

625-EMD-111

EOSDIS Maintenance and Development Project

Training Material for the EMD Project Volume 11: Database Administration

Revision --

July 2007

Raytheon Company
Upper Marlboro, Maryland

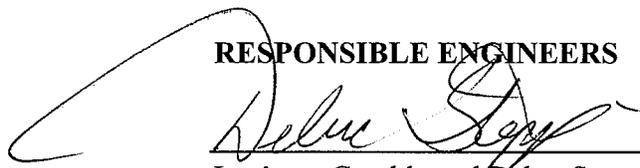
Training Material for the EMD Project Volume 11: Database Administration

Revision --

July 2007

Prepared Under Contract NAS5-03098
CDRL Item 23

RESPONSIBLE ENGINEERS



Lay'wan Gamble and Debra Stepp
EOSDIS Maintenance and Development Project

Date

7-30-2007

RESPONSIBLE OFFICE



Mary Armstrong, Program Manager
EOSDIS Maintenance and Development Project

Date

7/31/2007

Raytheon Company
Upper Marlboro, Maryland

This page intentionally left blank.

Preface

This document is a formal contract deliverable. It requires Government review and approval within 45 business days. Changes to this document will be made by document change notice (DCN) or by complete revision.

Any questions should be addressed to:

Data Management Office
The EMD Project Office
Raytheon Company
1616 McCormick Drive
Upper Marlboro, Maryland 20774-5301

Revision History

Document Number	Status/Issue	Publication Date	CCR Number
625-EMD-111	Original	July 2007	07-0381

This page intentionally left blank.

Abstract

This is Volume 11 of a series of lessons containing the training material for the Earth Observing System Data and Information System (EOSDIS) Maintenance and Development (EMD) Project. This lesson provides a detailed description of the process required to perform the tasks associated with database administration.

Keywords: training, database administration, course objective, metadata, Release 7.20.

This page intentionally left blank.

Contents

Preface

Abstract

Contents

Introduction

Identification.....	1
Scope.....	1
Purpose.....	1
Status and Schedule	1
Organization.....	1

Related Documentation

Parent Documents	3
Applicable Documents.....	3
Information Documents	3
Information Documents Referenced.....	3
Information Documents Not Referenced.....	3

Database Administration

Lesson Overview	5
Lesson Objectives	5
Importance	7

Slide Presentation

Slide Presentation Description.....	9
-------------------------------------	---

This page intentionally left blank.

Introduction

Identification

Training Material Volume 11 is part of Contract Data Requirements List (CDRL) Item 23, which is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Maintenance and Development (EMD) Contract (NAS5-03098).

Scope

Training Material Volume 11 describes the process and procedures for database administration. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

Purpose

The purpose of this Student Guide is to provide a detailed course of instruction that forms the basis for understanding database administration. Lesson objectives are developed and will be used to guide the flow of instruction for this lesson. The lesson objectives will serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Status and Schedule

This lesson module provides detailed information about training for the current baseline of the system. Revisions are submitted as needed.

Organization

This document is organized as follows:

- | | |
|------------------------|--|
| Introduction: | The Introduction presents the document identification, scope, purpose, and organization. |
| Related Documentation: | Related Documentation identifies parent, applicable and information documents associated with this document. |
| Student Guide: | The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics are included. |
| Slide Presentation: | Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson. |

This page intentionally left blank.

Related Documentation

Parent Documents

The parent documents are the documents from which the EMD Training Material's scope and content are derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-46-03	EMD Task 101 Statement of Work For ECS SDPS Maintenance
423-46-02	Contract Data Requirements Document for EMD Task 101 ECS SDPS Maintenance

Applicable Documents

The following documents are referenced within this EMD Training Material, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document:

420-05-03	Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) (ECS F&PRS)
423-46-01	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Science Data Processing System (EMD F&PRS)

Information Documents

Information Documents Referenced

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of the EMD Training Material.

609-EMD-100	Release 7.20 Operations Tools Manual for the EMD Project
611-EMD-100	Release 7.20 Mission Operation Procedures for the EMD Project

Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the EMD Training Material.

313-EMD-001	Release 7.20 Internal Interface Control Document for the EMD Project
-------------	--

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the EMD Training Material.

305-EMD-100	Release 7.20 Segment/Design Specification for the EMD Project
311-EMD-100	Release 7.20 INGEST (INS) Database Design and Schema Specifications for the EMD Project
311-EMD-101	Release 7.20 Science Data Server Database Design and Schema Specifications for the EMD Project
311-EMD-102	Release 7.20 Storage Management Subsystems Database Design and Database Schema Specifications for the EMD Project
311-EMD-103	Release 7.20 Systems Management Subsystem Database Design and Schema Specifications for the EMD Project
311-EMD-104	Release 7.20 Order Manager Database Design and Database Schema Specifications for the EMD Project
311-EMD-105	Release 7.20 Spatial Subscription Server (SSS) Database Design and Schema Specifications for the EMD Project
311-EMD-106	Release 7.20 Data Pool Database Design and Schema Specifications for the EMD Project

Database Administration

Lesson Overview

This lesson will provide you with the tools needed to perform the various tasks required to administer and maintain the database and structure management for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) during maintenance and operations.

Lesson Objectives

Overall Objective - This lesson provides a detailed description of the different tasks required to maintain the database and structure management for ECS, provide the operations interface to perform database administration utilities such as product installation and disk storage management, managing user accounts and privileges, backup and recovery, monitoring physical allocation of database resource information, loading metadata and maintaining metadata.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures required to perform database administration.

Specific Objective 1 - The student will create new database devices, allocate appropriate disk space to house the new database, and maintain database segments including managing and monitoring the use of available disk space, memory, connection error logs, state of transaction logs, device problems, etc.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to the creation of new database devices, the allocation of appropriate disk space, and maintenance of database segments.

Specific Objective 2 - The student will start and shutdown the ASE server.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating the startup and shutdown of the ASE server.

Specific Objective 3 - The student will perform database user account and access privilege procedures including:

- Creating user accounts.
- Granting and revoking access privileges for data retrieval, insertion, deletion and update of objects.

- Granting and revoking roles for ASE server users groups.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to the creation of user accounts and the granting and revoking of access privileges.

Specific Objective 4 - The student will perform database security and auditing procedures.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database security and auditing procedures.

Specific Objective 5 - The student will perform database integrity monitoring.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database integrity monitoring.

Specific Objective 6 - The student will perform database backups on a regular or on-demand basis.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database backups.

Specific Objective 7 - The student will perform a recovery of the database following a system failure or on-demand.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database recovery.

