EOSDIS Core System Design Overview

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Agenda

- Program Purpose
- Architecture (High Level)
- Push, Production, and Pull Scenarios
- Hardware Architecture
- Primary COTS Products
- Infrastructure Key Mechanisms
- Design Artifacts

Program Purpose

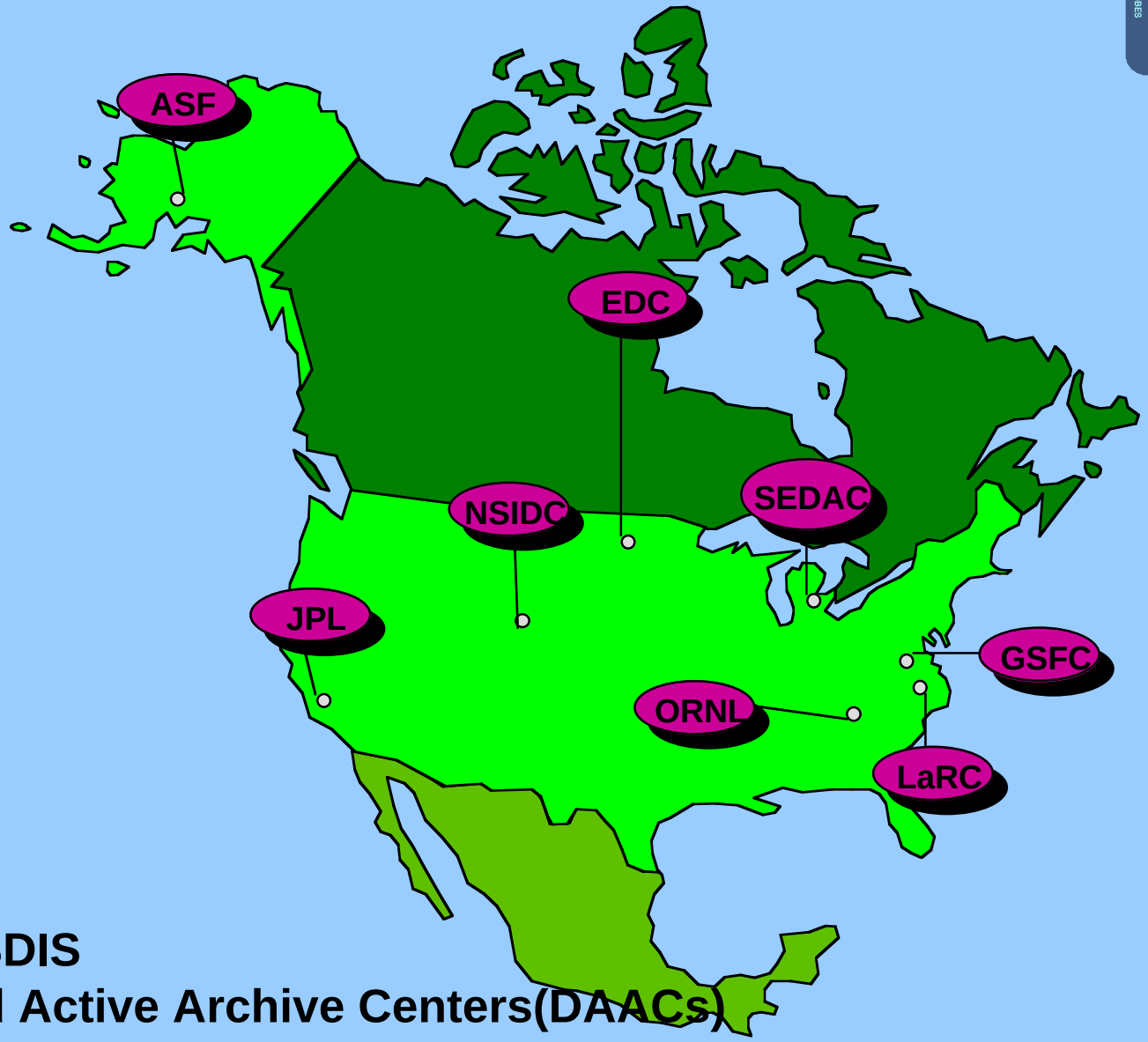
ECS Purpose

EOSDIS (Earth Observing System Data Information System) Core System (ECS)

- **NASA-Sponsored, open, distributed information system**
- **Manages information from Pre-EOS and EOS-era observation satellites, and other Earth Science field measurement programs**
- **Provides EOS instrument data collection, science data processing, access to data holdings.**

System Architecture

ECS Data Centers



NASA EOSDIS
Distributed Active Archive Centers(DAACs)

ECS Design Factors

- Distributed
- Client/Server
- Object-Oriented
- COTS Intensive
- Extensible

Software Architecture

Software Architecture

Software composed of subsystems organized by function

- **Ingest (INS)**
- **Client (CLS)**
- **Planning (PLS)**
- **Data Processing(DPS)**
- **Data Server (DSS)**
- **Data Management (DMS)**
- **Interoperability (IOS)**

