COMP 3400 Mainframe Administration[1]

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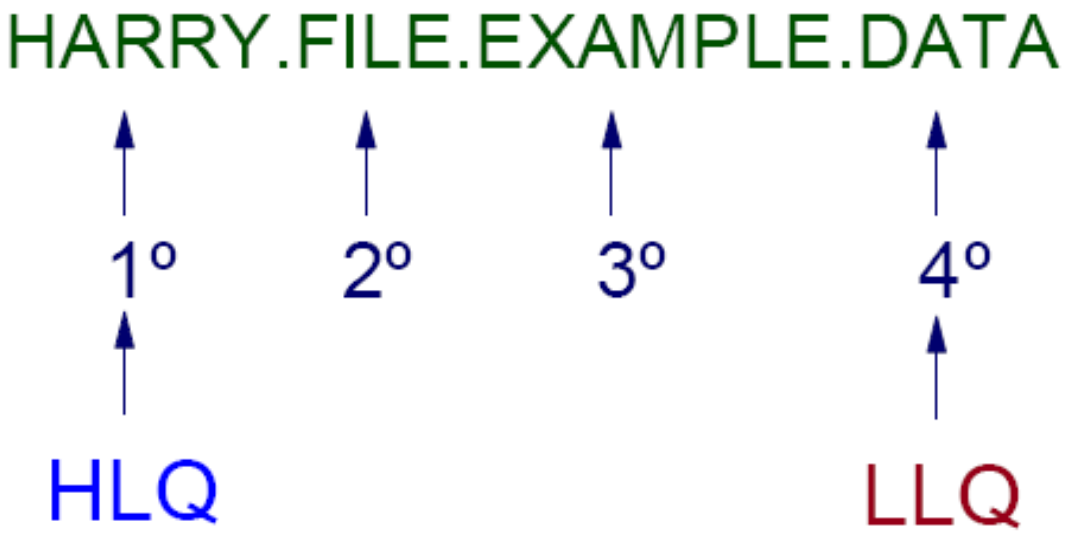
[1]These slides are based in part on materials provided by IBM's Academic Initiative.

Data Sets

- A data set is a collection of logically related data records stored on one disk storage volume or a set of volumes.
- Data sets can be:
  - a source program
  - a library of macros
  - a set of data records used by a processing program
- Data sets can be printed or displayed on a terminal.
- The logical record is the basic unit of information used by a program running on z/OS (except z/OS UNIX)

Data Set Naming



Naming Requirements

- Names must be upper case only and unique (kind of)
- Maximum of 44 characters; maximum of 22 name segments
- Each level qualifier can have 1 to 8 characters
- Each level qualifier must start with A-Z or specials "@#$"
- Remaining characters can also contain 0-9 and hyphen ("-")

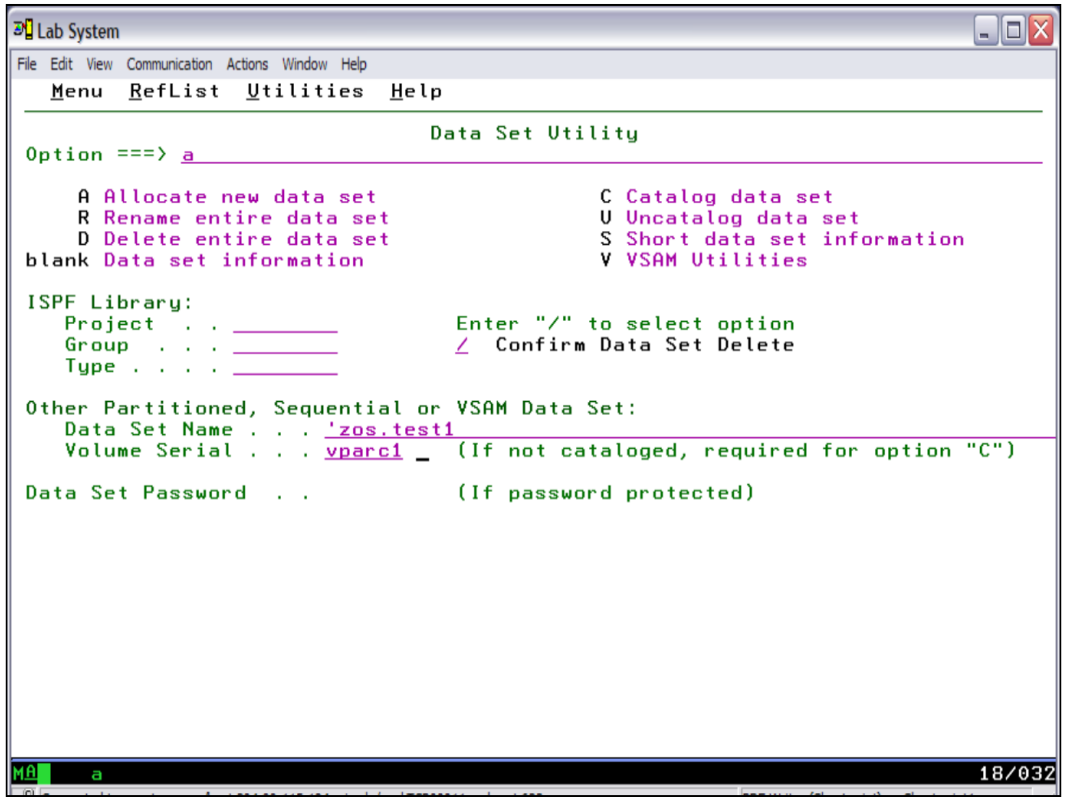
Allocating Data Sets

Allocation methods:

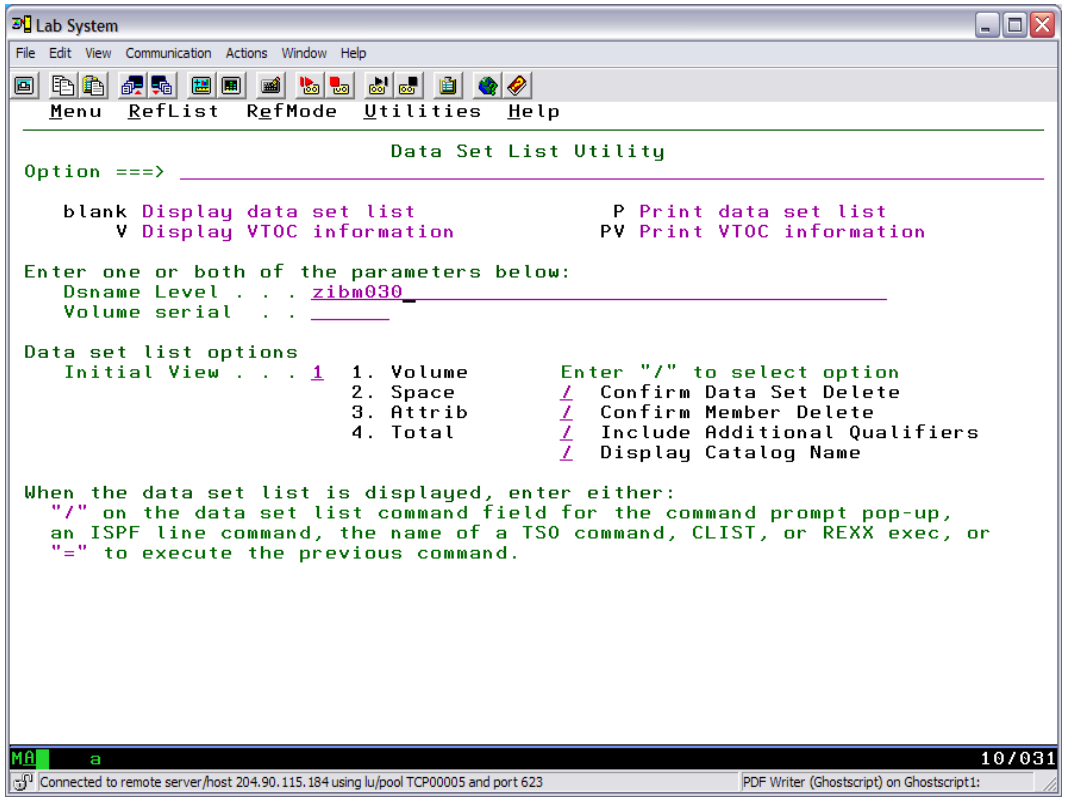
- ISPF data set panel, option 3.2
- TSO ALLOCATE command
- Access Method Services (more later)
- Using the Job Control Language (JCL) – next lecture

During allocation, you must specify certain details about the size and structure of the data set.