Specific Objective 8 - The student will configure databases unique to ECS DAACs including:

- Making database size estimates and planning.
- Preparing database-unique attributes.
- Preparing database reports.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database configuration specific to the ECS DAACs.

Specific Objective 9 - The student will perform database tuning and performance monitoring procedures including:

- Design and indexing.
- Responding to queries.
- Monitoring and boosting performance.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will perform without error the procedures relating to database tuning and performance monitoring.

Specific Objective 10 - The student will describe Sybase Replication Server Administration.

Condition - The student will be given a copy of 611-EMD-100, *Release 7.20 Mission Operation Procedures for the EMD Project*, a copy of 609-EMD-100, *Release 7.20 Operations Tools Manual for the EMD Project*, and a functioning system.

Standard - The student will describe Sybase Replication Server Administration.

Importance

ECS relies on vast amounts of data from the science user perspective and from a maintenance and operations perspective. Accurate information stored in the science databases allows science users to access necessary data quickly. Similarly, databases that maintain operational data must be kept current in order for routine and specialized administrative tasks to be performed.

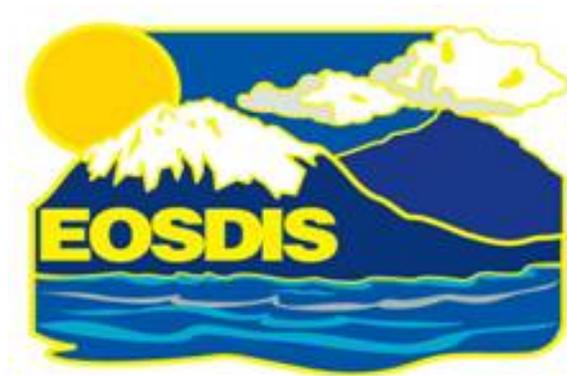
This page intentionally left blank.

Slide Presentation

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.

This page intentionally left blank.

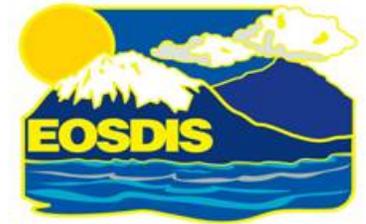


Database Administration

July 2007

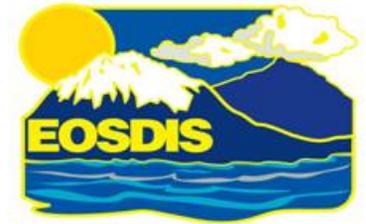
Raytheon

Topics



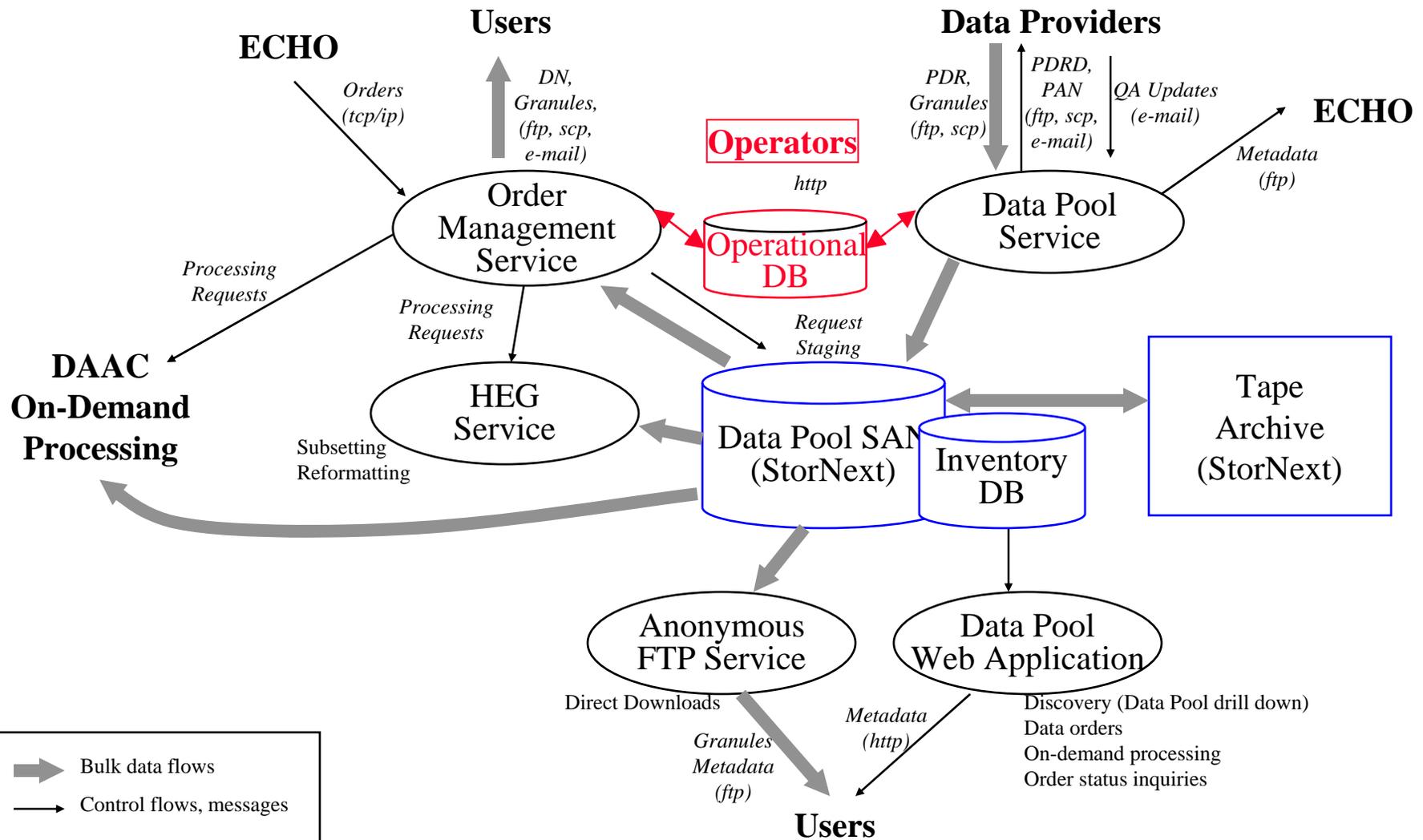
- **This course addresses:**
 - **DBA responsibilities**
 - **Starting and stopping database servers**
 - **Creating database devices**
 - **Installing databases and patches**
 - **Configuring databases**
 - **Working with indexes, segments, and caches**
 - **Establishing database security**
 - **Copying, replicating, and extracting data**
 - **Replication system administration**
 - **Performance monitoring, tuning, and problem reporting**
 - **Ensuring database quality**
 - **Generating reports**
 - **Sybase Troubleshooting**
 - **Oracle Procedures**

