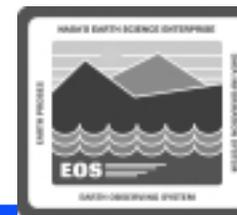


DATA DISTRIBUTION

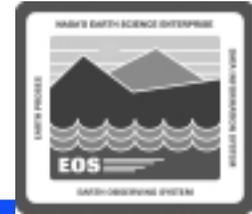
ECS Release 6A Training

Overview of Lesson



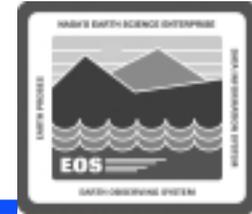
- **Introduction**
- **Distribution Concepts**
- **Launching the Data Distribution Operator and Storage Management Control GUIs**
- **Monitoring/Controlling Distribution Requests**
- **Modifying Preambles**
- **Configuring Storage Management Polling and Deleting Files from Cache**
- **Monitoring Storage Management Server Operations**

Overview of Lesson (Cont.)



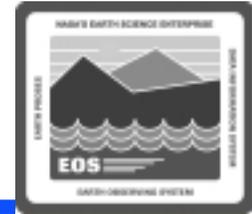
- **Tuning System Parameters**
- **Troubleshooting Data Distribution Problems**
- **Practical Exercise**

Objectives



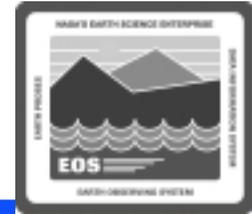
- **OVERALL:**
 - Develop proficiency in the procedures that apply to data distribution operations
- **SPECIFIC:**
 - Describe the general functions and processes associated with data distribution
 - Perform the steps involved in...
 - » launching the Data Distribution Operator and Storage Management Control GUIs
 - » monitoring/controlling data distribution requests
 - » modifying an e-mail preamble
 - » configuring Storage Management polling functions
 - » deleting files from cache

Objectives (Cont.)



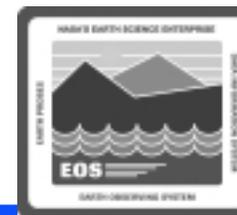
- **SPECIFIC (Cont.):**
 - **Perform the steps involved in...**
 - » **viewing Storage Management Event Log information**
 - » **monitoring Storage Management server operations**
 - » **modifying system parameters in database tables**
 - » **troubleshooting data distribution problems**

Objectives (Cont.)



- **STANDARDS:**
 - Lesson content (procedures in the lesson)
 - Mission Operation Procedures for the ECS Project (611-CD-600-001)

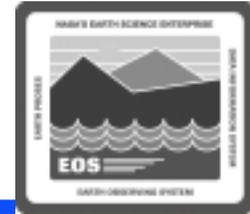
Distribution Concepts



- **ECS Context**

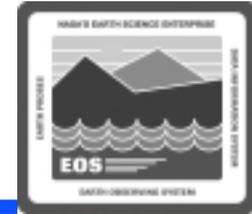
- **Data distribution for ECS is accomplished at the Distributed Active Archive Centers (DAACs)**
- **People involved in data distribution activities are Ingest/Distribution Technicians**
- **Data Server Subsystem (DSS), which manages access to the data archive, is key to data distribution as well as several other functions**
- **Computer software configuration items (CSCIs) in DSS**
 - » **DDIST**
 - » **STMGT**
 - » **SDSRV**

Distribution Concepts (Cont.)



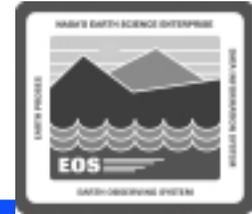
- **ECS Context (Cont.)**
 - **DDIST CSCI formats and distributes data to users**
 - » **Accepts requests from the SDSRV CSCI**
 - » **Directs the STMGT CSCI to transfer data**
 - **STMGT CSCI stores, manages, and retrieves data files on behalf of other science data processing components**
 - » **Provides interfaces that allow Data Distribution to obtain access to disk space**
 - » **Maintains a user pull area that supports electronic pull distribution**
 - » **Provides for the copying of files into the archive for permanent storage**

Distribution Concepts (Cont.)



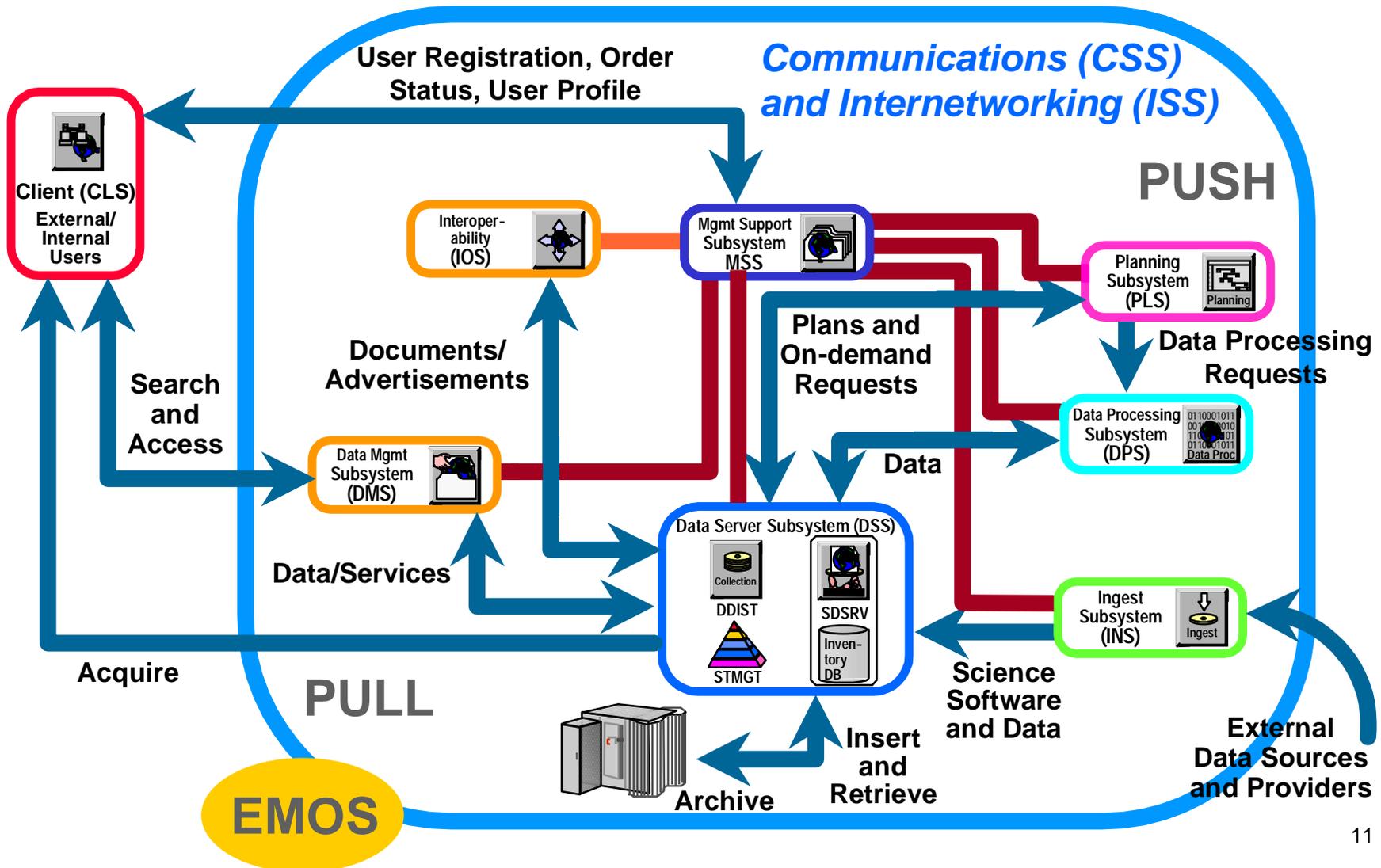
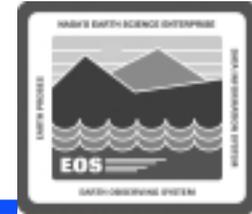
- **ECS Context (Cont.)**
 - **SDSRV CSCI manages and provides user access to collections of non-document Earth Science data**
 - » **Checks/verifies metadata**
 - » **Issues requests to the STMGT and DDIST CSCIs to perform storage and distribution services in support of the processing of service requests, such as insertion of data into the archive or distribution of data products from the archive**
 - **Product Distribution System (PDS) (a recent addition to ECS) supports the distribution of data on the following types of media:**
 - » **8mm tape cartridges**
 - » **Digital Linear Tape (DLT)**
 - » **Compact disk (CD)**
 - » **DVD (formerly digital video disk or digital versatile disk now referred to as just "DVD")**

Distribution Concepts (Cont.)

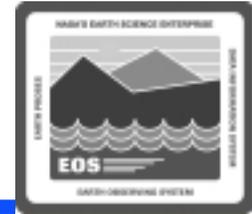


- **ECS Context (Cont.)**
 - A description of PDS is described in an addendum to the lesson
 - » Includes procedures for the distribution of data on hard media

