

311-EMD-008

ECS Maintenance and Development Project

Release 7 Registry Database Design and Schema Specifications for the EMD Project

July 2004

Raytheon Company
Upper Marlboro, Maryland

Release 7
Registry Database Design and Schema Specifications
for the EMD Project

July 2004

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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.

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This document describes the data design and database specification for the Subscription Server subsystem. It is one of eleven documents comprising the detailed database design specifications for each of the ECS subsystems.

The subsystem database design specifications for the as delivered system include:

- 311-EMD-001 Release 7 Data Management (DM) Subsystem Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-002 Release 7 Ingest Subsystem Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-003 Release 7 Planning and Data Processing Subsystem (PDPS) Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-004 Release 7 Science Data Server (SDSRV) Subsystem Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-005 Release 7 Storage Management (STMGT) Subsystem Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-006 Release 7 Subscription Server (SUBSRV) Subsystem Database Design and Database Schema Specifications for the ECS Project

- 311-EMD-007 Release 7 Management Support Subsystem (MSS) Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-008 Release 7 Configuration Registry Subsystem (CONFIG) Database Design and Database Schema Specifications for the ECS Project
- 311-EMD-009 Release 7 PDS Subsystem Database Design and Database Schema Specification
- 311-EMD-010 Release 7 Name Server Subsystem Database Design and Database Schema Specification
- 311-EMD-011 Release 7 Order Manager Server Database Design and Database Schema Specification
- 311-EMD-012 Release 7 Spatial Subscription Server Database Design and Database Schema Specification
- 311-EMD-013 Release 7 Data Pool Database Design and Database Schema Specification

Entity Relationship Diagrams (ERDs) presented in this document have been exported directly from tools and some cases contain too much detail to be easily readable within hard copy page constraints. The reader is encouraged to view these drawings on-line using the Portable Document Format (PDF) electronic copy available via the ECS Data Handling System (EDHS) on the world wide web at <http://edhs1.gsfc.nasa.gov>.

Abstract

This document outlines Release 7 “as-built” database design and database schema of the Registry database including the physical layout of the database and initial installation parameters.

Keywords: data, database, design, configuration, database installation, scripts, security, data model, data dictionary, replication, performance tuning, SQL server, database security, replication, database scripts

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Appendix A. Registry Subsystem Entity Relationship Diagrams

Abbreviations and Acronyms

1. Introduction

1.1 Identification

This Registry (REGIST) Database Design and Database Schema Specification document, is part of Contract Data Requirements List (CDRL) Item Number 23, which is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Maintenance and Development (EMD) Contract (NAS5-03098).

1.2 Scope

The REGIST Database Design and Database Schema Specification document describes the data design and database specifications to support the data requirements of Release 7 REGIST software.

1.3 Purpose

The purpose of the REGIST Database Design and Database Schema Specification document is to support the maintenance of REGIST data and databases throughout the life cycle of ECS. This document communicates the database implementation in sufficient detail to support ongoing configuration management.

1.4 Audience

This document is intended to be used by ECS maintenance and operations staff. The document is organized as follows:

Section 1 provides information regarding the identification, purpose, scope and audience of this document.

Section 2 provides a listing of the related documents, which were used as a source of information for this document.

Section 3 contains the REGIST physical data model which is the database tables, triggers, stored procedures, and flat files.

Section 4 provides a description of database performance and tuning features such as indexes, caches, and data segments.

Section 5 provides a description of the security infrastructure used and a list of the users, groups, and permissions available upon initial installation.

Section 6 provides a description of database and database related scripts.

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2. Related Documents

2.1 Applicable Documents

The following documents, including Internet links, are referenced in this document, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

305-CD-610	Release 7 Segment Design Specification for the ECS Project
920-TDG-009	DAAC Hardware Database Mapping/GSFC
920-TDN-009	DAAC Hardware Database Mapping/NSIDC
920-TDE-009	DAAC Hardware Database Mapping/EDC
920-TDL-009	DAAC Hardware Database Mapping/LARC
920-TDS-009	DAAC Hardware Database Mapping/SMC
920-TDG-010	DAAC Database Configuration/GSFC
920-TDN-010	DAAC Database Configuration/NSIDC
920-TDE-010	DAAC Database Configuration/EDC
920-TDL-010	DAAC Database Configuration/LARC
920-TDS-010	DAAC Database Configuration/SMC
920-TDG-011	DAAC Sybase Log Mapping/GSFC
920-TDN-011	DAAC Sybase Log Mapping/NSIDC
920-TDE-011	DAAC Sybase Log Mapping/EDC
920-TDL-011	DAAC Sybase Log Mapping/LARC
920-TDS-011	DAAC Sybase Log Mapping/SMC
922-TDG-013	Disk Partitions/GSFC
922-TDN-013	Disk Partitions/NSIDC
922-TDE-013	Disk Partitions/EDC
922-TDL-013	Disk Partitions/LARC
922-TDS-013	Disk Partitions/SMC

These documents are maintained as part of the EMD baseline and available on the world wide web at the URL: <http://cmdm.east.hitc.com/baseline>. Please note that this is a partial mirror site in that some items are not available (they are identified) since this is OPEN to all. This site may also be reached through the EDHS homepage. Scroll page to the connections line and click on the EMD Baseline Information System link.

2.2 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document. These documents are not binding on this document.

