TLMS
TAPE LIBRARY MANAGEMENT SYSTEM

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Information Technology Standards

1   INTRODUCTION

The Tape Library Management System (TLMS) was acquired by the Information and Communication Services Division (ICSD), Department of Accounting and General Services (DAGS) to assist the State of Hawaii central DAGS ICSD mainframe computer center in automating and managing its computer magnetic tape media inventory.

The TLMS automatically provides complete control over the DAGS ICSD central computer center's magnetic tape media library and improves the usage, reliability, and availability of the very important shared storage resources.

1.1   PURPOSE

The purpose for this document is to establish conventions, rules or standards to assist mainframe computer users in the orderly and efficient use of the TLMS.

The main objective for this document is to provide the framework to use the TLMS to its fullest potential by having application systems incorporate the automated tape media *scratch pool* concept, and thereby effectively enhance the DAGS ICSD mainframe computer center's operational environment.

This document has the official State Executive Branch conventions, rules, and/or procedures for the effective use of the TLMS at the State central computer center.

1.2   SCOPE

The scope of this document is limited to establishing policies, procedures, rules, standards, and/or conventions for consultants, vendors, contractors, and State of Hawaii computer information technology specialists who must design, develop, test, and install programs, systems, and/or job streams.

The scope of this document includes providing guidance for contractors, vendors, consultants and computer information technology specialists (who use the TLMS in the State controlled mainframe computer systems) to follow when they must use magnetic tape media to store data for application systems that they design, develop or control.

All tape media datasets must be defined so that the TLMS can determine which dataset it must protect and which tape media it controls. All production and test tape datasets must be defined to the TLMS Tape Retention System (TRS).

1.3   APPLICABILITY

The standards, procedures and conventions presented in this document must be followed by all State computer information technology specialists and any contractor, vendor or consultant who is hired by the State who uses the State's mainframe computing resources at the DAGS ICSD central computer site.

Non-compliance with these established policies, conventions or rules may result in a computer operating system (OS) error message or unpredictable results.

Failure to follow these procedures, standards or conventions may result in delays and/or cancellation of an application program or job stream.

1.4   COMMENTS AND SUGGESTIONS

Any State of Hawaii Information Technology Standards document, reference manual or users guide mentioned in this document are available through the departmental user agency data processing coordinator (DP Coordinator). Many IT Standards documents are also accessible on-line by clicking on Information Technology Standards on the ICSD home page at:

> http://www.hawaii.gov/dags/icsd/

Statewide forms referenced in this document are also accessible on-line by clicking on Forms Central in the Government in Hawaii home page at:

> http://www.hawaii.gov/forms/

Any comment, recommendation, proposal or suggestion regarding the topics or contents of this document may be sent either via Internet email to icsd.admin.ppmo@hawaii.gov or in writing via the State messenger service to:

> Department of Accounting and General Services
> Information and Communication Services Division
> Project Planning and Management Office
> 1151 Punchbowl Street, B-10
> Honolulu, Hawaii 96813-3024

2   TLMS OPERATIONAL ENVIRONMENT

The TLMS operational environment is based on the concept of a scratch pool of ~~output~~ tape volume media that are controlled and assigned by the TLMS.

The TLMS will automatically record the volume serial number and maintain the relationship between the dataset and all volumes on which data associated with a dataset resides.

The retention and scratching of tape media, and the offsite backup movement of tape media are performed by the Tape Retention System (TRS). The TRS performs its functions by using the retention criteria defined for each cataloged dataset.

If a dataset is not cataloged, then the TLMS reports must be used to identify the tape volume number(s) associated with a dataset.

The job stream SYSOUT command can also assist the TLMS in tracking output tape volumes.

2.1   TLMS OPERATIONAL FUNCTIONS

The TLMS captures tape activity information and enters it in a database it uses for the protection, retention, and maintenance of the computer center tape library. This is accomplished through one of the following operational functions:

a.   Online Recorder   Provides for controlled dataset protection and message handling.

b.   Online Inquiry/Update   Provides immediate access to the Volume Master File (VMF), and permits flexible displays of datasets and volumes.

c.   Batch Inquiry/Update   Provides batch level controls for large volumes of transactions and comprehensive reports.

d.	Tape Retention System	Provides for controlled and scheduled retention of tape volumes, the automatic release of tape volumes to the scratch pool, and for the movement of tape volumes through offsite storage facilities.
e.	Utility Subsystem	Provides procedures for initialization, backup and recovery, restoring, debugging, and for the verification of the TLMS.