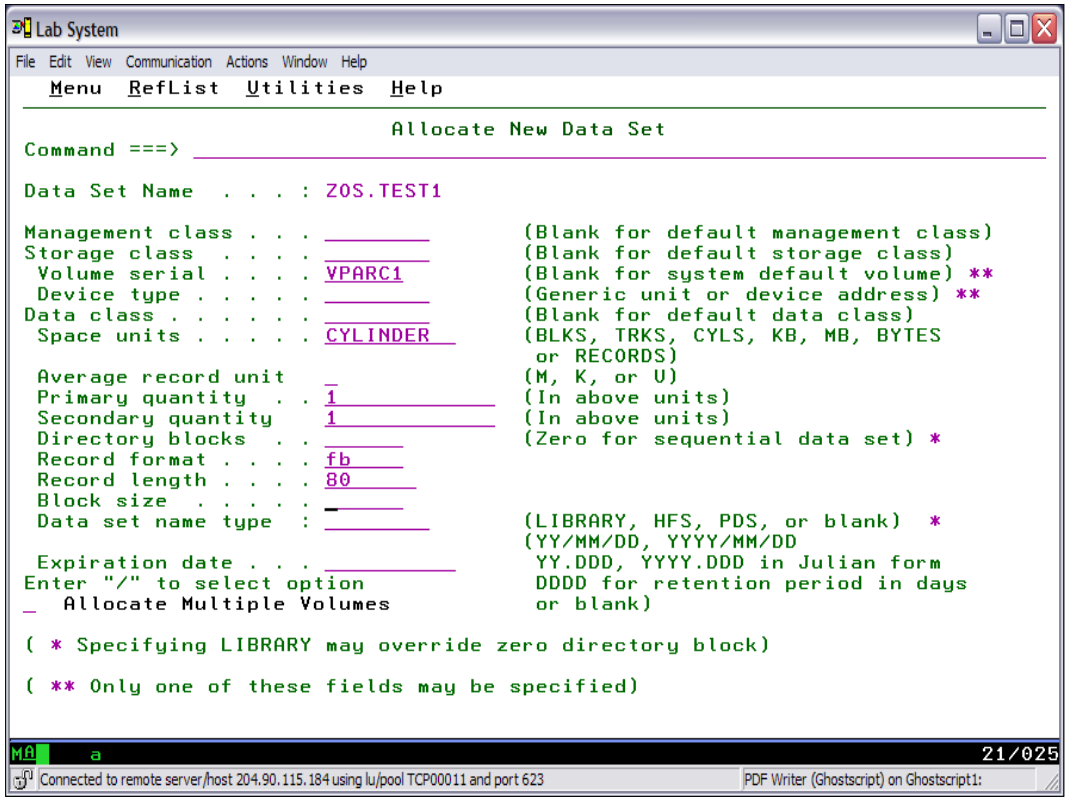
ISPF-based Allocation



Data Set List Utility



ISPF-based Allocation



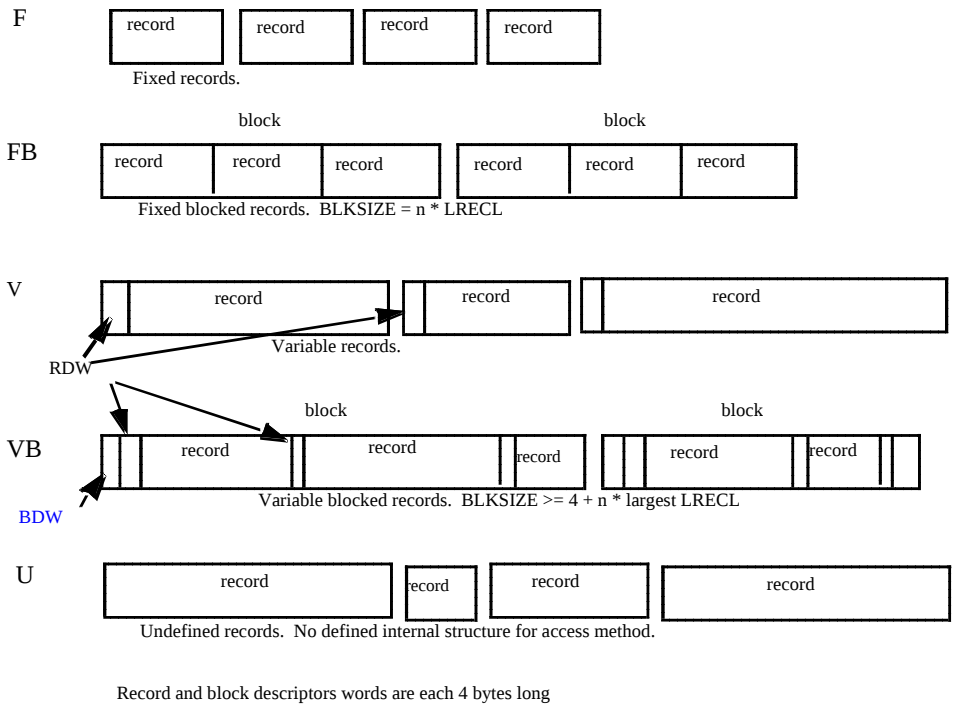
Records

- A record is the equivalent of a line in a textfile
- Data sets do not have EOL characters
- Records can be fixed-length or variable-length
- Record length (for fixed-length records) is referred to as the `LRECL`
- Indentation (offset of text in the record) often matters

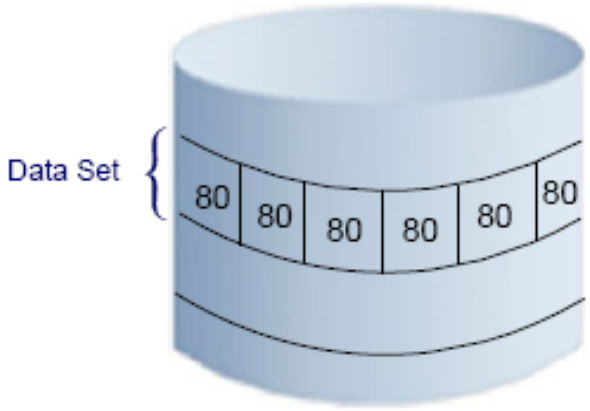
Blocks

- Multiple records are grouped in a block
- Logical records are usually the smallest amount of data to be processed by applications
- Blocks are usually the unit of data read from or written to DASD

Data set record formats



Example Data Set Specification



DATASET.TEST.SEQ1

DSORG=PS

RECFM=FB

LRECL=80

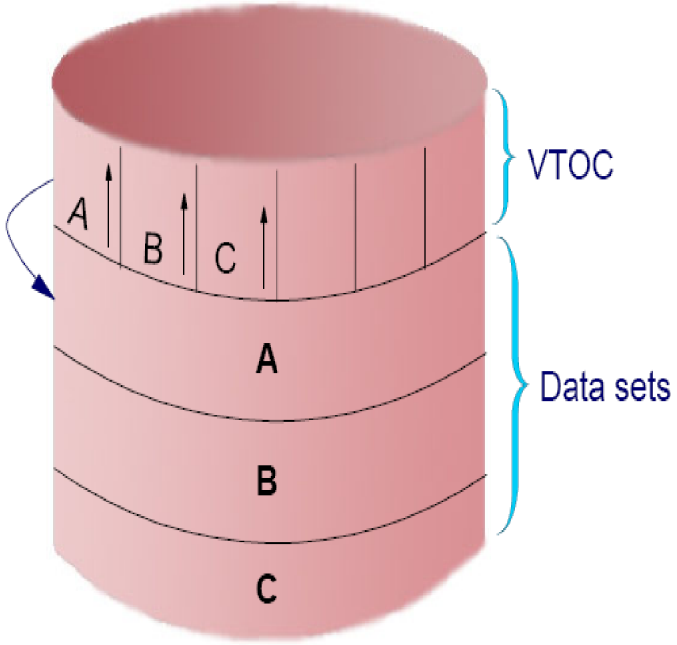
BLKSIZE=27920

The Volume Table of Contents (VTOC)

