance Static Analysis Engine to Build Automated Code Analysis Tools for the Formal Verification of Critical Software Properties — ARC-16789-1

IKOS is a kernel for the construction of open-static analyzers based on Patrick Cousot and Radhia Cousot's theory of abstract interpretation, which states that computations can be abstracted and reduced to a generalized set of objects and still exhibit the same critical properties of the parent program. By reducing the set of objects through abstraction, IKOS is scalable to large complex computer programs and presents a sound approach to verification of such programs. Download the software at: http://ti.arc.nasa.gov/opensource/ikos/

Open Source

Information Sharing Protocol Advanced Tool of Math (ISPATOM), Version 02.03.07 — MSC-25714-1

ISPATOM is a generic computational software program (comps). Most comps that are run in the NASA Mission Control Center (MCC) must be defined and hard-coded into C or some other programming language. ISPATOM runs on the MCC Linux workstations and can run any computations that can be represented as a mathematical equation without prior configuration. An equation or several equations are simply entered on the command line, the values are calculated, the computed values are saved in output symbols, and the output symbols are published.

U.S. Government Purpose Release

Innovative Utilization of the Heap Data Structure for Efficient Determination of Best Merges for Hierarchical Segmentation — GSC-14995-1

Recursive hierarchical segmentation (and HSEG by its inclusion in RHSEG) has wide-ranging space, Earth, and medical-science applications. In this technological improvement, the computational efficiency of RHSEG and HSEG is increased by as much as two and a half times for large images (7,000 by 7,000 pixels) processed on a parallel computing system.

U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS), Release 3.0 — GSC-16052-1

ITPS was enhanced to provide a more flexible network interface to support the publish, subscribe, and messaging interface of Goddard Mission Services Evolution Center (GMSEC) middleware. This capability allows for plug-and-play and loosely coupled interfaces between the trending system and the other components/systems in the Mars Orbiter Camera (MOC) environment.

U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS), Release 6.0 — GSC-16169-1

Release 6.0 of ITPS was developed to provide the Fermi mission with an improved ability to handle multiple long-term trending jobs without adjusting the time range and reselecting all the options. This release also provides more flexibility in the use of input definition files (IDFs). IDFs are used in the generation of ITPS trending products and contain selected mnemonics, filtering information, and output formats.

U.S. Government Purpose Release

IsoClus Program in C++ — GSC-14692-1

The IsoClus algorithm is a data clustering procedure used for the classification of data, frequently for the purpose of image processing.

U.S. Government Purpose Release

Iterative Transform Phase Retrieval Utilizing Adaptive Diversity — GSC-14879-1

This software is a comprehensive suite of wavefront sensing and optical control tools designed to measure the wavefront and control the optical systems in order to correct for distortion. It combines phase retrieval and phase diversity algorithms with a variety of control strategies. The software can perform these operations for filled aperture telescopes, segmented aperture telescopes, sparse aperture telescopes, and interferometric systems.

U.S. Government Purpose Release

Java Pathfinder (JPF), Version 2.0 — ARC-15388-1

Java Pathfinder (JPF) is a model checker for Java. The technology takes a Java program and "executes" it in a way that explores all possible executions/interleavings of the threads in the program. This allows JPF to detect certain bugs (e.g., deadlocks and assertion violations) that may be missed during testing.

Download the software at: http://babelfish.arc.nasa.gov/trac/jpf/

Open Source

Java Program to Promote an Open-Source "E-Standard" for Mass Properties Engineering — LAR-17635-1

This open-source Java software helps develop electronic standards (E-Standards) for mass properties engineering. An E-Standard is a highly descriptive dataset that includes standardizing functions for data manipulation, interrogation, and formatting. With this tool, any number of users can interface with the proposed E-Standard datasets and still seamlessly utilize their own software methods.

Open Source

Java-Based Software Tool for Dynamic Aerospace Vehicle Exchange Markup Files — LAR-17460-1

An update to software originally named DAVEtools 0.5, this software-based technology is used for manipulating standard Dynamic Aerospace Vehicle Exchange Markup Language (DAVE-ML) models. The improved technology embeds the necessary initialization data into a data structure to keep the MATLAB workspace uncluttered and creates Simulink models from a generated MATLAB script.

Open Source

Knowledge Discovery and Data Mining Based on Hierarchical Segmentation of Image Data and on Visual Grammar — GSC-14696-1

This project enhances the VisiMine system by incorporating hierarchical segmentations from the Hierarchical Segmentation (HSEG) algorithm into the VisiMine system. HSEG is an approach for producing high-quality, hierarchically related image segmentations. The VisiMine image information mining system utilizes clustering and segmentation algorithms for reducing visual information in multi-spectral images to a manageable size. The features and the trainable spatial relationship model developed allow accurate classification and effective retrieval of different scenes and land cover.

U.S. Government Purpose Release

Kodiak: A Software Library for Verifying Nonlinear Arithmetic Statements — LAR-18268-1

Kodiak is a software implementation of an algorithm for verifying expressions involving nonlinear real arithmetic. It includes an optimizer for nonlinear real functions, a solver for nonlinear inequalities, and an application programming interface (API) for integrating other software verification tools.

Open Source

Libibvpp — ARC-16075-1

Libibvpp is a C++ wrapper around libibverbs, which is part of the OpenFabrics software suite.

Download the software at: http://ti.arc.nasa.gov/opensource/projects/libibvpp/

Open Source

Library Suite That Speeds Development of Kalman Filter Design — MSC-23704-1

The Generic Kalman Filter (GKF) provides all the functionality of a Kalman filter, including state and variance/co-variance matrix propagation and measurement updating, while allowing a user to define subroutines for particular problems. The innovation uses a library of trusted subroutines to handle the mundane functions that are common to all Kalman filters. This generic quality allows for flexibility and fast start-up speed for the creation of a new filter.

