Earthdata Integration Reference Guide

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What is the earthdata.nasa.gov website?

The earthdata.nasa.gov (Earthdata) website is a collaborative environment providing a centralized means of providing information regarding NASA's Earth Observing System Data and Information System (EOSDIS). In addition to providing content, the Earthdata website provides a platform for developing and hosting interactive end user tools and applications that leverage the EOSDIS infrastructure.

You can visit the Earthdata website online at https://earthdata.nasa.gov.

What EOSDIS system components are available to system developers and integrators?

The following EOSDIS system components and services are available for use by system developers and integrators. Each of these systems has capabilities that may be useful to integrators.

- EOS ClearingHOuse (ECHO)
- EOSDIS User Registration System (URS)
- Global Image Browse Services (GIBS)
- Data from LANCE and DAACs
- Web Infrastructure

You can find out more about each of these system components online at http://earthdata.nasa.gov/about-eosdis/system-description.

What environments are available to system integrators for development and integration into Earthdata?

The EOSDIS system support team provides several environments to support the software development life cycle. Specific information regarding the environments will be made available to integrators during integration. However, the environments can be generally classified in the following manner:

- Virtual Development Environment - Integrators will be provided access to a standard release of Earthdata that they can use for offsite

development activities. This virtual machine will contain the core components of Earthdata useful to integrators.[1]

- Integration – The integration system provides an environment to deploy and integrate development builds once they have moved beyond localized environments and are ready for additional and more extensive system-wide testing. This environment is outside the firewall and subjected to security requirements and scanning. The support team will help integrators understand and meet these additional requirements.
- User Acceptance – The user acceptance testing system provides an environment for controlled deployment and end-user validation. This environment is externally visible for targeted user testing and internal quality assurance testing.
- Production – This is the operational system where changes are ultimately applied and made available for end user consumption and use.

Note that each environment will interact with correlated development, integration, user acceptance, or production instances of dependent system components (e.g. EOSDIS User Registration System, Global Imagery Browse Services, etc.).

What accounts will I need to access the EOSDIS environments and systems?

The EOSDIS user registration system (URS) provides a single username and password via a centralized authentication service for EOSDIS. URS allows web-based registration and user maintenance while focusing on user management and authentication. Application integrators will use URS for end user accounts that access the Earthdata website and other EOSDIS system components (e.g. ECHO) and supporting applications (e.g. Earthdata Collaboration Environment).

By leveraging the URS integration within EOSDIS system components, the workload of application integrators is reduced. Applications will still need to manage their own authorization levels, as dictated by the software requirements. The URS provides Application Programmer Interfaces (APIs) that allow applications to deploy URS using multiple technologies. URS provides primary access for client applications via an HTTP REST-style interface and has limited access through FTP. You can read more about URS online at http://earthdata.nasa.gov/about-

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1 Some additional software to support a localized virtual development environment may be required. Earthdata will provide detailed information about system and software requirements upon request.

eosdis/system-description/user-registration-system-urs and register for a URS account at https://earthdata.nasa.gov/urs/register.

The NASA Access Management System (NAMS) is for users that are affiliated with NASA and need privileged access to the Earthdata website and associated tools. Users with NAMS accounts are assigned roles that allow privileged users to manage their sections of the website and associated tools. Specific information on obtaining a NAMS account will be made available during project execution. For more on NAMS, visit http://itcd.hq.nasa.gov/nams.html online.

How do end users submit questions and receive responses about components added to Earthdata?

EOSDIS maintains a centralized User Support Tool (UST) that is used to manage and resolve user requests throughout EOSDIS. Users can submit requests to this tool via a web form or via email. Once the request is created, it is routed to the specific department within EOSDIS that is best suited to handle the request. Staff within that department then interact directly with the user via email to resolve the user's request. The UST encourages and facilitates EOSDIS Core System collaboration by utilizing an EOSDIS-wide knowledge base to efficiently resolve user requests.

New User Support Teams may be integrated into the UST as needed to support individual scientific community needs. The UST supports numerous out-of-the-box customizations that can be implemented by the UST team with help from Earthdata developers. Additional customizations may be requested during project integration.