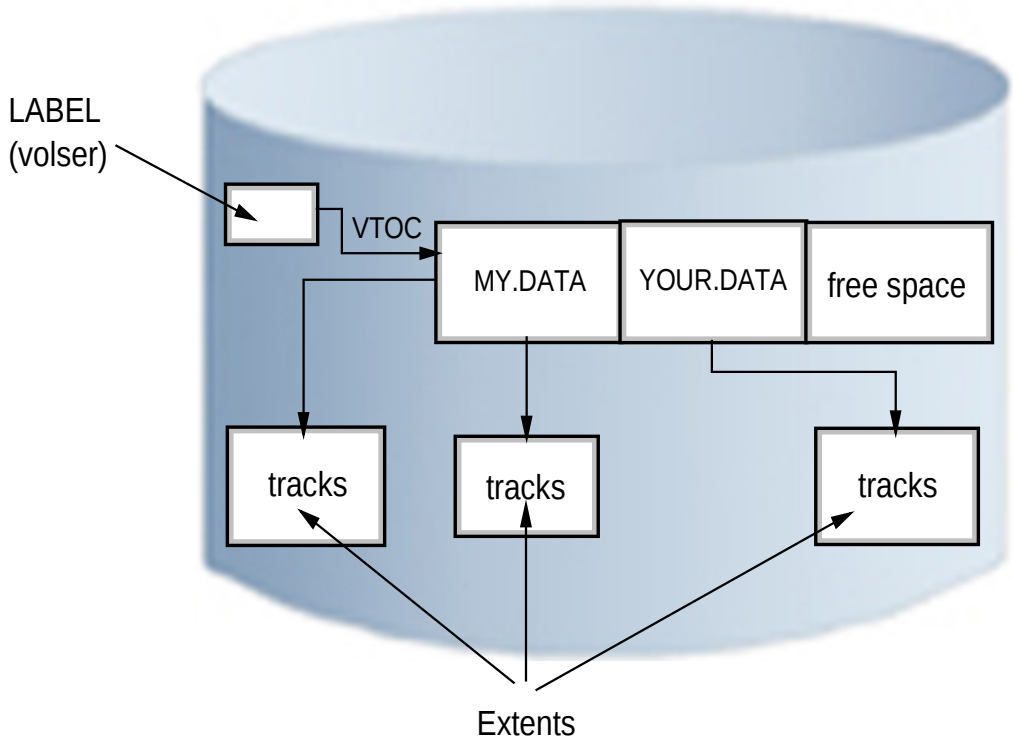
VTOC:

- Lists the data sets on a volume
- Lists the free space on the volume

The Volume Table of Contents (VTOC)



Extents


LABEL
(volser)
VTOC
MY.DATA
YOUR.DATA
free space
tracks
tracks
tracks
Extents

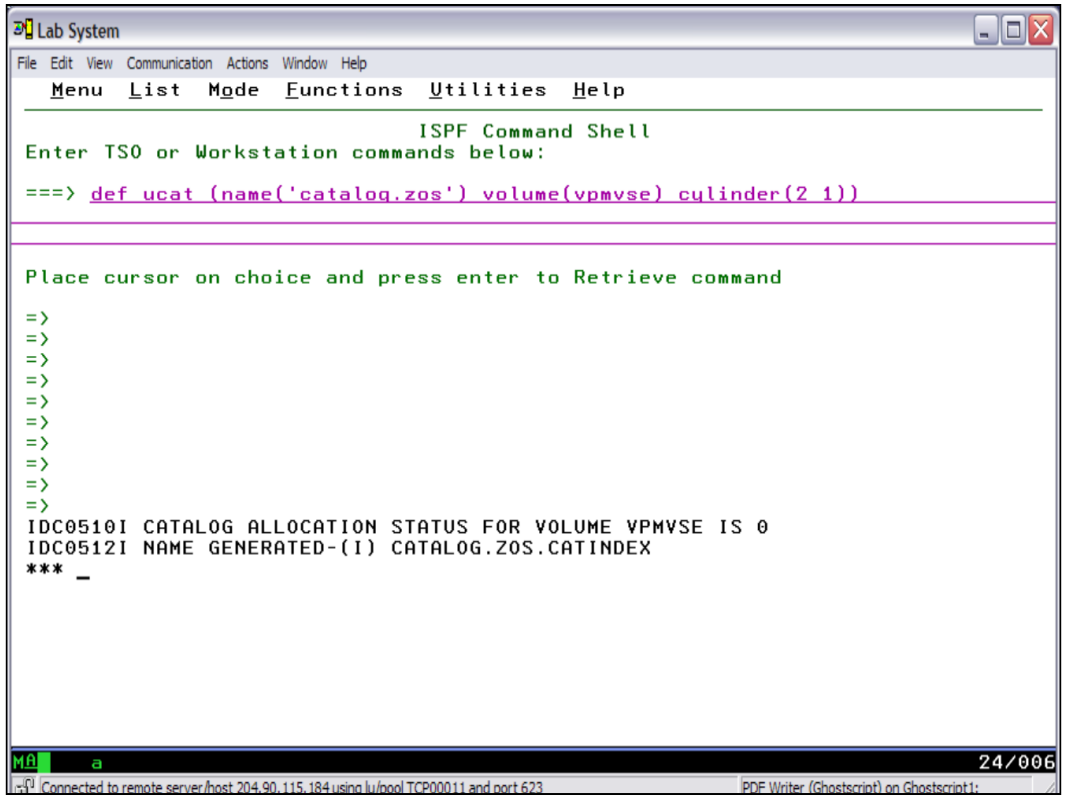
Catalogs

A catalog associates a data set name with the volume on which the data set is located; locating a data set requires:

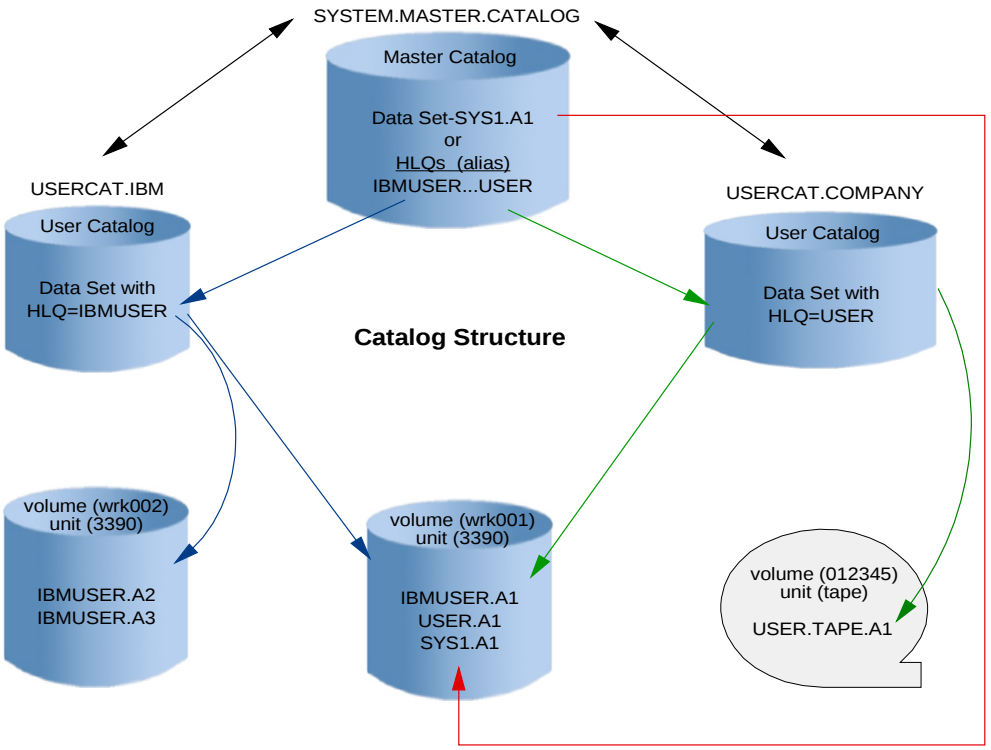
- Data set name
- Volume name
- Unit (volume device type)

Typical z/OS systems include a master catalog and numerous user catalogs.

