

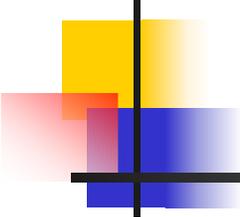
HDF EOS Workshop

David Han

Code 586

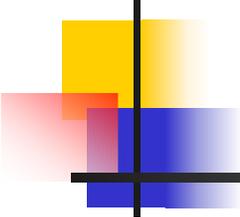
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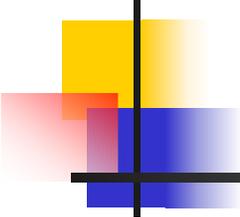
Abstract

The variety of available data formats (e.g. CDF, netCDF, HDF, etc.) has been a problem for scientists (because data of their interest must be translated into the format they understand before they can analyze data), and it will continue to be a problem for years to come. In a bid to make data format differences transparent to the end users, the CDF office has employed the eXtensible Markup Language (XML) technology, Simple Object Access Protocol (SOAP), and developed various custom ad-hoc translators to facilitate and promote data interoperability with other data formats.



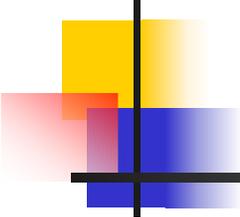
What is CDF

- Self-describing platform-independent scientific data format (object oriented like HDF5)
- Most widely used format in Space Physics
- Available on all major platforms
 - Unix (HP, AIX, Sun OS, Solaris, Linux, SGI)
 - Windows 95/98/NT/2000, QNX
 - Macintosh OS 8.x, 9.x, 10.x
 - DEC (VMS, OpenVMS, Ultrix, OSF/1)
- Interfaces supported: C, Fortran, Java, and Perl
- See more information at the CDF FAQ page (<http://nssdc.gsfc.nasa.gov/cdf/html/FAQ.html>)



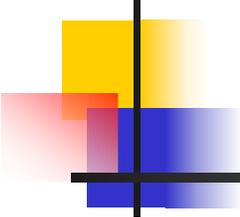
Software for CDF

- IDL, MATLAB, IBM DX, FlexPro, Application Visualization System
- NSSDC developed Web-based systems
 - CDAWeb (<http://cdaweb.gsfc.nasa.gov/cdaweb>)
 - SSCWeb (<http://sscweb.gsfc.nasa.gov>)
 - COHOWeb (<http://nssdc.gsfc.nasa.gov/cohoweb/cw.html>)
 - OMNIWeb (<http://cdaweb.gsfc.nasa.gov/omniweb/ow.html>)
- CDAWlib (<http://spdf.gsfc.nasa.gov/CDAWlib.html>)
 - A set of IDL routines that allow users to manipulate data store in CDF
 - Available at <ftp://cdaweb.gsfc.nasa.gov/pub/CDAWlib>
- Standard CDF tools (CDFcompare, CDFconvert, CDFedit, CDFexport, CDFstats, SkeletonTable, SkeletonCDF)
 - Distributed as part of the standard CDF distribution package
 - See <http://nssdc/cdf/html/FAQ.html> for a detailed description of each tool



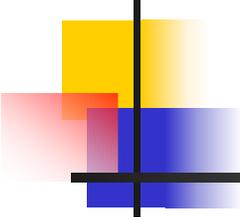
CDF Users

- ISTP affiliated missions that adopted CDF as the primary data format
 - WIND, POLAR, GEOTAIL
- IMAGE (March 2000) - above L1 products
- CLUSTER (summer 2000) - adopted CDF
- Missions/ITs that are sending or have sent products in CDF to CDAWEB
 - ACE, FAST, IMP-8, SAMPEX, Equator-S, SOHO, Interball (Tail and Aurora) and Ulysses
- Academia, commercial companies, military
- Total number of CDF files downloaded in 2002: 20,703



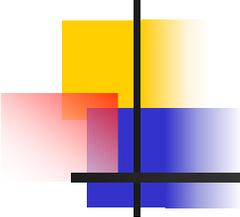
Support for LWS and Staying in Line with the SEC Goal

- SEC is one of three divisions in OSS
- SEC Goal (CDF requirements)
 - To understand the Sun, heliosphere, and planetary environments as a single-connected system
- LWS is a part of the SEC theme
- CDF contribution towards the SEC goal
 - Individual data translators
 - Make data translators available via Web services using SOAP
 - XML support



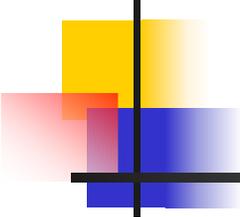
CDF Markup Language (CDFML)

- XML Markup Language describing Common Data Format (CDF) data and metadata
- A CDFML file (XML file) is an ASCII representation of a CDF file
- Used as a mechanism to promote and facilitate data interoperability with other science data formats (since translation to and from another data format via XSL is very easy)



LWS Relevant Tools

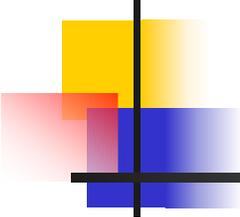
- HDF5-to-CDF translator
- FITS-to-CDF translator
- CDF-to-FITS translator
- netCDF-to-CDF translator
- CDF-to-netCDF translator
- CDF2CDFML and CDFML2CDF converters
- Data Translator Web Service



Web Services Layers

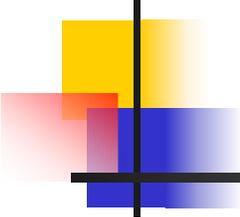
Discovery	UDDI
Description	WSDL
XML Messaging	SOAP, XML-RPC
Transport	HTTP, SMTP, FTP

NOTE: As web services evolve, additional layers may be added, and additional technologies may be added to each layer.



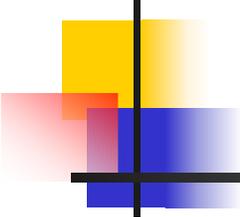
Web Services

- Simple Object Access Protocol (SOAP)
 - An XML-based protocol for exchanging information in a distributed environment
 - Defines a way to perform remote procedure calls (RPCs) - method name and a list of parameters
 - HTTP is the most popular option for data transport (since it is simple, stable, and widely deployed), but not mandatory. In addition, the SOAP specification has only details on HTTP.
 - SOAP messages masqueraded as HTTP messages can pass through some firewalls - can be good or bad
 - Supported in C, C++, Java, C#, Perl, Python, and JavaScript



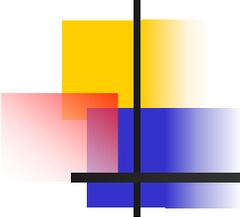
Web Services (con'td)

- Web Services Definition Language (WSDL)
 - Public interface written in XML that describes the following:
 - what a web service can do
 - where the service resides
 - how to invoke the service
 - Using WSDL, a client can locate a web service and invoke any of the publicly available functions.



Web Services (con'td)

- Universal Description, Discovery and Integration (UDDI)
 - A mechanism for clients to dynamically find web services
 - Layered over SOAP and assumes that requests and responses are UDDI objects sent around as SOAP messages



WSDL & UDDI

- Web Services Definition Language (WSDL)
 - Describes the following in XML:
 - what a web service can do
 - where the service resides
 - how to invoke the service
- Universal Description, Discovery and Integration (UDDI)
 - A mechanism for clients to dynamically find web services