U.S. Release Only

Lossless Hyper-/Multi-Spectral Data Compression Software — GSC-15992-1

This software performs lossless hyper-spectral and multi-spectral data compression. It can be downloaded at: http://opensource.gsfc.nasa.gov/projects/LHD/

Open Source

Low-Density Parity Check Fault-Programmable Gate Array (FPGA) Decoder for the Code (8176,7154) Specified in the Consultative Committee for Space Data Systems (CCSDS) Orange Book 131.1-O-2 — GSC-15454-1

VHDL code has been written to implement the LDPC code (8176,7154) in the CCSDS Orange Book 131.1-O-2. The design has been tested using a Virtex 4 LX200 FGPA running at 66 MHz for various signal-to-noise ratios with on-chip random normal generators. The decoder core will run at 100 MHz giving a sustained throughput of 650 Mbits/second. The decoder uses the minimum sum algorithm with an attenuation multiplier of 0.75 and 6-bit saturating arithmetic. The decoder does 14 iterations per block and generates a dot product for the last iteration. Data are input and output as 7-bit probabilities of 6 bits each per cycle.

U.S. Government Purpose Release

Mariana: Text Classification System — ARC-16070-1

Mariana is an algorithm that efficiently optimizes the hyperparameters for support vector machines for regression and classification. It currently uses simulated annealing for optimization but can be extended to use a variety of stochastic optimization techniques, including Markov Chain Monte Carlo, Sequential Monte Carlo, and genetic algorithms. Download the software at: http://ti.arc.nasa.gov/opensource/projects/mariana/

Open Source

MATLAB Automated Test Tool (MATT) — GSC-14861-1

MATT is an application that provides an enhanced test-generation capability to users of Simulink and Real-Time Workshop. The ability to rapidly create custom test data for model simulations/executables is an important time saver that frees a user from having to develop a variety of testing input data.

U.S. Government Purpose Release

MATLAB-Code V Toolkit — GSC-15140-1

This toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Code V optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses such as ray tracing or generation of point-spread functions in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at: http://opensource.gsfc.nasa.gov/projects/Matlab_Code_V/index.php

Open Source

MATLAB-Oslo Toolkit GSC-15138-1

This toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Oslo optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at: http://opensource.gsfc.nasa.gov/projects/Matlab/index.php

Open Source

MATLAB-Zemax Toolkit GSC-15151-1

The MATLAB-Zemax toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Zemax optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at: http://opensource.gsfc.nasa.gov/projects/Matlab_Zemax/index.php

Open Source

Metric Analysis Tool (MAT) GSC-15109-1

The Metrics Analysis Tool (MAT) performs data-mining tasks to show the correlation between software source code metrics and the defects within the source code to determine the best predictors for errors/defects. MAT was designed for software code metrics, but it is not limited to that purpose and can be applied to any type of metric with an associated effort and trigger.

U.S. Government Purpose Release

Mirador: A Fast, Minimalist Search Tool for Remote Sensing Data GSC-15291-1

Mirador is a search tool that emphasizes speed and simplicity in searching remotely sensed Earth science data. The search execution is accelerated by initially presenting dataset results with an estimated number of hits for each dataset. The simplicity of the search form makes the tool easy to learn and use, and the speed of the searches enables an iterative form of data discovery.

U.S. Government Purpose Release

Multivariate Time Series Search Capability to Identify Complex Patterns in Large Datasets ARC-16452-1

This software allows the user to specify a time series over multiple variables to search within massive datasets. The tool will return a listing of events (a time series) from the database that spans multiple variables and is within a threshold distance from the query. Experiments on numerous real aviation datasets have demonstrated the algorithm's capability to uncover potential aircraft safety events (as validated by multiple aviation safety experts and airlines). Download the software at: https://c3.nasa.gov/dashlink/resources/449/ and http://ti.arc.nasa.gov/opensource/projects/mts-search/

Open Source

MYSTRAN GSC-17173-1

Originally developed at NASA Goddard Space Flight Center in the 1960s, MYSTRAN is a finite element analysis (FEA) processor that takes NASTRAN data decks as input and processes them to generate results files. Given input files that describe the mechanical nature of a given piece of hardware and the loads or driving inputs that cause a particular reaction, MYSTRAN will compute the responses to the driving inputs. Download the software at: http://opensource.gsfc.nasa.gov/projects/mystran/index.php

Open Source

NASA App — ARC-16325-1A

The NASA App delivers near-real-time NASA content to phones and tablets. The technology features missions, images, videos, tweets, a live stream of NASA TV, and news topics. The app can be downloaded at: http://www.nasa.gov/centers/ames/iphone

General Public Release

NASA Vision Workbench (VW), Version 3 — ARC-15761-1A

Vision Workbench (VW) is a modular, extensible computer vision framework that supports a range of tasks, including automated science and engineering analysis, large satellite image processing, and 2D/3D environment reconstruction. The framework provides a rapid C++ development environment as well as a flexible, multi-platform system to deploy computer vision applications. The module interface allows new capabilities to be rapidly integrated, and the dataflow architecture allows image-processing pipelines to be quickly developed and reconfigured. Download the software at: https://github.com/visionworkbench/visionworkbench

Open Source

New Data System for Laser Development, Real-Time Beam Analysis, and Automated Testing for the Macintosh Platform — GSC-14828-1

This hardware/software package is a one-of-a-kind laser beam imaging system for the Macintosh platform, taking advantage of the UNIX kernel and 64-bit architecture. The package consists of a commercial video capture card, a digital charge-coupled device (CCD) camera, and custom drivers and software. The technology allows a laser developer or operator to image any component of a laser beam in real-time fashion.

U.S. Government Purpose Release

nu-Anomica (Previously Sparse One Class Support Vector Machines (SOC-SVMs)) — ARC-16346-1

nu-Anomica is an anomaly detector that can run faster than traditional OC-SVMs. The technology can handle large training sets and works with a well-defined target function. The program utilizes the OSU SVMs code (which is a MATLAB version of Lib-SVMs) as the baseline. Download the software at: http://ti.arc.nasa.gov/opensource/projects/nu-anomica/

Open Source

nub-NPOESS User Block Tool — GSC-15190-1

The nub-NPOESS user block all-in-one tool allows a user to manipulate an h5 user block without changing the h5 formatting (the format of most data distributed by the National Polar-Orbiting Operational Environmental Satellite System).

