# COMMONWEALTH OF PENNSYLVANIA
## HEALTH & HUMAN SERVICES DELIVERY CENTER

## INFORMATION TECHNOLOGY STANDARD

| | |
|---|---|
| Name of Standard: <br> **Database Backups** | Number: <br> **STD-DMS006** |
| Domain: <br> **Data** | Category: <br> **Database Backups** |
| Date Issued: <br> **08/25/2009** | Issued by Direction of: |
| Date Revised: <br> **06/16/2020** | **Jon Arnold, Chief Technology Officer, Technology Services Office** |

## Abstract:

The Health and Human Services Delivery Center (HHS DC) has a multi-platform architecture consisting of Unisys hierarchical and relational databases on the mainframe, Oracle and Microsoft SQL Server relational database management systems (RDMS) on Windows and Linux OS platforms.

The Database Operations, Oracle Unit within Service Operations of the HHS Technology Services Office (TSO) is responsible for overseeing the reliable and efficient recovery of data due to loss and/or data corruption within the Department of Health and Human Services (DHS) business applications.  The unit also develops, implements, and continually refines efficient and effective measures for all HHS databases to safeguard information resources while maximizing availability of data throughout the Department.

The Oracle Unit coordinates and works closely with appropriate personnel in the Compute and Batch Units within Service Operations of HHS TSO determining the type of backup methodology based on application and business requirements and discussions held with the application owner and end users.

## General:

This document contains standards followed regarding the software, backup schedule, and types of backups used for DHS applications and supplements the standards contained in the Governor's Office of Administration/Office of Information Technology (OA/OIT) Information Technology Policies specifically, ITP-INF001  - Database Management Systems

Policy Supplements:
STD-INF001A - Database Product Standards

OPD-INF001B - Database Management Systems: Production and Operations Standards

## Standard:

## Mainframe

### Software

The Integrated Recovery Utility (IRU) is the software used for backups on the Unisys 2200 Mainframe for the Unisys 2200 Database Management System and the Unisys 2200 Relational Database Management System.

### Backup Schedule

Dynamic backups of all databases on the Production mainframe, Host HSH-A, are scheduled every night after the AP1SAV job except on Sunday when a static backup is completed first.  The audit trail tapes are then swapped, and all databases are dumped dynamically to Host HSH-C.

Dynamic backups of SAT, Systems Acceptance, occur 7 days each week at 01:00 hours Static

backups of all databases on the Host HSH-C, Development mainframe are as follows:

> DEV, Development backups occur every Friday after COMPLT and every Sunday at 18:00 hours

> TRN, Training backups occur Monday through Saturday at 20:00 hours

> INT, Integration backups occur every Friday after 18:00 and every Saturday at 20:00 hours

### Disaster Recovery

The backup tapes of Production on Host HSH-A are replicated at the Harrisburg Data Center as they are created.

### Backup Types Dynamic Backup

Database files are up and available for update and retrieval during backup process.

### Static Backup

Database files are down and unavailable for update or retrieval during backup process.

### Read Only

Database files are unavailable for updating but are available for retrieval during backup process.

## Oracle

### Software

Oracle Recovery Manager (RMAN)

Oracle Data Pump Export Utility and Oracle Data Pump Import Utility

Databases residing in an ORACLE relational database management system use ORACLE Recovery Manager (RMAN). The RMAN repository resides in a separate ORACLE instance/database within the ASM Disk Manager. The 'resync catalog' command is executed twice per week, at a minimum, to keep the control file and the RMAN repository current. The RMAN repository is backed up daily. Depending on application requirements and the volatility of the application, a decision between the DBA, Application owner and Development Analyst will be made to run databases in ARCHIVELOG or NOARCHIVELOG mode. The backup strategy includes control files, online and archive redo log files, and data files.