313-CD-610	Release 7 CSMS/SDPS Internal ICD for the ECS Project
609-CD-610	Release 7 Operations Tools Manual for the ECS Project
611-CD-610	Release 7 Mission Operation Procedures for the ECS Project

3. Data Design

3.1 Database Overview

The REGIST database implements the large majority of the persistent data requirements for the REGIST subsystem. The database is designed in such a manner as to satisfy business policy while maintaining data integrity and consistency. Database tables are implemented using the Sybase Relational Database Management system (RDBMS). All components of the REGIST database are described in the sections, which follow.

3.1.1 Physical Data Model Entity Relationship Diagram

The Entity Relationship Diagram (ERD) presents a schematic depiction of the REGIST physical data model. The ERDs presented here for the REGIST database were produced using the Power Designer Data Architect Computer Aided Software Engineering (CASE) tool. ERDs represent the relationship between entities or database tables. The key for the symbols used in the ERDs follows in Figure 3-1.

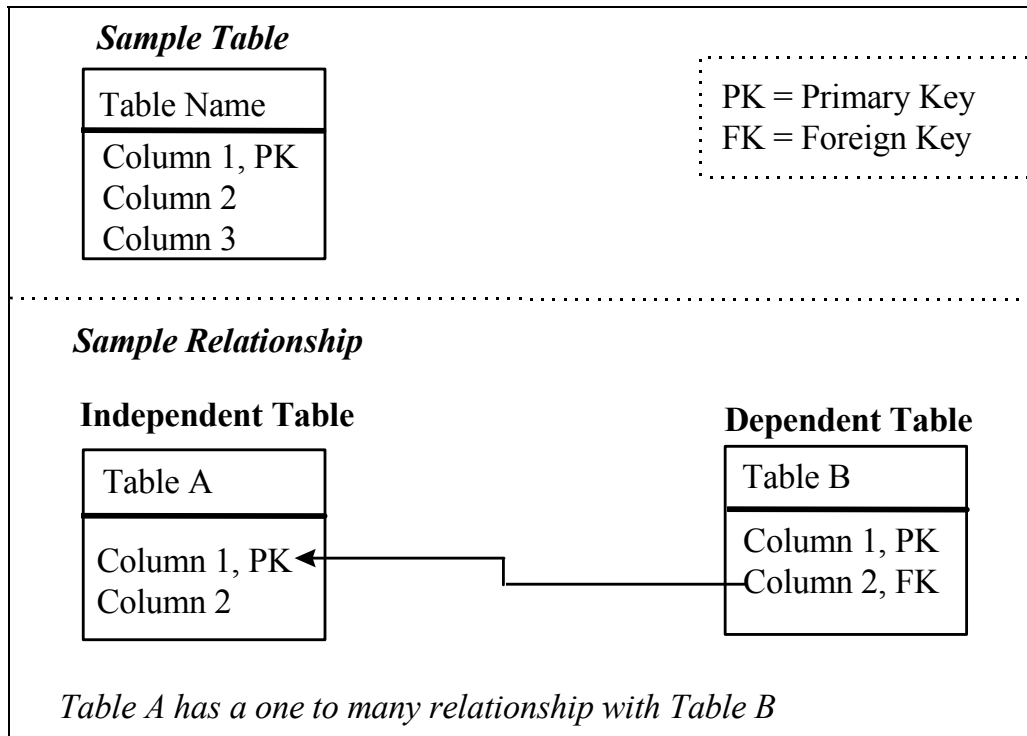


Figure 3-1. ERD Key

The ERDs for the REGIST database are shown in Appendix A, Figure A-1.

3.1.2 Tables

A listing of each of the tables in the REGIST database is given in table 3-1. A brief definition of each of these tables follows.

Table 3-1. REGIST Database Tables Listing

Table Name	Logical Grouping
AccessControllist	Security Information
Attribute	Registered Parameter Information
AttributeTree	Registered Parameter Information
AttributeValidEnum	Registered Parameter Information
ConfigurationManagementContact	Registered Parameter Information
ConfiguredValue	Registered Parameter Information
EcDbDatabaseVersions	Database versioning
Mode	Registered Parameter Information
Node	Registered Parameter Information
NodeContact	Registered Parameter Information
RegistryServerCache	Registered Parameter information
RegistryServerErrors	Registry Server Error information

Table 3-2 contains the set of user and groups access criteria applicable to a specific configuration node.

Table 3-2. AccessControllist

Name	Type	PK	Mandatory
AclCreateAllowedFlag	bit	No	Yes
AclDeleteAllowedFlag	bit	No	Yes
AclGroup	char(8)	No	No
AclReadAllowedFlag	bit	No	Yes
AclSequenceNumber	smallint	Yes	Yes
AclType	char(5)	No	No
AclUpdateAllowedFlag	bit	No	Yes
AclUser	char(14)	No	No
NodeID	numeric(12)	Yes	Yes

Table 3-3 defines a configurable attribute or parameter that may be set to a discrete value.

Table 3-3. Attribute

Name	Type	PK	Mandatory
AttributeDataType	char(20)	No	Yes
AttributeDecPlaces	tinyint	No	No
AttributeMaxValue	numeric(18)	No	No
AttributeMinValue	numeric(18)	No	No
NodeID	numeric(12)	Yes	Yes

Table 3-4 defines the set of hierarchically related configured items.

Table 3-4. AttributeTree

Name	Type	PK	Mandatory
AttribTreeDescription	varchar(80)	No	No
AttribTreeName	char(20)	Yes	Yes

Table 3-5 defines the set allowed values for a configurable attribute with string data type.