Evolution Software Architecture General Design



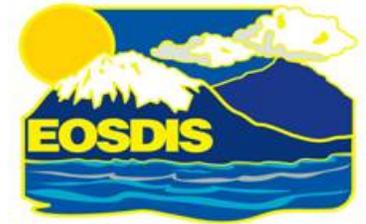
- **The system is designed to:**
 - **Receive data from external sources**
 - **Save those data in either long-term or permanent storage**
 - **Consolidate all database data on a Linux database server**
 - **Produce higher-level data products from the received data**
 - **Support access to the data by scientists and other registered clients**
 - **Provide better tools for monitoring, performance tuning and troubleshooting.**

Evolution Software Architecture System Context Diagram



System Overview

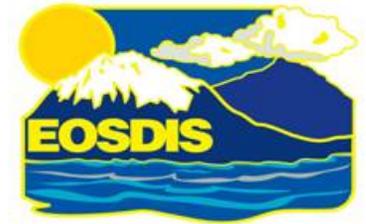
COTS Databases



Subsystem	COTS Product/Database Name	DB Software
MSS	TestTrack Pro (ECHO: Remedy)	Linux

System Overview

Flat Files



Flat Files

Database	Flat File Attributes			
	Usage	Types	Formats	Descriptions
TestTrack Pro	Yes	Linux flat file	Variable length	Log files, configuration files; portability
SDSRV	No			
DMS	Yes	UNIX flat file	Variable length	Log files, configuration files
STMGT & DDIST	No			
DPL	Yes	ASCII	Variable length	For Data Pool Access Statistics Utility, temporary storage of data to be exported to database.
INS	Yes	UNIX flat file	Variable length	Log files, configuration files, data delivery records
REGIST	No			
MSS	Yes	ASCII, binary	Single line records, one/two fields; EcAgEvent objects; MsAgMgmtHandle object; integers; string lists	Accountability component files, subagent component files
SUBSERV	No			
NM	No			
OMS	No			
SSS	No			

System Overview

Resident Databases

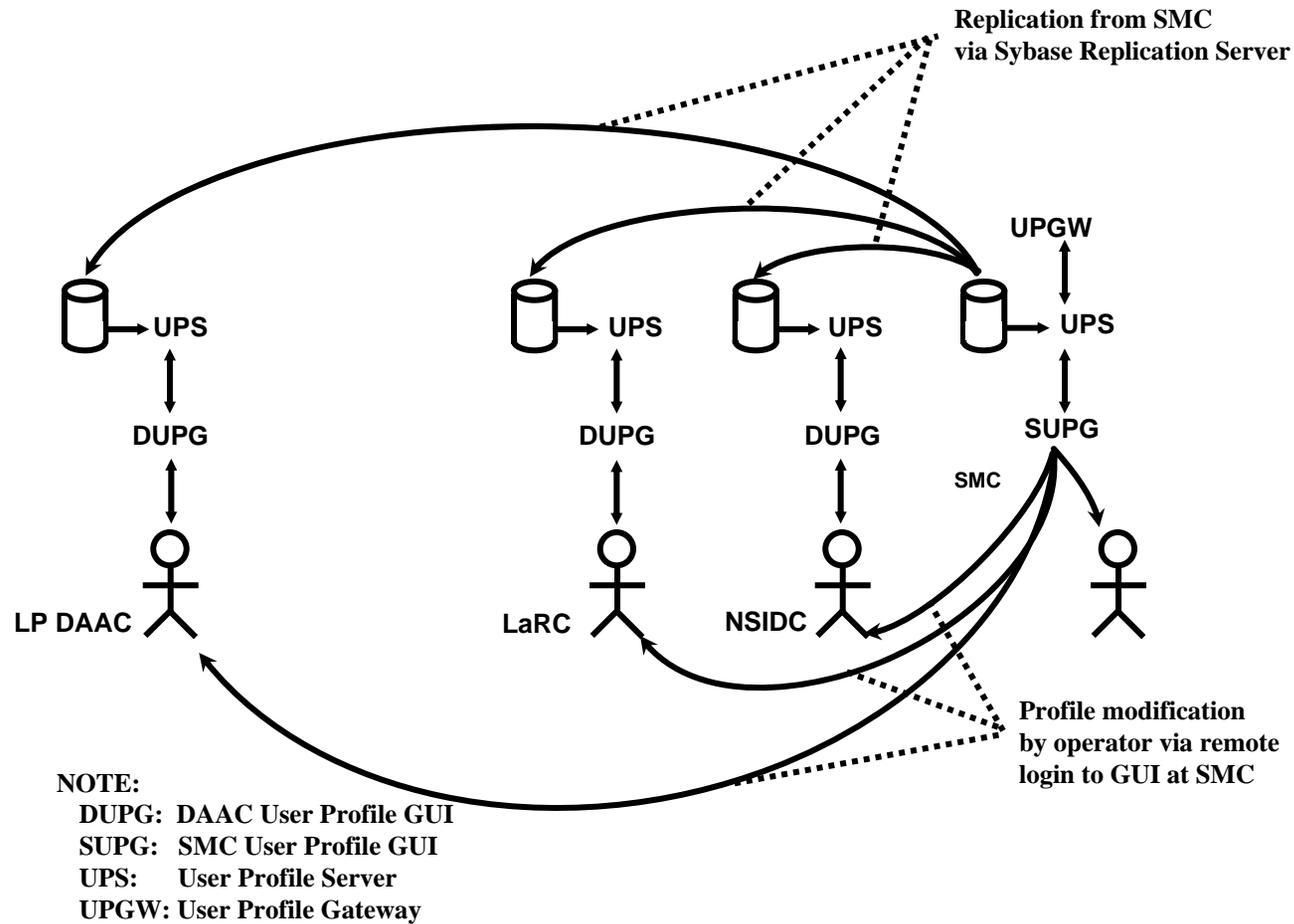
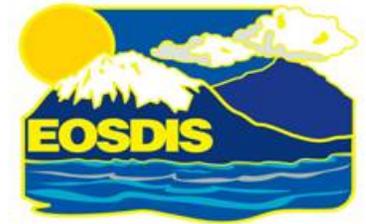