Read the EOSDIS User Support Tool User Guide:
http://wiki.earthdata.nasa.gov/display/UG/User+Support+Tool+%28Kayako%29+User+Guide
Learn more about the Kayako Fusion User Support Tool:
http://www.kayako.com/products/fusion/
Learn more about the Kayako REST API:
http://wiki.kayako.com/display/DEV/Kayako+REST+API

How do I submit enhancement requests or bug reports for the Earthdata system?

Earthdata uses a ticket tracking software called JIRA (by Atlassian) to track software bugs, issues, and feature enhancements. Projects being incorporated into Earthdata are provided accounts for developers and managers to facilitate interaction among the different projects. If a project has an issue with systems, networks, or any other

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EOSDIS system component, JIRA provides a means by which a ticket or enhancement request can be submitted, and an easy way to track progress of that issue.

Projects integrating with the Earthdata site will receive issue and bug assignments through the JIRA application when issues are reported. The Earthdata team will regularly follow up with project representatives regarding timely disposition of assigned issues. The process for assigning and addressing issues will be coordinated with each project team during the development and integration phase.

Learn more about the Jira issue and bug tracking system:
http://www.atlassian.com/software/jira/overview/

Does Earthdata provide a software repository for my application?

The Earthdata Code Collaborative (ECC) provides a git-based platform to host and collaborate on development of tools, services, or service endpoints. This service is available to EOSDIS-affiliated developers and data centers, and requires a NAMS account. ECC provides versioning and code control via a git repository, and repository management via the Atlassian Stash tool, including branching, forking, and pull requests

Projects integrating with the Earthdata site will receive accounts in the ECC. Deployments within the various Earthdata environments will be preformed using ECC-managed code, and will require automated testing and continuous integration —both provided through tools within the ECC itself.

Learn more about the Earthdata Code Collaborative (ECC):
http://earthdata.nasa.gov/about-eosdis/system-description/web-infrastructure-wi

How do I discover EOSDIS data products?

The EOS ClearingHOuse (ECHO) is the EOSDIS middleware layer between Earth science data and users via a service-oriented architecture. It was designed to improve the discovery and access of NASA Earth science data by acting as an order broker between end users and EOSDIS Data Centers who provide metadata for their data holdings and other Earth science-related data holdings.

ECHO offers a suite of Application Programmer Interfaces (APIs) for search and access that allow users to develop specialized "clients" to give science data users of

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their community access to data and services. The Reverb (http://earthdata.nasa.gov/reverb/) discovery tool acts as a reference client for how the ECHO APIs can be used to discover and access EOSDIS data and services.

Earthdata integrators may develop their own software application that communicates with web services available through the ECHO API. The ECHO API allows for various client types including user-interactive, metadata harvesting and other batch processing for scientists and other clients. These custom ECHO client applications can meet the specific needs of targeted science communities.

Additionally, the Global Change Master Directory (GCMD) offers more than 28,000 Earth science data set and service descriptions, which cover subject areas within the Earth and environmental sciences. Projects can use this tool to find datasets from NASA and external communities.

Learn more about ECHO: http://earthdata.nasa.gov/echo/
View the ECHO REST API Documentation: https://api.echo.nasa.gov/catalog-rest/catalog-docs/index.html
Access the NASA Reverb discovery tool: http://earthdata.nasa.gov/reverb/
Access the NASA entries in GCMD: http://gcmd.nasa.gov/KeywordSearch/Home.do?Portal=GCMD_Services&MetadataType=1

What satellite imagery is available for inclusion in end-user facing applications?

The Global Imagery Browse Services (GIBS) are a set of standard services to deliver global, full-resolution satellite imagery in a highly responsive manner. Its goal is to enable interactive exploration of NASA's Earth imagery for a broad range of users. Currently, 50+ full-resolution, global imagery products from NASA Earth Observing System satellites are available in near real-time. This includes products from the MODIS instrument aboard Terra and Aqua, the AIRS instrument aboard Aqua, and the OMI instrument aboard Aura. Imagery is available in geographic, Arctic, and Antarctic map projections.