Table 3-5. AttributeValidEnum

Name	Type	PK	Mandatory
AttribValidEnumString	varchar(80)	Yes	Yes
AttribValidEnumStringDescr	varchar(80)	No	No
NodeID	numeric(12)	Yes	Yes

Table 3-6 defines contact information for Configuration Management parties to be notified whenever an item in the registry is changed.

Table 3-6. ConfigurationManagementContact

Name	Type	PK	Mandatory
CmContactEmailAddr	varchar(80)	Yes	Yes
CmContactFirstName	varchar(20)	No	No
CmContactLastName	varchar(30)	No	No
CmContactOrg	varchar(30)	No	No

Table 3-7 defines current and/or previous settings of a configurable attribute.

Table 3-7. ConfiguredValue

Name	Type	PK	Mandatory
ConfigValueChangeComment	varchar(255)	No	No
ConfigValueDataType	char(20)	No	Yes
ConfigValueDeleted	bit	No	Yes
ConfigValueSubscript	int	Yes	Yes
ConfigValueTimeStamp	smalldatetime	No	Yes
ConfigValueUserID	char(8)	No	Yes
ConfigValueVersionNbr	int	Yes	Yes
FloatConfigValue	float(8)	No	No
IntegerConfigValue	int	No	No
NodeID	numeric(12)	Yes	Yes
StringConfigValue	varchar(255)	No	No

Table 3-8 identifies the current version level of the REGIST database.

Table 3-8. EcDbDatabaseVersions

Name	Type	PK	Mandatory
EcDbSchemaVersionId	smallint	Yes	Yes
EcDbDropVersion	char(64)	Yes	Yes
EcDbDropDescription	varchar(255)	No	No
EcDbCurrentVersionFlag	char(1)	No	No
EcDbDatabaseName	varchar(255)	No	No
EcDbDropInstallDate	datetime	No	No
EcDbSybaseVersion	varchar(255)	No	No
EcDbSybaseServer	varchar(255)	No	No
EcDbComments	varchar(255)	No	No
EcDbUpdateProcess	varchar(255)	No	No

Table 3-9 defines a designated ECS software environment with a defined operations purpose.

Table 3-9. Mode

Name	Type	PK	Mandatory
AttribTreeName	char(20)	No	No
ModeName	char(8)	Yes	Yes
ModePurpose	varchar(80)	No	No

Table 3-10 defines an element or unit in the ECS software configuration hierarchy.

Table 3-10. Node

Name	Type	PK	Mandatory
AttribTreeName	char(20)	No	Yes
NodeDescription	varchar(255)	No	No
NodeID	numeric(12)	Yes	Yes
NodeName	varchar(64)	No	Yes
NodeType	char(9)	No	No
ParentNodeID	numeric(12)	No	No

Table 3-11 defines contact information for the parties to be notified whenever the configuration for a specific item is changed.

Table 3-11. NodeContact

Name	Type	PK	Mandatory
NodeContactEmail	varchar(80)	Yes	Yes
NodeContactFirstName	varchar(20)	No	No
NodeContactLastName	varchar(30)	No	No
NodeContactOrg	varchar(30)	No	No
NodeID	numeric(12)	Yes	Yes

Table 3-12 defines an element or unit in the ECS software configuration hierarchy.

Table 3-12. RegistryServerCache

Name	Type	PK	Mandatory
NodeID	numeric(12)	Yes	Yes
AttribTreeName	char(20)	No	Yes
NodeName	varchar(64)	No	Yes
ParentNodeID	numeric(12)	No	No
NodeType	char(9)	No	No
NodeDescription	varchar(255)	No	No
Lvl	int	No	No
Hierarchy	varchar(255)	No	No

Table 3-13 contains the Registry Server error codes.

Table 3-13. RegistryServerErrors

Name	Type	PK	Mandatory
ErrorCode	int	No	Yes
ErrorMsg	varchar(255)	No	Yes
ErrorTimeStamp	smalldatetime	No	Yes

3.1.3 Columns

Brief definitions of each of the columns present in the database tables defined above are contained in Table 3-14.

Table 3-14. Column Definitions (1 of 5)

Column Code	Table	Definition
AclCreateAllowedFlag	AccessControlList	A flag indicating if node creation access is authorized.
AclDeleteAllowedFlag	AccessControlList	A flag indicating if node deletion access is authorized.
AclGroup	AccessControlList	The group for which the access control list entry is applicable.
AclReadAllowedFlag	AccessControlList	A flag indicating if node read access is authorized.
AclSequenceNumber	AccessControlList	The relative order of this access control list entry to other access control list entries applicable for a given configuration item.
AclType	AccessControlList	A discriminator used to distinguish between access control list entries applicable to users as opposed to those applicable to groups.
AclUpdateAllowedFlag	AccessControlList	A flag indicating if node update access is authorized.
AclUser	AccessControlList	The user identifier of the user for whom the access control list is applicable.
AttribTreeDescription	AttributeTree	A short explanation of the purpose or use of the attribute tree.
AttribTreeName	AttributeTree Node Mode RegistryServerCache	A descriptive tag or name by which the attribute tree is known.