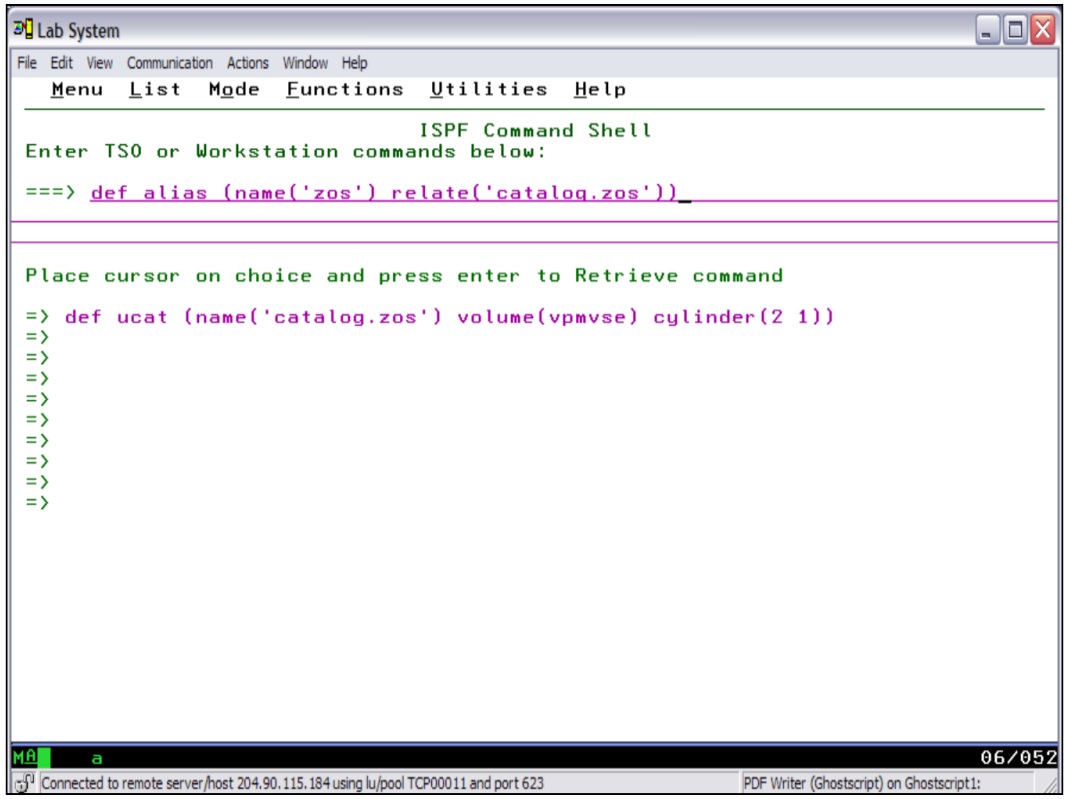
Creating a Catalog



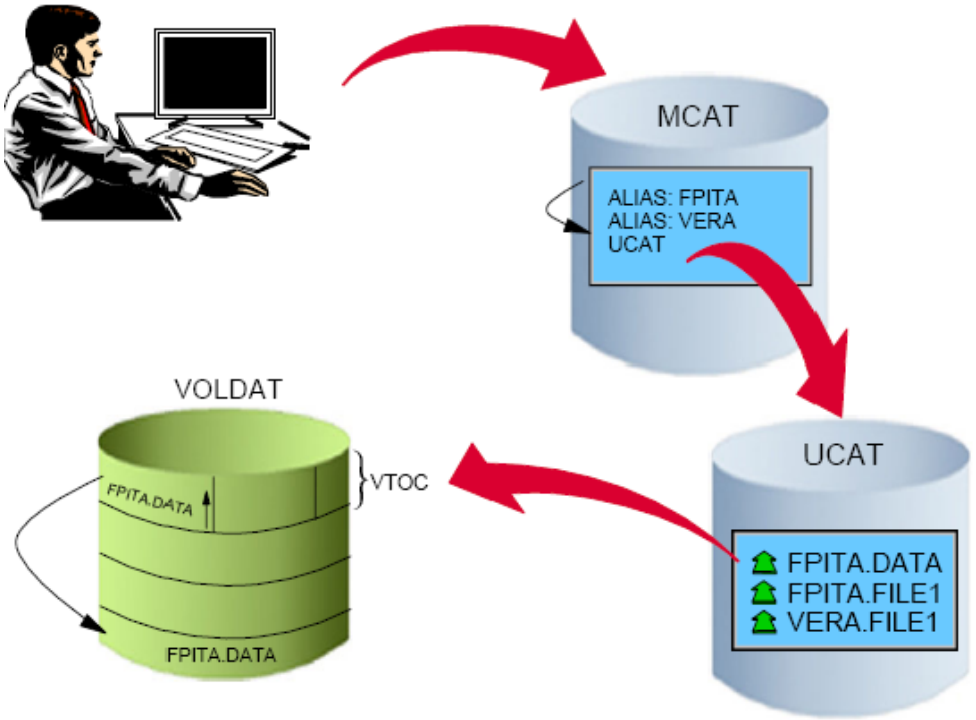
Catalog Structure



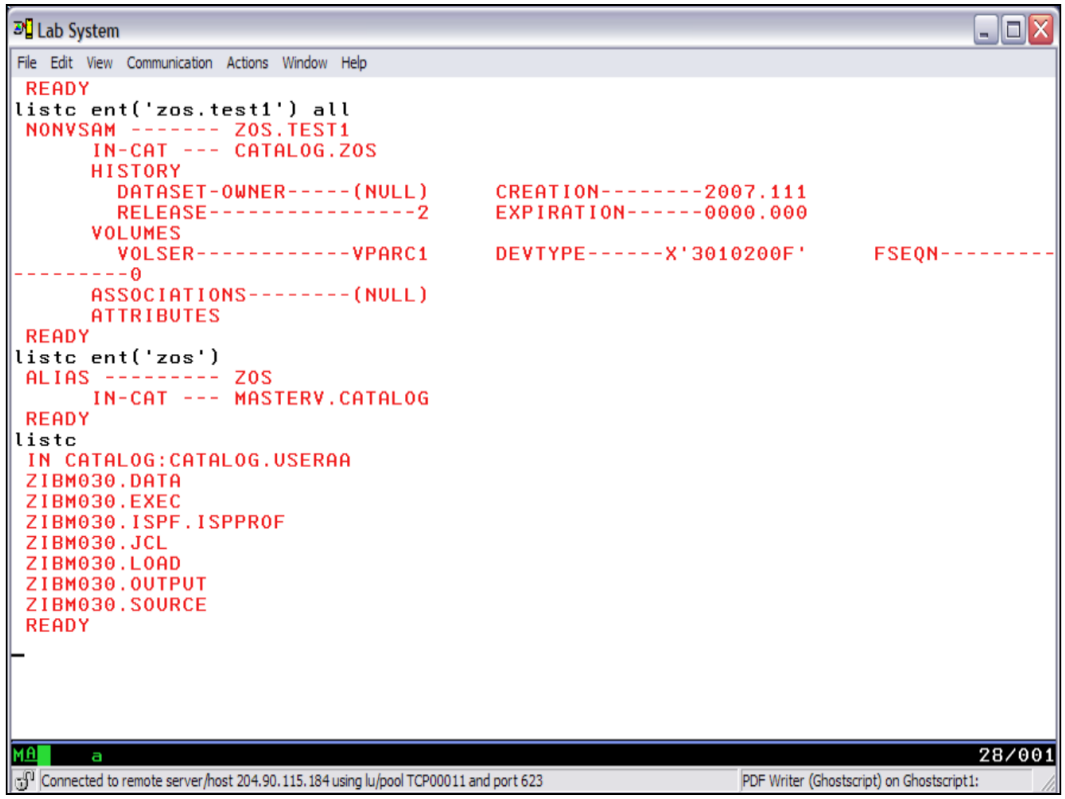
Defining an Alias



Locating a data set in z/OS



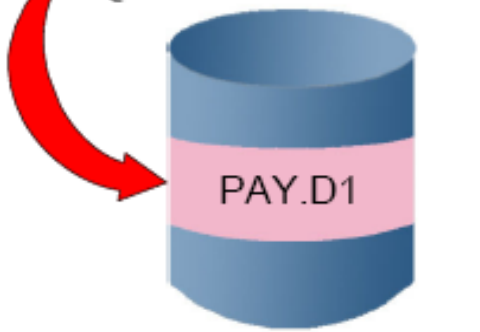
Inspecting a Catalog



Cataloged and Uncataloged Data Sets

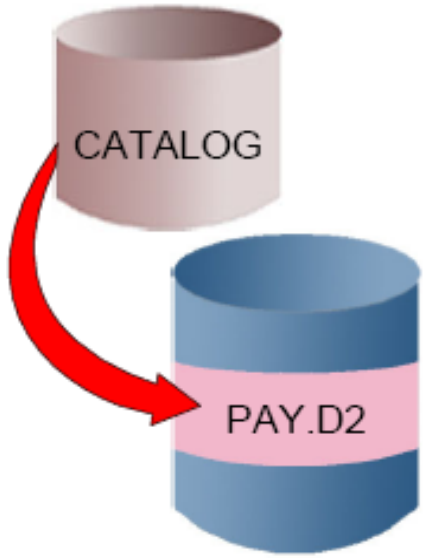
- Uncataloged reference

```
// DD    DSN=PAY.D1
         DISP=OLD
         UNIT=3390
         VOL=SER=MYVOL
```