SDPS Segment

- **Communications (CSS)**
- **Management (MSS)**

CSMS Segment

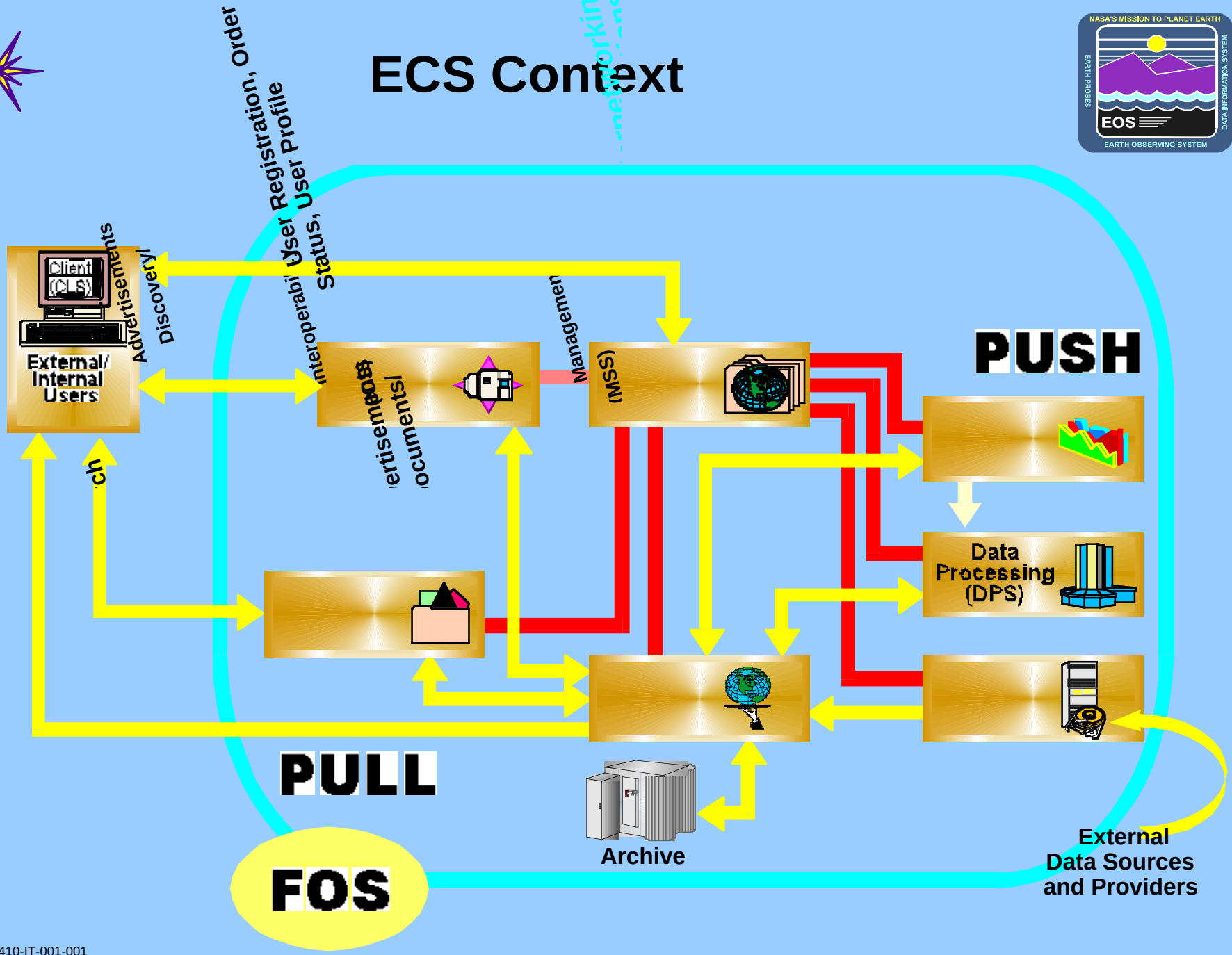
Subsystems

- Client (CLS) - Science user interface to data and services
- Ingest (INS) - Receive external data and ingest into ECS
- Planning(PLS) - Plan production processes to create new products from ECS data
- Data Processing (DPS) - Execute science software to create new products or special services
- Data Server (DSS) - Archive and retrieve ECS science data and documents

Subsystems (continued)

- Data Management (DMS) - Give user single view of distributed data and distributed search
- Interoperability(IOS) - Advertising of data and services available
- Communications (CSS) - Provide communications between ECS subsystem software objects in distributed environment
- Management (MSS) - Provide enterprise management of resources

ECS Context


Client (CLS)
External/ Internal Users
Advertisements
Discovery
Registration, Order
User Profile
Status,
Management
(MSS)
PUSH
Data Processing (DPS)
PULL
Archive
FOS
External Data Sources and Providers

Configuration Items

Subsystems composed of Configuration Items (CI)

Computer Software CIs (CSCI) and Hardware CIs (HWCI)

Data Server Subsystem CIs

CSCI	HWCI
Science Data Server (SDSRV) CI	Access Control and Management (ACMH
Storage Management (STMGT) CI	Working Storage (W Data Repository (DR
Data Distribution (DDIST) CI	Distribution and Ingc Peripherals (DIPHW)
Document Data Server (DDSRV) CI	Document Data Serv Hardware (DDSR

SDPS CI Overview

Client (CLS)

- Desktop CSCI DESKT
- Workbench CSCI WKBCH

Interoperability (IOS)

- Advertising Service CSCI ADSRV
- Advertising Server HWCI ADSHW

Data Management (DMS)

- Local Information Management CSCI LIMGR
- Distributed Information Management CSCI DIMGR
- Data Dictionary Services CSCI DDICT
- Version 0 Interoperability Gateway CSCI GTWAY
- Data Management Server HWCI DMGHW

Data Server (DSS)

- Science Data Server CSCI SDSRV
- Document Data Server CSCI DDSRV
- Storage Management CSCI STMGT
- Data Distribution CSCI DDIST
- Access Control & Management HWCI ACMHW
- Working Storage HWCI WKSHW
- Document Data Server HWCI DDSHW
- Data Repository HWCI DRPHW
- Distribution & Ingest Peripherals HWCI DIPHW

Ingest (INS)

- Ingest CSCI INGST
- Ingest Client HWCI ICLHW

Data Processing (DPS)

