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DATA CAPTURE SYSTEM (DCS) DATABASE ANALYSIS AND DESIGN

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DATA CAPTURE SYSTEM (DCS) DATABASE ANALYSIS AND DESIGN

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Section 1 Introduction

1.1 Identification

The purpose of this document is to present the database analysis and detailed database design for the Data Capture System (DCS). The DCS was developed for the United States Geological Survey's (USGS) Earth Resources Observation System (EROS) Data Center (EDC) of the United States Department of Interior (DOI) for operation at the EDC. This document defines the DCS requirements and gives details for the current Landsat 7 mission.

1.2 System Overview

The DCS is a modular wideband data capture platform used to capture data for the Landsat 7 mission. As a modular platform, the DCS has the ability to capture data for multiple missions; therefore, this document defines the DCS requirements and gives details for the current mission.

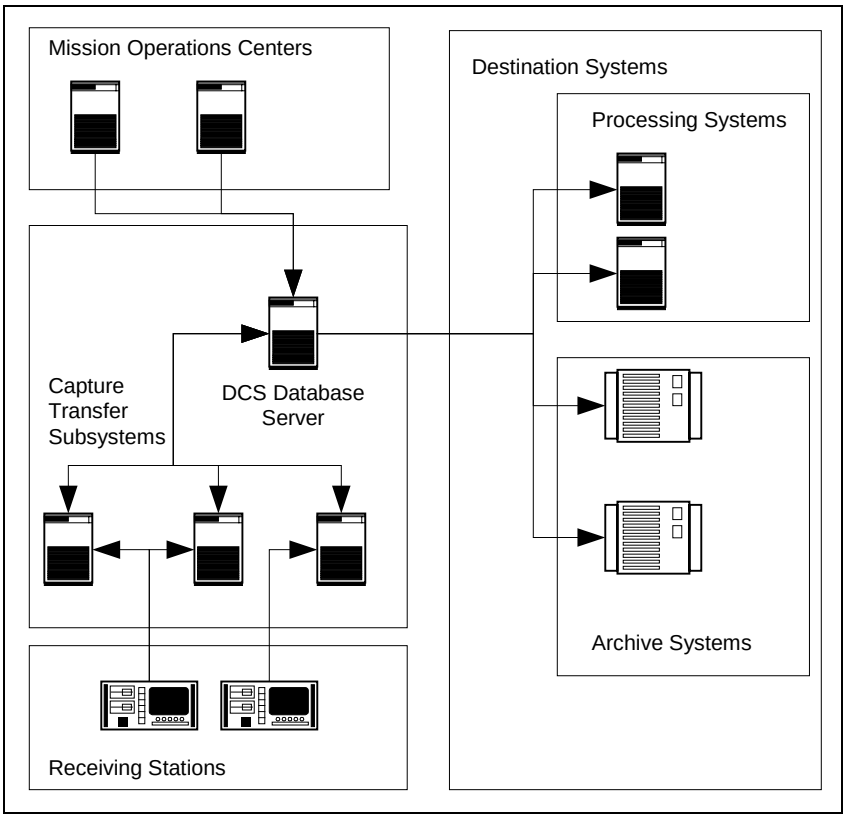

Figure 1-1. General DCS Environment

The DCS has two basic subsystems: the DCS Database Server (DDS) Subsystem and multiple Capture Transfer Subsystems (CTS). The DDS Subsystem, serving as the primary operator station for DCS, tracks raw file delivery to destination systems and/or backup tapes. CTSs (with additional capture hardware platforms) can be added as additional missions are added to the DCS project.

After capturing the wideband data, the CTS transfers the data to the DDS for distribution to mission-defined destination systems. Destination systems include both processing and archive systems.

The DDS stores the captured wideband data temporarily for retrieval by the destination systems. The wideband data are received from the CTS(s) via network transfer or from tape (for ingest of data from the CTS operating in stand-alone mode). Normally, the appropriate network-connected destination system(s) carry out the transfer of raw data. These transfers can occur simultaneously. The DDS can also copy raw data to tape in non-nominal operation.

Each mission will have a Mission Operations Center (MOC) that will deliver mission-specific contact schedules to the DDS. The contacts defined in the schedule are for live supports at EDC. There is no data transfer from the DDS to the MOCs.