ECS Context Diagram

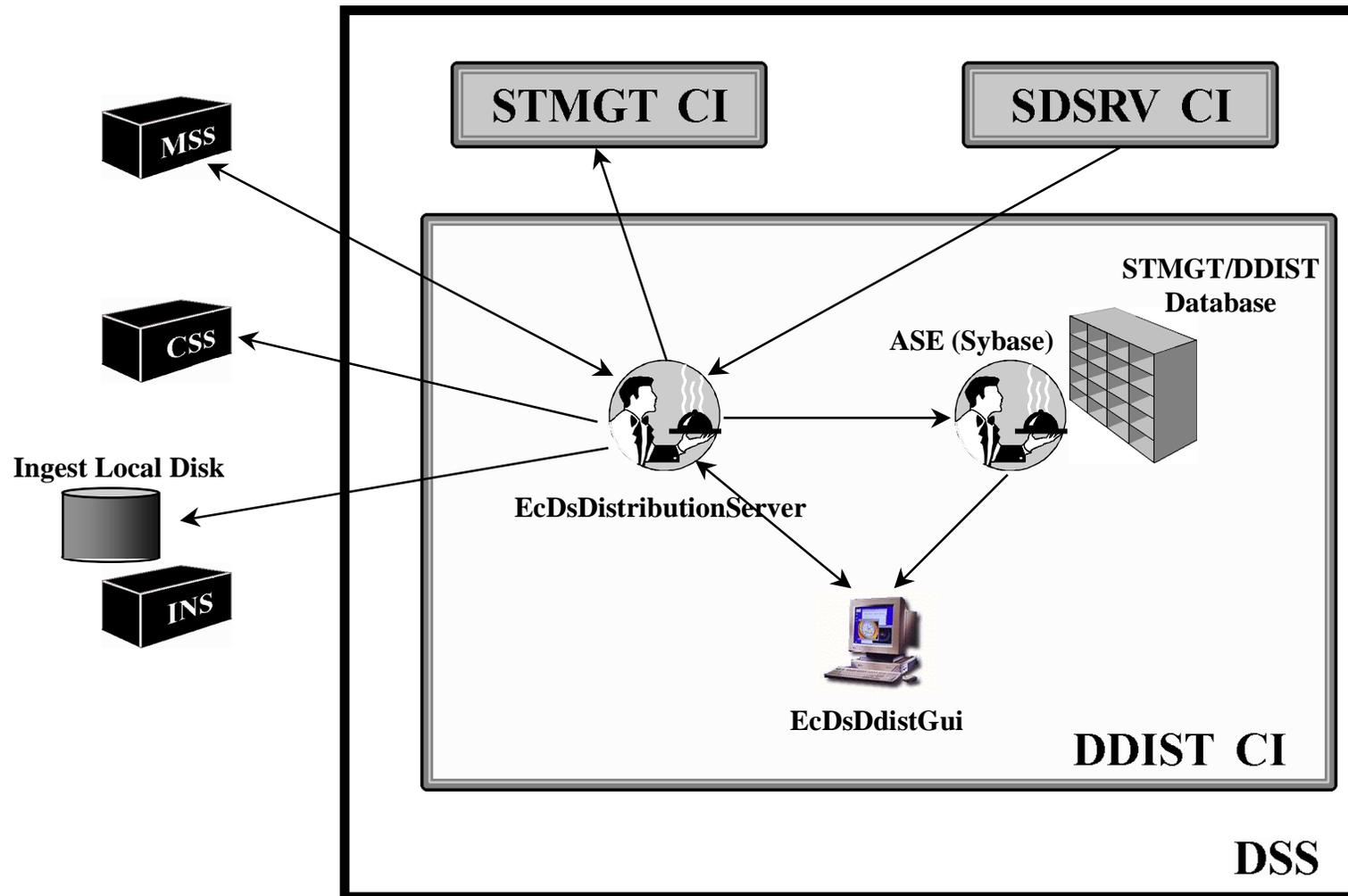
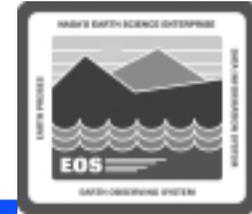


Distribution Concepts (Cont.)

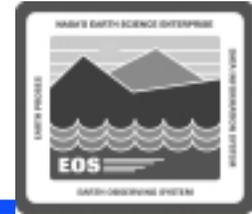


- **DDIST**
 - **Data Distribution Operator GUI (EcDsDdistGui)**
 - **Distribution Server (EcDsDistributionServer)**
 - **Sybase Adaptive Server Enterprise (ASE) Server**

Data Server Subsystem: DDIST Architecture and Interfaces

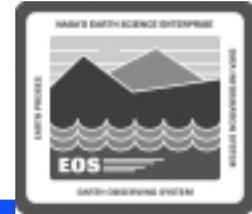


Distribution Concepts (Cont.)



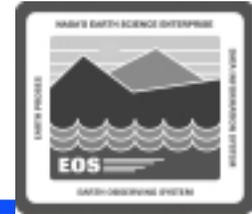
- **DDIST (Cont.)**
 - **Start-up script used by Ingest/Distribution Technicians (/usr/ecs/MODE/CUSTOM/utilities directory on the Distribution Server host)**
 - » **EcDsDdistGuiStart**
 - **Start-up scripts called by other applications (not normally invoked directly by Ingest/Distribution Technicians)**
 - » **EcDsDataDistributionAppStart**
 - » **EcDsDdStart**
 - » **EcDsDistributionServerStart**
 - **Other scripts**
 - » **DsDdSendMailPl.pl**
 - » **EcDsDdPTEdit.pl**

Distribution Concepts (Cont.)



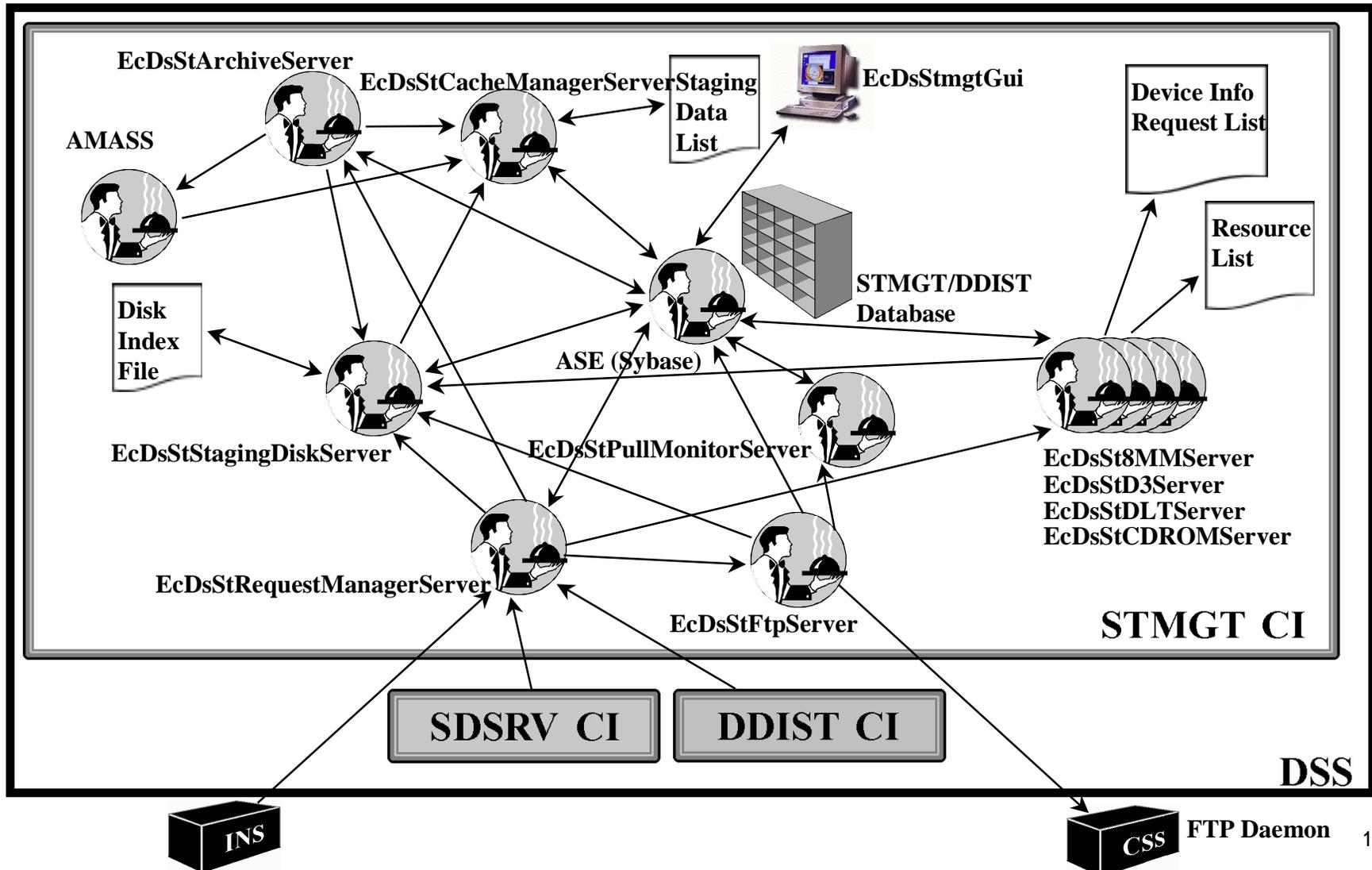
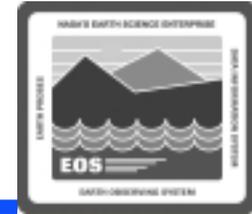
- **STMGT**
 - **Archive Server (EcDsStArchiveServer)**
 - **Staging Servers**
 - » **Cache Manager Server (EcDsStCacheManagerServer)**
 - » **Pull Monitor (EcDsStPullMonitorServer) [symbolic link to the Cache Manager Server]**
 - » **Staging Disk Server (EcDsStStagingDiskServer)**
 - **Resource Managers**
 - » **8mm Server (EcDsSt8MMServer)**
 - » **D3 Server (EcDsStD3Server)**
 - » **FTP Server (EcDsStFtpServer)**
 - **Storage Management Request Manager (EcDsStRequestManagerServer)**
 - **Storage Management Control GUI (EcDsStmgtGui)**

Distribution Concepts (Cont.)

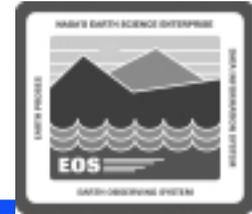


- **STMGT (Cont.)**
 - Sybase ASE Server
 - Archival Management and Storage System (AMASS)

Data Server Subsystem: STMGT Architecture and Interfaces

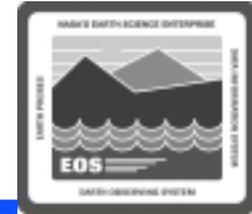


Distribution Concepts (Cont.)



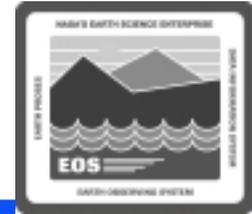
- **STMGT (Cont.)**
 - **Start-up script used by Ingest/Distribution Technicians (/usr/ecs/MODE/CUSTOM/utilities directory on the Distribution Server host)**
 - » **EcDsStmgtGuiStart**

Distribution Concepts (Cont.)