U.S. Government Purpose Release

ODL-to-XML Converter — GSC-15013-1

This command-line Java-based utility converts ODL Hierarchical Data Format-Earth Observing Satellite (HDFEOS) metadata file to an HDFEOS XML file. The tool utilizes an all-Java ODL library that includes a syntax and grammar parser. The software can be downloaded at: http://opensource.gsfc.nasa.gov/projects/ODL_XML/index.php

Open Source

On-the-Fly Reprocessing (OTFR) Subsystem — GSC-14953-1

The OTFR subsystem provides scientifically useful (level-2) Hubble Space Telescope (HST) science products from the archived HST raw (level-0) datasets on demand. OTFR operates as a collection of data processing routines that work within the context of the existing HST pipeline data flow system.

U.S. Government Purpose Release

Optical Systems Characterization and Analysis Software GSC-14727-1

This comprehensive tool is used for filled aperture, segmented aperture, and sparse and interferometric imaging systems. The software applies to models, wavefront aberrations, misalignments, optical point-spread functions, and optics of multiple spacecraft flying in formation. Modeling options include coronagraphs, fast-steering mirrors, actuators, and deformable mirrors, among others.
U.S. Government Purpose Release

OPUS GSC-14353-1

Originally designed by the Space Telescope Science Institute for use in the Hubble Space Telescope program, the OPUS software allows engineers to reduce data taken by the telescope and guide data through a processing pipeline that converts raw information into information useful to astronomers.
U.S. Government Purpose Release

OPUS Application Programming Interface (OAPI)/ On-the-Fly Reprocessing (OTFR) Data Processing System GSC-14739-1

Based on the OPUS design, OAPI and OTFR have significantly enhanced the quality of science data available to astronomical researchers from the Hubble Data Archive and have facilitated the use of OPUS to support data processing for other missions.
U.S. Government Purpose Release

Outlier Detection Via Estimating Clusters (ODVEC) ARC-16467-1

The Outlier Detection Via Estimating Clusters (ODVEC) software provides an efficient method for real-time or offline analysis of multivariate sensor data for use in anomaly detection, fault detection, and system health monitoring. ODVEC uses models automatically derived from archived system data to identify unusual, out-of-family data samples (outliers) that indicate possible system failure or degradation.
U.S. Government Purpose Release

Parallel Computing Tools for the Interactive Data Language (IDL) GSC-15048-1

The Interactive Data Language (IDL) is a standard tool used by researchers in observational fields. The increasing amounts of data produced by observatories and increasing complexity in image processing algorithms require enhanced computing power. Cluster computing is a cost-effective way to increase the speed of computation; however, IDL currently has no support for cluster computing. This software package allows researchers to take advantage of clusters from within IDL.
U.S. Government Purpose Release

Parallel Integrated Frame Synchronizer (PIFS) Chip GSC-13813-1

This parallel integrated frame synchronizer implements a sequential pipeline process wherein serial data (in the form of telemetry data or weather satellite data) enter the synchronizer by means of a front-end subsystem and pass to a parallel correlator subsystem or a weather satellite data processing subsystem.
U.S. Government Purpose Release

PEGASUS 5: Software for Automated Pre-Processing of Overset Computational Fluid Dynamics (CFD) Grids ARC-15117-1

PEGASUS 5 provides the hole-cutting and connectivity information between overlapping grids, and it is used as the final part of the grid-generation process for overset-grid computational fluid dynamics (CFD) approaches. This version of PEGASUS has many new features: automated hole cutting; a projection scheme for fixing small discretization errors in overset surfaces; more efficient interpolation search methods using an alternating digital tree and a stencil-jumping scheme; hole-size optimization based on additional layers of fringe points; and an automatic restart capability. The new code has also been parallelized using the Message-Passing Interface standard and can speed up execution time by up to a factor of 30 for very large problems. More information can be found at: http://people.nas.nasa.gov/~rogers/pegasus/intro.html
U.S. Release Only

Perilog, Version 3.0 — ARC-15310-1

Perilog software capabilities include keyword-in-context search, flexible phrase search, search by example, phrase generation, and phrase extraction. The technology's keyword-in-context search feature retrieves documents that contain one or more user-specified keywords in context, ranks documents on their relevance to the keywords in context, and displays the documents with the query words highlighted and, optionally, with strongly associated words also highlighted.

U.S. Government Purpose Release

PixelLearn — JPL-42082

PixelLearn is a tool for classifying the pixels in scientific image data sets. Based on one or more images on the same grid, the tool uses cutting-edge clustering algorithms to automatically find structures in the image, or to label individual classes and use supervised classification methods to extend the labels to the rest of the image.

U.S. Government Purpose Release

PLOT3D, Version 4.1 — ARC-14400-1

PLOT3D is a computer graphics program designed to visualize the grid and solutions of structured computational fluid dynamics (CFD) datasets. Version 4.1 uses the OpenGL/GLUT graphics library. Several new features have been added to the code. These include: automatic computation of grid coordinate minimum/maximum; an orphan point plotting function; the ability to read double-precision unformatted data; negative grid index processing; random specification of colors for different walls; and simultaneous specification of walls and subsets for all zones.

U.S. Release Only

Pour: A Framework for Periodic, On-Demand, and User-Specified Information Reconciliation — ARC-15468-1

Pour is a general-purpose information service framework for periodic, on-demand, and user-specified information reconciliation. The technology is designed to accommodate a wide variety of information types with support for high-volume, low-frequency periodic updates, user-specified updates, and automatic updates collected on demand when needed. Download the software at: http://people.nas.nasa.gov/~kolano/projects/pour.html

Open Source

Projection to a Dynamical System for the Incompressible Navier-Stokes Equations — GSC-15105-1

This software computes the coefficients of the nonlinear dynamical system for the case of the incompressible Navier-Stokes equations.