Resident Databases

Databases	SMC	DAAC		
		LP DAAC	NSIDC	LaRC
Custom				
Science Data Server Subsystem (SDSRV)	Not supported in Release 7.20			
Planning and Data Processing Subsystem (PDPS)	Not supported in Release 7.20			
Data Management Subsystem (DMS)	✓	✓	✓	✓
Storage Management and Database Distribution Subsystems (STMGT & DDIST)	Not supported in Release 7.20			
Registry (REGIST [MSS])	✓	✓	✓	✓
Systems Management Subsystem (MSS)	✓	✓	✓	✓
Subscription Server (SUBSRV)		✓	✓	✓
NameServer (NM)	✓	✓	✓	✓
Product Distribution System (PDS)	Not supported in Release 7.20			
Data Pool Ingest (DPL_INS)		✓	✓	✓
Order Manager Subsystem (OMS)		✓	✓	✓
Spatial Subscription Server (SSS)		✓	✓	✓
Replication Server System Database (RSSD)		✓	✓	✓
COTS				
TestTrack Pro (MSS)	✓	✓	✓	✓
AutoSys (PDPS)	Not supported in Release 7.20			

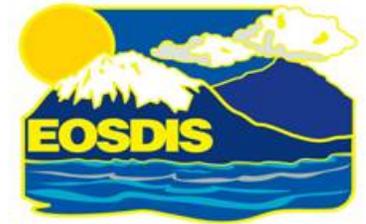
System Overview

Database Replication



System Overview

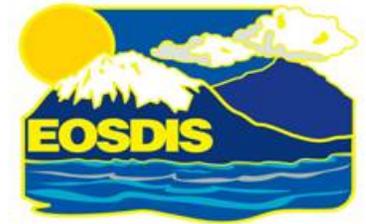
Location of Principal Database Components



Name	Variant	Vendor	Principal Directory	Comments
Software Developer's Kit (formerly Open Client)	PC	Sybase	c:\windows\system	
Software Developer's Kit (formerly Open Client)	Linux	Sybase	/tools/sybOCv12.5.1	
Red Hat Enterprise Linux 4	Red Hat	Linux		
Replication Server	SUN	Sybase	/usr/ecs/OPS/COTS/rep125	Obsolete in Release 7.21
Replication Server Manager	SUN	Sybase	/usr/ecs/OPS/COTS/rep125	Obsolete in Release 7.21
ASE Server Monitor Client/Svr	Linux	Sybase	/usr/ecs/<mode>/COTS/sybase	At DAAC discretion/ required for launch
Spatial Query Server (SQS)	Linux	Boeing	/usr/ecs/OPS/COTS/sqs2	
Sybase Adaptive Server	Linux	Sybase	/usr/ecs/OPS/COTS/sybase	/usr/ecs/OPS/COTS/sybase_125 or sybase125 is an acceptable install dir.
Sybase Adaptive Svr Enterprise	Sun	Sybase	/usr/ecs/OPS/COTS/sybase	/usr/ecs/OPS/COTS/sybase_125 or sybase125 is an acceptable install dir.
Sybase Central	PC	Sybase	TBI	

System Overview

Database Management Implementation



- **System databases are primarily based on Sybase software. Primary components include:**
 - **Sybase Adaptive Server Enterprise (ASE)**
 - **Other Sybase Components:**
 - **Spatial Query Server (SQS)**
 - **Replication Server (RS)**

System Overview

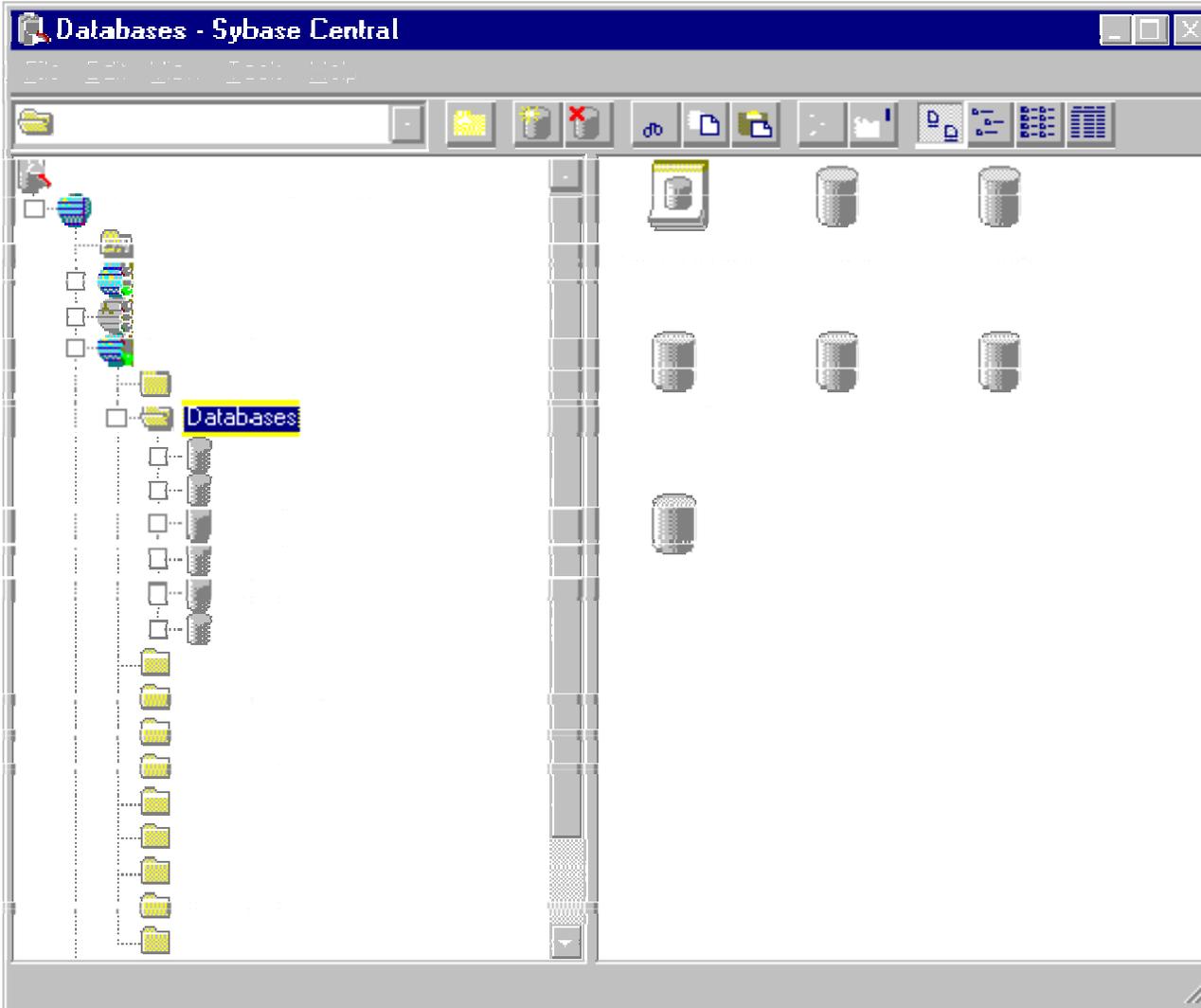
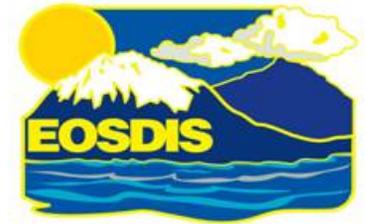
Sybase ASE Components