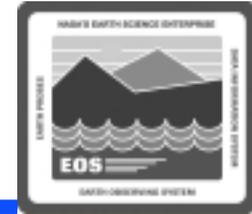
- **STMGT (Cont.)**
 - **Start-up scripts called by other applications (not normally invoked directly by Distribution personnel)**
 - » **EcDsStFtpServerStart**
 - » **EcDsStStagingDiskServerStart**
 - » **EcDsStStart**
 - » **EcDsStStorageMgmtAppStart**
 - » **EcEcsAppStart**
 - » **EcDsStArchiveServerStart**
 - » **EcDsStCacheManagerServerStart**
 - » **EcDsStRequestManagerServerStart**
 - » **EcDsSt8MMServerStart**
 - » **EcDsStD3ServerStart**
 - » **EcDsStDLTServerStart**
 - » **EcDsStCDROMServerStart**

Distribution Concepts (Cont.)



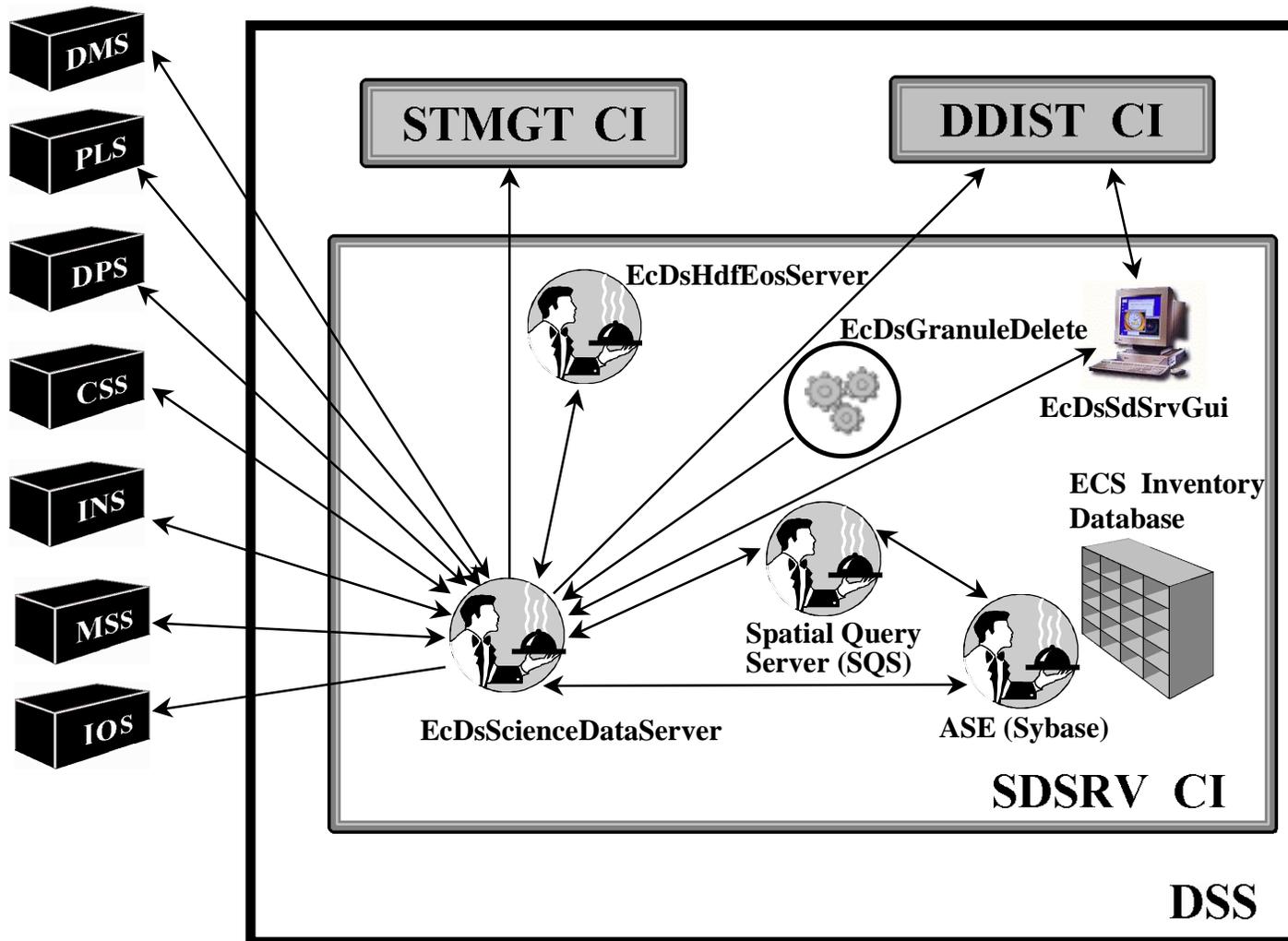
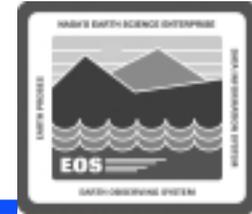
- **STMGT (Cont.)**
 - **Other scripts**
 - » **EcDsCheckArchive**
 - » **EcDsStConfigVolGrps**
 - » **EcDsStDbBuild**
 - » **EcDsStDbDrop**
 - » **EcDsStDbDump**
 - » **EcDsStDbDumpTrans**
 - » **EcDsStDbLoad**
 - » **EcDsStDbLoadTrans**
 - » **EcDsStDbPatch**
 - » **EcDsStFilesPerTapeUtility**
 - » **EcDsStVolGrpCreateMain.pl**

Distribution Concepts (Cont.)

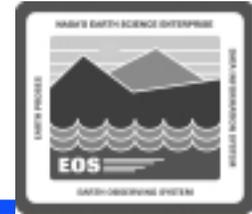


- **SDSRV**
 - **Science Data Server (EcDsScienceDataServer)**
 - **Hierarchical Data Format (HDF) EOS Server (EcDsHdfEosServer)**
 - **Granule Deletion Administration Tool (EcDsGranuleDelete)**
 - **Science Data Server GUI (EcDsSdSrvGui)**
 - **Autometric Spatial Query Server (SQS)**
 - **Sybase ASE Server**

Data Server Subsystem: SDSRV Architecture and Interfaces

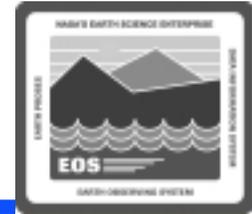


Distribution Concepts (Cont.)



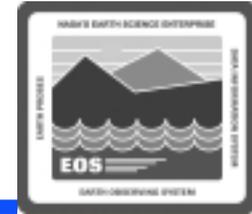
- **SDSRV (Cont.)**
 - **Start-up script (/usr/ecs/MODE/CUSTOM/utilities directory on the SDSRV Server host and the Operations Workstation)**
 - » **EcDsSdSrvGuiStart**

Distribution Concepts (Cont.)



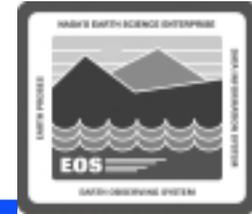
- **SDSRV (Cont.)**
 - **Other scripts**
 - » **EcTsDsClientDriverStart**
 - » **EcDsSrConvertEvt**
 - » **EcDsSrDbBuild**
 - » **EcDsSrDbDrop**
 - » **EcDsSrDbDump**
 - » **EcDsSrDbLoad**
 - » **EcDsSrDbMigrate**
 - » **EcDsSrDbPatch**
 - » **EcDsSrDbValid**

Distribution Concepts (Cont.)



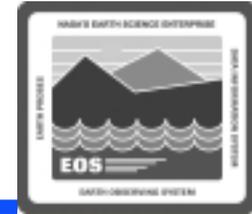
- **System Changes for Release 6A**
 - Increased data processing load at certain DAACs in support of...
 - » Reprocessing of Terra satellite data in addition to routine processing of Terra data (essentially doubles the previous Terra processing load)
 - » Processing of data from the Aqua satellite (Release 5B supported Aqua Science Software Integration and Test (SSI&T) only)
 - Greater volume of data to be ingested
 - » Supports more interfaces and a larger number of Earth Science Data Types (ESDTs)
 - Higher volume of data products to be distributed

Distribution Concepts (Cont.)



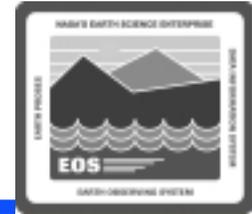
- **System Changes for Release 6A (Cont.)**
 - **ECS hardware configuration upgrades for Release 6A**
 - » **Replacement of the Fiber Distributed Data Interface (FDDI) networks with gigabit Ethernet networks at two DAACs [i.e., Goddard Spaceflight Center (GSFC) and Earth Resources Observation Systems Data Center (EDC)]**
 - » **The gigabit Ethernet networks are expected to handle the increased throughputs of Terra reprocessing along with routine processing for Aqua**
 - » **Addition of an SGI Origin processor to the Science Processing configuration at GSFC to handle the additional Aqua MODIS processing load**
 - » **Replacement of SGI Challenge archive machines with SGI Origin machines**

Distribution Concepts (Cont.)



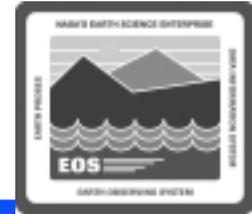
- **System Changes for Release 6A (Cont.)**
 - ECS hardware configuration upgrades for Release 6A (Cont.)
 - » Upgrading of Science Data Server configurations (both the SDSRV and Sybase/SQS hosts) at EDC and GSFC so that the request load is shared between two separate host configurations
 - » Additional staging disks in the Release 6A configuration to handle increased Ingest and Data Distribution loads

Distribution Concepts (Cont.)



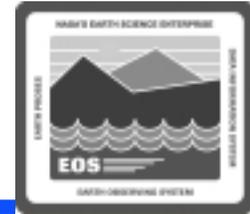
- **Data Distribution is a process of retrieving archived data and providing the data to requesters in response to the orders they submit**
 - external requesters
 - internal processes
- **Data retrieved from the archives can be distributed to requesters using either of the following three general methods:**
 - Electronic pull
 - Electronic push
 - Hard (physical) media distribution on disks or tape cartridges [distributed through the Product Distribution System (PDS)]

Distribution Concepts (Cont.)



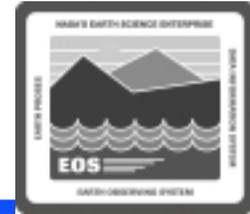
- **Method of data distribution is dictated by the nature of the data distribution request**
 - Requester specifies the distribution method when ordering or subscribing to the data

Distribution Concepts (Cont.)