U.S. Government Purpose Release

PseudoDiversity: Direct Wavefront Control and Image Restoration at High Bandwidth — GSC-15464-1

PseudoDiversity is an approach that simultaneously recovers (1) the wavefront feedback to actuators in an optical system or a telescope system and (2) the object or extended scene under study. The technology is very useful for both astronomical and Earth-sensing imaging and spectroscopic systems, and it removes the need for complex metrology and nonlinear phase retrieval and phase diversity approaches.

U.S. Government Purpose Release

Quick Plot General-Purpose Plotting Tool — DRC-012-022

Quick Plot is a general-purpose tool used to plot Armstrong time-history data files and data files in the MATLAB format. The graphical user interface allows commands to be scripted and read from an input script file; input signals can be modified using algebraic expressions.

U.S. Release Only

Radar Software Library (RSL) GSC-15037-1

The Radar Software Library (RSL) is a set of routines designed to facilitate the task of accessing radar data. The technology provides a consistent data structure independent of original data format; software tools for accessing components of that structure; an object-oriented approach for accessing data; and the ability to read many radar formats, including WSR-88D, UF, and SIGMET.
U.S. Government Purpose Release

Real-Time Software Receiver GSC-14917-1

This software receiver executes on a general-purpose processor, and it includes data acquisition and correlator modules that perform baseband mixing and PRN code correlation using bitwise parallelism.
U.S. Government Purpose Release

Requirements Tracing On Target (RETRO) GSC-14976-1

RETRO offers methods and techniques for information retrieval (IR), including vector retrieval and probabilistic retrieval. The technology can be downloaded at: http://opensource.gsfc.nasa.gov/projects/RETRO/index.php
Open Source

Scalable Gaussian Process Regression ARC-16864-1

Block GP, a Gaussian Process regression framework for multimodal data, can be an order of magnitude more scalable than existing state-of-the-art nonlinear regression algorithms. The framework builds local Gaussian Processes on semantically meaningful partitions of the data and provides higher prediction accuracy than a single global model with very high confidence. The method relies on approximating the covariance matrix of the entire input space by smaller covariance matrices that can be modeled independently, and can therefore be parallelized for faster execution. Download the software at: http://ti.arc.nasa.gov/opensource/projects/block-gp/
Open Source

Semantic Metrics for Object-Oriented Design (SemMet) GSC-14752-1

SemMet calculates semantic metrics, providing software metrics that are substantially more accurate and more human-understandable than traditional software metrics based on calculated syntactic aspects of source code.
U.S. Government Purpose Release

SequenceMiner: Anomaly Detection in Large Sets of High-Dimensional Symbol Sequences ARC-16053-1

SequenceMiner was developed to address the problem of detecting and describing anomalies in large sets of high-dimensional symbol sequences. The technology performs unsupervised clustering (grouping) of sequences using the normalized longest common subsequence (LCS) as a similarity measure, followed by a detailed analysis of outliers to detect anomalies. SequenceMiner utilizes a new hybrid algorithm for computing the LCS that has been shown to outperform existing algorithms by a factor of five. Download the software at: http://ti.arc.nasa.gov/opensource/projects/sequenceminer/
Open Source

Simple, Scalable, Script-Based Science Processing (S4P) Archive GSC-15040-1

S4P is a disk-based data archival system for remote sensing data. The system is used for new data transfer, data preprocessing, metadata generation, and data archival.
U.S. Government Purpose Release

Software Metrics Analysis Tool (SMAT) GSC-15108-1

SMAT was developed in order to analyze the effectiveness of common software metrics for predicting/detecting defects in software.
U.S. Government Purpose Release

Space Habitability Observation Reporting Tool (iSHORT) MSC-25736-1

Designed for use on the iPad 2® (or newer technology), iSHORT allows users to capture text, audio, video, and photographs within a single interface. The app enables users to indicate the priority of their observation (no change needed, nice to have, or must be addressed); provides a list of memory joggers to assist users in recalling items of interest related to human factors and habitability; and allows for simple report submission within the app.

U.S. Government Purpose Release

Space Packetized Telemetry System (SPoTS) MSC-25183-1

The Space Packetized Telemetry System (SPoTS) is a real-time telemetry viewer. Display screens are built using a custom display builder with telemetry data fields, plot objects, data widgets, and standard objects. Measurement IDs are loaded from XTCE files.

U.S. Government Purpose Release

Spatial Resolution Verification Tool (SRVT) SSC-00339

SRVT provides rapid determination of spatial resolution characteristics for remotely sensed aerial and satellite imagery. The technology finds uniform, high-contrast edges from urban scenes and uses these edges to determine standard estimators of spatial resolution. Algorithms have been validated against traditional techniques by using the IKONOS and QuickBird imagery of engineered edge targets.

U.S. Government Purpose Release

Spatial Standard Observer ARC-14569-1

The Spatial Standard Observer (SSO) is a computer program for measurement and specification of the perceptual intensity of a visual image, or of the perceptual distance between two visual images. The SSO operates on a digital image or a pair of digital images. It computes a numerical measure of the perceptual strength of the single image, or of the difference between the images.

U.S. Government Purpose Release

Speaker Verification, Speaker Authentication, and Speaker-Independent Phoneme Recognition Improvements and Equivalent Image Processing GSC-14723-1

This powerful tool offers more accurate and detailed processing of human speech by tailoring the type and duration of measurements, removing many transmission variables, and truncating non-speech noises that degrade detection processes.

U.S. Government Purpose Release

Spectral Analysis Tool (SAT), Version 6.2 JPL-43129

The SAT computer program calculates signal spectra, bandwidths, and interference effects for several families of modulation schemes found commonly in radio, satellites, and space communications. It is primarily used for spectrum management purposes to examine the effects of radio frequency interference on a satellite communication system.

U.S. Government Purpose Release

Split-Remerge Method for Eliminating Processing Window Artifacts in Recursive Hierarchical Segmentation GSC-14994-1

This technology allows recursive hierarchical segmentation to better serve wide-ranging space, Earth, and medical science applications.

