Living With a Star Scientific Resource Access System

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Flexible architecture enables discovery and retrieval of both static data products and dynamically generated data

Variety of user interfaces for different science types

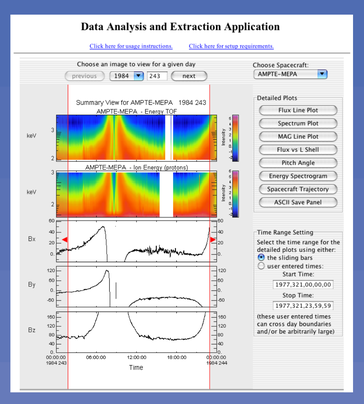
Geophysicist User

Space Physicist User

Solar Physicist User

Non-interactive requests for tool interfaces

System User (MIDL)



Resource Request Component

Resource request only requires temporal and descriptive search parameters (i.e., spacecraft, instrument, data format are optional)

(optional)

(1) Resource Explorer
Provides interactive interface for describing and discovering resources.

(2) Resource Evaluator
Provides interactive or automatic evaluation of identified candidate resources.

(3) Request Processor
Creates individual requests for each resource type.

Request State
Status and interim results for each request.

(6) Results Processor
Monitors request status and aggregates results.

(4) Request Execution Manager
Optimizes and dispatches requests.

(5) Resource Manager
Executes request for each individual resource.

To individual data sources using remote access protocols

Finding Scientific Resources

(1) Scientist or system user creates request containing resource search parameters. Using knowledge base, matching resources are identified.

(2) If desired, detailed resource descriptions can be reviewed and resources individually selected.

(3) Individual requests for each resource are created.

(4) Resource requests are optimized and dispatched.

(5) Individual requests are executed and request results (data or retrieval information) are collected.

(6) Results are aggregated and returned to the user.

Knowledge Base Component

Resource Mapping
Maps individual resource data content to common data model

Common Data Model
Provides common reference and logical organization for resource data content

Descriptive Metadata
Describes provenance and content of resources

Structural Metadata
Describes access protocol and structure of resources

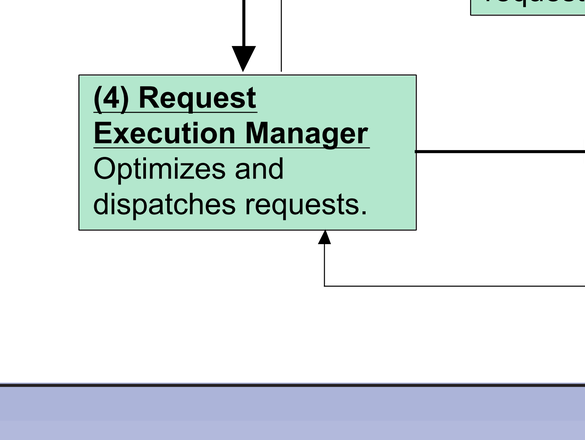
The knowledge base provides information used to find and access scientific resources and eliminates need for rigid metadata standards or unique software for each resource

JDBC, HTTP, FTP

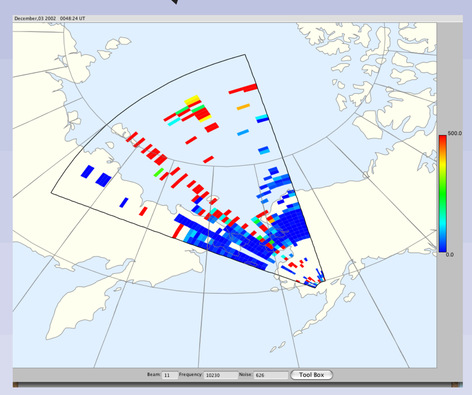
HTTP, FTP, CGI

FTP, HTTP

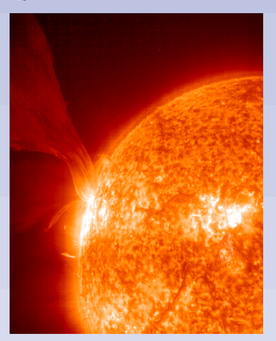
CGI, HTTP, FTP



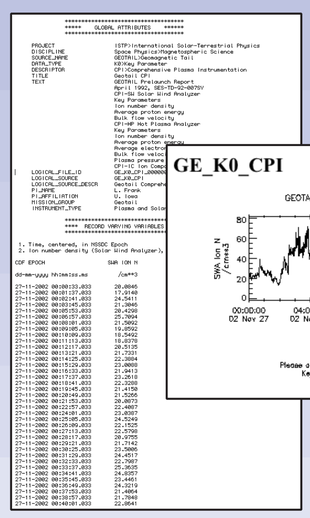
TIMED - GUVI



SuperDARN



SOHO



CDAWeb

Scientific Resources can be data, models, format converters, analysis tools

LWS Resource Issues

- Widely disparate data sources
  - Variety of disciplines, formats, conventions
- Long-term, evolving mission
  - Includes technologies and formats not envisioned today
- Resources are more than just data
  - Tools and models produce data, too
- Heterogeneous Sources
  - All resources can't adhere to a single standard

Unique Architecture Features

- Ability to discover and access resources irrespective of format, protocol (FTP, HTTP, CGI, JDBC, ...), or discipline
  - Integrates heritage data systems with minimal software
- Adaptable architecture for new capability and technology insertion
- Requires minimal effort and no new software to add new resources (data, tools, models)
  - Generalized approach to variety of data sources
  - Not limited by resource formats
- Distributed and scalable, both for reliability and performance
- Supports multiple user and system interface types tuned for different types of science