- Processing CSCI PRONG
- SDP Toolkit CSCI SDPTK
- Algorithm Integration & Test CSCI AITTL
- Science Processing HWCI SPRHW
- Algorithm QA HWCI AQAHW
- Algorithm Integration & Test HWCI AITHW

Planning (PLS)

- Production Planning CSCI PLANG
- Planning HWCI PLNHW

Software CI

Hardware CI

CSMS CI Overview

Communications Subsystem* (CSS)

- Distributed Computing Software CI

- Distributed Computing HWCI DCHCI

*SBSRV is a service of CSS but not CI

System Management Subsystem (MSS)

- Management Software CSCI MCI

- Management Agents CSCI MACI

- Management Logistics CSCI MLCI

- Management Hardware HWCI MHCI

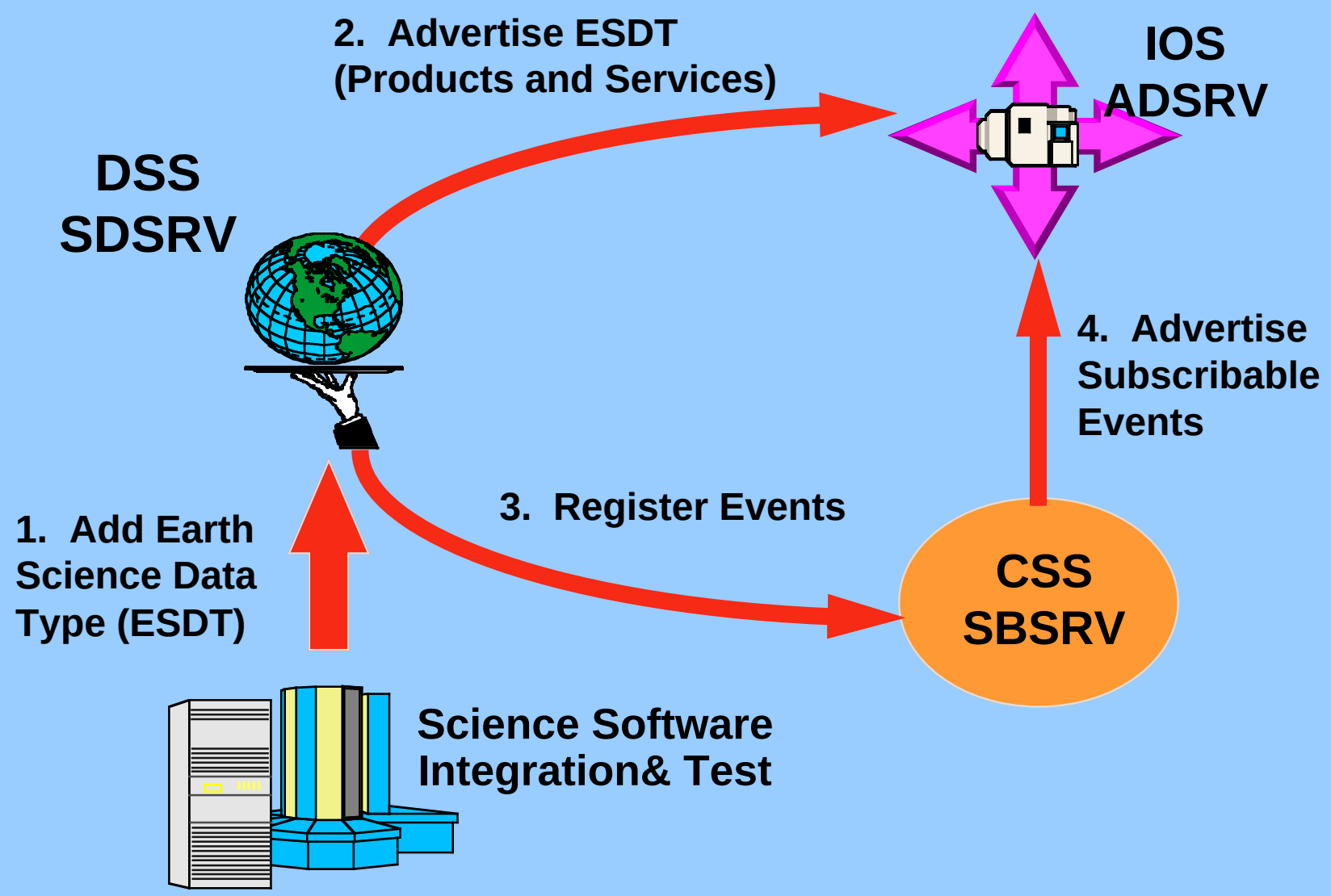
Internetworking Subsystem (ISS)