2.2 AUTOMATED CARTRIDGE SYSTEM

The TLMS provides the protection, retention, and scratching of magnetic tape cartridge volumes, while the Automatic Cartridge System (ACS) provides automated magnetic tape mounts and dismounts.

Currently installed at the DAGS ICSD central mainframe computer site are four ACS units. Each ACS unit consists of a robotic tape manager and a tape media loader.

The ACS houses tape cartridge media that are automatically mounted, dismounted and maintained with minimal human computer operator intervention.

The ACS maintains a database that contains all the information necessary to automatically manage the tape cartridge media housed in the ACS, and to direct the ACS operations.

There is also an ACS batch interface program, which synchronizes each tape cartridge's scratch status between the TLMS and the ACS.

2.3 TLMS CATALOG

The TLMS catalog dataset is the key component of the TLMS. The TLMS catalog is used to automatically track magnetic tape media under its control.

All TLMS dataset names in the DAGS ICSD computer mainframe OS catalog must begin with the prefix characters: **"TMS."**.

The State of Hawaii pre-1999 OS cataloged dataset names of historical backup tape volume-assigned generation data group (GDG) datasets have since been converted and migrated to the TLMS catalog.

2.4 ASSIGNED TAPE VOLUMES

No specific tape volume number should ever be coded with the "VOL=SER" data definition (DD) parameter when defining an output tape dataset that will be under the control of the TLMS.

The DAGS ICSD programs, UPGEN (to increase a fixed cyclical GDG dataset) and DEGEN (to decrease a fixed cyclical GDG dataset), and the concept of a closed loop GDG are not allowed under the TLMS because these features must use explicit assigned tape volume numbers.

The TLMS does not permit pre-processing nor the assigning of specific tape volumes to a GDG. If an old production job stream had used the UPGEN and DEGEN program commands, those steps have been removed because the TLMS will automatically use and assign tape volumes from its scratch pool.

If a job stream had used the GDG closed loop with a refer back DD statement parameter to identify the oldest generation in the cycle, the refer back DD statement parameter has been deleted.

The output dataset name with a "(0)" generation reference has been changed to a "(+1)" generation reference. With the "(+1)" relative generation designation, the TLMS is able to automatically request and assign a new tape volume from the TLMS scratch pool.

Closed cycle GDG tapes will not allow DAGS ICSD PSB Operations to perform tape maintenance whenever there may be GDG problems.

Before a tape dataset that was defined to the TLMS is written to, the DAGS ICSD PSB operator receives a console message to mount a scratch pool tape. After processing the application program, the TLMS records the number of the volume that was mounted, and the computer OS would catalog the dataset name if directed by the DD statement disposition parameter.

2.5   TLMS DATASET RETENTION

The TLMS includes a Tape Retention System (TRS). TRS is an extension of the TLMS that controls the retention and automatic release of tape media. TRS also schedules the movement of tape media through the DAGS ICSD Computer Center's offsite backup facilities.

If a DD Statement is executed without the tape dataset name defined to the TLMS catalog, the assigned tape media will by default be identified by the job's DD statement dataset name for only seven (7) calendar days, and then the assignment information is automatically scratched by the TLMS TRS.

DAGS ICSD has implemented the following TRS retention types:

2.5.1 Catalog Control Type 1

Catalog Control Type 1 means that the dataset is controlled by the computer OS catalog. The dataset is retained as long as the dataset name exists in the OS catalog.

2.5.2 Cycle Control Type 4

Cycle Control Type 4 is based on retaining the dataset a specified number of cycles. This method is used for production datasets that require offsite backup and can be used with or without the computer OS catalog. When the TLMS scratches the tape media definition from the TRS, the respective media definition is also deleted from the computer OS catalog.

2.5.3 Cycle Control Type 6

Cycle Control Type 6 is for internal use only by DAGS ICSD PSB to change media location from the ACS silo to an external destination.

3   USING TLMS

All permanent output tape datasets for a job must be defined to the TLMS. The following features must be addressed when using the TLMS to define a tape dataset name:.

a.   Add "**TMS.**" as the prefix for the tape dataset name.