Table 3-14. Column Definitions (2 of 5)

Column Code	Table	Definition
AttributeDataType	Attribute	The data format in which the registry attribute is stored i.e. integer, float.
AttributeDecPlaces	Attribute	The amount of decimal places a floating number, within the numeric configurable attribute may be set to in the EcCsRegistry.
AttributeMaxValue	Attribute	The maximum numeric values that the numeric configurable attribute may be set to.
AttributeMinValue	Attribute	The minimum numeric values that the numeric configurable attribute may be set to.
AttribValidEnumString	AttributeValidEnum	An allowable value for a configurable attribute with a string datatype.
AttribValidEnumStringDescr	AttributeValidEnum	An explanation of the meaning of a allowable value for a configurable attribute with string datatype.
CmContactEmailAddr	ConfigurationManagementContact	The electronic mail address of the person to be contacted or notified about changes to ECS software configuration.
CmContactFirstName	ConfigurationManagementContact	The first name of a person to be contacted or notified about ECS software configuration changes.
CmContactLastName	ConfigurationManagementContact	The last name of the person to be contacted or notified about ECS software configuration changes.
CmContactOrg	ConfigurationManagementContact	The home organization of person to be contacted or notified about changes to ECS software configuration.
ConfigValueChangeComment	ConfiguredValue	An explanation of the reason that a configuration value was changed to a particular setting.
ConfigValueDataType	ConfiguredValue	The defined data format applicable to the configured value (i.e. integer, float.)

Table 3-14. Column Definitions (3 of 5)

Column Code	Table	Definition
ConfigValueDeleted	ConfiguredValue	This column is in reference to active status flag for the configured values.
ConfigValueSubscript	ConfiguredValue	Configuration Value Subscript is the order of how an array will pass multiple values through the GUI.
ConfigValueTimeStamp	ConfiguredValue	The date and time that a configurable value was set.
ConfigValueUserID	ConfiguredValue	The login id of the user who set the configuration value.
ConfigValueVersionNbr	ConfiguredValue	A number which identifies the variation and historical sequence of each configuration setting for a given configurable attribute.
EcDbComments	EcDbDatabaseVersions	Notes or comments on the database version level.
EcDbCurrentVersionFlag	EcDbDatabaseVersions	Flag indicating if this row represents the current database version entry. Valid Values: 1= yes, 0 = no
EcDbDatabaseName	EcDbDatabaseVersions	The name of the database for which this database version levels is applied.
EcDbDropDescription	EcDbDatabaseVersions	The official descriptions of the ECS software drop for this database version level.
EcDbDropInstallDate	EcDbDatabaseVersions	The date and time that the database version level was installed.
EcDbDropVersion	EcDbDatabaseVersions	The official name of the ECS software drops for this database version level.
EcDbSchemaVersionId	EcDbDatabaseVersions	The subsystem-specific identifier for this database schema version.
EcDbSybaseServer	EcDbDatabaseVersions	The name of the baseline Sybase SQL server controlling this database.

Table 3-14. Column Definitions (4 of 5)

Column Code	Table	Definition
EcDbSybaseVersion	EcDbDatabaseVersions	The software release version of the Sybase SQL server in place when this database version level was initially installed.
EcDbUpdateProcess	EcDbDatabaseVersions	The installation method by which this database version level was installed.
ErrorCode	RegistryServerErrors	The error codes which use by the Registry Server.
ErrorMsg	RegistryServerErrors	The error messages which associate with the error code.
ErrorTimeStamp	RegistryServerErrors	The time which the error occurs.
FloatConfigValue	ConfiguredValue	The setting for a registered attribute having a float data format.
Lvl	RegistryServerCache	This column holds the depth level of the node in the hierarchy, starting with 0 (Root Node) for the highest level.
IntegerConfigValue	ConfiguredValue	The setting for a registered attribute having a string data format.
Hierarchy	RegistryServerCache	The "Hierarchy" column will hold the chain of the node's NodeIDs of all parents of the node, including the node's own NodeID.
ModeName	Mode	A descriptive tag that uniquely identifies an ECS software development environment.
ModePurpose	Mode	A description of the usage of an ECS software development environment.
NodeContactEmail	NodeContact	The electronic mail address of the person to be contacted or notified about changes to a specific configuration node.
NodeContactFirstName	NodeContact	The first name of the person to be contacted or notified about changes to a specific configuration node.
NodeContactLastName	NodeContact	The last name of the person to be contacted or notified about changes to a specific configuration node.

Table 3-14. Column Definitions (5 of 5)

Column Code	Table	Definition
NodeContactOrg	NodeContact	The home organization of the person to be contacted or notified about changes to a specific configuration node.
NodeDescription	Node RegistryServerCache	An explanation of the usage or purpose of the configuration item.
NodeID	AccessControlList Attribute AttribValidEnum ConfiguredValue Node NodeContact RegistryServerCache	A code that uniquely identifies a registry item.
NodeName	Node RegistryServerCache	The descriptive tag by which the registry item is known for example, NumListemThreads.
NodeType	Node RegistryServerCache	A discriminator which indicates the type of registry item.
ParentNodeID	Node RegistryServerCache	A code that uniquely identifies a registry item.
StringConfigValue	ConfiguredValue	The setting for a registered attribute having a string data format.

3.1.4 Column Domains

Domains specify the ranges of values allowed for a given table column. Sybase supports the definition of specific domains to further limit the format of data for a given column. Sybase domains are, in effect, user-defined data types. There are no domains defined in the REGIST database.