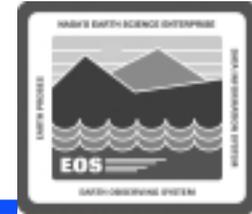
- **Electronic Pull:**
 - Requester searches for a specific data product
 - Requester submits an order for a “pull” of the data using file transfer protocol (ftp)
 - **STMGT** retrieves the specified data from the archive and places it on the pull disk
 - **DDIST** builds an e-mail notification that the requester’s order has been filled
 - Message is sent via e-mail to the requester’s e-mail address, which is determined from the User Profile
 - Requester pulls (transfers) the data from the Data Server pull disk to the requester’s own system
 - Data are deleted from the pull disk in accordance with DAAC policy

Distribution Concepts (Cont.)



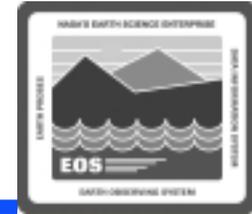
- **Electronic Push:**
 - Requester searches for a specific data product
 - Requester submits an order for ftp “push” of the data
 - Data are retrieved from the archive, placed on the Data Server staging disk and pushed (transferred) to the requester's system
 - DDIST builds an e-mail notification that the requester's order has been filled
 - Message is sent via e-mail to the requester's e-mail address, which is determined from the User Profile
 - Data are deleted from the staging disk in accordance with DAAC policy

Distribution Concepts (Cont.)



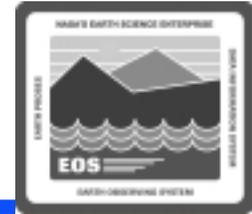
- **Physical Media Distribution:**
 - Requester searches for a specific data product
 - Requester submits an order for shipment of data on a physical medium
 - If an order to be delivered on a physical medium is for a product other than a Landsat-7 product, the V0 Gateway forwards the order to the Product Distribution System (PDS)
 - For Landsat-7 products, the V0 Gateway first forwards the order to be delivered on a physical medium to the Distributed Ordering, Research, Reporting and Accounting Network (DORRAN) at the Earth Resources Observation Systems (EROS) Data Center (EDC); then when the gateway receives a validated Product Request from DORRAN, it forwards the Landsat-7 order to the PDS

Distribution Concepts (Cont.)



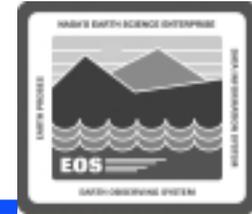
- **Physical Media Distribution (Cont.):**
 - For each order it receives from the V0 Gateway, the PDS orders the requested data from the ECS using the Science Data Server (SDSRV) Command Line Interface (SCLI)
 - » The PDS may break up large orders into smaller sets and may elect to order granules for a request individually
 - ECS delivers the data to the PDS using its standard ftp push data distribution capability
 - The PDS transfers the data to the specified physical medium
 - The PDS e-mails a data distribution notice (order shipment notification) to the user and (for Landsat-7 orders) to DORRAN
 - The PDS updates the ECS order tracking database to completed status

Launching Data Distribution and Storage Management GUIs



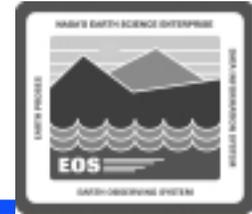
- **Software applications associated with Data Distribution**
 - Data Distribution Operator GUI (EcDsDdistGui)
 - Distribution Server (EcDsDistributionServer)
 - Sybase ASE Server
- **Data Distribution depends on a number of related servers, especially...**
 - Science Data Server servers
 - Storage Management servers

Launching Data Distribution and Storage Management GUIs (Cont.)



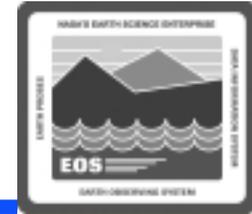
- **Software applications associated with Storage Management**
 - **Storage Management Control GUI (EcDsStmgtGui)**
 - **Archive Server (EcDsStArchiveServer)**
 - **Cache Manager Server (EcDsStCacheManagerServer)**
 - **Pull Monitor (EcDsStPullMonitorServer)**
 - **Staging Disk Server (EcDsStStagingDiskServer)**
 - **FTP Server (EcDsStFtpServer)**
 - **8mm Server (EcDsSt8MMServer)**
 - **D3 Server (EcDsStD3Server)**
 - **Storage Management Request Manager (EcDsStRequestManagerServer)**

Launching Data Distribution and Storage Management GUIs (Cont.)



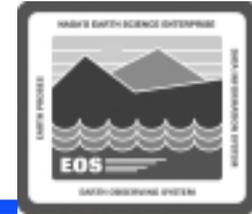
- **Software applications associated with Storage Management (Cont.)**
 - Sybase ASE Server
 - Archival Management and Storage System (AMASS)

Launching Data Distribution and Storage Management GUIs (Cont.)



- **Use UNIX command line to gain access to GUIs**
- **Procedure (Launching the Data Distribution Operator and Storage Management Control GUIs)**
 - **Log in to the distribution server GUI host using secure shell**
 - **Change directory to the utilities directory**
 - **Enter the command to start the Data Distribution Operator GUI**
 - **Enter the command to start the Storage Management Control GUI**

Data Distribution Operator GUI: Distrib'n Requests Tab



Data Distribution Operator GUI - TS2

File Selected Edit View Options Help

Distrib'n Requests System Requests Tape IDs Preamble Editor Event Logging

Data Distribution - Track Activity

Data Distribution Requests Items: 0

Mod	Request ID	Requester	Esdt Type	Media	Priority	State	Status Mnemonic	Si
-----	------------	-----------	-----------	-------	----------	-------	-----------------	----

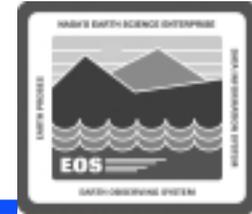
Find

Change Priority: [Xpress] Apply Refresh

Mark Shipped Cancel Suspend Resume Suspend New Requests Resume New Requests

Operator Messages

Storage Management Control GUI: Storage Config. Tab



Storage Management Control

File Options Backup Delete Help

Wednesday July 26, 2000 02:49:38 PM Mode: OPS

Storage Config. Vol Grp Config. Resource Mngmnt. Cache Stats. Storage Events Request Status

Configuration Parameter Reporting

Server Type	# of Servers	Description	# of Re-routes
BMM	10	BMM Stacker Server	1
ARCHIVE	7	Archive Server	
CACHE MANAGER	10	Cache Management Server	
CDROM	9	CDROM Device Server	1
D3	3	D3 Device Server	1
DLT	4	DLT Stacker Server	1
FTP	4	FTP Server	
REQUEST_MANAGER	5	Request Manager Server	

Times to Re-route: [] Apply to Server Type

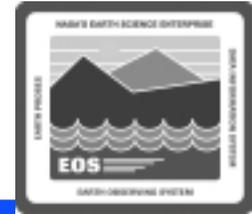
Server Name	Status
EcDsSt8MMServerCRW1	Down
EcDsSt8MMServerCRW3a	Down
EcDsSt8MMServerCRW456	Down
EcDsSt8MMServerCRW5d	Down
EcDsSt8MMServercrw456	Down
EcDsSt8MMServercrw457	Down
EcDsSt8MMServercrw4aa	Down
EcDsSt8MMServercrwaaa	Down
EcDsSt8MMServercrwtesta	Down
EcDsSt8MMServercrwt	Down

Add Server Modify Server/View Stackers Delete Server

Operator Messages

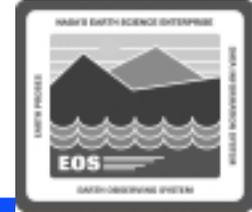
07/26/00 14:43:14 Warning: Error saving Staging Monitor information.

Monitoring/Controlling Data Distribution Requests



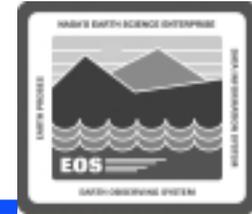
- **Data Distribution activities are monitored and controlled using....**
 - **Data Distribution Operator GUI**
 - **Storage Management Control GUI**
- **DAAC Ingest/Distribution Technician monitors and manages data distribution requests primarily via the Data Distribution - Track Activity window of the Data Distribution Operator GUI**

Monitoring/Controlling Data Distribution Requests (Cont.)



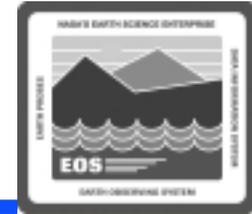
- From the Data Distribution - Track Activity window the DAAC Ingest/Distribution Technician can perform the following functions:
 - View data distribution requests
 - Change the priority of a selected request
 - Cancel, suspend, or resume processing of a request
 - Edit a suspended request to the selected media type
 - Filter on all or specific requests by...
 - » Request ID
 - » Requester
 - » Media Type
 - » State (current status)

Monitoring/Controlling Data Distribution Requests (Cont.)



- **The Data Distribution - Track Activity window displays the following information (plus additional information) for each data distribution request:**
 - Request ID
 - Requester
 - ESDT Type
 - Media type
 - Priority
 - State
 - Estimated # of Media
 - Total Size [of the request]
 - # of Files

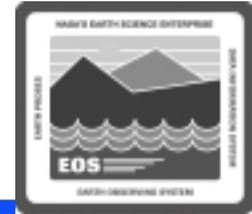
Monitoring/Controlling Data Distribution Requests (Cont.)



- **Procedure**

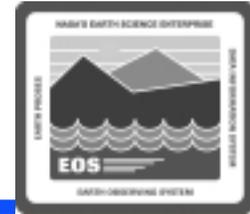
- **Configure data distribution polling (subordinate procedure)**
- **Observe data distribution request information displayed in the Data Distribution Requests list**
- **Filter requests as necessary (subordinate procedure)**
- **Change the priority of distribution requests (subordinate procedures)**
- **Change the status of distribution requests (subordinate procedures)**
 - » **Suspend requests**
 - » **Resume processing of suspended requests**
 - » **Cancel requests**

Configuring Data Distribution Polling



- **Refresh Options Dialogue from the Data Distribution Operator GUI Options menu is used for...**
 - **switching the Data Distribution database polling function on or off**
 - **modifying DDist Polling Rate**
 - » **specifies how often (in seconds) the system updates the information displayed in the Data Distribution - Track Activity window**
 - **modifying Error Retry Rate**
 - » **specifies the amount of time (in seconds) that the system waits before trying to poll the Data Server after a failed attempt**

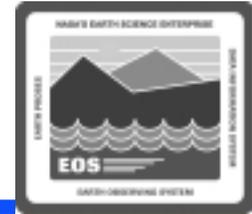
Configuring Data Distribution Polling (Cont.)