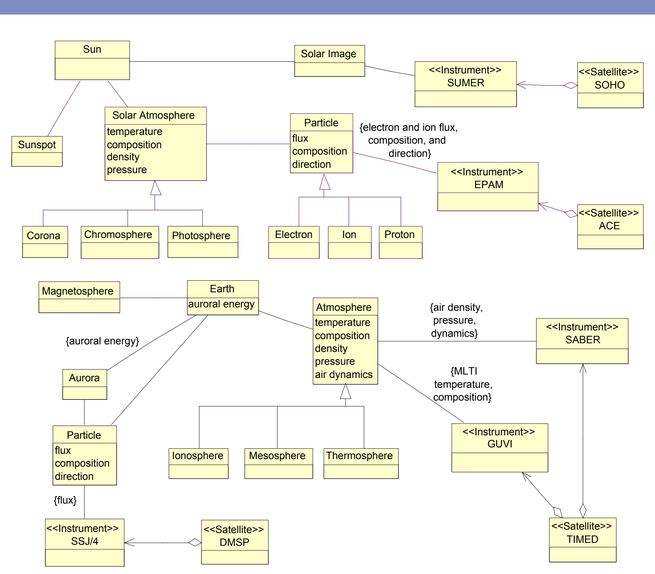
Adding New Resources

- No new software required
- Resource providers supply descriptive metadata (for discovery) and structural metadata (for access) describing resources
- Resource providers supply mapping of resource content to common data model
- Common data model provides stable baseline for discovery and access software

Knowledge Base

Internal knowledge base minimizes effort to add new LWS resources (data, tools, and models)

Partial Common Data Model



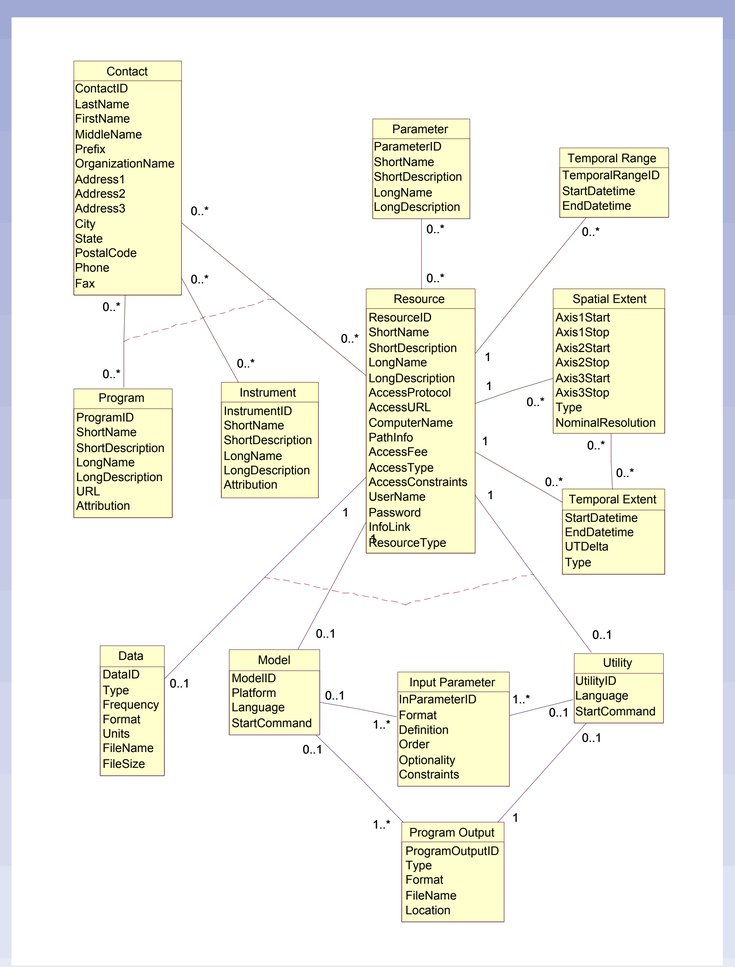
Common data model:

- *organizes search parameters*
- *enables simpler user requests*
- *provides additional information for automatically refining and optimizing resource requests*

Metadata describes resources:

- *to enable automated discovery and access*
- *to provide detailed information for scientists*

Notional Metadata Model (Descriptive and Structural)



Notional Metadata (Descriptive and Structural)

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<Contact>
    <LastName>Paxton</LastName>
    <FirstName>Larry</FirstName>
    <MiddleName>J.</MiddleName>
    <Prefix>Dr.</Prefix>
    <OrganizationName>The Johns Hopkins University Applied Physics Laboratory
                      </OrganizationName>
    <Address1>11100 Johns Hopkins Road</Address1>
    <City>Laurel</City>
    <State>MD</State>
    <Country>USA</Country>
    <PostalCode>20723-6099</PostalCode>
    <Phone>240-228-6871</Phone>
</Contact>

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                      the MLTI region.</ShortDescription>
    <LongName>The Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics
             Mission</LongName>
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                     The TIMED mission will study the influences of the sun and humans
                     on the least explored and understood region of Earth's atmosphere
                     - the MLTI region.  The TIMED spacecraft will focus on a portion
                     of this region located approximately 40 -110 miles above the
                     surface.  TIMED's payload consists of 4 instruments - the Global
                     Ultraviolet Imager (GUVI), the Solar Extreme Ultraviolet Experiment
                     (SEE), the TIMED Doppler Interferometer (TIDI), and the Sounding of
                     the Atmosphere using Broadband Emission Radiometry (SABER).
                     </LongDescription>
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<Instrument>
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    <ShortDescription>The Mesosphere, Lower Thermosphere, and Ionosphere region.
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