Type	Component	Description	Sub-Components and Features	Type	Component	Description	Sub-Components and Features
Client	Sybase Central	A Windows application for managing Sybase databases. Helps manage Database objects and Perform Common Administrative tasks.	Connecting to, disconnecting from, and stopping servers	Server	Adaptive Server (ASE)	Sybase's high-performance RDBMS	
			Troubleshooting Adaptive Server problems				
			Managing data caches				
			Managing Adaptive Server physical resources				
			Creating, deleting, backing up, and restoring databases				
			Creating and deleting Adaptive Server logins, creating and deleting database users and user groups, administering Sybase roles, and managing object and command permissions				
			Monitoring Adaptive Server performance data and tuning performance parameters				
	Sybase Central Plug-Ins	Each server product is managed by a service Provider plug-ins that coexists with other service providers in the Sybase Central framework.	ASE Plug-In	Adaptive Server Monitor	Monitor Server	Allows capture, display, and evaluation of Adaptive Server performance data and tune Adaptive Server performance	
			Replication Server Manager (RSM). Provides the ability to manage, monitor, and troubleshoot most replication system components (primary and replicate database servers, Replication Servers, Replication Agents, and database gateways).		Historical Server	Writes the data to files for offline analysis	
	Software Developer's Kit (formerly Open Client)		CS-Library, which contains a collection of utility routines used by all client applications.				
			Client-Library and DB-Library, which contains a collection of routines that are specific to the programming language being used in an application				
			Net-Library, which contains network protocol services that support connections between client applications and Adaptive Server.				
			Utilities: isql - an interactive query processor that sends commands to the RDBMS from the command line. bcp - a program that copies data from a database to an operating system file, and vice versa. defncopy - a program that copies definitions of database objects that from a database to an operating system file and vice-versa.				

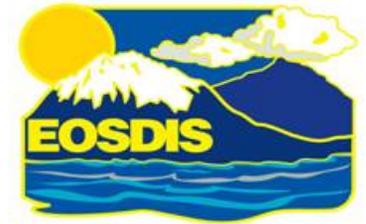
System Overview

Sybase Central



System Overview

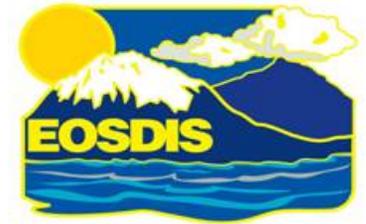
Hardware, Software, and Database Mapping



- **Baseline information available at:**
<http://cmdm-ldo.raytheon.com/baseline/>
- **Link to Technical Documents**
 - **920-TDx-001: Hardware-Design Diagram**
 - **920-TDx-002: Hardware-Software Map**
 - **920-TDx-009: DAAC HW Database Mapping**

DBA Responsibilities

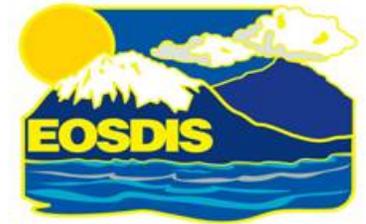
Basic Responsibilities



- **Performing the database administration utilities (e.g., database backup, maintenance of database transaction logs, and database recovery)**
- **Monitoring and tuning the database system (e.g., the physical allocation of database resources)**
- **Maintaining user accounts for external system users (e.g., new user registration and account access control permissions in the security databases)**
- **Creating standard and ad hoc security management reports**
- **Working with EMD sustaining engineering and DAAC system test engineers to set up a test environment as needed**

DBA Responsibilities

Basic Responsibilities (Cont.)



- **Assisting data specialist with information management tasks involving databases, data sets, and metadata management**
- **Regularly, consolidating event reports into a site event history database for reporting activities to the SMC**
- **Performing daily database synchronization**
- **Administering the Replication Server System Database (RSSD)**

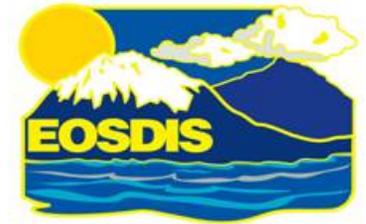
DBA Responsibilities

Routine Tasks



Time Period	Task	Importance	Found In ...
Daily	Capture database configurations	Absolutely necessary for database recovery if problems occur	Configuring Databases
	Reclaim disk space		/usr/ecs/OPS/CUSTOM/dbms/COMD BAdmin/EcCoDbSyb_Reorg compact
	Run after reorg compact	only necessary if you want statistics for non-leading columns of the index	/usr/ecs/OPS/CUSTOM/dbms/COMD BAdmin/EcCoDbSyb_Customize dDbStat
	Remove old dump files.	Keeping tack of seven (7) days worth of retrievable data or can specify another value.	/usr/ecs/OPS/CUSTOM/dbms/COMD BAdmin/EcCoDbSyb_CleanupD umps
Weekly	Monitor Sybase disk usage		Monitoring and Tuning Databases
	Clean up old files		
Monthly	Reboot		Starting and Stopping Servers
Before and After Installations	Run DbVerify scripts		Installing Databases and Patches

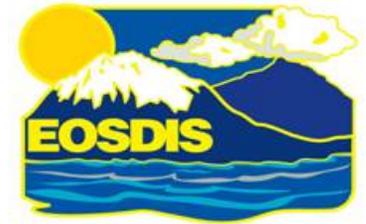
Starting and Stopping Servers Procedures



- **Servers DBAs routinely start up and shut down include:**
 - ASE Servers
 - ASE Backup Servers
 - ASE Monitor Server
 - SQS Servers
 - Replication Servers