Example: DSNAME=TMS.PMSCODE.MASTER

b.   Add a new tape dataset name to the TLMS catalog by completing the ICSD-191 TLMS Tape Media Request. This form will be returned to the project manager after DAGS ICSD PSB Operations completes appropriate actions. The ICSD-191 TLMS Tape Media Request form and the instructions for completing the form are available on the Internet by clicking on Forms Central on the Government in Hawaii home page at: http://www.hawaii.gov/forms/

c.   Add a new cyclical cataloged GDG dataset by completing the ICSD-191 TLMS Tape Media Request and sending it to DAGS ICSD PSB. The number of generation cycles and the number of tape media volumes per generation are defined. Both OS catalog and TLMS catalog must have the same cycle value.

d.   Create initial input GDG datasets when necessary. The first generation cycle of input can be created using a computer utility or a user-program.

e.   All backup tape datasets for monthly, quarterly, or yearly jobs must be copied to TLMS controlled volumes. All work tapes should be TLMS controlled tape volumes.

f.   Test job stream JCL statements with the IBM job control statement parameter, TYPRUN=SCAN, or with a utility software to scan job statement commands and parameter syntax.

The Appendix in this document has samples of JCL for TLMS tape dataset names One example shows the changes that were made to JCL for pre-TLMS job streams to be modified to the TLMS version. The Appendix also has a sample JCL for a dataset to be processed with "DISP=MOD".

4   GDG RERUN OR RESTART

When it is necessary to scratch a GDG cycle before a job stream may rerun, the following steps must be done:

a.   An ICSD-192 GDG Change Request form needs to be completed.

b.   The application project manager must have approved the completed ICSD-192 GDG Change Request form.

c.   The approved ICSD-192 GDG Change Request form must have been submitted to DAGS ICSD PSB Scheduling and Control Unit.

The completed ICSD-192 GDG Change Request form must have the following data:

a.   The full GDG dataset name;

b.   The full generation version number spelled out, and

c.   The number of the volume(s) that need to be scratched.

This data is needed so that the generation version and assigned volume number(s) can be deleted from the TLMS catalog tracking database and the computer OS catalog.

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5   TLMS TECHNICAL CONSIDERATIONS

To summarize the technical considerations for tape media datasets that are under the control of the TLMS:

a.   All test and production tape dataset names must begin with "**TMS.**" and must be defined to the TLMS Tape Retention System.

b.   The ICSD-191 TLMS Tape Media Request form must be completed and sent to DAGS ICSD PSB before a job stream may be tested. The ICSD-191 TLMS Tape Media Request form is available online at: Forms Central.

c.   The ICSD-191 TLMS Tape Media Request form must include the dataset name, and for test dataset names, it must have the expected expiration date.

d.   The ICSD-191 TLMS Tape Media Request form must have the volume count parameter for all datasets that will reside on more than one tape volume. See the IBM OS JCL reference manual for details.

e.   The DD Statement parameter "UNIT=ACS" is needed to direct the computer OS to assign the input or output data to the Automated Cartridge System.

f.   No explicit volume number may be specified for an output tape media dataset.

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6 APPENDIX: JCL SAMPLES

6.1 PRODUCTION GDG DATASET

```
//JOB001    JOB  (1234,XYZ,05,02),'ITS-User-Name'
//***********************************************************************************
//*      PRE-TLMS JCL DD STATEMENTS USING OS CATALOG
//***********************************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN    DD    DUMMY
//SYSUT1   DD    DSN=PMS.INFILE,DISP=SHR
//OLDEST   DD    DSN=PMS.OUTFILE(-4),
//               UNIT=TAPE,DISP=OLD
//SYSUT2   DD    DSN=PMS.OUTFILE(+1),
//               UNIT=TAPE,DISP=(NEW,CATLG,DELETE),
//               DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160,DEN=4),
//               VOL=REF=*.STEP1.OLDEST
//
```

```
//JOB001    JOB  (1234,XYZ,05,02),ITS-User-Name
//***********************************************************************************
//*      TLMS MODIFIED JCL DD STATEMENTS
//***********************************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN    DD    DUMMY
//SYSUT1   DD    DSN=PMS.INFILE,DISP=SHR
//SYSUT2   DD    DSN=TMS.PMS.OUTFILE(+1),
//               UNIT=(ACS,,DEFER),DISP=(NEW,CATLG,DELETE),
//               DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160)
//
```