- Internetworking CSCI INCI

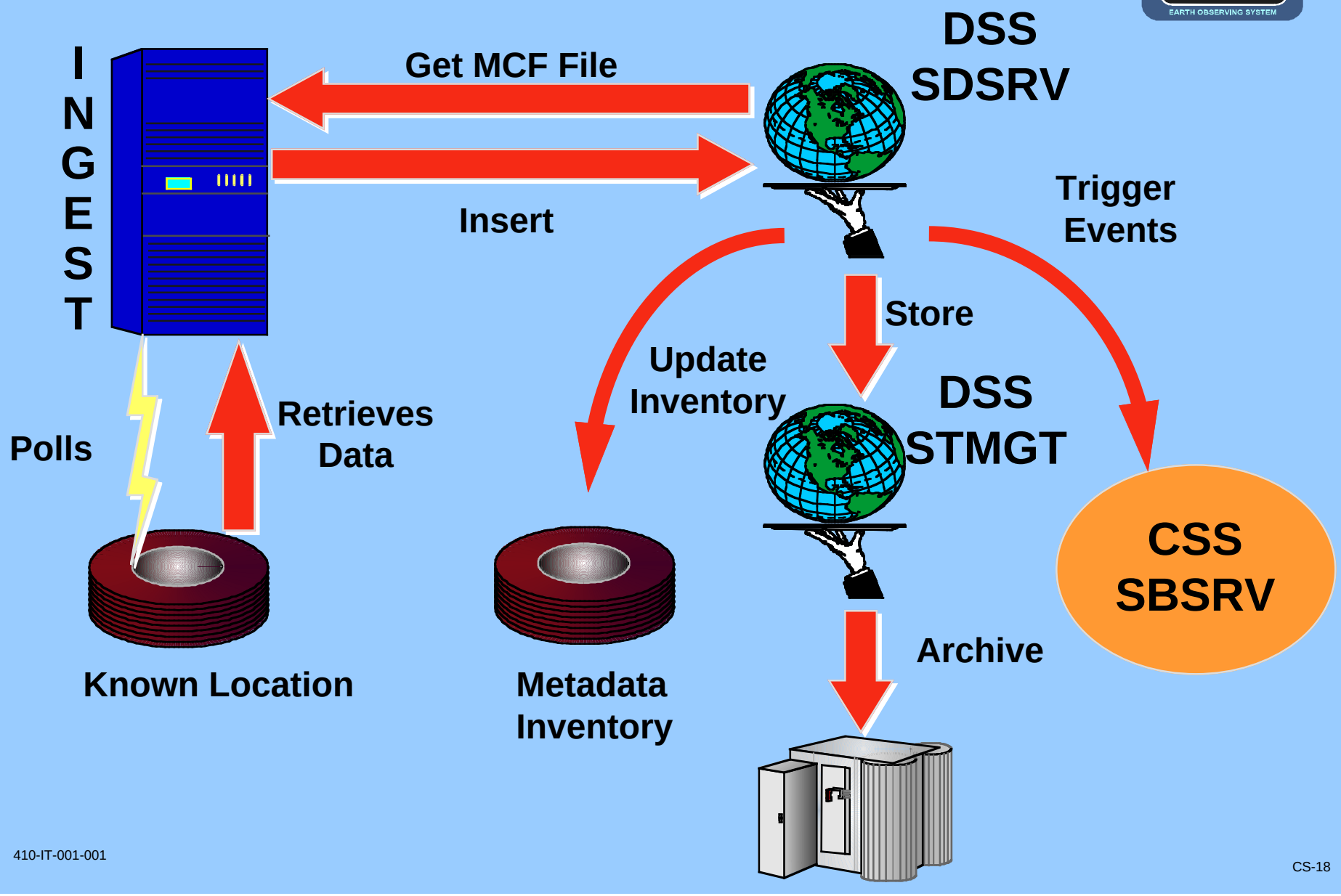
- Internetworking Hardware HWCI INCI

Push, Data Production, and Pull Scenarios