Database Devices & Logical Volumes

Database Devices



- **In order to create a new device, the DBA must have the following:**
 - **The name of database device to be created**
 - **A physical device on which to place database device**
 - **The device size in megabytes**
 - **The name of the mirror device, if one is in effect**

Database Devices & Logical Volumes

Database Device Procedure



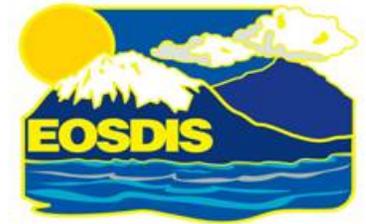
```

/*****/
/* name: test_dev.sql
/* purpose: allocate 3Mb device for testing          */
/* written: 12/18/97
/* revised:
/* reason:
/*****/
disk init name = test_dev,
physname
    "/usr/ecs/Rel_A/COTS/sybase/studentdevices/test_dev.dat
    ",
vdevno = 15,
size = 1536
go
sp_helpdevice test_dev          */
go
*/
*/
*/

```

Installing Databases & Patches

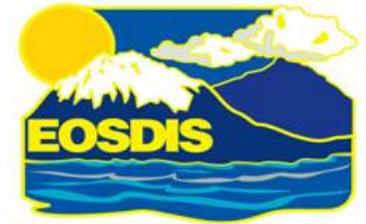
ECS Assistant Subsystem Manager



The screenshot shows the ECS Assistant Subsystem Manager application window. The title bar reads "ECS ASSISTANT: Subsystem Manager User: dclark Host: blueridge Site: EDF". The menu bar includes "File", "Tools", "Utilities", and "Help". Below the menu bar are several tabs: "Database", "Install", "Shutdown Servers", "Configuration", "Stage Area Installation", "Start Servers", and "View Task Output". The main window is divided into two frames. Frame 1 (left) shows a tree view of subsystems under the heading "SUBSYSTEMS". The list includes: CLS, CSS, DM, DPS, DSS, INGEST, IOS, MSS, PLS, TOOLKIT, and VOC. Frame 2 (right) contains a "Settings" section with a "ClearCase View" field set to "dclark_RemoveCDS_6A", and fields for "Selected Subsystem:", "Selected Component:", and "Selected Application:". Below this is an "Installation Statistics" section with a large empty area. At the bottom of Frame 2 is a "Legend" section with four entries: "Not Installed" (grey circle), "Successfully Installed" (green circle), "Installation Warnings" (yellow circle), and "Installation Errors" (red circle).

Configuring Databases

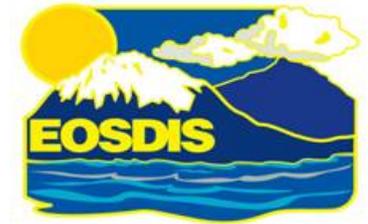
Configuration Parameter and Procedures



- **The configuration parameters are divided between two tables:**
 - **Sybase Configuration Parameter Table**
 - **DAAC-Specific Configuration Parameter Table**
- **Configuration parameters can be set or changed in one of two ways:**
 - **By executing the system procedure `sp_configure` with the appropriate parameters and values**
 - **By hand-editing your configuration file and then invoking `sp_configure` with the configuration file option**

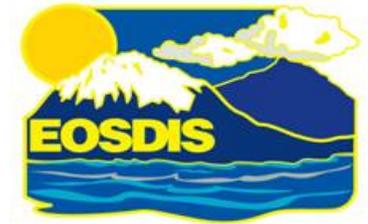
Configuring Databases

sp_configure Sample Output



name	minimum	maximum	config value	run value
recovery interval		32767	0	5
allow updates	1		0	0
user connections	0	2147483647	0	25
memory	3850	2147483647	0	5120
open databases	5	2147483647	0	12
locks	5000	2147483647	0	5000
open objects	100	2147483647	0	500
procedure cache		99	0	20
fill factor	10	100	0	0
time slice	50	1000	0	100
database size		10000	0	2
tape retention	20	365	0	0
recovery flags	0	1	0	0
nested triggers		1	1	1
devices	0	256	0	10
remote access	4		1	1
remote logins	0	2147483647	0	20
remote sites	0	2147483647	0	10
remote connections	0	2147483647	0	20
pre-read packets	0	2147483647	0	3
upgrade version	0	2147483647	1002	1002
default sortorder id	0	255	50	50
default language	0	2147483647	0	0
language in cache		100	3	3
max online engines	3	32	1	1
min online engines	1	32	1	1
engine adjust interval	1	32	0	0
cpu flush	1	2147483647	200	200
i/o flush	1	2147483647	1000	1000
default character set id	1	255	1	1
stack size	20480	2147483647	0	28672
password expiration interval	0	32767	0	0
audit queue size	10	65535	100	100
additional netmem	10	2147483647	0	0
default network packet size	512	524288	0	512
maximum network packet size	512	524288	0	512
extent i/o buffers		2147483647	0	0
identity burning set factor	0	9999999	5000	5000
allow sendmsg	10		0	0
sendmsg starting port number	0	65535	0	0

Configuring Databases Configuration Registry



Database Login

User Id:

Password:

Server:

DB Name:

ECS REGISTRY (1.0)

File Utilities Help

Attribute Tree Name

TS2_5B.01

- TS2_5B.01
- t1ins02
- t1ins01
- t1dms02
- t1icg01
- config
- CFG
- EcDsStingestFtpServer
- EcDsStStagingDiskServer
- EcInAuto
- EcInGran
- EcInGran0
- EcInGran1
- EcInInter
- EcInPolling.ASTERDEM
- EcInPolling.ASTER_OSF
- EcInPolling.DDIDIST
- EcInPolling.EDOS
- EcInPolling.EMOS
- EcInPolling.FDD
- EcInPolling.IGSASA
- EcInPolling.LaRC_SAGE_III_MOC
- EcInPolling.SAGE_III_SCF
- EcInPolling.ias002
- EcInReqMgr
- t1acg01
- t1acs02
- t1acs03
- t1ais01
- t1ais03
- t1dps01
- t1dps04
- t1drg01
- t1mss06
- t1mss07
- t1pls01
- t1pls02
- t1sps02
- t1wkg01
- EcCsRegistry