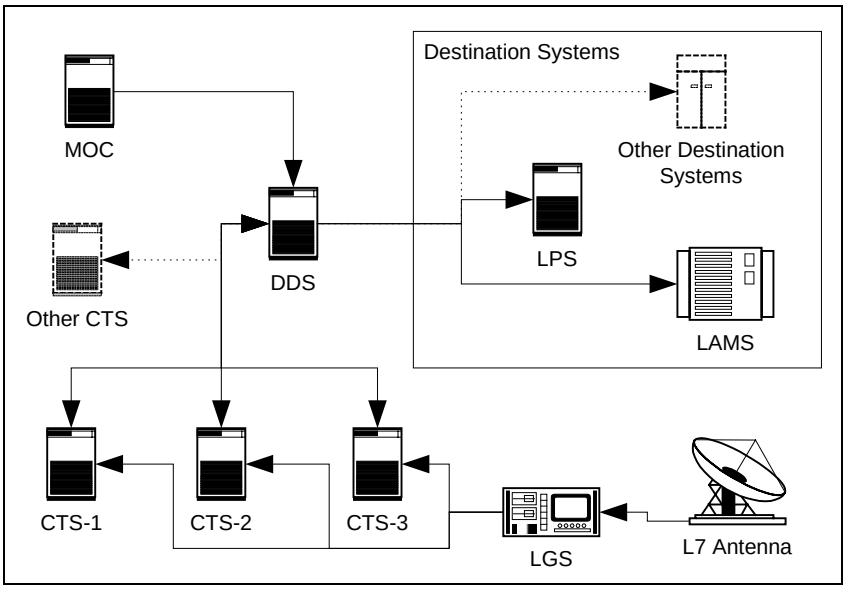

Figure 1-2. DCS L7 Environment

1.3 Document Overview

This database analysis and design document lists the logical and physical characteristics of the DCS database. The database requirements are derived from the system and software requirements that are applicable to database analysis and design. Oracle Designer captured most of the database analysis and design.

Section 2 Database Analysis and Design

2.1 Logical Entity Relationship Diagram

The DCS logical entity relationship diagram shows entities and attributes used in the DCS subsystem. Attachment A is the DCS logical diagram generated from Oracle Designer. See the Data Capture Processing Facility (DCPF) Landsat Database Administrator (DBA) for more information concerning Oracle Designer.

2.2 Tables and Columns Including Descriptions and Data Types

The tables and columns, generated from Oracle Designer, are contained in the DCS container of the Designer repository. See DCPF DBA for more information concerning Oracle Designer. See Attachment B for a report of tables and columns.

2.3 Physical Implementation

The DCS Database was implemented using Oracle 8i on the DDS computer. Separate disk drives were necessary for mirrored redo logs to mitigate recovery risks. One tablespace was used for all DCS table data segments and one for index segments. The tablespaces may be located on a partition of the RAID.

2.3.1 Triggers

Update table TRANSFER_ACCT.STATUS_DATE to sysdate when an insert (after commit) or update occurs on TRANSFER_ACCT.XFER_STATUS.

2.4 Availability Requirements

DCS System Requirement 2.2.1, “The DCS shall be capable of storing a minimum of 144 GB of unique wideband data,” denotes that the CTS subsystem can hold approximately three days of data. With this requirement, DDS could be down (theoretically) for over two days before the CTS disk drives fill up.

CTS contingency operations also include writing data to tape for ingest into DDS when the DDS becomes available. This allows even more time before the DCS database is required to be on-line during an emergency.

2.5 Backup and Recovery

The DCS database uses Oracle’s hot backup facility, which provides until-time recovery. In the event of a complete loss of all disk assemblies, recovery will only be available to the last backup of archived log and database files.

In the near future, the database will be backed up using Oracle's RMAN backup utility. This utility will allow the administrators to maintain the same level of recovery and have the ability to take incremental backups in order to save on backup space.

Optionally, Landsat 7 DBAs may choose to use Oracle 8i’s standby database. The standby database allows the archived redo logs to be applied to a separate database for EMERGENCY purposes. If DCS is unable to recover, or if database administration

support is not available, operators will have the ability to connect to the standby database and continue to process data. If the standby database is used for emergency purposes, all information that has been committed and applied to redo logs, but has NOT been archived, will be lost. Recovery of the non-archived information will be possible after the original database is recovered, by applying the non-archived redo logs after they are manually switched. The recovery of the database and the non-archived information will be performed by the DBA.

Appendix A Acronyms

CCR	Configuration Change Request
CTS	Capture Transfer Subsystem
DBA	Database Administrator
DCPF	Data Capture Processing Facility
DCS	Data Capture System
DDS	DCS Database Server
DHF	Data Handling Facility
DOI	Department of the Interior
EDC	EROS Data Center
EROS	Earth Resources Observation System
MOC	Mission Operations Center
RAID	Redundant Array of Independent Drives
RMAN	Recovery Manager
SAIC	Science Applications International Corporation
USGS	U.S. Geological Survey

References

USGS. DCS-100. Data Capture System (DCS) System Requirements Document (SRD). March 2003.

USGS. DCS-103. Data Capture System (DCS) Software Requirements Specification (SRS). April 2003.