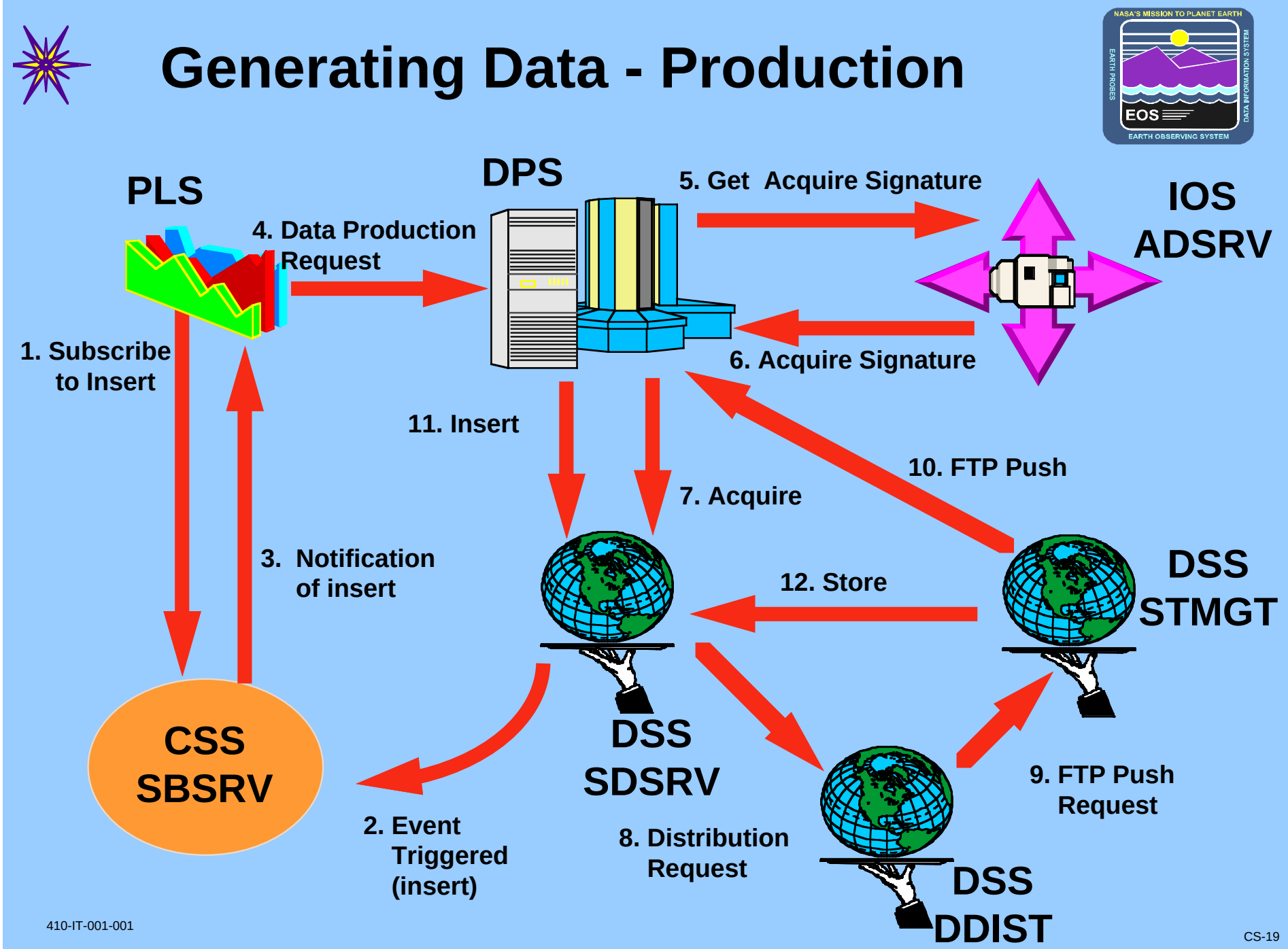
Push Step 1: Registering a Data Type



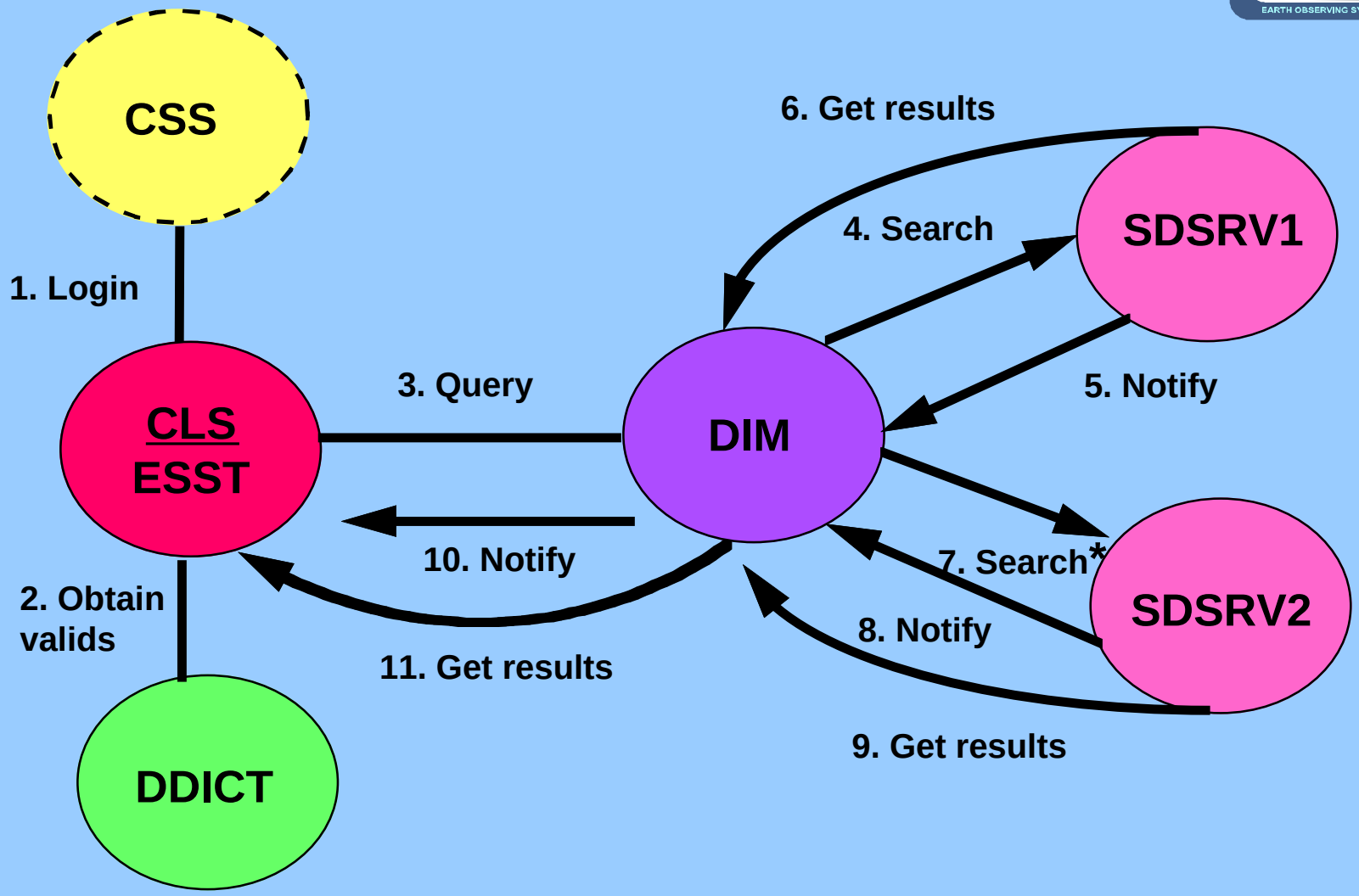
Push Step 2: Ingesting Data



Generating Data - Production