Attribute Listing <75>

PseudoAttribute	One	Two	Three
Name	EcInGran		
ProgramID	5800000		
ApplicationID	5000000		
Site	vatc		
DeltaTime	3600		
MajorVersion	1		
MinorVersion	0		
Release	B		
SubSysName	INS		
AppLogSize	5000000		
AppLogLevel	0		
HostPolicy	multiple		
ServerDescription	This is ../subsys/ecs/server		
old_EcInGranObj	80e4c765-7b28-1023-891b-0800e		
old_EcAgManager_TS2	80e4c766-7b28-1023-891b-0800e		
ListenThreads	20		
Protocol	EMPTY		
KeyFile	CUSTOM/security/EcInGran.Keyf		
PrincipalName	EcInGran		
AcIPermission	x		
AcIDBTableName	IngestAcItable		
AcIName	InGranObj		
AppStrtNum	12345		
DBAcIKey	PFAcIKey		
DBLibrary	SYBASE_CT		
DBServer	t1mss07_srvr		
DBLoginName	acluser		
---	---		

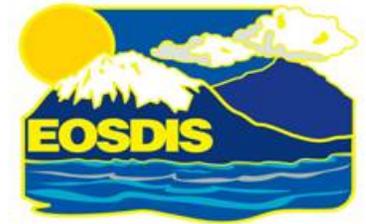
Add new attribute

625-EMD-111

23

Indexes, Segments, & Caches

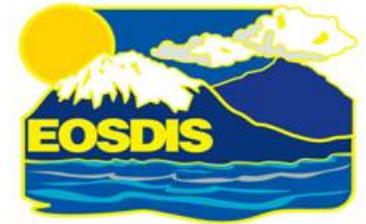
Indexes



- **Sybase allows the definition of two types of indexes:**
 - **Clustered index, where the rows in a database table are physically stored in sequence determined by the index.**
 - **Non-clustered indexes, which differ from their clustered counterpart in that the physical order of rows is not necessarily the same as their indexed order.**

Indexes, Segments, & Caches

Segment Use



- **Segments are used when:**
 - A table is placed on one device and its non-clustered indexes on a device on another disk controller, the time required to read or write to the disk can be reduced since disk head travel is usually reduced.
 - A large, heavily used table is split across devices on two separate disk controllers, read/write time may be improved.
 - The ASE Server stores the data for text and image columns on a separate chain of data pages. By default, this text chain is placed on the same segment as the table.

Indexes, Segments, & Caches

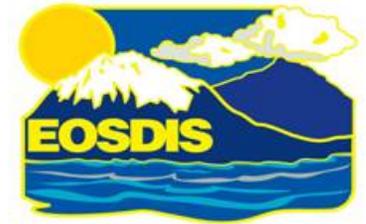
Segments



- **Subsystem databases, for example, consist of:**
 - **Default data segment (if no segment specified create statement)**
 - **SYSLOGS, transaction logs**
 - **System tables and indexes**
 - **OPS mode data and index segments**
 - **TS1 mode data and index segments**
 - **TS2 mode data and index segments**

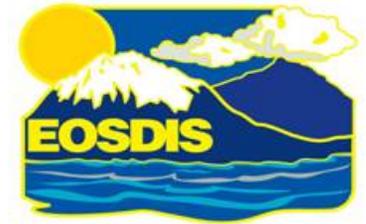
Indexes, Segments & Caches

Types of Caches



- **Default caches:**
 - *Data caches* retain most recently accessed data and index pages
 - *Procedure caches* retain most recently accessed stored procedure pages
 - *User transaction log caches* are transaction log pages that have not yet been written to disk for each user
- **Named caches**, a named block of memory that is used by the database management system (DBMS) to store data pages. Also defined as subdivisions of default caches

Backing Up & Recovering Data Backups



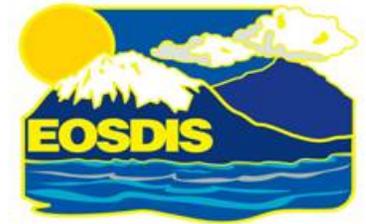
- **DBA can perform manual backups and are recommended for the following situations:**
 - *Any change to the master database*, including new logins, devices, and databases
 - *Any major change to user databases*, such as a large ingest or deletion of data, definition of indexes
 - *Other mission-critical activities* as defined by the DAAC operations controller
- **Automatic Backups**

Backing Up & Recovering Data



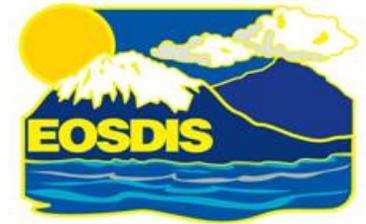
- **Performed when a database is corrupt or a device fails**
- **Run *dbcc* command frequently**
- **Dump current database and transaction log for failed database (or, if necessary, use most recent dumps)**
- **Set space defaults**
- **Drop database and device, and initialize new database device**
- **Re-create database**
- **Reload data from backups**
- **Manual recovery: System Administrator uses *load database* and *load transaction* commands**

Establishing Database Security Discretionary Access Controls



Roles		Privileges
System Administrator	sa_role	Grant a specific user permissions needed to perform standard system administrator duties including: Installing ASE server and specific ASE server modules Managing the allocation of physical storage Tuning configuration parameters Creating databases
Site Security Officer	sso_role	Grant a specific user the permissions needed to maintain ASE server security including: <ul style="list-style-type: none"> • Adding server logins • Administrating passwords • Managing the audit system • Granting users all roles except the sa_role
Operator	oper_role	Grant a specific user the permissions needed to perform standard functions for the database including: <ul style="list-style-type: none"> • Dumping transactions and databases • Loading transactions and databases
Navigator	navigator_role	Grant a specific user the permissions needed to manage the navigation server
Replication	replication_role	Grant a specific user the permissions needed to manage the replication server
Sybase Technical Support	sybase_ts_role	Grant a specific user the permissions needed to execute database consistency checker (dbcc), a Sybase supplied utility supporting commands that are normally outside of the realm of routine system administrator activities

Establishing Database Security Identification & Authentication Controls



- **Providing users with access to servers and their databases consists of the following steps:**
 1. **Create a new user server login account with a unique ID.**
 2. **Add user to a database and assigned to a group (optional).**
 3. **Grant permissions to user or group based on specific commands and database objects.**

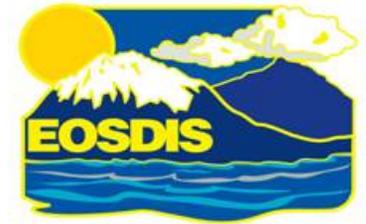
Establishing Database Security

EMD Security Directive



- **All System Administrators and Database Administrators at the sites are responsible for reasonable security measures when installing custom software. This means:**
 - **Changing the permissions of online secure files to the minimum level required**
 - **Backing up secure file(s) to removable media (floppy or tape) and removal of secure files immediately after installation is complete and then keeping the removable medium in a secure location**