- **Procedure**

- **Select Options → System Settings from the pull-down menu of the Data Distribution Operator GUI**
- **Click on the DDist Polling On button to change the state of polling**
- **Enter value for the polling rate**
 - » **default value is 30 seconds**
- **Enter value for the error retry rate**
- **Click on the Ok button to apply the values and dismiss the dialogue box**

Refresh Options Dialogue Box



Refresh Options

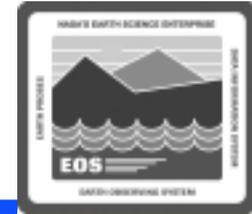
DDist Polling On

DDist Polling Rate: secs

Error Retry Rate: secs

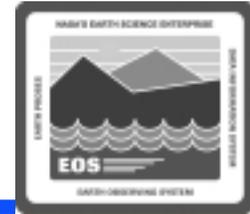
Ok Cancel

Filtering Data Distribution Requests



- **Filtering Data Distribution Requests**
 - **Data distribution requests can be filtered with respect to the following criteria:**
 - » **request ID**
 - » **requester**
 - » **media type**
 - » **state**
 - **Procedure**
 - » **Select View → Filter**
 - » **Select filter criteria**
 - » **Click on the OK button to implement the selections and dismiss the dialogue box**

Distribution Filter Requests Dialogue Box



Distribution Filter Requests

Request ID

Requester

All Requests

Media Type:

CD-ROM D3

DLT Electronic Push

8 mm Electronic Pull

State:

Pending Suspended

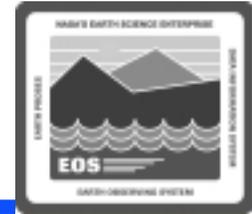
Active Suspended with Errors

Staging Waiting for Shipment

Transferring Shipped

Cancelled Failed

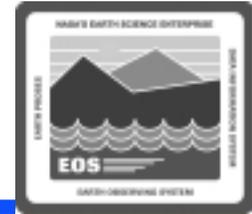
Changing the Priority of Data Distribution Requests



- **Procedure**

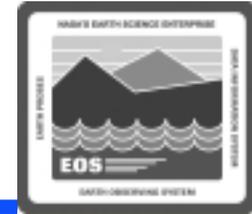
- Highlight the distribution request to be assigned a different priority
- Select the new priority using the Change Priority button
- Click on the Apply button to implement the priority change

Suspending/Resuming Data Distribution Requests



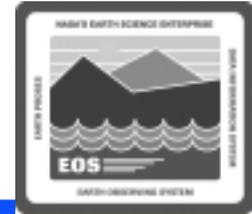
- Under certain circumstances it may be advisable to suspend the processing of a data distribution request and resume it at a later time
- Procedure
 - Click on the Suspend New Requests button to suspend all new distribution requests
 - Select the individual distribution request to be suspended and click on the Suspend button to suspend a single distribution request
 - Click on the Resume New Requests button to resume processing of all new distribution requests
 - Select the individual distribution request for which processing is to be resumed and click on the Resume button to resume processing of a single distribution request

Canceling Data Distribution Requests



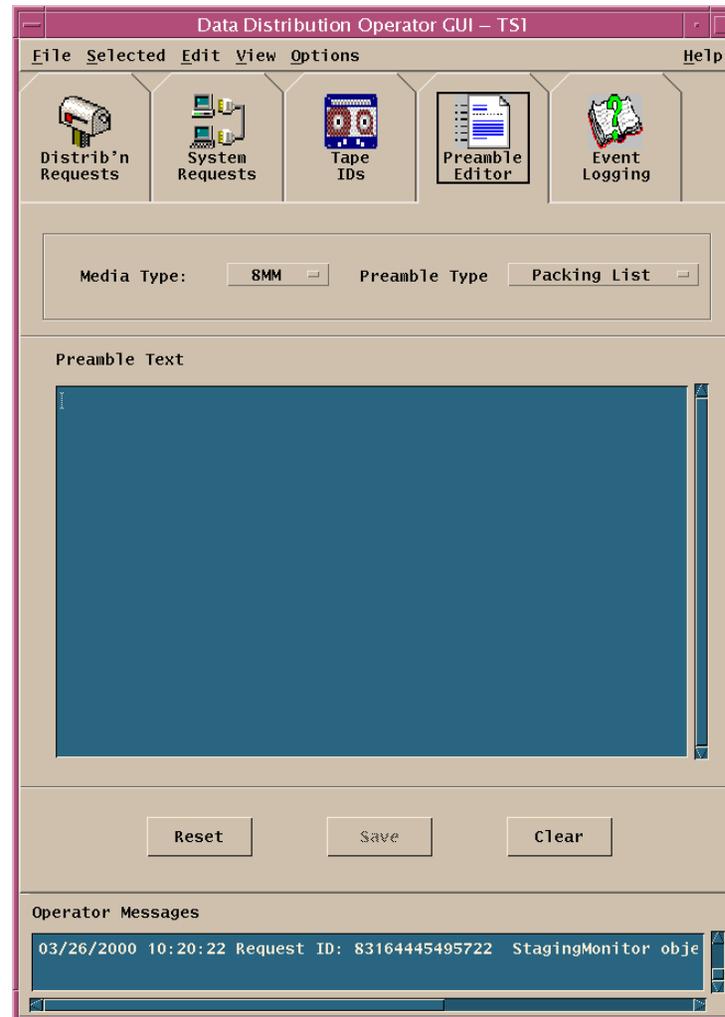
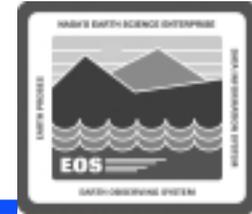
- **Sometimes it may be necessary to cancel the processing of a data distribution request**
- **Procedure**
 - **Select the distribution request to be canceled**
 - **Click on the Cancel button**

Modifying Preambles

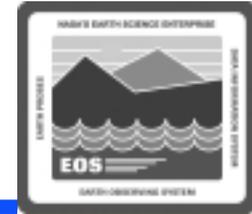


- **Preamble Editor tab on the Data Distribution Operator GUI allows the Ingest/Distribution Technician to review and/or modify the text of preambles to the following types of documents:**
 - Packing list
 - Successful e-mail
 - Failed e-mail
- **Preambles for different types of distribution are accessible in the `/usr/ecs/MODE/CUSTOM/data/DSS` directory on the Distribution Server host**
- **Types of media relevant to Release 6A:**
 - Ftp pull
 - Ftp push

Data Distribution Operator GUI: Preamble Editor Tab



Data Distribution Operator GUI: FTP Push Failed E-Mail Preamble



Data Distribution Operator GUI – TS1

File Selected Edit View Options Help

Distrib'n Requests System Requests Tape IDs Preamble Editor Event Logging

Media Type: Preamble Type:

Preamble Text

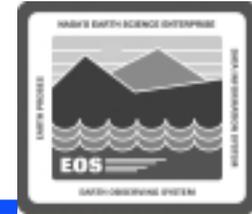
```
Thank you for using the Earth Observing System Distribution System. We apologize for not being able to distribute the requested data. For more information on your request contact the DAAC.  
  
Thank You!  
I
```

Reset Save Clear

Operator Messages

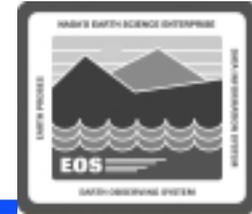
```
03/26/2000 10:20:22 Request ID: 83164445495722 StagingMonitor obje
```

Modifying Preambles (Cont.)

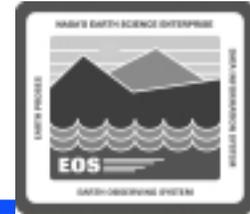


- **Procedure**
 - **Select the Preamble Editor tab of the Data Distribution Operator GUI**
 - **Select the appropriate media type**
 - **Select the appropriate preamble type**
 - **Edit the preamble text**
 - **Save the edited preamble**

Preamble Save Confirmation Dialogue Box

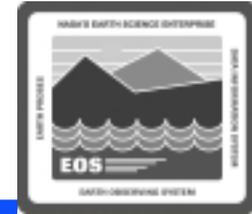


Configuring STMGT Polling & Deleting Files from Cache



- **Configuring Storage Management Polling (Storage Management Control GUI Options menu)**
 - **Switch database polling functions on or off**
 - » **Operator Notification Timer [e.g., polling for displaying Event Log data]**
 - » **Cache Statistics Timer [polling for displaying cache statistics data]**
 - **Modify parameters relevant to the Operator Notification Timer**
 - » **Database Polling Rate**
 - » **Error Retry Rate**
 - **Modify parameter relevant to the Cache Statistics Timer**
 - » **Database Polling Rate**

Storage Management Control GUI: Session Settings Dialogue



Session Settings

Operator Notification Timer

Polling

Database Polling Rate: secs

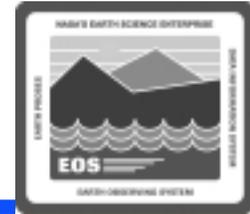
Error Retry Rate: secs

Cache Statistics Timer

Polling

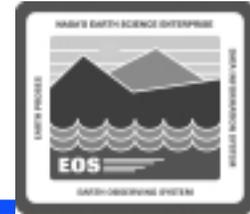
Database Polling Rate: secs

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



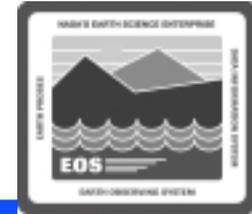
- **Configuring Storage Management Polling: Procedure**
 - **Select Options → System Settings from the pull-down menu on the Storage Management Control GUI**
 - **Set the Operator Notification Timer and/or Cache Statistics Timer to the appropriate polling states (off or on) if applicable**
 - **Enter the database polling rate for the Operator Notification Timer and/or Cache Statistics Timer if applicable**
 - **Set the error retry rate for the Operator Notification Timer if applicable**
 - **Apply the modifications**

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



- **Cache Stats. tab on the Storage Management Control GUI**
 - Displays all of the files that are in the cache areas, including the Pull Monitor and other staging areas
 - Displays general statistics on the selected cache
 - Allows the operator to delete expired files in cache areas
 - If a cache area reaches an operator-configurable threshold, the operator receives a warning message in the operator messages area of the GUI
 - If expired files are not deleted and the cache fills completely, the server is not able to copy new files to the cache area

Storage Management Control GUI: Cache Stats. Tab



Storage Management Control

File Options Backup Delete Help

Wednesday August 02, 2000 11:47:34 AM Mode: MINNIE_6A

Storage Config. Vol Grp Config. Resource Mngmt. Cache Stats. Storage Events Request Status

Cache: [Dropdown] Text

Cache Statistics

Current Utilization:	[Field]	Number of Resident Files:	[Field]
Used Space (Blocks):	[Field]	Maximum File Size (Blocks):	[Field]
Free Space (Blocks):	[Field]	Minimum File Size (Blocks):	[Field]
Total Space (Blocks):	[Field]	Average File Size (Blocks):	[Field]

Cache Information

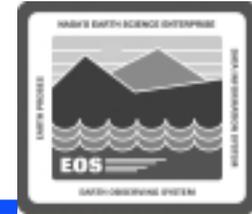
File Filename	Last Size	Delete Accessed	Flag	State
[Empty Table]				

Mark Delete Unmark Delete

Operator Messages

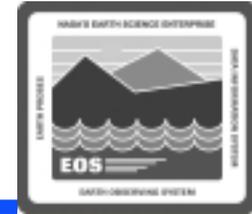
08/02/00 11:47:07 Error purging old database entries.