## Backup Schedule

**Full Backups**

| Environment | **Processing Type** | Oracle RMAN backups to Data Domain | Oracle Data Pump Export Utility | Type of Backup |
|---|---|---|---|---|
| | | Frequency | Export Type /Frequency | |
| DEV | OLTP | Weekly – Sat Archive Logs – Daily every 3 hours 05:00 to 23:00 | Full Daily | Hot |
| INT | OLTP | Weekly – Sat Archive Logs – Daily every 3 hours 05:00 to 23:00 | Meta data Daily CISI Full daily | Hot |
| TRN | OLTP | Weekly – Sat Archive Logs – Daily every 3 hours 05:30 to 23:30 | Full Daily Meta data only EDXRADC | Hot |
| SAT | OLTP | Weekly Sat Archive Logs – Daily every 3 hours 05:00 to 23:00 | Full Daily | Hot |
| TFP | OLTP | Weekly Saturday Archive Logs – Daily every 3 hours 05:00 to 23:00 | Meta data Daily | Hot |
| LOAD | OLTP | Upon request | Upon request | Hot |
| PROD | OLTP | DB - Weekly Mon and Fri Archive Logs – Daily every 3 hours 06:00 to 23:00 | Full export Daily | Hot |

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|---|---|---|---|---|
| DEV | DW | Weekly Saturday<br>Archive Logs – Daily every 3 hours 06:00 to 23:00 | Meta data Daily | Hot |
| TRN | DW | Weekly Saturday<br>Archive Logs – Daily every 3 hours 06:00 to 23:00 | Meta data Daily | Hot |
| SAT | DW | Weekly Saturday<br>Archive Logs – Daily every 3 hours 06:00 to 23:00 | Meta data Daily | Hot |
| TFP | DW | Weekly Saturday<br>Archive Logs – Daily every 3 hours 06:00 to 23:00 | Meta data Daily | Hot |
| PROD | DW | Weekly Mon and Sat<br>Archive Logs – Daily every 3 hours 06:00 to 23:00 | Meta data Daily<br><br>CWIS Full daily | Hot |

*OLTP – Online Transaction Processing
*DW – Data Warehouse also known as OLAP – Online Analytical Processing
*DEV – Development, INT – Integration, TRN – Training, SAT – Systems Acceptance Test, TFP – Test For Production, PROD - Production

The above schedule is followed on a regular basis except when problems occur at which times the schedule may fluctuate/change at the discretion of the DIU Chief or DMS Director.
The archive log files for all Databases are written to Data Domain located at Ashburn (ADC) and replicated to Data Domain located at Harrisburg (HDC) data center.


**Backup and Restore Process for the Load Test Databases**

A user of the load environment database can make a request to have a new baseline created or a roll back of the database to the original baseline.  The backup and restore of the load environment database is done through an RMAN backup and the use of the Oracle flash recovery feature.  To establish the ability to recover the load database environment, an RMAN backup is taken of the database, the backup is written to Data Domain, at the same time a restore point is established with the flash recovery.  Upon request, a restore of the database can be done by restoring the backup or by flashing back to the restore point; this depends on the need of the user request.

**Disaster Recovery**

Ongoing during each day all backups and archive logs on Data Domain are replicated from Data Domain Ashburn Data Center (ADC) to Data Domain Harrisburg Data Center (HDC) for all database environments.   A hardware solution, recovery timeline and Databases to be restored are not yet defined and under discussion.

**Backup Types**

**Hot Backup**

During a hot backup the database has been started, is open and available to end users.   The online redo logs are archived and used for database recovery if needed.

# SQL Server

**Software**

DHS databases residing in a SQL Server environment use SQL Server native backup tools through SQL Server Management Studio storing in Data Domain.

The backup strategy includes full and transaction logs.

**Backup Schedule**

Full backups are scheduled once a day with the exception of the Documentum servers which run multiple days within a week.