U.S. Government Purpose Release

Stata Code for Finding the "Optimal Alpha" for Several Statistical Tests MSC-25682-1

Two main types of errors occur in statistical hypothesis testing: type I errors reject a default hypothesis when it is actually correct, and type II errors fail to reject the default hypothesis when it is incorrect. The probability of type I errors is conventionally denoted as alpha, while the probability of type II errors is conventionally denoted as beta. The NASA code developed in this effort calculates the optimal alpha in Stata statistical software for several versions of statistical hypothesis tests.

U.S. Government Purpose Release

Structural Analysis Routines (STARS) DRC-011-003

Structural Analysis Routines (STARS) is an efficient, cost-effective, and unique computer program that analyzes a variety of practical engineering problems. The software is a fully integrated, multidisciplinary, finite-element-based, graphic-oriented analysis tool that combines individual modules to solve complex engineering problems. STARS can be used for a range of applications, including structural analysis, heat transfer, linear aerodynamics, and computational fluid dynamics (CFD) as well as coupled linear and CFD-based (aeroelastic, aeroacoustic, and aerothermoelastic) acoustics and aeroservoelastic analysis. Because of the tool's highly integrated nature, it has broad application across many engineering disciplines.

U.S. Release Only

Sun Format Database (SunAcc) File Read/Write Library MFS-32397-1

The Sun Format Database (SunAcc) was developed to fulfill a need for local native storage of space shuttle main engine (SSME) test data. While the file format itself is native to the Sun UNIX platform, the read/write library was developed to be a cross-platform tool and is compatible with a variety of UNIX and Windows platforms.

U.S. Release Only

Surfer: An Extensible Pull-Based Framework For Resource Selection and Ranking ARC-15295-1

Surfer examines the pool of potential grid resources and extracts the highest-ranking resources that meet user-specified constraints and preferences. The technology has been implemented as a grid service that is compliant with an Open Grid Services Infrastructure (OGSI), and it can also be embedded directly into Java applications through its application programming interface or into non-Java applications through its XML- based command-line interface. Download the software at: http://people.nas.nasa.gov/~kolano/projects/surfer.html

Open Source

Swim: A Software Information Metacatalog for the Grid ARC-15469-1

Swim is a software information service for the grid built on top of the NASA-developed Pour framework. Software information is periodically gathered from native package managers on FreeBSD, Solaris, and IRIX as well as the RPM, Perl, and Python package managers on multiple platforms. Download the software at: http://people.nas.nasa.gov/~kolano/projects/swim.html

Open Source

TestEVAL Python Software Tool to Assist in Mechanical Testing GSC-17288-1

TestEVAL provides a tool for processing and plotting mechanical test data. The tool, which can be used for handling both pre-test planning and post-test processing, offers a plotting capability for a variety of data formats, including NASTRAN XYPLOT punch files, Excel® files, CSV files, and MATLAB files. The data, which can be plotted in linear, log, or semi-log scales, can be modified and processed against other data sets to assist in the understanding of the test responses or predictions.

U.S. Government Purpose Release

Tiled Web Map Service (WMS) Server — JPL-44685

This technology processes WMS requests that comply with a given request grid from an existing tile dataset. It also generates the KML configuration files required to access WMS tiles.
U.S. Government Purpose Release

Tolerance Domain Specific Language — LAR-17546-1

This sensitivity task employs the Monte Carlo method. Thousands of simulations are run with randomly varied input parameters, and then statistical correlations are computed to determine the sensitivity of output parameters to each input parameter.
Open Source

Tool For Interactive Plotting, Sonification, and 3D Orbit Display (TIPSOD) — GSC-14732-1

TIPSOD is a software application designed for interactive, animated, 4D (space and time) visualization of satellite orbits. The technology is implemented in Java 3D and is an extension to the existing Satellite Situation Center Web (SSCWeb) 2D static orbit graphics. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/tipsod/index.php
Open Source

Trending and Plotting System (TAPS) — GSC-15025-1

The TAPS system is a Java/Web-based computer software application that accesses archived engineering telemetry and allows the user to plot, trend, and display spacecraft engineering data in a format that is useful for spacecraft subsystems engineers to evaluate the health and status of various subsystems.
U.S. Government Purpose Release

Using Independent Verification and Validation (IV&V) Findings to Perform Flight Software Technical Assessments — GSC-15041-1

This process recasts and overlays information onto the current methods to collect IV&V issues, essentially enabling a “normalization” of IV&V findings.
U.S. Government Purpose Release

Vectorization of Global Flood Monitoring System Using TopoJSON — GSC-17169-1

This capability allows for the generation of vectors by reading the Global Flood Monitoring data, processing the data, and then generating a TopoJSON encoded file for visualization on the Web. Download the software at: http://opensource.gsfc.nasa.gov/projects/vgfms/index.php
Open Source

VHDL Code For High-Rate Digital Demodulator (HRDD) Application-Specific Integrated Circuit (ASIC) — GSC-14808-1

The HRDD ASIC chip is a very large scale integrated circuit that provides demodulation and bit synchronization across a wide range of mission and telemetry formats, including Binary Phase-Shift Keying (BPSK), Quadrature Phase-Shift Keying (QPSK), 16-Quadrature Amplitude Modulation (QAM), and other forms of PSK. The chip is designed to operate at rates up to 300 mega-symbols per second for BPSK and QPSK modulation and can operate at higher rates when QAM or higher orders of PSK modulation are used.
U.S. Government Purpose Release

Video Image Stabilization and Registration (VISAR) — MFS-31243-1

Video Image Stabilization and Registration (VISAR) is a software program that will stabilize video images distorted as a result of video camera motion.
U.S. Government Purpose Release

Viewpoints: Software for Visualization of Multivariate Data — ARC-16019-1

A software application that allows the interactive visualization of multivariate data using a variety of standard techniques, Viewpoints can be used with extremely large data sets. Download the software at: http://www.assembla.com/wiki/show/viewpoints/downloads

Open Source

Visual Environment for Remote Virtual Exploration (VERVE), Version 2 — ARC-16457-1A

VERVE is a 3D visualization system that provides situational awareness, science analysis tools, and data understanding capabilities for robotics researchers and exploration science operations. The technology is highly modular and extensible and includes a 3D scene-graph database, an interactive 3D viewer, and associated graphical user interfaces to OSGI plugin-based applications. Download the software at: http://sourceforge.net/projects/irg-verve

Open Source

Visual System for Browsing, Analysis, and Retrieval of Data (ViSBARD) — GSC-15744-1

ViSBARD provides a way of visualizing multiple vector and scalar quantities as measured by many spacecraft at once. The data are displayed three-dimensionally; may be displayed either as connected lines or as points; and allow the rapid determination of vector configurations, correlations between many measurements at multiple points, and global relationships. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/visbard/index.php

Open Source

Wavefront Sensing and Optical Control Software (WSOC) — GSC-14725-1

Offered in a single package, this comprehensive suite of wavefront sensing and optical control software includes a set of phase retrieval and phase diversity algorithms as well as various optical control strategies.