- Cataloged reference

```
// DD    DSN=PAY.D2
         DISP=OLD
```



Types of Data Sets

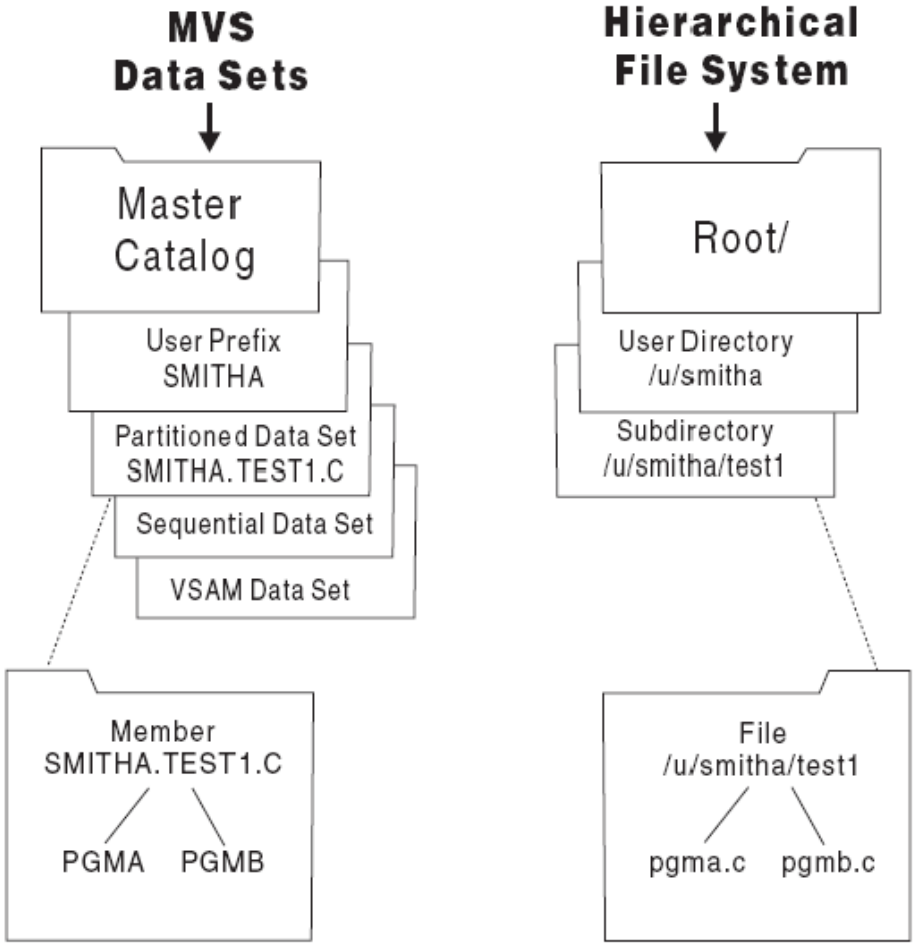
- Sequential Data Set: written and read in sequential order
- Partitioned Data Set (PDS or *library*):
  - Collection of a directory and sequential data sets (called members)
  - Member names can be 8 bytes long
- VSAM – both a type of data set and an *access method*

PDS vs. PDSE

PDS Extended (PDSE) is an extension of PDS with the following advantages:

- Space reclaimed automatically when a member is deleted (PDS has a compaction utility)
- Flexible size
- Can be shared
- Faster directory searches

Comparison of MVS Data Sets and UNIX HFS



Access Methods

- An *access method* defines the technique used to store and retrieve data
- This definition includes system-provided programs and utilities to define and process data sets.

Commonly Used Access Methods

QSAM Queued Sequential Access Method (for most simple data sets)

BSAM Basic Sequential Access Method (for special cases)

BDAM Basic Direct Access Method (becoming obsolete)

BPAM Basic Partitioned Access Method (for libraries)

VSAM Virtual Storage Access Method (for complex applications)

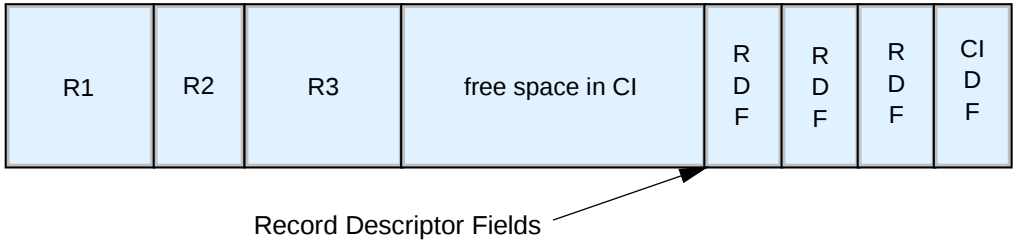
VSAM

VSAM provides more complex functions than other common disk access methods; VSAM knows four record formats:

- Key Sequence Data Set (KSDS) – most commonly used; like a hash table
- Entry Sequence Data Set (ESDS) – for simple sequential access
- Relative Record Data Set (RRDS) – access records by number
- Linear Data Set (LDS) – like UNIX files (and used by zFS)

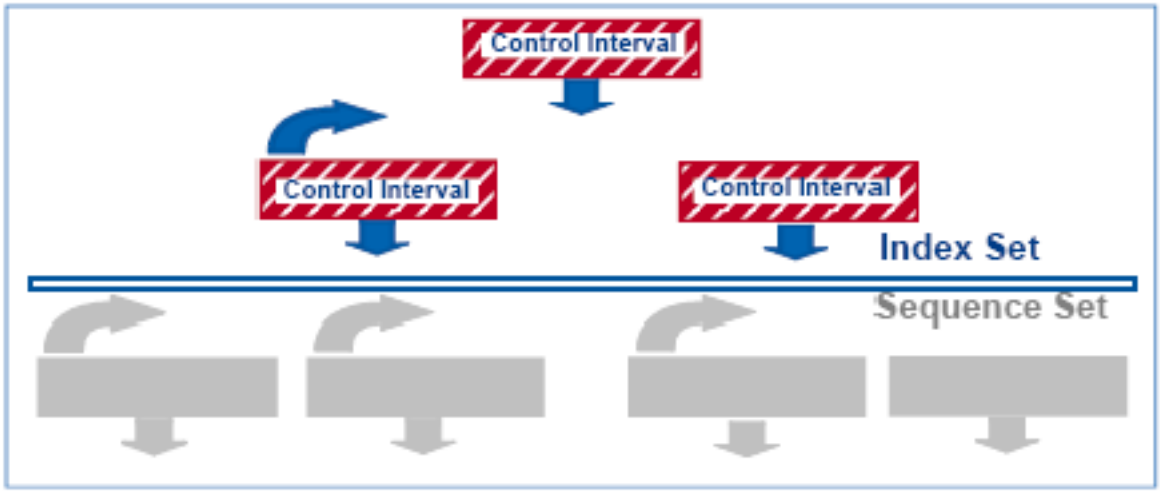
Simple VSAM Control Interval

VSAM Control Intervals are the basic unit for DASD reads and writes used by VSAM. They contain records and meta data:



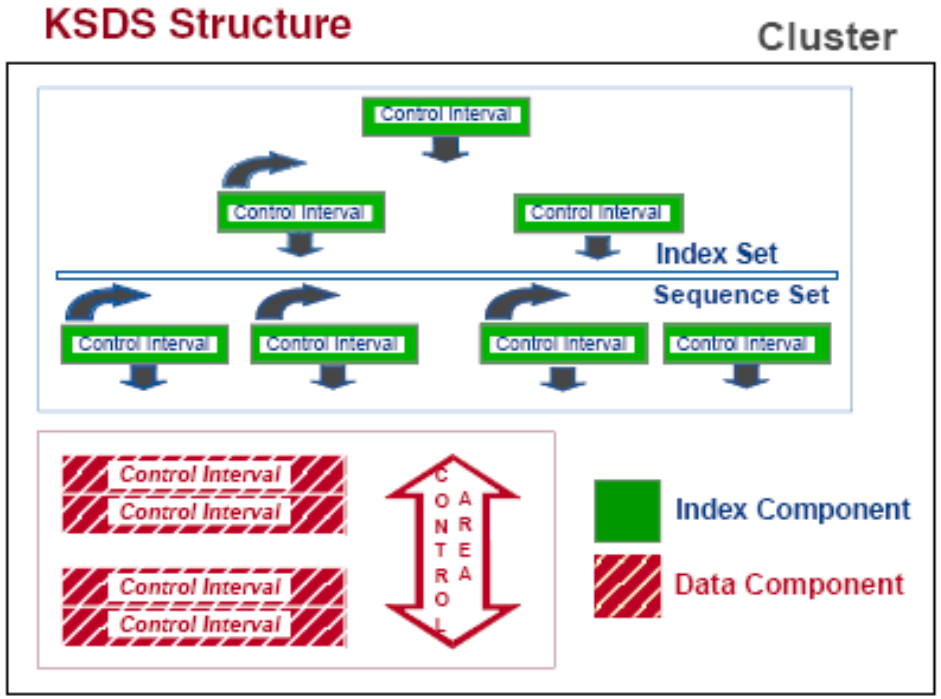
VSAM Index Structure

Index Set

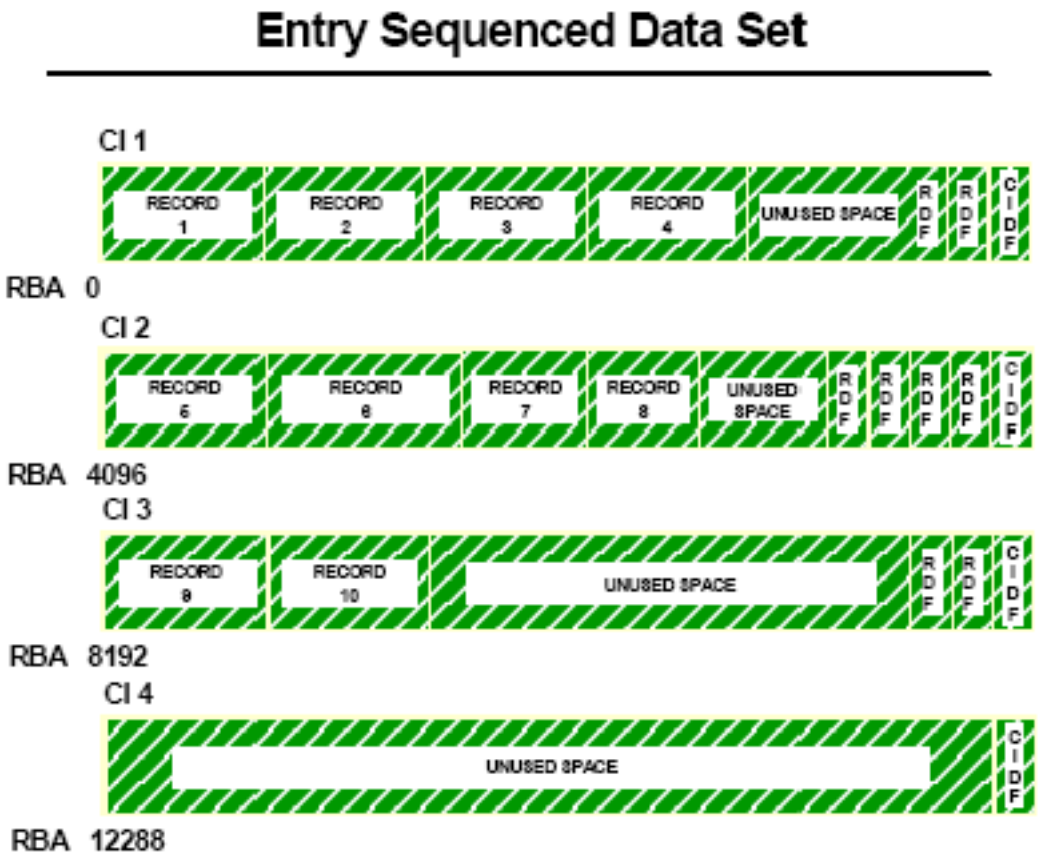


- Forward horizontal pointer at same level
- Vertical pointers to next lower level index records
- Just one CI in the top

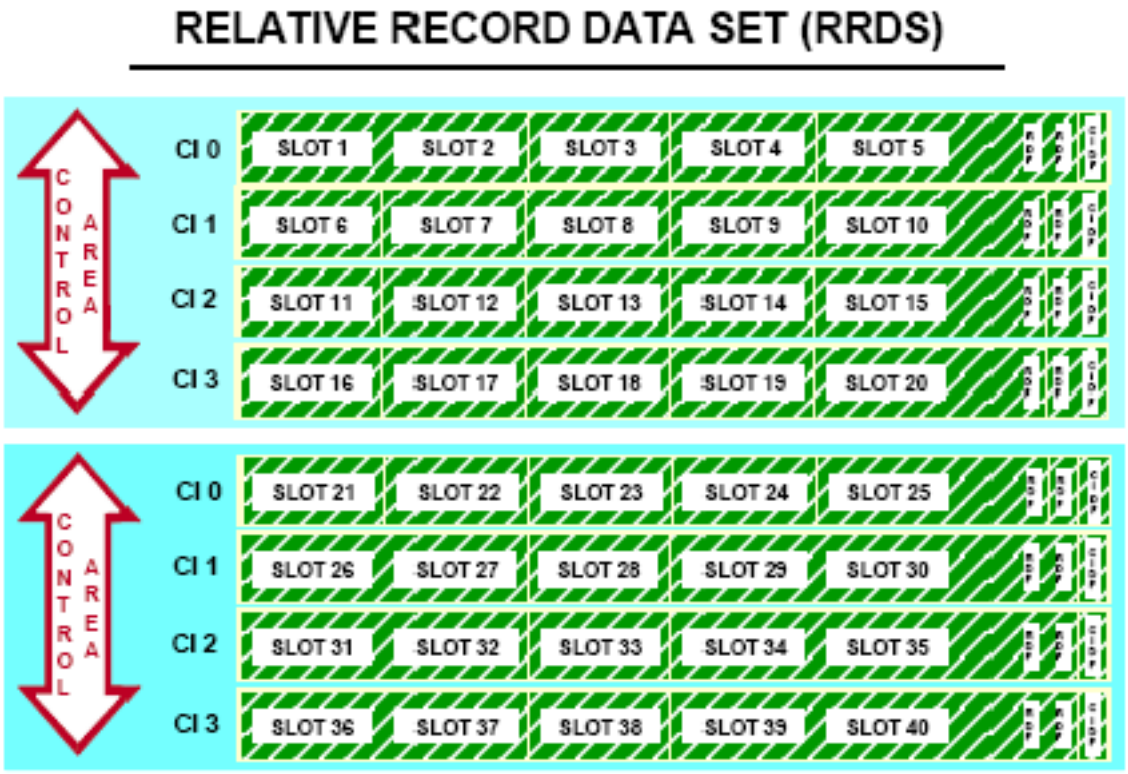
Key Sequence Data Set (KSDS)



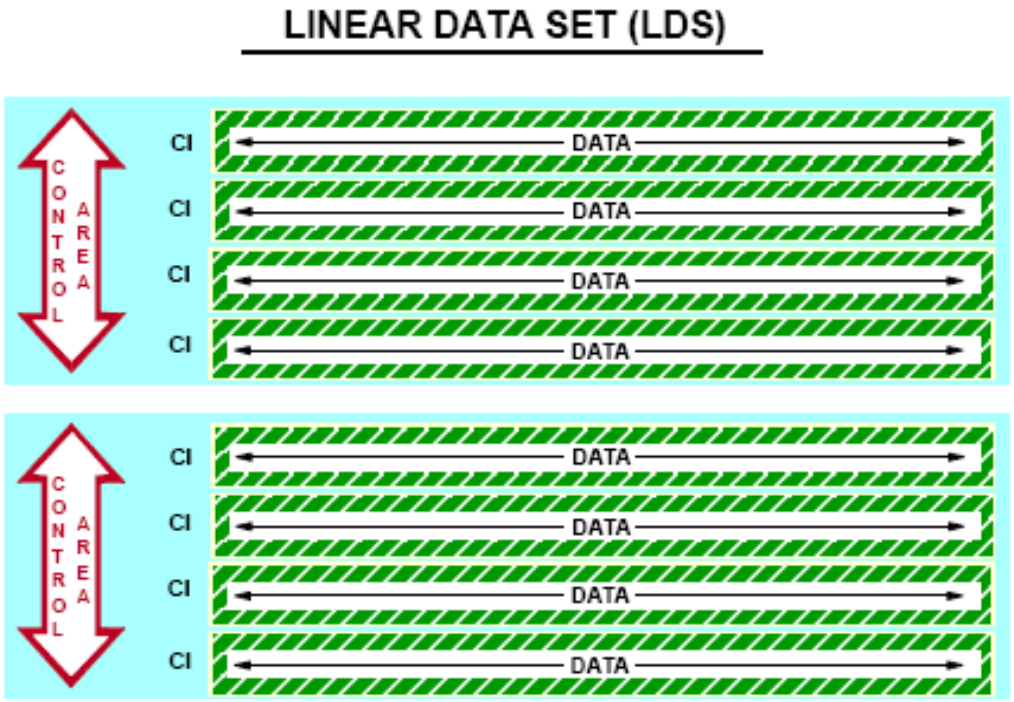
Entry Sequence Data Set (ESDS)