PROD (Production) – Daily full at midnight

                Documentum server databases full every M-W-F 8:00 PM

                Biztalk – Daily full at 8:00 PM

TFP (Test for Production) – Daily full at midnight

                Documentum server databases full every M-W-F 8:00 PM

                Biztalk – Daily full at 9:00 PM

SAT (Systems Acceptance Test) – Daily full at midnight

                Documentum server databases full every M-W-F 8:00 PM

                Biztalk – Daily full at 9:00 PM

INT (Integration) -– Daily full at midnight

                Documentum server databases full every M-W-F 8:00 PM

Biztalk – Daily full at 9:00 PM

DEV (Development) – Daily full at midnight

Documentum server databases full every M-W-F 8:00 PM

Biztalk – Daily full at 9:00 PM

LOAD (LOAD)  – Daily full at midnight

Documentum server databases full every M-W-F 8:00 PM

Biztalk – Daily full at Midnight

TRN (Training) – Daily full at midnight

Biztalk – Daily full at Midnight


Transaction log backups are scheduled as follows:

PROD (Production) - Daily every 3 hours (6:00AM to 6:00 PM)

Documentum server <Server name removed due to security reasons> daily every 3 hours (7:00 AM to 4:00 PM) < Server name removed due to security reasons> daily every 2 hours (7:00 AM to 7:00 PM)   Biztalk – Daily every hour


TFP (Test for Production) – Daily at Noon except

BizTalk – Daily every 3 hours

SAT (Systems Acceptance Test) – Daily at Noon except

BizTalk – Daily every 3 hours

INT (Integration) – Daily at Noon except

BizTalk – Daily every 3 hours

DEV (Development) – Daily at Noon except

BizTalk – Daily every 3 hours

LOAD (LOAD) – Daily at Noon except

Biztalk – Daily every 16 hours

TRN (Training) – Daily at Noon except

BizTalk – Daily every 8 hours


## Disaster Recovery

Ongoing during each day all backups and transaction logs on Data Domain are replicated from Data Domain Ashburn Data Center (ADC) to Data Domain Harrisburg Data Center (HDC) for all database environments.

A hardware solution, recovery timeline and Databases to be restored are not yet defined and under discussion.

**Backup Types**

**Full Backup**

During a full backup, the database is available to the end users.  A full backup stores all data and objects, set of file groups or files that are currently part of a database.  This includes the information stored in tables, as well as the object definitions, such as triggers, views, stored procedures and user permissions.  It also includes enough of the transaction log file needed to recover the data. Each full backup is consistent up to the time of the end of the preceding full backup.  Additionally, a full backup is the only type of backup that can be performed on the SQL Server master database.  Full backups do not truncate the transaction log files at the completion of the backup operation.

**Transaction Log Backup**

Transaction log backups are a method in which information is backed up to restore the database to a pointin-time recovery.  The transaction log backups run after a full backup has been run and will only backup data modifications that have modified the database since the last full backup or last transaction log backup.  By default, the transaction log is deleted after a transaction log backup has been performed.  It should be noted that to return a database to a point-in-time using transaction log backups, you must have both a full backup and an unbroken sequence of transaction log backups.

# Exemptions from this Standard:

There will be no exemptions to this standard.

# Refresh Schedule:

All standards and referenced documentation identified in this standard will be subject to review and possible revision annually or upon request by the HHS Delivery Center Domain Leads.

# Standard Revision Log:

| Change Date | Version | Change Description | Author and Organization |
|---|---|---|---|
| 08/25/2009 | 1.0 | Initial Creation | Database Integrity, Patty Gillingham |
| 06/30/2016 | 1.1 | Update Standard | Stacey Borger, BIS-DMS |
| 04/03/2017 | 1.2 | Update Standard | Stacey Borger, BIS-DMS |
| 06/24/2019 | 1.3 | Update Standard | Stacey Borger, Database Operations, Oracle Unit |

| 06/16/2020 | 1.4 | Update Standard | Jamie Gulden, Database Operations, Oracle Unit |
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