U.S. Government Purpose Release

WinPlot Graphical Display System — MFS-31664-1

WinPlot is a powerful desktop graphical analysis tool that allows the user to generate displays of unrestrictive amounts of data. It was developed to fulfill the need for fast and easily managed graphical displays of NASA test articles and facilities. WinPlot features include seamless displays of realtime and post- test data with time and event-time synchronization of data from multiple sources.

General Public Release

XML to HDF-EOS Convertor — GSC-15017-1

This software program takes an XML representation of the contents of a Hierarchical Data Format-Earth Observing System (HDF-EOS) file and recreates the file from that description. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/xml2he/index.php

Open Source

XML to ODL Convertor — GSC-15006-1

This program translates an XML representation of Hierarchical Data Format-Earth Observing System (HDF-EOS) ODL metadata back to the ODL format. Please visit the following URL for additional information: http://opensource.gsfc.nasa.gov/projects/xml2odl/index.php

Open Source

15

aeronautics

Air Traffic
Management Tools

Modeling
and Simulation Tools

Aeronautical Data Link and Radar Simulator (ADRS) ARC-15390-1

The ADRS distributed "simulation hub" allows multiple air traffic simulation components (e.g., pilot and controller operator stations and airborne and ground-based decision support tools) to be interconnected in the same simulation. The technology runs on both Windows® and UNIX platforms.
U.S. Release Only

Airspace Concepts Evaluation System (ACES) ARC-15068-1

From gate departure to gate arrival, ACES is a dynamic, event-based computer simulation of aircraft operations in the National Airspace System (NAS). The technology's software-agent infrastructure provides flexibility in configuring custom simulations and enables explicit modeling of command and control entities operating within the NAS.
U.S. and Foreign Release (Academic)

Apparatus for Evaluating Software Decision Logic (ADEPT) ARC-14928-1A

The ADEPT design tool integrates a graphical user interface with an automation decision-logic application. The software generates testable prototypes for traditional usability evaluations. Exportable products can be added to the base architecture.
U.S. and Foreign Release

Application of Simplex Method to Aircraft Control Allocation Expressed as a Linear Programming Problem ARC-15285-1

This package can be used to generate actuator commands for aircraft control systems. The technology minimizes the cost function and respects actuator limitations.
U.S. Government Purpose Release

Attitude Control Software GSC-14818-1

This technology employs coarse- and fine-attitude sensor inputs to control various actuators.
U.S. Government Purpose Release

Automated Conflict Resolution for Air Traffic Control (AAC), Versions 1 and 2 ARC-15581-1A

The AAC algorithm generates resolution trajectories through a multi-step iterative process: (1) a resolution generator performs the analytical and logical functions; (2) a 4D trajectory synthesizer integrates aircraft equations of motion using detailed models of aircraft performance, operational procedures, and atmospheric conditions; and (3) a conflict detector compares trial resolution trajectories against the 4D trajectories of all other aircraft in an airspace of interest.
U.S. Government Purpose Release

Balloon Ascent: 3D Simulation Tool for the Ascent and Float of High-Altitude Balloons GSC-15120-1

The user-friendly Balloon Ascent tool simulates vertical and horizontal motions of high-altitude balloons. Because formulations are generalized, the software can be used for Earth's atmosphere as well as for the atmospheres of other planets.
U.S. Release Only

Center TRACON Automation System (CTAS) ARC-15309-1

CTAS provides automation tools for planning and controlling arrival air traffic. The technology generates advisories designed to increase fuel efficiency, reduce delays, and provide automation assistance to air traffic controllers. Please visit the following URL for additional information: http://www.aviationsystemsdivision.arc.nasa.gov/research/foundations/index.shtml
U.S. Government Purpose Release

Cockpit Displays of Traffic Information (CDTI) Software Suite — ARC-14581-1

CDTI consists of two main components: (1) the Pulse Predictor for Traffic Display Tool, which allows a user to compare a representation of his own expected trajectory with those of other traffic elements; and (2) the Flight-Deck-Based Flight Plan Modification Tool, which allows flight crew members to display and modify their flight plans graphically, check for predicted conflicts, and load changes into the flight management system.

U.S. Government Purpose Release

Empirical Assurance of Embedded Software Using Realistic Simulated Failure Modes — GSC-15153-1

Providing a realistic virtual system simulation of the NASA Mini-AERCam nanosatellite in its orbital environment, this technology affords sufficient fidelity for running and testing satellite-executable flight software.

U.S. Government Purpose Release

Evolutionary Mission Trajectory Generator (EMTG) — GSC-16824-1

EMTG is a global trajectory optimization tool intended for interplanetary mission design. The technology automatically searches for the optimal sequence of planetary flybys and propulsive maneuvers for maximizing payload delivery at a destination. Designed for minimal user oversight, EMTG requires only start location, destination, allowable launch-date range, allowable flight time, and minimal spacecraft hardware information.

U.S. Government Purpose Release

Future Air Traffic Management Concepts Evaluation Tool (FACET) — ARC-14653-1

FACET provides a simulation environment for evaluating novel air traffic management concepts, including air traffic control and traffic flow management. Please visit the following URL for more information about the technology: http://www.aviationsystemsdivision.arc.nasa.gov/research/modeling/facet.shtml

U.S. and Foreign Release (Academic)

Goddard Trajectory Determination System (GTDS), Release 2002 — GSC-14787-1

This technology addresses eight minor software change requests written against the 2001.01 release of the Goddard Trajectory Determination System.