3.1.5 Rules

Sybase supports the definitions of rules. Rules provide a means for enforcing domain constraints on a given column. There are no rules defined in Sybase for the REGIST database.

3.1.6 Defaults

Defaults are used to supply a value for a column when one is not defined at insert time. There are no defaults defined in Sybase in the REGIST database. The following, Table 3-15, is a list of tables and columns which contain defaults.

Table 3-15. List of Defaults

Table Name	Column Name	Default Value
ConfiguredValue	ConfigValueDeleted	0
AccessControllist	AclCreateAllowedFlag	0
AccessControllist	AclReadAllowedFlag	0
AccessControllist	AclUpdateAllowedFlag	0
AccessControllist	AclDeleteAllowedFlag	0

3.1.7 Views

Sybase allows the definition of views as a means of limiting an application or users access to data in a table or tables. Views create a logical table from columns found in one or more tables. There are no views defined in the REGIST database.

3.1.8 Integrity Constraints

Sybase allows the enforcement of referential integrity via the use of declarative integrity constraints. Integrity constraints allow the SQL server to enforce primary and foreign key integrity checks without automatically without requiring programming constraints support “restrict-only” operations. This means that a row can not be deleted or updated if their are rows in other tables having a foreign key dependency on that row. Cascade delete and update operations can not be performed if a declarative constraint has been used. There are no declarative integrity constraints defined in the REGIST database.

3.1.8.1 Dependencies on Table: AttributeTree

Reference by List

Referenced by	Primary Key	Foreign Key
Node	AttribTreeName	AttribTreeName
Mode	AttribTreeName	AttribTreeName

3.1.8.2 Dependencies on Table: Node

Reference by List

Referenced by	Primary Key	Foreign Key
NodeContact	NodeID	NodeID
Attribute	NodeID	NodeID
Node	NodeID	ParentNodeID
AccessControllist	NodeID	NodeID

3.1.8.3 Dependencies on Table: Attribute

Reference by List

Referenced by	Primary Key	Foreign Key
ConfiguredValue	NodeID	NodeID
AttributeValidEnum	NodeID	NodeID

3.1.8.4 Dependencies on Table: RegistryServerCache

Reference by List

Referenced by	Primary Key	Foreign Key
RegistryServerCache	NodeID	ParentNodeID

3.1.9 Triggers

Sybase supports the enforcement of business policy via the use of triggers. A trigger is best defined as set of activities or checks that should be performed automatically when ever a row is inserted, updated, or deleted from a given table. Sybase allows the definition of insert, update, and delete trigger per table. A listing of each of the triggers in the REGISTRY database is given in Table 3-16. A brief definition of each of these stored procedures follows:

Table 3-16. Triggers Listing

Name	Description
TrigInsRegistryServerCache	Updates the Lvl and Hierarchy columns.

3.1.10 Stored Procedures

Sybase also includes support for business policy via the use of stored procedures. Stored procedures are typically used to capture a set of activities or checks that will be performed on the database repeatedly to enforce business policy and maintain data integrity. Stored procedures are parsed and compiled SQL code that reside in the database and may be called by name by an application, trigger or another stored procedure. A listing of each of the stored procedures in the REGISTRY database is given in Table 3-17. A brief definition of each of these stored procedures follows.

Table 3-17. Stored Procedure Listing (1 of 2)

Name	Description
ProcRgyDeleteAttribTree	Deletes the attribute tree
ProcRgyGetAttribInfo	Returns attribute information for the specified parentNodeID.
ProcRgyGetAttribName	Returns Attribute Tree name which is mapped to mode.

Table 3-17. Stored Procedure Listing (2 of 2)

Name	Description
ProcRgyGetConfigInfo	Returns attribute information based on the root node and the server NodeID.
ProcRgyGetMediaInfo	Returns Media Distribution Option Information.
ProcRgyGetRefCfgInfo	Returns value of referenced attribute.
ProcRgyGetSvrNodeID	Returns a list of associated servers based on the root node.
ProcRgyInsertSvrCache	Inserts requested attribute tree into Registry Server Cache Table.
logdump	Sets the threshold for dumping the transaction log.
logwarning	Sends a warning message when the data segment is filled up to a specific threshold.
datawarning	Notifies DBA when a data segment threshold is crossed.
sp_thresholdaction	Executes automatically when the number of free pages on the log segment falls below the last-chance threshold, unless the threshold is associated with a different procedure.

3.2 File Usage

There are cases when the implementation of a persistent data requirement is better suited to a flat file than to a database table. A common use of files in ECS is as an interface mechanism between ECS and the external world. There are no flat files used in REGIST.

3.2.1 Files Definitions

Not applicable.

3.2.2 Attributes

Not applicable.

3.2.3 Attribute Domains

Not applicable.

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4. Performance and Tuning Factors

4.1 Indexes

An index provides a means of locating a row in a database table based on the value of a specific column(s), without having to scan all data in the table. When properly implemented, indexes can significantly decrease the time it takes to retrieve data, thereby increasing performance. Sybase allows the definition of two types of indexes, clustered and non-clustered.

In a clustered index, the rows in a database table are physically stored in sequence-determined by the index. Clustered indexes are particularly useful, when the data is frequently retrieved in sequential order. Only one clustered index may be defined per table.

Non-clustered indexes differ from their clustered counterpart, in that, data is not physically stored in sorted order—newly added rows are stored at the end of the related database table.