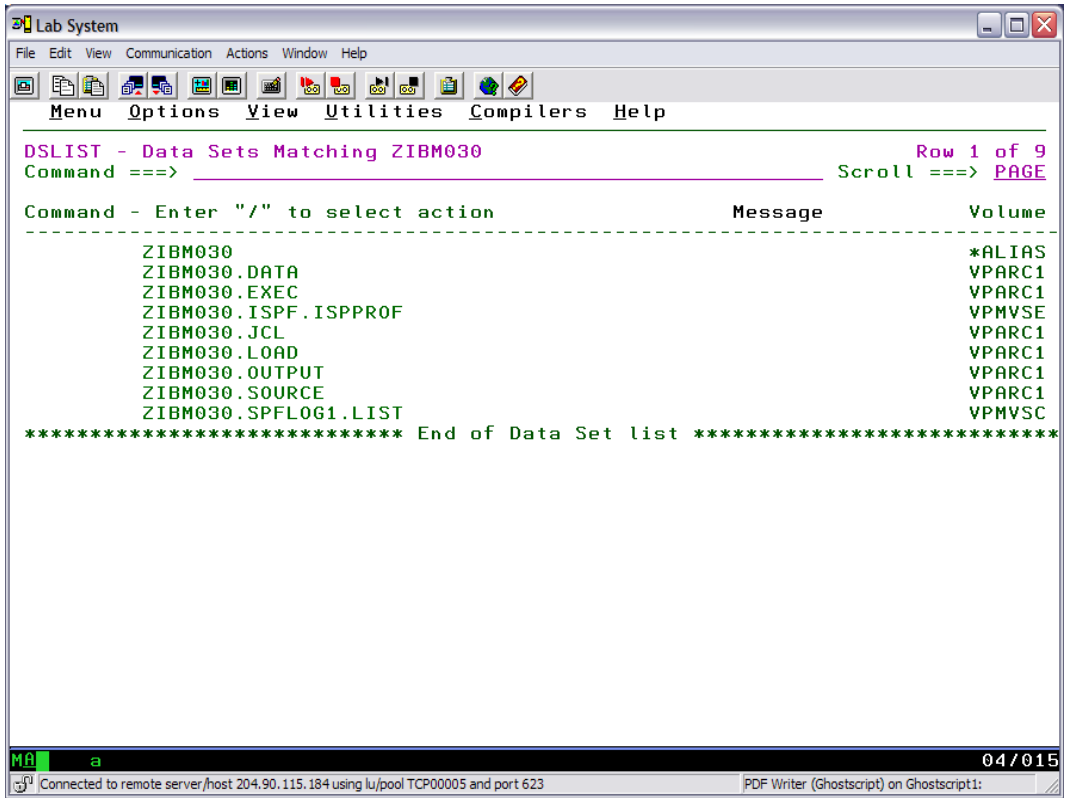
Relative Record Data Set (RRDS)



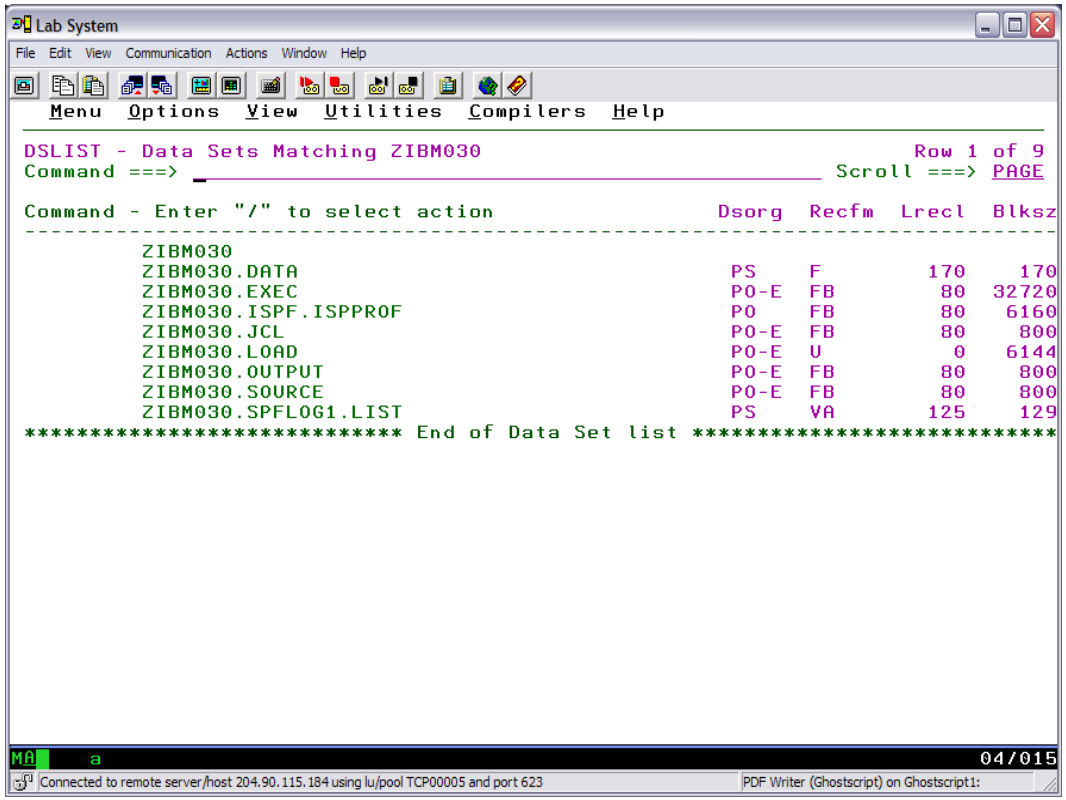
Linear Data Set (LDS)