U.S. Government Purpose Release

Goddard Trajectory Determination System (GTDS), Release 2008.01 — GSC-15539-1

This technology addresses minor software change requests written against the 2002 release of the Goddard Trajectory Determination System.

U.S. Government Purpose Release

Multi-Aircraft Control System (MACS) Software — ARC-14776-1

MACS increases the overall realism of human-in-the-loop air traffic control (ATC) simulations. The system accommodates multiple onsite or offsite participants (e.g., pilots, controllers, airline dispatchers, or observers) and provides simulations from either a pilot's view or a controller's view.

U.S. Government Purpose Release

Multi-Spacecraft Attitude and Trajectory Simulation (42) GSC-14817-1

Written in ANSI C to maximize portability and customization capacity, “42” provides a simulation of the attitude and translational dynamics of multiple spacecraft that could be operating anywhere in the solar system. Attitude dynamics feature high-fidelity models of spacecraft composed of up to three connected rigid bodies, each with up to four embedded momentum wheels. Translational dynamics use Encke’s method of orbit perturbation and are formulated to preserve the numerical accuracy required for precision multi-spacecraft formations.

U.S. Government Purpose Release

Navigation Accuracy Guidelines for Orbital Formation Flying GSC-15096-1

Based on the accuracy of determining a satellite formation’s semi-major axis differences, these simple guidelines could be useful in the preliminary design process and are valid for any elliptical orbit regardless of eccentricity.

U.S. Government Purpose Release

Orbit-Determination Toolbox GSC-15728-1

Based on MATLAB and Java, the flexible Orbit-Determination Toolbox is intended primarily for the advanced mission analysis that might be performed in the concept exploration, proposal, and early design phases. Visit the following URL for more information: http://opensource.gsfc.nasa.gov/projects/ODTBX/

Open Source

Parallel Dantzig-Wolfe Decomposition ARC-16432-1

This implementation of the Dantzig-Wolfe decomposition is built upon the GNU Linear Programming Kit. The technology provides a command-line tool for solving properly decomposed linear programs. Download the software at: http://sourceforge.net/projects/dwsolver

Open Source

Sector 33 App ARC-16853-1

Offering a single user interface, Sector 33 is an air traffic control simulator game for Apple® and Droid mobile devices. The technology includes introductory videos, an interactive air traffic control simulation of up to five airplanes; problem scoring; and integrated solution hints. The game can be downloaded at: http://www.nasa.gov/connect/apps.html

General Public Release

Space Operations Learning Center (SOLC) iPhone®/iPad® App GSC-16612-1

SOLC is an iPhone® application for educating children about the effects of orbital debris on space missions. For more information, please visit: http://solc.gsfc.nasa.gov

General Public Release

Spot and Runway Departure Advisor (SARDA) ARC-16809-1

By generating departure-sequence and spot-release advisories, SARDA assists controllers with managing air traffic on an airport surface.

U.S. Government Purpose Release

Stochastic Terminal Area Scheduling Simulation (STASS) ARC-17079-1

STASS simulates air traffic in the terminal area and ground traffic on the terminal surface. The technology uses time-based queues at various locations along an aircraft’s trajectory to model traffic. For arrivals, queue locations include the freeze horizon, metering fixes, and runways. For departures, queues are positioned at airport gates, runways, and metering fixes. Flight time uncertainty is modeled using probability distributions around queue arrival times.

U.S. Government Purpose Release

StormGen Weather Editor — ARC-16827-1

The StormGen interactive editor facilitates the design and production of dynamic convective weather scenarios. The software exports weather data in formats compatible with widely used air- and ground-tool simulators.

U.S. Release Only

SUPKEM — ARC-16260-1

SUPKEM is a fully implicit, parabolic, partial-differential equation solver that can be used for the integration of unsteady 3D turbulence kinetic energy and dissipation-rate equations. The technology enables any laminar computational fluid dynamics (CFD) solver to compute a given unsteady turbulent flow of interest.

U.S. Release Only

Surface Operations Simulator and Scheduler (SOSS) — ARC-16808-1

A simulation of air traffic movement on an airport surface, SOSS can be used in developing, analyzing, and testing runway schedulers and resolution algorithms.

U.S. Government Purpose Release

Taxiway Navigation and Situation Awareness (T-NASA) System Simulation Software — ARC-15246-1

The T-NASA suite is composed of a collection of computer programs and libraries that enable the real-time simulation of head-up, out-the-window, and head-down moving map displays. The technology currently runs on a distributed IRIX system using the Performer graphics libraries and the X Windows graphical user interface.

U.S. Government Purpose Release

Tool for Turbine Engine Closed-loop Transient Analysis (TTECTrA) — LEW-19177-1

Developed in the MATLAB/Simulink environment, TTECTrA extends systems analysis by estimating the transient performance/capability of a conceptual engine design. The tool is capable of designing a basic turbofan engine controller (with transient protection) based on the user's engine model and constraints. TTECTrA relies on the MATLAB Control Systems Toolbox to provide additional functionality and streamline the control design process. Download the software at: https://github.com/nasa/TTECTrA/releases

Open Source

Toolbox for the Modeling and Analysis of Thermodynamic Systems (T-MATS) — LEW-19165-1

T-MATS is a Simulink toolbox for use in modeling and simulating thermodynamic systems and their controls. The technology contains generic thermodynamic and controls components that may be combined with a variable-input iterative solver and optimization algorithm to create complex systems to meet the needs of a developer. T-MATS development was completed on behalf of the NASA Aviation Safety Program's Vehicle Systems Safety Technologies (VSST) project located at Glenn Research Center.
Download the software at: https://github.com/nasa/T-MATS

Open Source

Trajectory-Based Route Analysis and Control (TRAC) — ARC-16433-1

TRAC is an extensible software platform that supports next-generation air traffic concept investigations. The software enables visualization of current-day airspace elements; graphical creation of new elements; and runway-to-runway agent-based simulation and analysis of air traffic concepts.