6.2   JCL To Initialize A Dataset On A New Tape

```
//JOB001    JOB  (1234,XYZ,05,02),'ITS-User-Name'
//*******************************************************************************
//*      TLMS JCL To Create A New Empty TLMS Tape Dataset
//*******************************************************************************
//STEP1      EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN      DD    DUMMY
//SYSUT1     DD    DUMMY,
//             DCB=(RECFM=FB,LRECL=080,BLKSIZE=6160)
//SYSUT2     DD    DSN=TMS.PMS.MODFILE(+1),
//             UNIT=(ACS,,DEFER),DISP=(NEW,CATLG,DELETE),
//             DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160)
//
```

6.3 JCL To MOD (Append To) A TLMS Dataset

```
//JOB001    JOB  (1234,XYZ,05,02),'ITS-User-Name'
//************************************************************************************
//*      TLMS JCL To Append Input Data To An Existing Dataset
//************************************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN     DD    DUMMY
//INPUT     DD    DSN=PMS.INPUT.FILE,DISP=SHR
//OUTPUT    DD    DSN=TMS.PMS.MODFILE(0),
//               UNIT=(ACS,,DEFER),DISP=(MOD,KEEP,KEEP),
//               DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160)
//
```

6.4 JCL To Add Multiple Datasets To One Tape

```
//JOB001    JOB  (1234,XYZ,05,02),'ITS-User-Name'
//************************************************************************************
//*      Write Two Dataset Names To One TLMS Dataset In One Job Stream
//************************************************************************************
//STEP1     EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN     DD    DUMMY
//SYSUT1    DD    DSN=PMS.INFILE1,DISP=SHR
//SYSUT2    DD    DSN=TMS.PMS.OUTFILE1(+1),
//               UNIT=(ACS,,DEFER),LABEL=(01,SL),
//               DISP=(NEW,CATLG,DELETE),
//               DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160),
//               VOL=(,RETAIN)
//*
//STEP2     EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN     DD    DUMMY
//SYSUT1    DD    DSN=PMS.INFILE2,DISP=SHR
//SYSUT2    DD    DSN=TMS.PMS.OUTFILE2(+1),
//               UNIT=(ACS,,DEFER),LABEL=(02,SL),
//               DISP=(NEW,CATLG,DELETE),
//               DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160),
//               VOL=REF=*.STEP1.SYSUT2
```

6.5   JCL TO CREATE MULTIPLE DATASET ON EXISTING VOLUME

```
//JOB001    JOB   (1234,XYZ,05,02),'ITS-User-Name'
//**********************************************************************************
//*     ADD MULTIPLE DATASET NAMES TO AN EXISTING TLMS VOLUME
//**********************************************************************************
//STEP1      EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN     DD    DUMMY
//MOSTCURR      DD    DSN=TMS.PMS.OUTFILE1(0),
//          UNIT=(ACS,,DEFER),DISP=(OLD,KEEP,KEEP)
//SYSUT1    DD    DSN=PMS.INFILE3,DISP=SHR
//SYSUT2    DD    DSN=TMS.PMS.OUTFILE3(+1),
//          UNIT=(ACS,,DEFER),LABEL=(03,SL),
//          DISP=(NEW,CATLG,DELETE),
//          DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160),
//          VOL=REF=*.MOSTCURR
//
```

Note: The first dataset [LABEL=(01,SL)] is the controlling dataset name. This means that the date when the volume will be scratched and released to the scratch pool will be determined by the criteria specified for the first dataset name.

6.6   JCL TO COPY/CREATE FIRST GDG DATASET FROM INPUT

```
//JOB001    JOB   (1234,XYZ,05,02),'ITS-User-Name'
//**********************************************************************************
//*     ADD FIRST DATASET NAME TO NEW GDG DATASET NAME
//**********************************************************************************
//STEP1      EXEC PGM=IEBGENER
//SYSPRINT DD    SYSOUT=E
//SYSIN     DD    DUMMY
//SYSUT1    DD    DSN=PMS.MASTER,DISP=SHR
//SYSUT2    DD    DSN=TMS.PMS.MASTER(+1),
//          UNIT=(ACS,,DEFER),DISP=(NEW,CATLG,DELETE),
//          DCB=(X.SHRMODD,RECFM=FB,LRECL=080,BLKSIZE=6160)
//
```

Note: A program or another OS utility may be used to copy or create the new dataset.