A key of the types of indexes found in REGIST is provided in Table 4-1 Index Type Key. A description of each of the defined indexes is given in Table 4-2 Index List.

Table 4-1. Index Type Key

Index Type Key	Description
PK	Primary Key
FK	Foreign Key
U	Unique - Only one for the column code combination
C	Clustered or non-clustered index
Sort	ASC (ascending) or DESC (descending) order

Table 4-2. Index Listing (1 of 2)

Table Code	Index Code	Primary Key	Foreign Key	Unique	Clustered
AccessControlList	PK_ACCESSCONTROLLIST	Yes	Yes	Yes	Yes
	IdxAccessCtlListNodeID	No	Yes	No	No
Attribute	PK_ATTRIBUTE	Yes	Yes	Yes	Yes
AttributeTree	PK_ATTRIBUTETREE	Yes	No	Yes	Yes
AttributeValidEnum	PK_ATTRIBUTEVALIDENUM	Yes	Yes	Yes	Yes
	IdxAttribValidEnumNodeID	Yes	Yes	No	No
	IdxAtValidEnumNodeID_EnumStr	Yes	Yes	Yes	No

Table 4-2. Index Listing (2 of 2)

Table Code	Index Code	Primary Key	Foreign Key	Unique	Clustered
Node	PK_NODE	Yes	No	Yes	Yes
	IdxNodeAttribTreeName	No	Yes	No	No
	IdxNodeParentNodeID	No	Yes	No	No
Mode	PK_MODE	Yes	No	Yes	Yes
	IdxModeAttribTreeName	No	Yes	No	No
ConfigurationManagement Contact	PK_CONFIGURATIONMANAGEMENTCONT	Yes	No	Yes	Yes
ConfiguredValue	PK_CONFIGUREDVALUE	Yes	No	Yes	Yes
	IdxConfiguredValueNodeID	No	Yes	No	No
NodeContact	PK_NODECONTACT	Yes	No	Yes	Yes
	IdxNodeContactNodeID	No	Yes	No	No
RegistryServerCache	PK_RegistrySvrCache	Yes	No	Yes	Yes
	IdxParentNodeID	No	No	No	No

4.2 Segments

Sybase supports the declaration of segments. A segment is a named pointer to a storage device(s). Segments are used to physically allocate a database object to a particular storage device. Segments defined for the REGIST and all other subsystem databases are described in Table 4-3.

Table 4-3. Segment Descriptions

Segment Name	Description
default	Default data segment used if no other segment specified in the create statement.
logsegment	SYSLOGS, Transaction Logs.
systemsegment	System tables and indexes.

4.3 Caches

A cache is a block of memory that is used by Sybase to retain and manage pages that are currently being processed. By default, each database contains three caches:

Data cache – retains most recently accessed data and index pages

Procedure cache – retains most recently accessed stored procedure pages

User transaction log cache – transaction log pages that have not yet been written to disk for each user

The size of each of these default caches is a configurable item which must be managed on a per DAAC basis. These caches may be increased or decreased by the DAAC DBA as needed.

The data cache can be further subdivided into named caches. A *named cache* is a block of memory that is named and used by the DBMS to store data pages for select tables and/or indexes. Assigning a database table to named cache causes accessed pages to be loaded into memory and retained. The named cache does not need to be allocated to accommodate the entire database table since the DBMS manages the cache according to use. Named caches greatly increase performance by eliminating the time associated for disk input and output (I/O). There are no named caches that are currently defined for the REGIST Subsystem database. Named caches may be defined as the memory usage of the REGIST database becomes better known and the DAACs move into an operational environment. As named caches are defined this portion of the document will be updated.

There are no named caches for the Registry database.

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5. Database Security

5.1 Approach

The database security discussed within this section is bounded to security implementation within the Sybase SQL Server DBMS. A Sybase general approach to security is adopted as illustrated in Figure 5-1.