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



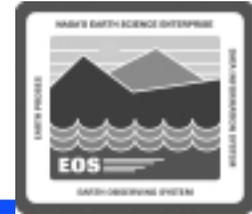
- **Deleting Files from Cache: Procedure**
 - **Select the Cache Stats. tab on the Storage Management Control GUI**
 - **Select the cache containing the files to be deleted**
 - **Select the file to be deleted from the cache**
 - **Click on the Mark Delete button**
 - **If any file has been inadvertently marked Delete, first click on the row corresponding to the file then click on the Unmark Delete button**

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



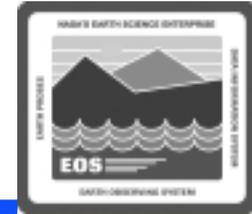
- **Viewing Storage Management Event Log Information: Storage Events tab on the Storage Management Control GUI**
 - Search the Event Log
 - Obtain reports on events that have occurred in Storage Management
 - Review information concerning a particular Storage Management event
 - » Number
 - » Date
 - » Level
 - » Type
 - » Message

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



- **Storage Events tab (Cont.)**
 - **Search criteria (can be used individually or in combination to view entries in the Event Log)**
 - » **Date Interval**
 - » **Event Type**
 - » **Event Level**
 - » **Message**

Storage Management Control GUI: Storage Events Tab



Storage Management Control

File Options Backup Help

Sunday March 26, 2000 03:02:33 PM Mode: TS1

Storage Config. Resource Schedule Cache Stats. Storage Events

Event Log Search Parameters

Begin 03 / 26 / 2000

Date Interval: End 03 / 26 / 2000

Event Type: Any Event Level: Any

Message:

Search Clear Parameters

Search Records Found: 0

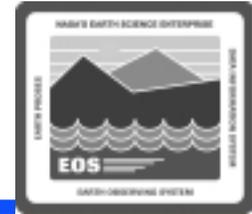
Number	Date	Level	Type	Message
--------	------	-------	------	---------

Purge Selected

Operator Messages

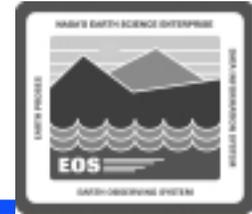
03/26/00 14:52:52 Warning: The GUI could not connect to the Pull Mor

Configuring STMGT Polling & Deleting Files from Cache (Cont.)



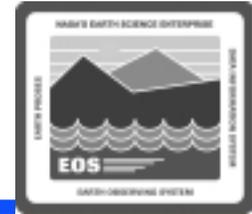
- **Viewing Storage Management Event Log Information: Procedure**
 - **Select the Storage Events tab of the Storage Management Control GUI**
 - **Enter the defining characteristic(s) (e.g., time period, event type, event level) of the event**
 - **Click on the Search button to search the event log for events that meet the specified criteria**
 - **Observe event information displayed in the Event Log window**

Monitoring Storage Management Server Operations



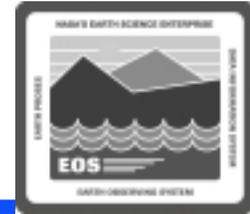
- **The Request Status tab on the Storage Management Control GUI**
 - Makes it possible to monitor processing activity in all of the storage management servers for a given mode
- **Request Status Information table**
 - Lists the requests that are currently being serviced by storage management servers and those that have been completed within the last 24 hours
 - Using the Request Status tab the Ingest/Distribution Technician can detect stalled requests or servers that appear to be idle

Monitoring Storage Management Server Operations (Cont.)



- **Request Status Information table contents**
 - **Operation [type of operation]**
 - **Request ID**
 - **Progress [current stage of processing]**
 - **Status**
 - **Priority**
 - **When Submitted [time and date received by the server that is responsible for the request]**
 - **Last Updated [time and date status was last updated]**

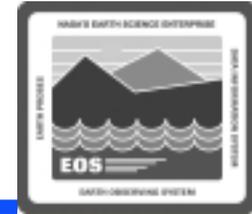
Monitoring Storage Management Server Operations (Cont.)



- **Procedure**

- **Click on the Storage Management Control GUI Request Status tab**
- **Observe information displayed on the Request Status tab of the Storage Management Control GUI**
- **If necessary, filter the list of Storage Management requests shown in the Request Status Information table by making the appropriate selection from the Filtering pull-down menu:**
 - » **Server**
 - » **Operation**
 - » **Processing State**
 - » **Submitter**
- **Observe the Storage Management requests displayed in the Request Status Information table**
- **To exit from the Storage Management Control GUI select File → Exit from the pull-down menu**

Storage Management Control GUI: Request Status Tab



Storage Management Control

File Options Backup Help

Thursday June 15, 2000 07:07:08 PM Mode: OPS

Storage Config. Vol Grp Config. Resource Mngmt. Cache Stats. Storage Events Request Status

Filtering

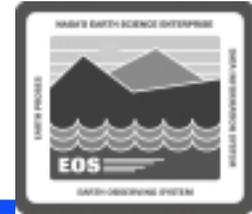
Request Status Information

Operation	Request ID	Progress	Status	Priority	When Submitted	Last Updated
CMCreateDir		CHECKPOINTED	OK	NORMAL	05/31/00	
CMLink		CHECKPOINTED	OK	NORMAL	05/31/00	
CMLink		CHECKPOINTED	OK	NORMAL	05/31/00	
CMLink		CHECKPOINTED	OK	NORMAL	05/31/00	
CMLink		CHECKPOINTED	OK	NORMAL	05/31/00	
CMRemoveDir		Checkpointed	OK	LOW	06/14/00	06/14/00
CMRemoveDir		Checkpointed	OK	LOW	06/13/00	06/13/00
CMResCache		Checkpointed	OK	NORMAL	06/14/00	06/14/00
FtpIngestPull	IngestRQ24GR1	Checkpointed	OK	NORMAL	05/31/00	05/31/00
FtpPush	IngestRQ12GR1	Checkpointed	OK	NORMAL	05/31/00	05/31/00
FtpPush	IngestRQ7GR1	Checkpointed	OK	NORMAL	05/30/00	05/30/00
FtpPush	IngestRQ4GR1	Checkpointed	OK	NORMAL	05/30/00	05/30/00
SDAllocateDisk		Checkpointed	OK	NORMAL	06/05/00	06/05/00
SDAllocateDisk		Checkpointed	OK	NORMAL	06/05/00	06/05/00
SDAllocateDisk		Checkpointed	OK	NORMAL	06/05/00	06/05/00
SDAllocateDisk	IngestRQ43GR1	Checkpointed	OK	VHIGH	06/13/00	06/13/00

Operator Messages

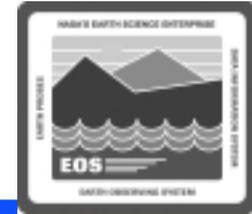
06/15/00 19:04:30 Warning: Error reading event log.

Tuning System Parameters



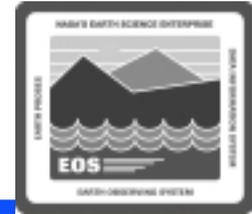
- **System parameters may be subject to control by Configuration Management (CM)**
 - When making or requesting a change to system parameters, the CM process at the particular site must be followed (if applicable)
- **Two databases where parameters can be set:**
 - STMGT/DDIST database
 - Configuration Registry database

Tuning System Parameters (Cont.)



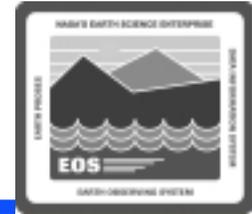
- **Configuration Registry**
 - **Configuration Registry Server provides a single interface (via a Sybase server) for retrieving configuration attribute-value pairs for ECS servers from the Configuration Registry database**
 - » **When ECS servers are started they access the Configuration Registry database to obtain needed configuration parameters**
 - **Database Administrator has access to a Configuration Registry GUI for viewing and editing configuration data in the database**
 - **It is necessary to coordinate with the Database Administrator when changes to configuration parameters are needed**
 - **Changes to configuration-controlled parameters are subject to approval through the site CM process**

Tuning System Parameters (Cont.)



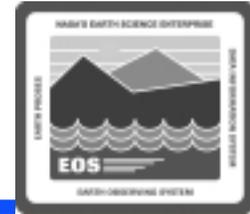
- **Default and adjusted values assigned to system parameters vary from site to site**
 - **For guidance concerning the assignment of values to parameters included in the Configuration Registry refer to document 910-TDA-022, Custom Configuration Parameters**
 - » **Document is available at <http://cmdm.east.hitc.com/baseline/> under “Technical Documents”**

Tuning System Parameters (Cont.)



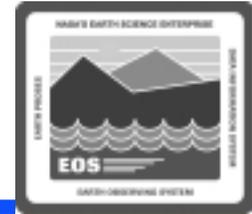
- **Parameters whose values may be modified to enhance system functioning or performance**
 - **AppLogSize**
 - » **Maximum size of the application log (ALOG) file for a particular application**
 - **AppLogLevel**
 - » **Level of detail provided in the ALOG file for a particular application**
 - **DebugLevel**
 - » **Level of detail provided in the debug log file for a particular application**

Tuning System Parameters (Cont.)