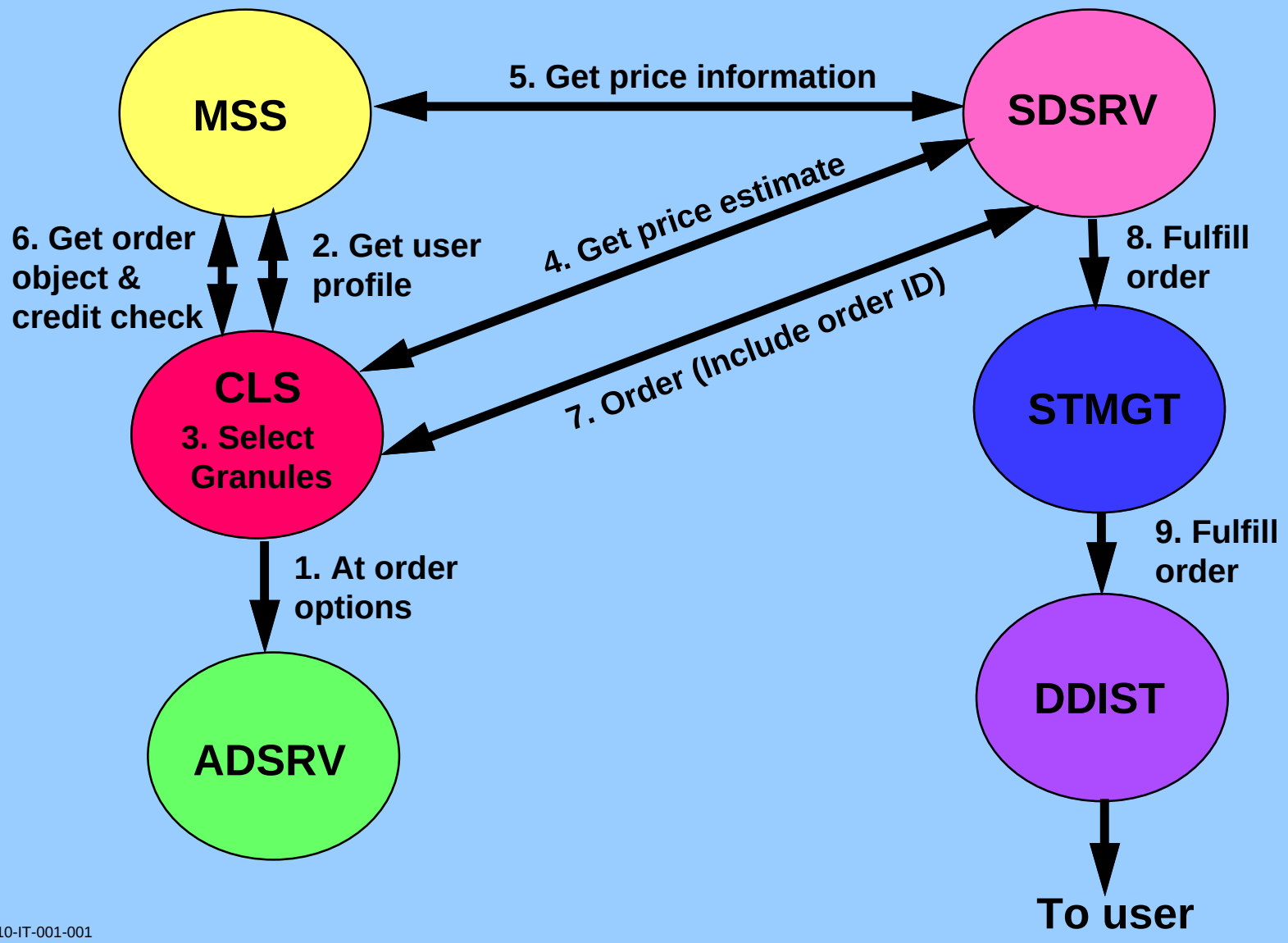


Coincident Search



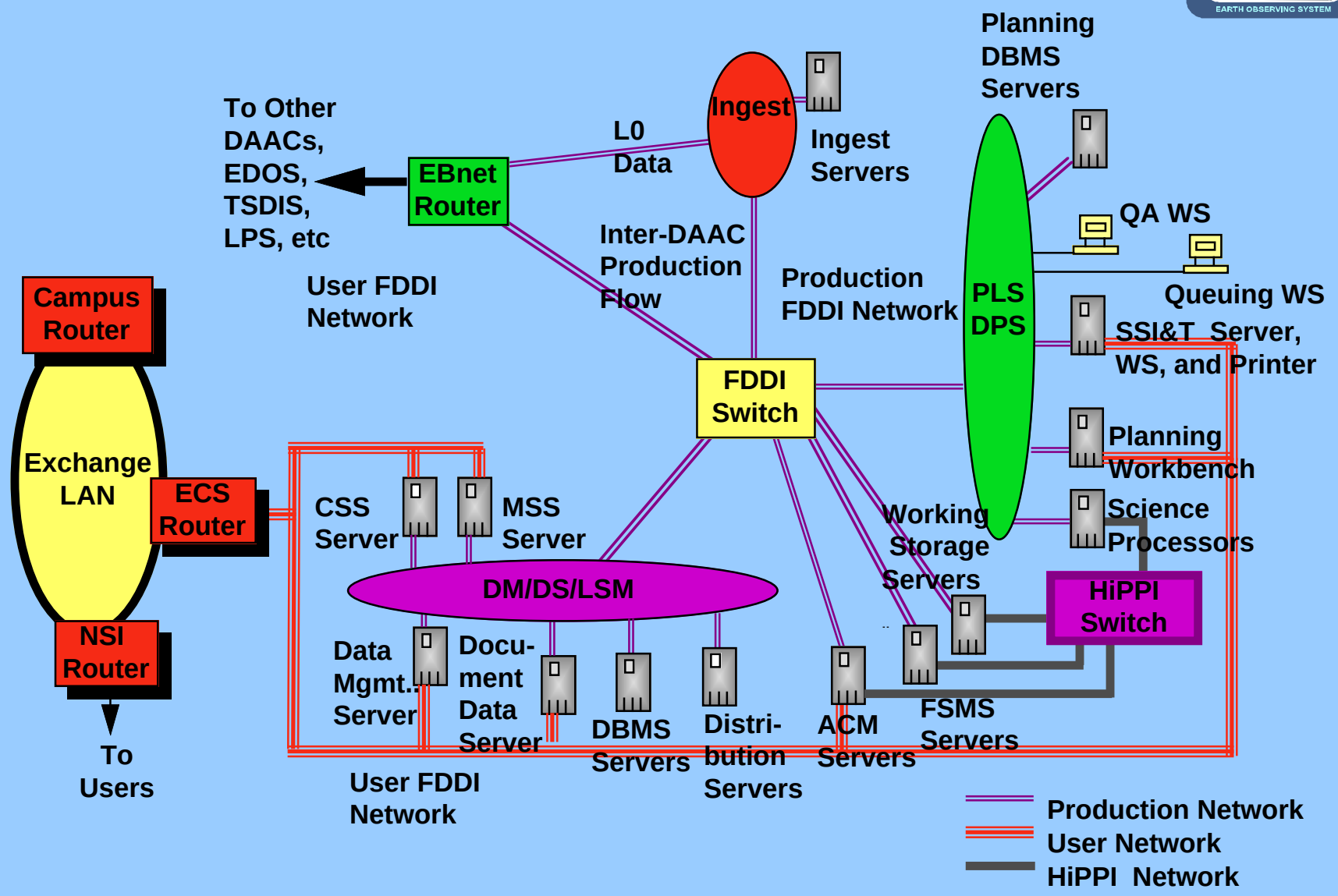
* Second search uses results of first search to perform the coincidence.