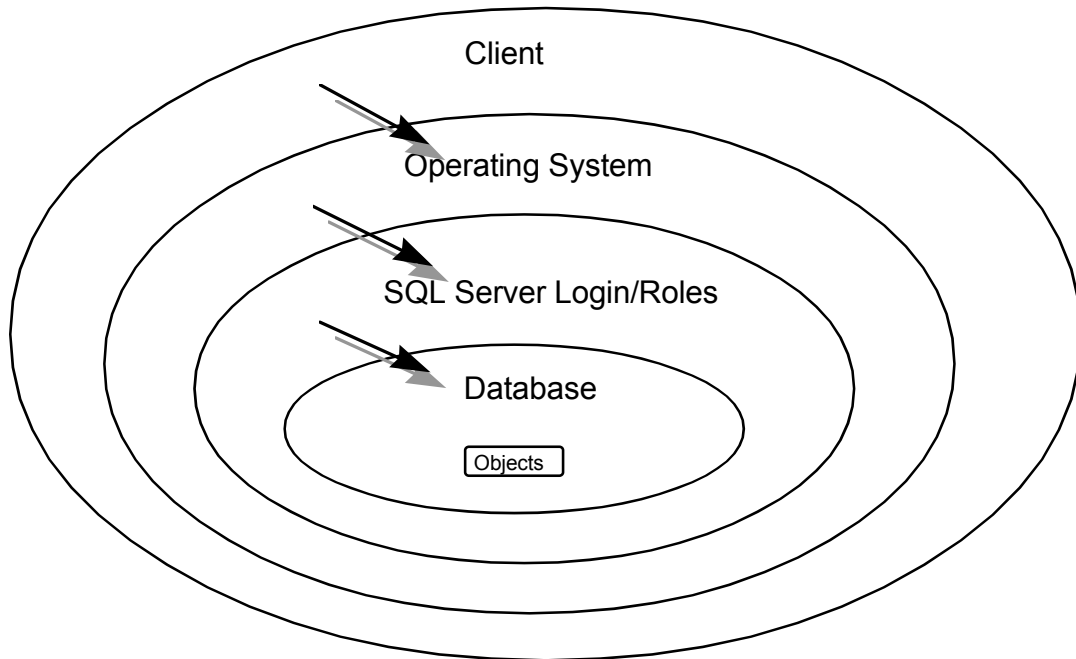


Figure 5-1. Sybase General Approach to SQL Server Security¹

5.2 Users

The client (user) requires a SQL Server login to access the DBMS. The login is assigned to a user with certain related permissions for gaining access to particular objects (e.g., database tables, views, commands) within the database. The System Administrator may grant or revoke objects permissions for a login individually or based on defined group or roles.

5.3 Groups

Groups are a means of logically associating users with similar data access needs. Once a group has been defined, object and command permissions can be granted to that group. A user who is

¹ Reference Sybase Student Guide: *Advanced SQL Server Administration*.

member of a group inherits all of the permissions granted to that group. No groups have been initially defined in the REGIST Subsystem “default database. The DAACs should define database groups to support the database security requirements of their individual DAACs. Assigning each user to the appropriate group should control security for local DAAC users.

5.4 Roles

Roles were introduced in Sybase to allow a structured means for granting users the permissions needed to perform standard database administration activities and also provide a means for easily identifying such users. There are six pre-defined roles that may be assigned to a user. A definition of each of these roles follows, as well as a description of the types of activities that may be performed by each role.

System Administrator (*sa_role*): This role is used to grant a specific user permissions needed to perform standard system administrator duties including:

1. installing SQL server and specific SQL server modules
2. managing the allocation of physical storage
3. tuning configuration parameters
4. creating databases

Site Security Officer (*sso_role*): This role is used to grant a specific user the permissions needed to maintain SQL server security including:

1. adding server logins
2. administrating passwords
3. managing the audit system
4. granting users all roles except the *sa_role*

Operator (*oper_role*): This role is used to grant a specific user the permissions needed to perform standard functions for the database including:

1. dumping transactions and databases
2. loading transactions and databases

Navigator (*navigator_role*): This role is used to grant a specific user the permissions needed to manage the navigation server.

Replication (*replication_role*): This role is used to grant a specific user the permissions needed to manage the replication server.

Sybase Technical Support (*sybase_ts_role*): This role is used to 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.

The DAACs should review these roles and assign them to the appropriate login and/or groups.

5.5 Login/Group Object Permissions

During initial database installation logins used by the ECS custom code were created and permissions assigned for access to the REGIST Subsystem database. In addition, special database installation login, REGIST_role, was created to support database installation needs. For each login, the level of access is limited to that associated with their login, group or assigned group/role. Object Permissions are set within the installation scripts of the REGIST Subsystem for each object and group/role.

Permissions are identified in Table 5-1. A specification of the object permissions is contained in Table 5-2.

Table 5-1. Permission Key

Permission	Description
A	All
S	Select
I	Insert
U	Update
D	Delete
E	Execute

Table 5-2. Object Permissions

Group/User	Sybase Login	Object	Select	Insert	Update	Delete	Execute
			X	X	X	X	
RgAdminGroup	EcCsRegistry	All Tables	X	X	X	X	
RgAdminGroup	GuiAdmin	All Tables	X	X	X	X	
RgUserGroup	EcCsUser	All Tables	X				

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6. Scripts

6.1 Installation Scripts

Any scripts used to support installation of the REGIST database are described in Table 6-1.

Table 6-1. Installation Scripts

Script File	Description
EcCsRgDbBuild	Installs/populates Registry database

6.2 De-Installation Scripts

Any scripts used to support de-installation of the REGIST database are described in Table 6-2.

Table 6-2. De-Installation Scripts

Script File	Description
EcCsRgDbDrop	Drops database objects

6.3 Backup/Recovery Scripts

Any scripts used to facilitate backup or recovery of the REGIST database are described in Table 6-3.

Table 6-3. Backup/Recovery Scripts

Script File	Description
EcCsRgDbDump	Creates a backup of the database
EcCsRgDbLoad	Restores the database

6.4 Miscellaneous Scripts

Miscellaneous scripts applicable to the REGIST database are described in Table 6-4.