NASA Worldview (http://earthdata.nasa.gov/labs/worldview/) is a reference client that demonstrates some of the power and capabilities of GIBS. Application integrators can use GIBS to provide a map- or globe-based client to allow interactive exploration of full-resolution, SLR-specific data products. Similarly, it could be used to illustrate the type of expected science to be addressed by an application and the relevant products available. Application integrators can request additional image layers be added to GIBS.

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Learn more about the Global Imagery Browse Services:
http://earthdata.nasa.gov/gibs
Learn more about data products available through GIBS:
http://earthdata.nasa.gov/about-eosdis/system-description/global-imagery-browse-services-gibs/gibs-available-imagery-products
Access the NASA Worldview reference client:
http://earthdata.nasa.gov/labs/worldview/

What web metrics are available to integrators who utilize the Earthdata website?

The Earth Science Data and Information System (ESDIS) Metrics System (EMS) is designed to collect and organizing various metrics from the EOSDIS DAACs, web applications and other Data Providers. EMS tracks the metrics on ingest, archive and distribution activity and supports web analytics tools, and analysis. The gathered metrics allow for the development of customized services directed to specific users or groups.

The Earthdata and EMS teams work closely with application integrators as they add content and tools into the Earthdata website. This integration support includes identification and development of web metric page tagging, report analysis, and metrics tuning. Additional information will be provided during development and integration phases.

Learn more about EMS: http://earthdata.nasa.gov/ems

What Configuration Management and Quality Assurance processes are in place?

Earthdata provides a number of development environments for integrated testing. Integration begins in a localized development environment, where code developed by projects is tested alongside functionality developed by other projects without affecting any publicly-available systems. After testing is confirmed, features are moved from these local environment to the Systems Integration and Testing (SIT) environment, where regression testing is preformed. Features are then moved from the SIT environment to the User Acceptance Testing (UAT) environment, allowing for testing by selected end users. Once features and enhancements are successfully tested in UAT, they are then candidates to be moved into Production.

Throughout all environments, automated testing is required at the unit and behavioral/functional level. While there is some manual testing, the bulk of Earthdata testing is programmatic, and is run frequently (often daily, if not more

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often). Tools within the ECC provide a mechanism for executing tests at pre-defined and customizable intervals, and reporting on the results of those tests.

Learn more about the Earthdata CM and QA processes:
http://earthdata.nasa.gov/about-eosdis/system-description/web-infrastructure-wi.

Can I create a collaborative space for my project end users?

The Earth Data Collaboration Environment (ECE) enables projects to communicate and collaborate within a host of common workspaces. The ECE is based on the popular wiki platform called Confluence (by Atlassian) and has many options for customization of a wiki space and use of various macros and plugins available. Users wanting to contribute must have either a URS or NAMS account to participate.

Application integrators will have a common workspace created within the ECE for collaboration between internal team members and other Earth Data approved users. Spaces and information can also be made available to the general public. The ECE will enable application teams to post documentation (such as meeting notes/minutes, technical specification documents, how-to documents, etc), link to other sites, announce news, post blog entries, etc.

Learn more about the Earth Data Collaboration Environment:
http://earthdata.nasa.gov/about-eosdis/system-description/web-infrastructure-wi
View a sample collaborative wiki: http://wiki.earthdata.nasa.gov

What security infrastructure is available for Earthdata integrators?

The Earthdata website employs security hardening and website penetration testing to identify security threats. The details of the specific approaches are not included herein to avoid compromising the EOSDIS security posture.   Application integrators will be required to address security issues identified by regular and targeted system and application scans. The Earthdata system does not collect Personally Identifiable Information (PII), and all integrated applications should not collect such information either. All communications including user information or administrative functionality shall utilize https encryption. The Earthdata security and systems engineering team will discuss security requirements as needed during development and integration.

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What System & Network Administration support do Earthdata integrators receive?

The Earthdata development and operations team provides support for projects being integrated into the website and is the primary interface for addressing integration issues between Earthdata and other components of EOSDIS. The Earthdata team will help developers during their development and design phases to identify and leverage best practices for Earthdata integration. The Earthdata team has experts in graphic design, development, security, networking and system/database administration. Earthdata also maintains computational resources that can be leveraged by integrators to support specific tools and capabilities.