Ordering Data From ECS (PULL)



Hardware Architecture

ECS Hardware Architecture



Primary COTS Products

✦ Sybase	DBMS for most DB needs (PLS, DPS, Authorization (IDG), DSS, INS, IOS)
✦ Autosys	Manages Data Processing health, control, and monitoring
✦ HP Open View	System level network/host/server health control, monitoring, enterprise management
✦ Tivoli	
✦ DCE/OODCE	Distributed Computing Environment - Distributed framework and Distributed Security Services (Middleware)

Infrastructure Key Mechanisms

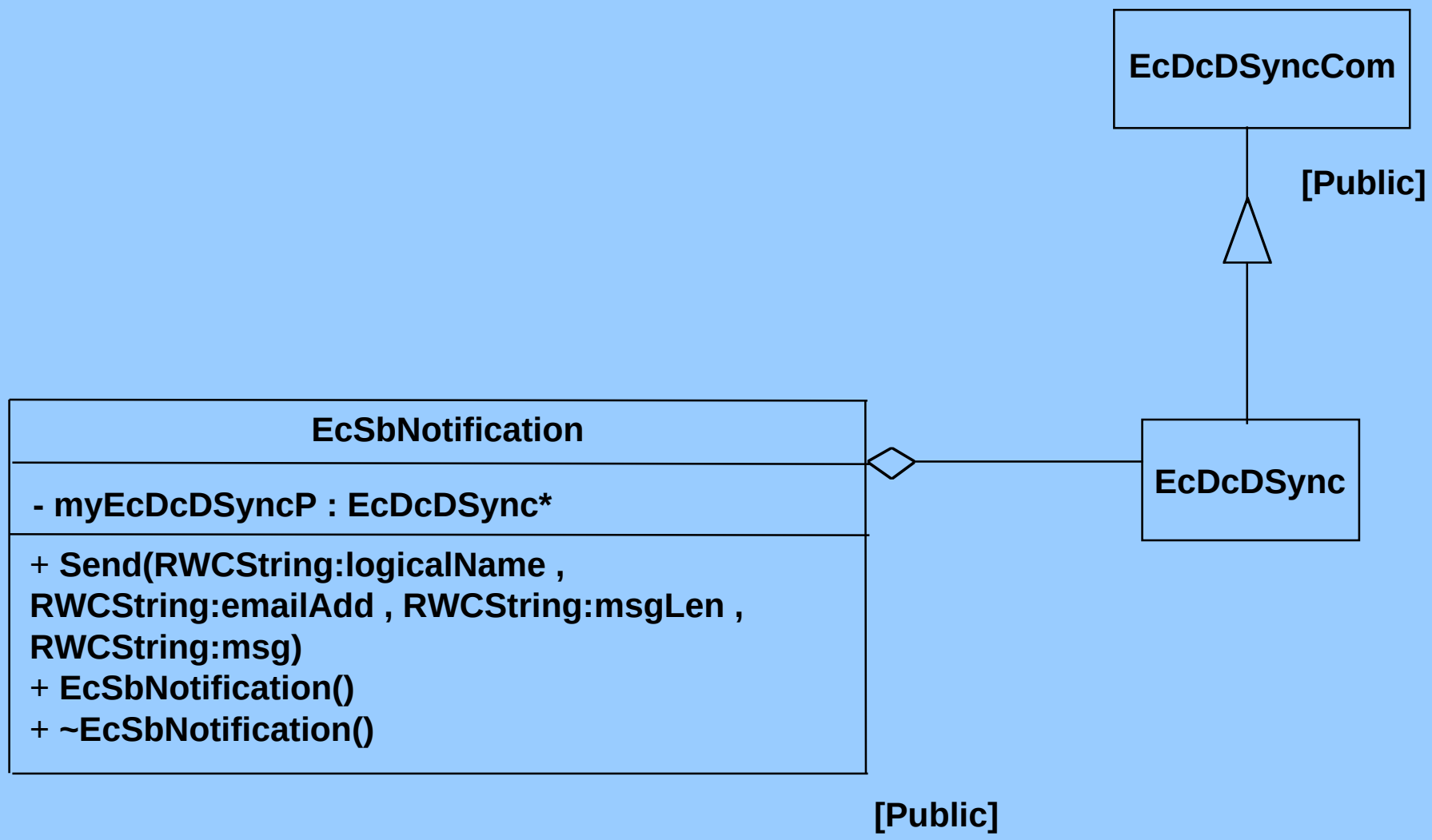
- **Low-Level Components of Software Architecture that are ubiquitous throughout system design**