Copying, Replicating, & Extracting Data

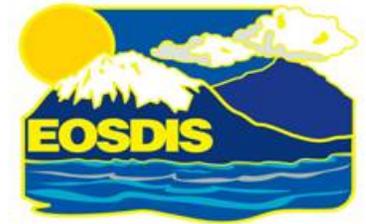


- **Copy**
 - Dump database to be copied
 - Create a database to load with the dump
- **Bulk Copy (bcp)**
 - Located in `$SYBASE/OCS-12_5/bin` directory
 - Need ASE Server account and appropriate permissions
 - Syntax:

```
bcp [[database_name].owner.]table_name {in | out} datafile  
[-e errfile] [-n] [-c] [-t field_terminator] [-r row_terminator]  
[-U username] [-S server]
```

Replication System Administration

System Administrator Tasks



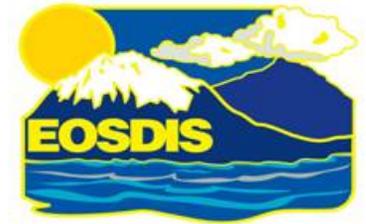
Task	Roles
Installing Replication Server	Replication System Administrator (RSA)
Adding or removing a Replication Server	RSA
Starting up and shutting down Replication Server.	RSA
Configuring Replication Server	RSA
Maintaining Routes (Creating and modifying)	RSA
Managing the RSSD	RSA
Adding a primary and replicate database.	RSA
Adding login names, database users, and administering appropriate permissions	RSA
Adding replicated tables or changing table schemas. Creating and modifying replicated tables Creating and modifying replication definitions Creating and materializing subscriptions at replicate sites.	RSA
Defining data server function-string classes and function strings.	RSA
Applying database recovery procedures.	RSA
Maintaining and monitoring database connections	RSA
Monitoring Replication Server	RSA
Processing rejected transactions	RSA
Quiescing Replication Server	RSA
Reconciling database inconsistencies.	RSA

Replication System Administration Database Administrator Tasks



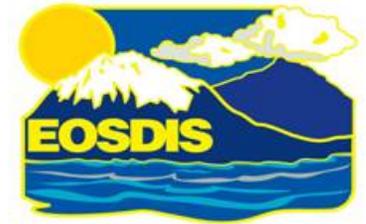
Task	Roles
Installing Replication Server	DBA
Managing the RSSD	DBA
Adding a primary and replicate database.	DBA
Adding login names, database users, and administering appropriate permissions	DBA
Adding replicated tables or changing table schemas. Creating and modifying replicated tables Creating and modifying replication definitions Creating and materializing subscriptions at replicate sites.	DBA
Defining data server function-string classes and function strings.	DBA
Applying database recovery procedures.	DBA
Processing rejected transactions	DBA
Quiescing Replication Server	DBA
Reconciling database inconsistencies.	DBA

Performance Monitoring & Tuning Monitoring



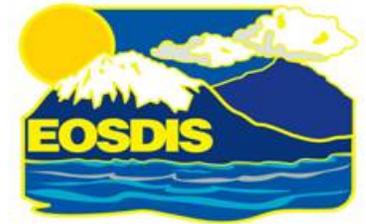
- **Monitor database performance:**
 - Before and after cache or pool configuration changes
 - Before and after certain sp_configure changes
 - Before and after the addition of new queries to your application mix
 - Before and after an increase or decrease in the number of Adaptive Server engines
 - When adding new disk devices and assigning objects to them
 - During peak periods, to look for contention
 - During stress tests to evaluate an Adaptive Server configuration for a maximum expected application load
 - When performance seems slow or the system behaves abnormally

Performance Monitoring & Tuning Tuning Options



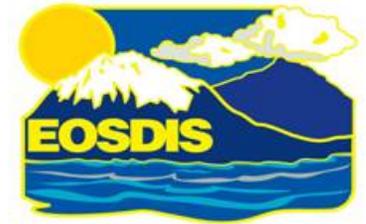
Layers	Tuning Options
Application	Remote or replicated processing to move decision support off machine
	Stored procedures to reduce compilation time and network usage
	Minimum locking level that meets application needs
Database	Transaction log thresholds to automate dumps and avoid running out of space
	Thresholds for space monitoring in data segments
	Partitions to speed loading of data
	Devices to avoid disk contention, take advantage of I/O parallelism
Server	Tuning memory, most critical configuration parameters and other parameters
	Configuring cache sized and I/O sizes
	Scheduling batch jobs and reporting for off hours
	Reconfiguring parameters for shifting workload patterns
Devices	More medium-sized devices and more controllers for better I/O throughput
	Distributing databases, tables, and indexes for even I/O load across devices
	Segments, partitions for I/O performance on large tables used for parallel queries
Network	Configuring packet sizes to match application needs
	Configuring subnets
	Isolating heavy network uses
	Configuring for multiple network engines
Hardware	Configuring the housekeeper task to improve CPU use
	Configuring multiple data caches
Operating System	Choosing between riles and raw partitions
	Increasing memory size

Ensuring Database Quality Integrity Monitoring



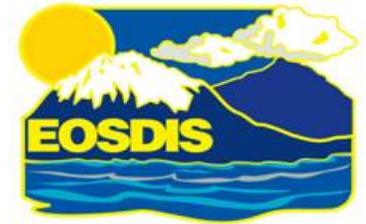
- **The integrity of the internal structures of a database depends upon the System Administrator or Database Owner running database consistency checks on a regular basis. Two major functions of dbcc are:**
 - **Checking allocation structures (the commands checkalloc, tablealloc, and indexalloc).**
 - **Checking page linkage and data pointers at both the page level and row level (checktable and checkdb).**

Sybase Troubleshooting Space Usage



- **Thresholds are defined on segments to provide a free space value at which a procedure is executed to provide a warning or to take remedial action.**
- **Use `sp_addthreshold` to define your own thresholds:**
 - `sp_addthreshold database_name, segment_name, free_space, procedure_name`
 - `free_space` is the number of free pages at which the threshold procedure executes
 - `procedure_name` is the stored procedure which the threshold manager executes when the number of free pages falls below the `free_space` value

Troubleshooting Deadlocks



- **A deadlock (also known as a "deadly embrace") is a situation where two database processes are simultaneously attempting to lock data that the other holds**
 - **For example, two users (A and B) are updating the same table of data at the same time**
 - **User A holds a lock on Page 1 and requests a lock on Page 2**
 - **Meanwhile, user B holds a lock on Page 2 and has requested a lock on Page 1**
 - **Without intervention, these two jobs would never finish**