U.S. and Foreign Release

TRAJEX Binary File Reader — KSC-13564

This MATLAB function opens a binary file generated by TRAJEX, reads and parses it, and outputs a structured data array that can be used in trajectory analysis.
U.S. Government Purpose Release

Virtual Airspace Simulation Technology, Real Time (VAST-RT), Capability Two — ARC-15658-1

Designed to assess advanced automation concepts and procedures being considered for the next-generation air traffic management system, VAST-RT offers real-time simulations across all air traffic control domains. Gate-to-gate simulations can involve piloted flight simulators, multiple NASA centers, TRACONS, and towers. The software's architecture links disparate legacy facilities together with simulation components developed in house.
U.S. and Foreign Release (Academic)

Vision-Based Attitude and Formation Determination System (VBAFDS) — GSC-14933-1

With an integrated approach that combines a miniature star tracker with a suite of robust processing algorithms, VBAFDS provides a novel, simple, resource-efficient solution for determining navigation and topology problems. The technology is not constrained to certain Earth orbits or formation geometries.
U.S. Government Purpose Release

X-Plane Communication Toolbox (XPC) — ARC-17185-1

The X-Plane Communications Toolbox (XPC) enables users to (1) receive real-time information on a simulated vehicle's state from the X-Plane flight simulator and (2) control vehicles running in the X-Plane simulation environment. The toolbox can be used to record simulated flight data, visualize flight profiles, and test control algorithms. Enabling the display of ghost traffic flying predefined flight paths in the simulated airspace as well as the visualization of flight plans in the form of waypoints, XPC allows custom built or third party autopilot programs to interface with X- Plane through MATLAB or C++. Code examples, included in the open-source distribution, will use Ardupilot and Mission Planner to perform autopilot control functions on a simulated flight vehicle. The toolbox uses a network communication protocol, allowing X-Plane, the controlling program, and the autopilot program to run on different computers. Download the software at: https://github.com/nasa/XPlaneConnect
Open Source

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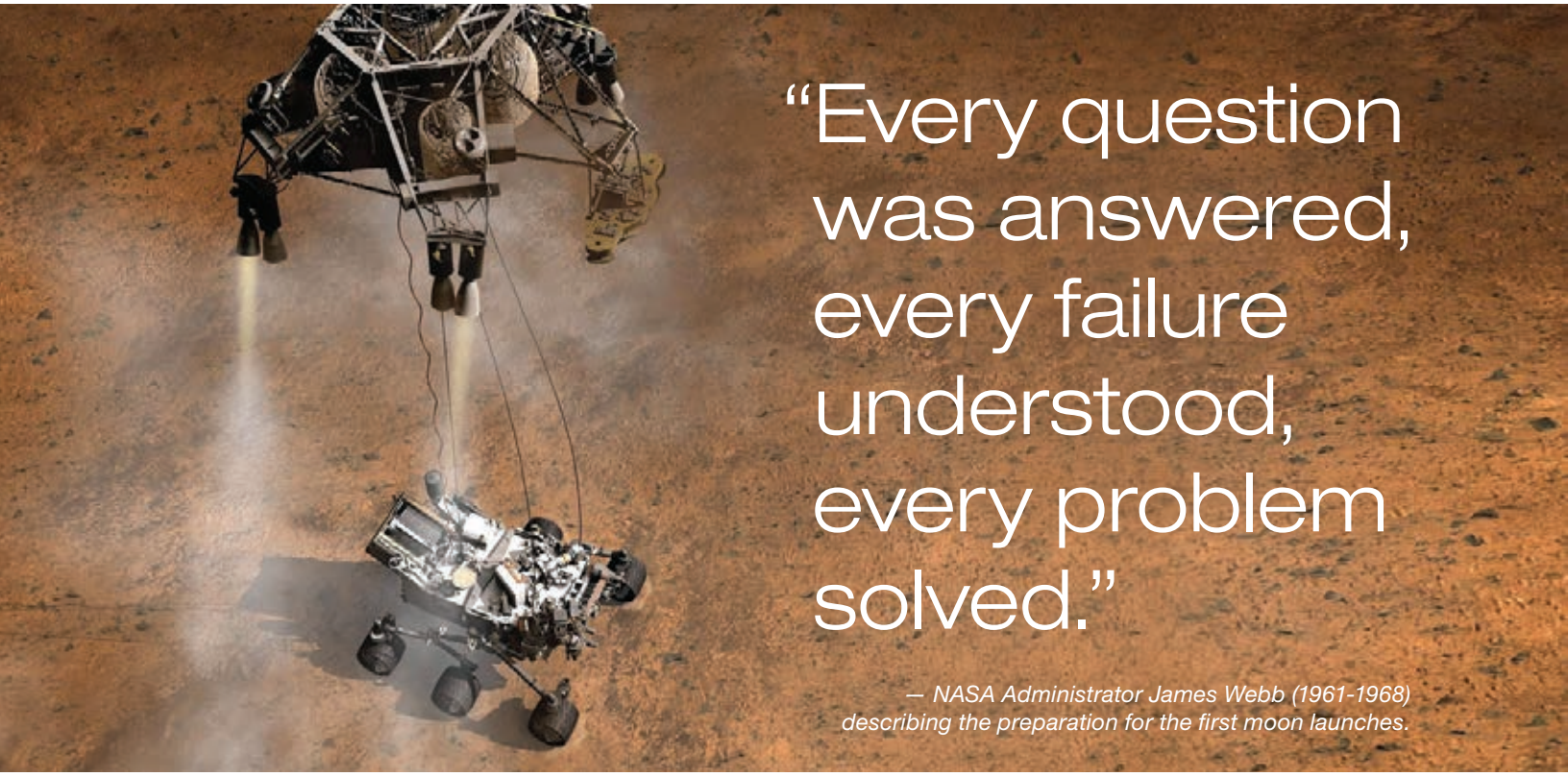

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