Key Mechanisms

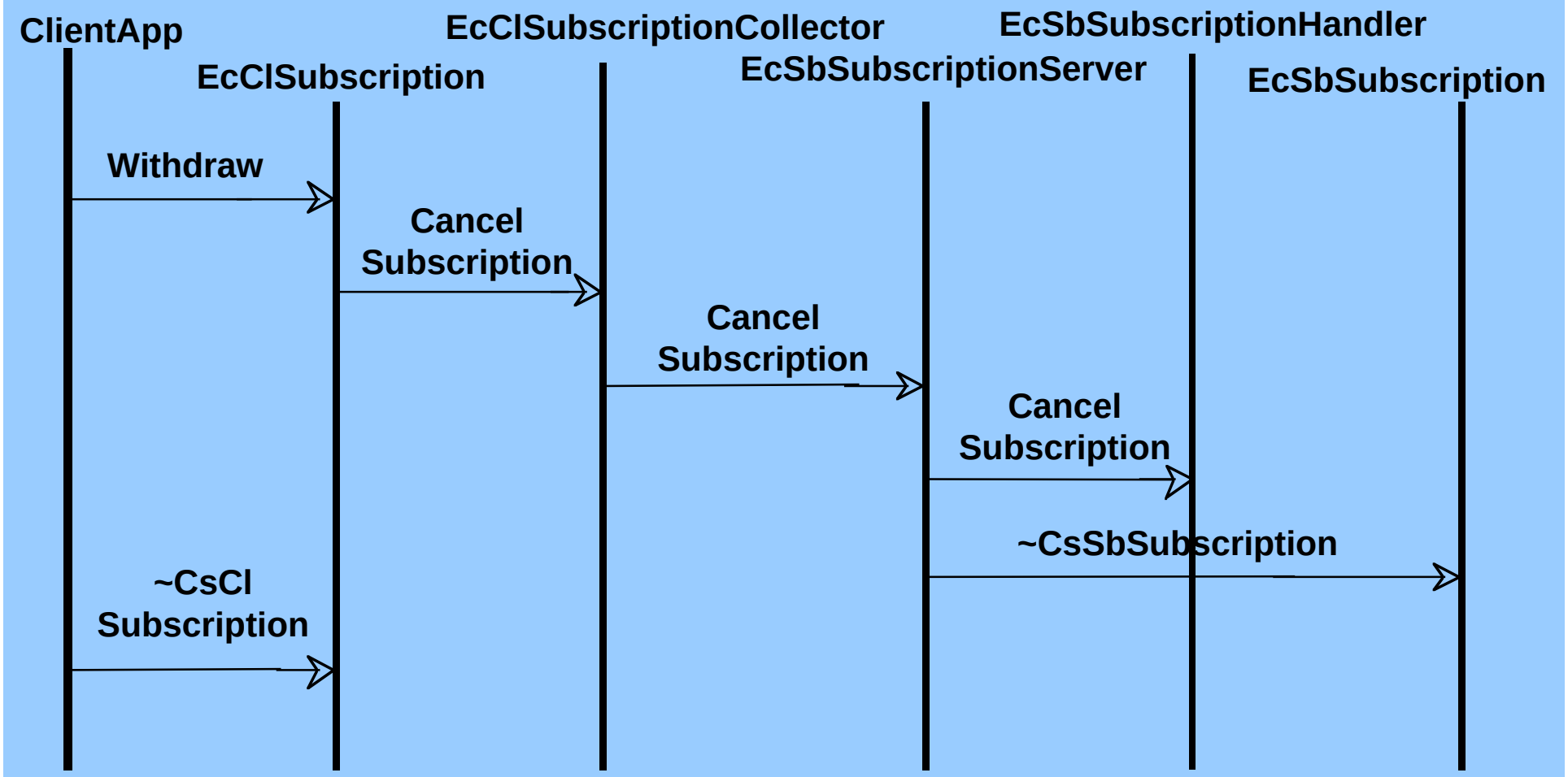
- **Server Request Framework - standard client-server framework.**
- **Universal Reference - common approach to data and server identification.**
- **Process Framework - Encapsulation of common process level initialization and instrumentation.**

Design Artifacts

OO Software Design - High Level Object Model Example



OO Software Design - High Level Event Trace Example



Summary

- **ECS is:**
  - **A distributed archive, production, and distribution system**
  - **Organized by subsystems**
  - **Design is object oriented, client/server**
  - **Uses COTS extensively**
  - **Must be extensible**

Design Presentations

- Client (CLS) - Keith Bryant
- Communications (CSS) - Doug Dotson
- Ingest (INS) - Lynn O'Neill
- Data Server and ESDTs - Peggy Eaton
- Planning (PLS) and Production (DPS) - Will Knauss
- Interoperability (IOS) and Data Management (DMS) - Lynne Case
- Management (MSS) - Dave Johnston

General Reference

- EDHS
  - - http://edhs1gsfc.nasa.gov
- 1995 MTPE EOS Reference Handbook
  - - http://eospso.gsfc.gov/eos-reference/TOC.html
- Others
  - - http://ecsinfo.hitc.com
  - - http://edhs1.hitc.com
- Other Documents (Please refer either to the EDHS or the library)
- Acronyms
  - - ECS Acronyms 152-TP-001-003
  - - Abbreviations and Acronyms Goddard Space Flight Center
- Glossary
  - - ECS Glossary 194-00285TPW
  - - Glossary of Terms for the EOSDIS Core System Project (ECS)