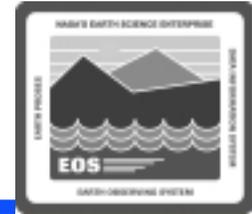
- **Tuning parameters (Cont.)**
 - **DBMaxConnections**
 - » **Maximum number of database connections allowed a particular application**
 - **FtpPushThreshold**
 - » **Maximum number of bytes per distribution request**
 - » **The FtpPushThreshold should always be greater than the size of the largest input granule used by the Planning and Data Processing Subsystems (PDPS) in order to ensure that PDPS distribution requests are processed without manual intervention**
 - » **When a distribution request exceeds a threshold (FtpPushThreshold or FtpPullThreshold), the request is suspended in DDIST**

Tuning System Parameters (Cont.)



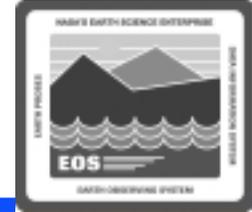
- **Tuning parameters (Cont.)**
 - **FtpPullThreshold**
 - » **Maximum number of bytes per distribution request**
 - **Checksum Status**
 - » **Check-summing can be enabled or disabled for either acquires or inserts**
 - » **Checksum calculation is a highly time-consuming process, and makes intensive use of central processing unit (CPU) resources**
 - » **Enabling check-summing has significant effects on both archive server and Cache Manager server**
 - **ListenThreads**
 - » **Number of listen threads assigned to a particular application**

Tuning System Parameters (Cont.)



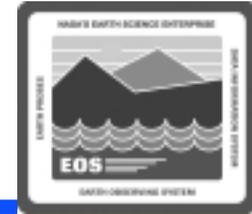
- **When the value assigned to a parameter has been changed and saved in the Configuration Registry, the modified value does not take effect until the affected server has been restarted**
- **Example**
 - **Debug level for the Distribution Server log has been changed from “2” to “3” in the Configuration Registry**
 - **Modification does not affect the recording of data in the log until after a warm restart of the Distribution Server (at which time the server would read the parameters in the Configuration Registry)**

Modifying System Parameters in the Database



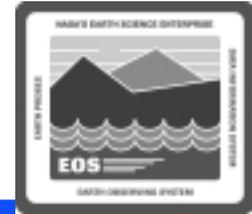
- **When making or requesting a change to system parameters, the CM process at the particular site must be followed (if applicable)**
- **Staging Area Size and Read-Only Cache Size**
 - **The DsStConfigParameter table in the Storage Management and Data Distribution database**
 - » **TotalSpace column contains the total size of raid allocated to the associated Cache Manager and staging disk combined**
 - » **CacheSpace column contains the amount of read-only cache space allocated/available on disk (to the associated Cache Manager/staging disk) in block-size increments**

Modifying System Parameters in the Database (Cont.)



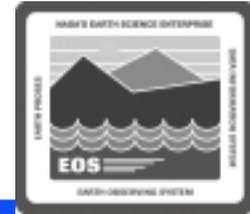
- **Staging area size and read-only cache size parameters are tuned in tandem**
 - They determine....
 - » How much disk space is available for staging of files (both for Ingest and acquires)
 - » How large is the read-only cache
 - When either area is exhausted, requests hang until space becomes available
 - The parameters are modified using the Storage Management Control GUI

Modifying System Parameters in the Database (Cont.)



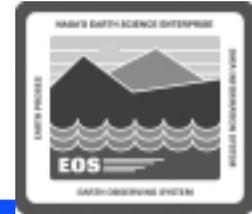
- **Staging area size and read-only cache size parameters (Cont.)**
 - **Pull area read-only cache size defaults to 2,000,000,000 (blocks)**
 - » **There is no need for much user space because the user files are symbolically linked back to the files in the read-only cache**

Modifying System Parameters in the Database (Cont.)



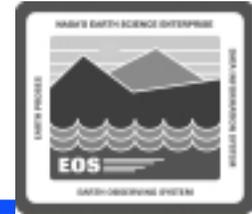
- **Staging area size and read-only cache size parameters (Cont.)**
 - **Staging area read-only cache size depends on the server and the data being handled**
 - » **Staging read-only cache comes out of the same disk space as staging disk; the greater the need for staging disk, the smaller the size of the read-only cache**
 - » **If the staging disk is being used primarily to link files from the read-only cache, the read-only cache can take most of the total staging area (90% or so)**
 - » **If data is being staged in support of Ingest or subsetting of data for distribution, the read-only cache should be smaller (e.g., 40% or 50% of the total staging area)**

Modifying System Parameters in the Database (Cont.)



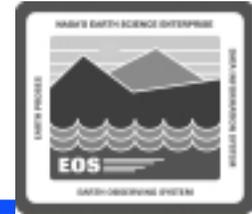
- **Setting the FTP Pull Expiration Time**
 - **DsStConfigParameter table in the Storage Management and Data Distribution database**
 - » **PullExpirationTime column**
 - » **Value listed for a particular pull monitor server specifies the duration (in hours) after which files may be considered for deletion**
 - **Ftp pull expiration time is used as a cleanup mechanism for files that have not been pulled**
 - **Appropriate setting for the ftp pull expiration time depends on the following factors:**
 - » **Frequency of files being left behind in the pull area (the more files, the lower the expiration time)**
 - » **Size of the files (the bigger the files, the lower the expiration time)**
 - » **Capacity of disk used (the higher the capacity used, the lower the expiration time)**

Modifying System Parameters in the Database (Cont.)



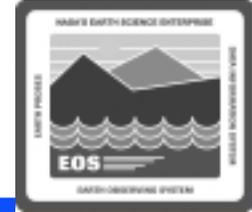
- **Setting the FTP Pull Expiration Time (Cont.)**
 - Pull expiration time defaults to 24 hours
 - Parameter is modified using the Storage Management Control GUI

Modifying System Parameters in the Database (Cont.)



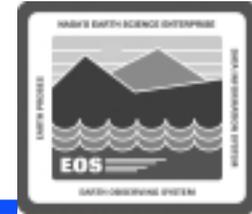
- **Priority Thread Allocation**
 - **DsDdPriorityThread** database table holds the threshold for the number of threads that can be active for each priority level of distribution requests
 - **Priorities are set in one of two ways**
 - » **Via a Perl script (EcDsDdPTEdit.pl)**
 - » **Through interactive structured query language (isql) commands**

Modifying System Parameters in the Database (Cont.)



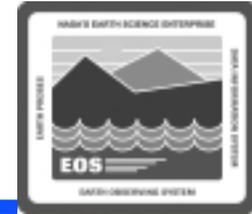
- **Modifying System Parameters in the Database Using the Storage Management Control GUI**
 - As previously mentioned the effects on system functioning and performance must be considered before modifying system parameters
 - When making or requesting a change to system parameters, the CM process at the particular site must be followed (if applicable)
 - Depending on circumstances (e.g., operator permissions) at a particular site, it may be necessary to request that someone else make parameter modifications using the Storage Management Control GUI

Modifying System Parameters in the Database (Cont.)



- **Modifying System Parameters in the Database Using the Storage Management Control GUI: Procedure**
 - Click on Cache Manager in the Server Type Information window on the Storage Config. tab
 - Click on the appropriate server in the server information window
 - Click on the Modify Server/View Stackers button
 - Enter modified data in relevant field(s) as necessary
 - If service threads are to be allocated by priority, type the desired values in the appropriate fields in the Service Threads: Allocate by Priority window
 - When new values have been entered in all fields to be modified, click on the OK button

Cache Manager Server Configuration Dialogue



Cache Manager Server Configuration

Server Name: CacheManagerServer RPC Tag:

Original Cache Space (blocks): Disk Capacity

Available Cache Space (blocks): Fault Level: ▲▼

Allocation Block Size (bytes): Warning Level: ▲▼

Description:

Expiration Threshold (hours): ▲▼ File I/O Block Size (bytes):

Expired Files Confirm Delete:

Retries: ▲▼

Sleeptime (seconds): ▲▼

Service Threads:

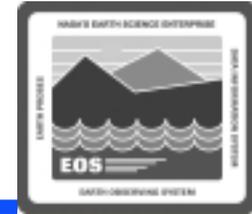
Cache Path:

User Request Directory:

FTP Notification File:

FTP Notification Freq (Sec): ▲▼

Service Threads: Allocate Threads by Priority Window



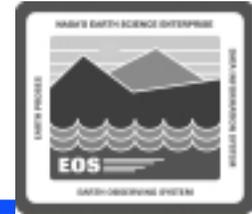
Service Threads

Allocate Threads by Priority

XPress:	0
V-High:	0
High:	0
Normal:	0
Low:	20
Total:	20

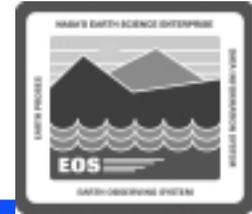
OK Cancel

Modifying System Parameters in the Database (Cont.)



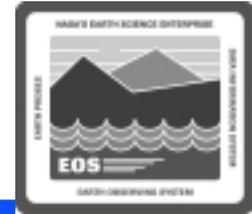
- **Modifying PriorityThread Table Values in the Database Using the EcDsDdPTEdit.pl Script**
 - EcDsDdPTEdit.pl script is a tool that can be used to change the limits for priority levels of threads in the DsDdPriorityThread database table
 - Script operates in either of two modes:
 - » Interactive (menu driven)
 - » Non-Interactive (command line)
 - Effects on system functioning and performance must be considered before modifying system parameters
 - When making or requesting a change to system parameters, the CM process at the particular site must be followed (if applicable)
 - Depending on circumstances at a particular site, it may be necessary to request that the Database Administrator modify database parameters

Modifying System Parameters in the Database (Cont.)



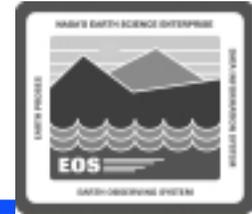
- **Modifying PriorityThread Table Values in the Database Using the EcDsDdPTEdit.pl Script: Procedure**
 - Access a terminal window logged in to the Distribution Server
 - Type script command in either interactive or non-interactive format (as applicable)
 - Respond to menu prompts for entering new value(s) for the number of priority threads (if applicable)
 - Save new values

Modifying System Parameters in the Database (Cont.)



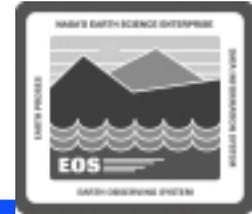
- **Modifying System Parameters in the Database Using ISQL**
 - Effects on system functioning and performance must be considered before modifying system parameters
 - When making or requesting a change to system parameters, the CM process at the particular site must be followed (if applicable)
 - Depending on circumstances at a particular site, it may be necessary to request that the Database Administrator modify database parameters

Modifying System Parameters in the Database (Cont.)