Table 6-4. Miscellaneous Scripts

Script File	Description
EcCsRgDbPatch	Install database schema modifications

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Appendix A. Registry Subsystem Entity Relationship Diagrams

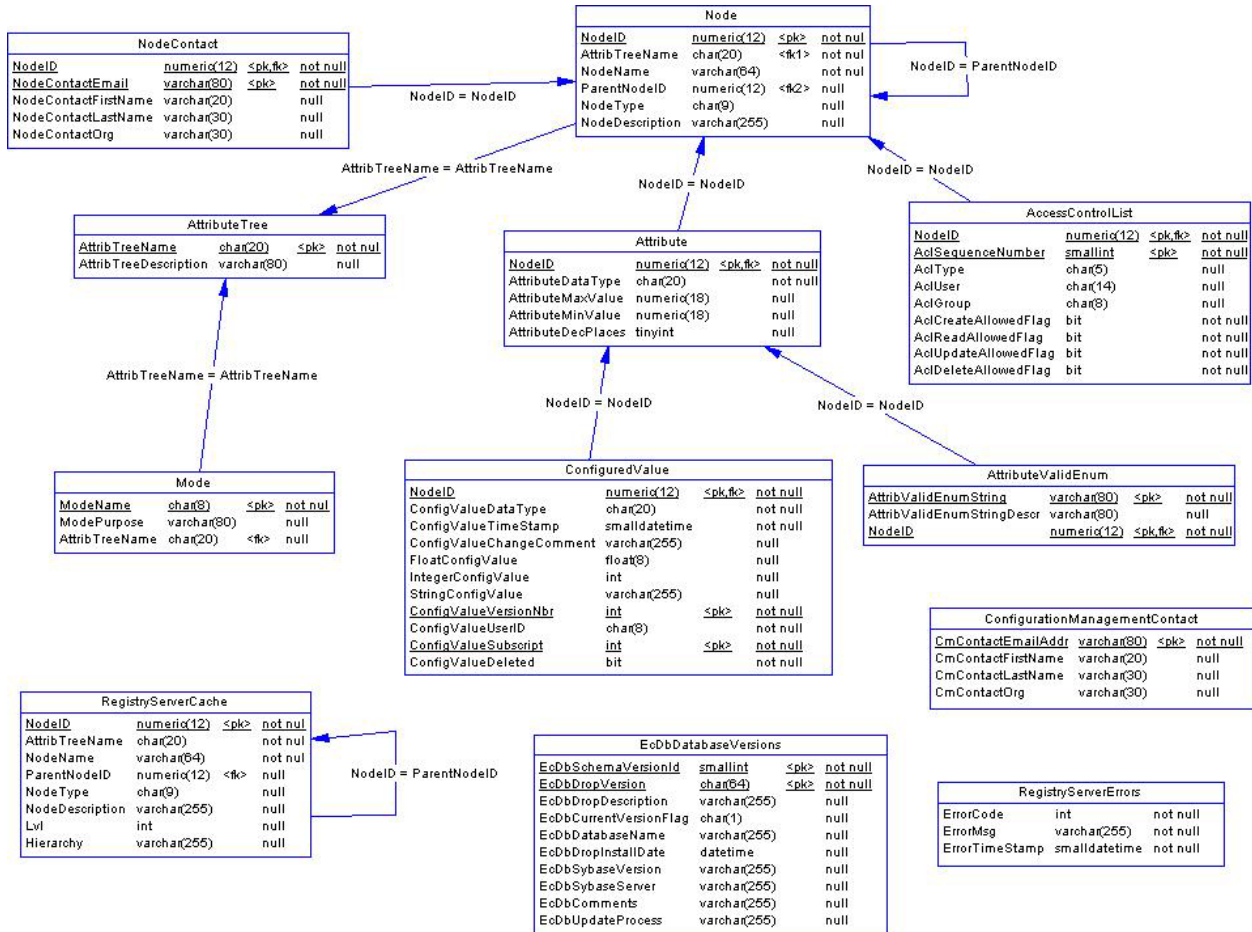


Figure A-1. Registry

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Abbreviations and Acronyms

ANSI	American National Standards Institute
ASCII	American Standard Code for Information Exchange
CASE	Computer Aided Software Engineering
CD	contractual delivery 213-001
CDRL	contract data requirements list
CI	configuration item
CONFIG	Configuration Registry Subsystem
COTS	commercial off-the-shelf (hardware or software)
CSCI	computer software configuration item
DAAC	Distributed Active Archive Center
DBCC	Database Consistency Checker
DBMS	Database Management System
DCN	Document Change Notice
DID	data item description
DM	Data Management
DMS	Data Management Subsystem
ECS	EOSDIS Core System
EDC	EROS Data Center
EDHS	ECS Data Handling System
EOSDIS	Earth Observing System Data and Information System
EROS	Earth Resources Observation System
ERD	Entity Relationship Diagram
ESDIS	Earth Science Data and Information System (GSFC)
ESDT	Earth science data types
ESN	EOSDIS Science Network (ECS)
FK	Foreign Key
GSFC	Goddard Space Flight Center

GUI	graphic user interface
HDF	hierarchical data format
HDF-EOS	an EOS proposed standard for a specialized HDF data format
HTML	HyperText Markup Language
HTTP	Hypertext Transport Protocol
I/O	input/output
ICD	interface control document
INGST	Ingest Services CSCI
IOS	Interoperability Subsystem
LaRC	Langley Research Center (DAAC)
MSS	Management Support Subsystem
N/A	not applicable
NAS	National Academy of Science
NASA	National Aeronautics and Space Administration
NSIDC	National Snow and Ice Data Center (DAAC)
ODL	Object Definition Language
PCF	Process Control File
PDF	Portable Document Format
PDPS	Planning and Data Processing Subsystem
PGE	Product Generation Executive
PK	Primary Key
QA	Quality Assurance
RDBMS	Relational Database Management System
REGIST	Registry
SDSRV	Science Data Server CSCI
SQL	Structured Query Language
STMGT	Storage Management Software CSCI
SUBSRV	Subscription Server
REGIST	Registry
URL	Universal Resource Locator
WWW	World-Wide Web