- **Modifying System Parameters in the Database Using ISQL: Procedure**
 - Access a terminal window logged in to the Access/Process Coordinators (APC) Server
 - Log in to isql
 - Specify the proper database name
 - Check the current contents of the ThreadName and ThreadLimit columns in the DsDdPriorityThread table
 - Update the appropriate rows in the DsDdPriorityThread table
 - Verify table update by checking the current contents of the ThreadName and ThreadLimit columns in the DsDdPriorityThread table
 - Quit isql

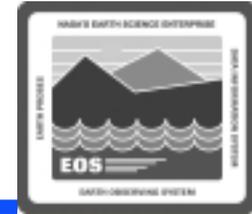
Troubleshooting Data Distribution Problems



- **Troubleshooting:**

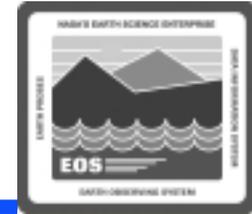
process of identifying the source of problems on the basis of observed trouble symptoms

Troubleshooting Data Distribution Problems (Cont.)



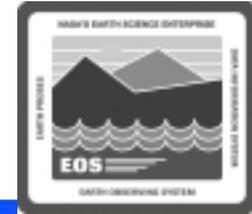
- **Problems with data distribution can usually be traced to...**
 - **some part of the Data Server Subsystem**
 - » **Data Server Subsystem (DSS)**
 - » **Science Data Server**
 - » **Storage Management**
 - **problems in other ECS subsystems, including (but not necessarily limited to):**
 - » **Communications Subsystem (CSS)**
 - » **System Management Subsystem (MSS)**

Troubleshooting Data Distribution Problems (Cont.)



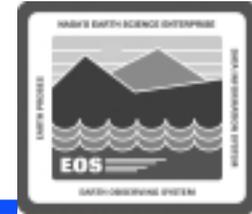
- **Troubleshooting table**
 - describes actions to be taken in response to some common data distribution problems
 - if the problem cannot be identified and fixed without help within a reasonable period of time, call the help desk and submit a trouble ticket in accordance with site Problem Management policy

Troubleshooting Data Distribution Problems (Cont.)



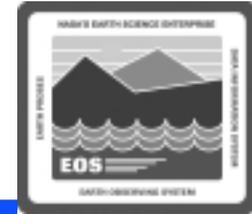
Symptom	Response
Unable to log in to any host (e.g., Distribution Server, g0dis02).	Check with the Operations Controller/System Administrator to ensure that the host is "up."
GUI not displayed when the start-up script has been properly invoked.	Ensure that the DISPLAY variable was set properly. [For detailed instructions refer to the procedure for Launching the Data Distribution Operator and Storage Management Control GUIs (previous section of this lesson).]
Error message associated with the Data Distribution Operator GUI.	Refer to Table 3, Data Distribution Operator GUI User Messages (adapted from the corresponding table in 609-CD-600-001, <i>Release 6A Operations Tools Manual for the ECS Project</i>).
Request status change to "Suspended with Errors," indicating a data distribution failure.	<ol style="list-style-type: none"> 1. Ensure (e.g., using ECS Assistant) that the necessary hosts and servers (listed in Table 4) are "up." 2. If hosts/servers have gone down, notify the Operations Controller/System Administrator to have servers brought back up. 3. If hosts/servers are all "up," notify the Operations Controller/System Administrator to have the STMGT servers bounced (shut down and immediately restarted). 4. Resume processing of the suspended request. [For detailed instructions refer to the procedure for Suspending/Resuming Data Distribution Requests (previous section of this lesson).] 5. If processing does not resume, refer to the procedure for Recovering from a Data Distribution Failure (subsequent section of this lesson).

Troubleshooting Data Distribution Problems (Cont.)



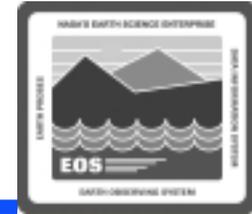
Symptom	Response
Other problems.	Check the log files (e.g., EcDsDdistGui.ALOG, EcDsDistributionServer.ALOG, EcDsStStagingDiskServer.ALOG, EcDsStCacheManagerServer.ALOG) in the /usr/ecs/MODE/CUSTOM/logs directory of the Distribution Server host for error messages. [For detailed instructions refer to the procedure for Checking Log Files (subsequent section of this lesson).]

Hosts, Servers, Clients and Other Software Relevant to DDIST



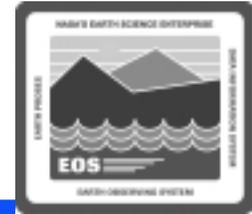
HOST	SERVER/CLIENT/OTHER SOFTWARE
Distribution Server (e.g., x0dis02)	Data Distribution Operator GUI (EcDsDdistGui) Distribution Server (EcDsDistribution Server) Staging Disk Server (EcDsStStagingDiskServer) Storage Management Request Manager (EcDsStRequestManagerServer)
Working Storage (e.g., x0wkg01)	HDF EOS Server (EcDsHdfEosServer) Archive Server (EcDsStArchiveServer) Cache Manager Server (EcDsStCacheManagerServer) FTP Server (EcDsStFtpServer) Staging Disk Server (EcDsStStagingDiskServer)
SDSRV Server (e.g., x0acs03)	Science Data Server (EcDsScienceDataServer)
Access/Process Coordinators (APC) Server (e.g., x0acg01)	Archive Server (EcDsStArchiveServer) Cache Manager Server (EcDsStCacheManagerServer) FTP Server (EcDsStFtpServer) Staging Disk Server (EcDsStStagingDiskServer) Pull Monitor Server (EcDsStPullMonitorServer)
FSMS Server (e.g., x0drg01)	Archive Server (EcDsStArchiveServer) Cache Manager Server (EcDsStCacheManagerServer) FTP Server (EcDsStFtpServer) Staging Disk Server (EcDsStStagingDiskServer)
Ingest Server (e.g., x0icg01)	Registry Server (EcCsRegistry)
Interface Server 02 (e.g., x0ins01)	Subscription Server (EcSbSubServer) Event Server (EcSbEventServer)

Recovering from a Data Distribution Failure



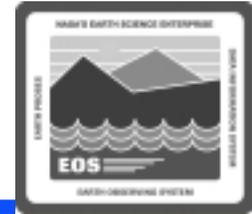
- **Recovering from a data distribution failure**
 - Operator intervention may be required when there is a data distribution fault or error (e.g., failure of storage management to acquire granules from the archive)
 - Ingest/Distribution Technician may use several sources for troubleshooting information
 - » Data Distribution Operator GUI Distrib'n Requests tab
 - » log files on various host machines

Recovering from a Data Distribution Failure (Cont.)



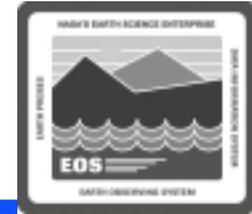
- **Procedure**
 - Review the trouble symptoms
 - Check for requests that exceed the distribution request threshold
 - Check for an acquire failure
 - Check appropriate log files as necessary
 - Take action to correct the problem(s)
 - Verify that distribution request processing has resumed

Responding to Requests that Exceed the Dist. Request Threshold



- **When a distribution request exceeds the corresponding distribution request threshold (e.g., FtpPushThreshold or FtpPullThreshold), the request is suspended in DDIST with the following error mnemonic:**
 - DsEDdXLargeRequest

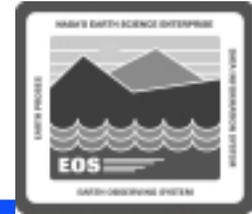
Responding to Requests that Exceed the Dist. Request Threshold



- **Procedure**

- **Contact User Services to determine whether or not the user's request should be processed**
- **If the request should be aborted, cancel the data distribution request**
- **If the request should be completed, first determine whether the request should be resumed immediately or should be left suspended until an off-hours period when the system is less loaded**
 - » **Another alternative may be to submit a request to the Database Administrator to increase (at least temporarily) the corresponding threshold**
- **If the request should be completed, resume processing of the data distribution request**

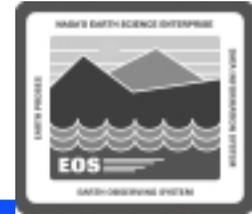
Handling an Acquire Failure



- **Procedure**

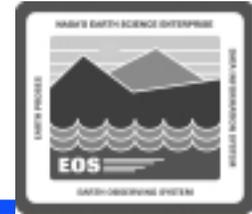
- **Check the Science Data Server ALOG File**
- **Check the Archive Server ALOG File**
- **Check the Staging Disk**
- **Check the Staging Disk ALOG File**
- **Check the Space Available in the Staging Area**

Checking Log Files



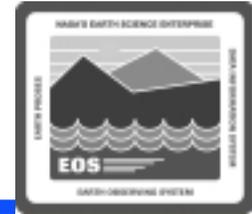
- **Log files can provide indications of the following types of problems:**
 - **DCE problems**
 - **Database problems**
 - **Lack of disk space**

Checking Log Files (Cont.)



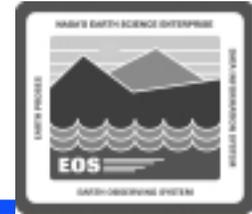
- **Procedure**
 - Access a terminal window logged in to the appropriate host
 - Change directory to the directory containing the data distribution log files
 - » `/usr/ecs/MODE/CUSTOM/logs`
 - Review log file to identify problems
 - Respond to problems

Checking Database Connections



- **Storage management/data distribution shared database**
 - Repository of data concerning data distribution requests
 - If applications are unable to connect to the database, the data distribution request data cannot be retrieved or displayed on the GUI
 - Checking the database connections is a logical step in trying to isolate the following types of problems:
 - » GUI does not display data
 - » Display does not refresh

Checking Database Connections



- **Procedure**

- **Submit a request to the Database Administrator to identify the values for the following parameters associated with the EcDsDistributionServer:**
 - » **DBName**
 - » **DBServer**
 - » **DBMaxConnections**
- **Use the interactive structured query language (isql) sp_who command to obtain a list of connections**
- **Use the isql sp_configure command to obtain a list of the number of connections for which the database has been configured**
- **Compare the number of actual connections (results of sp_who) with the number of connections for which the database has been configured (results of sp_configure "user connections")**
- **Notify the Database Administrator of problems**