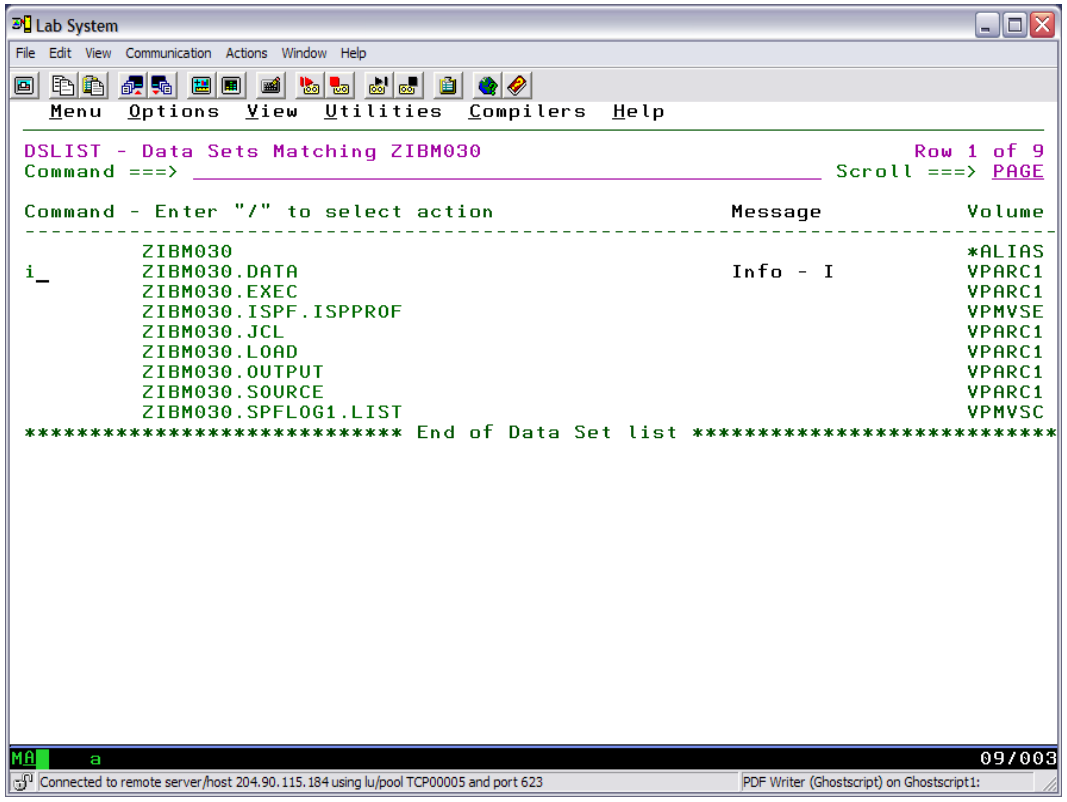
Data Set List Utility: Listing



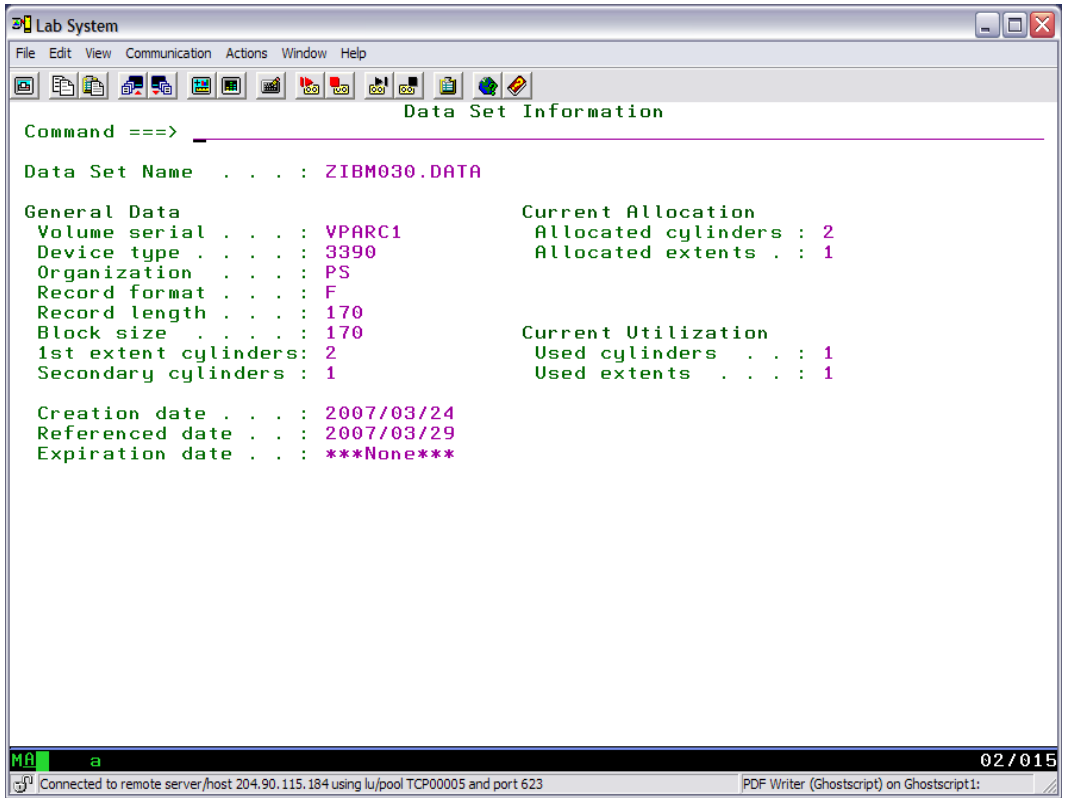
Data Set List Utility: Listing (More)



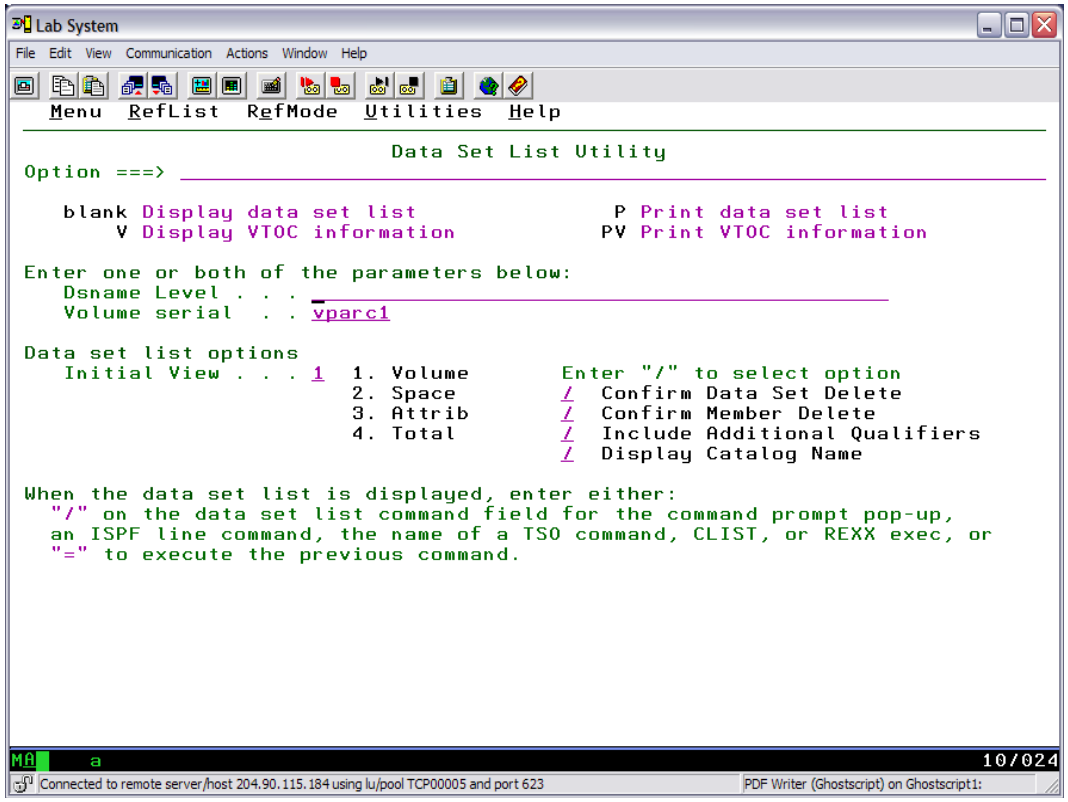
Data Set List Utility: Commands



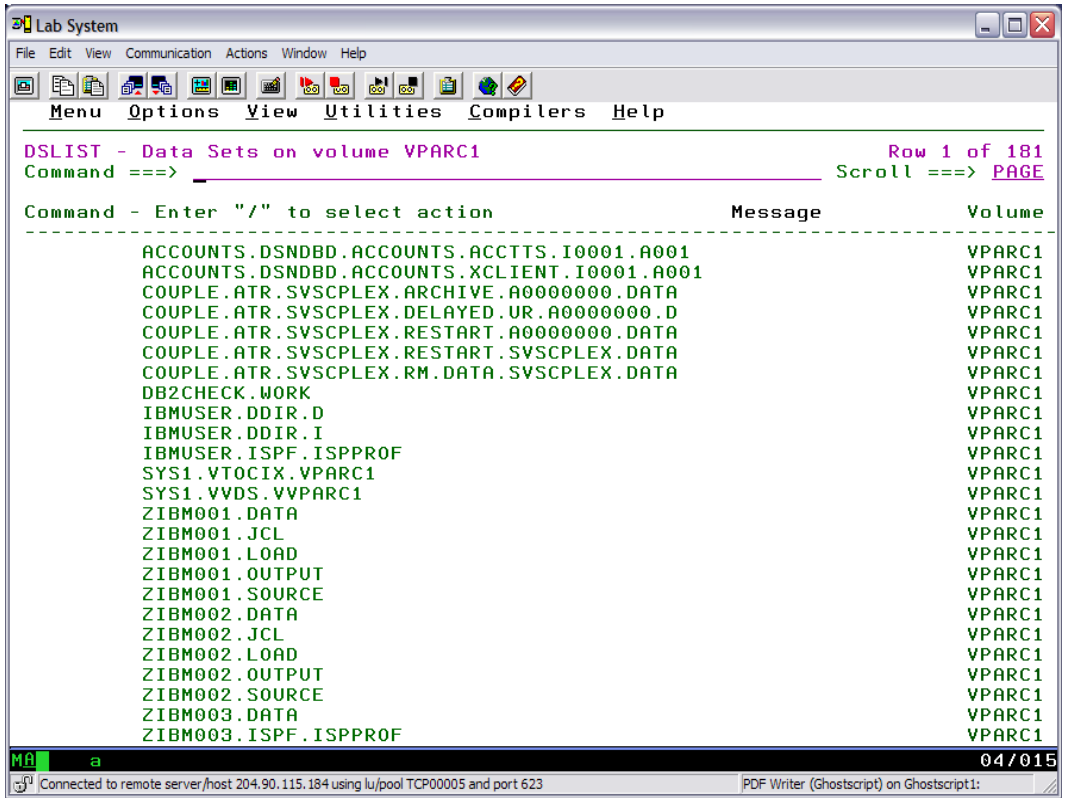
Data Set List Utility: Info



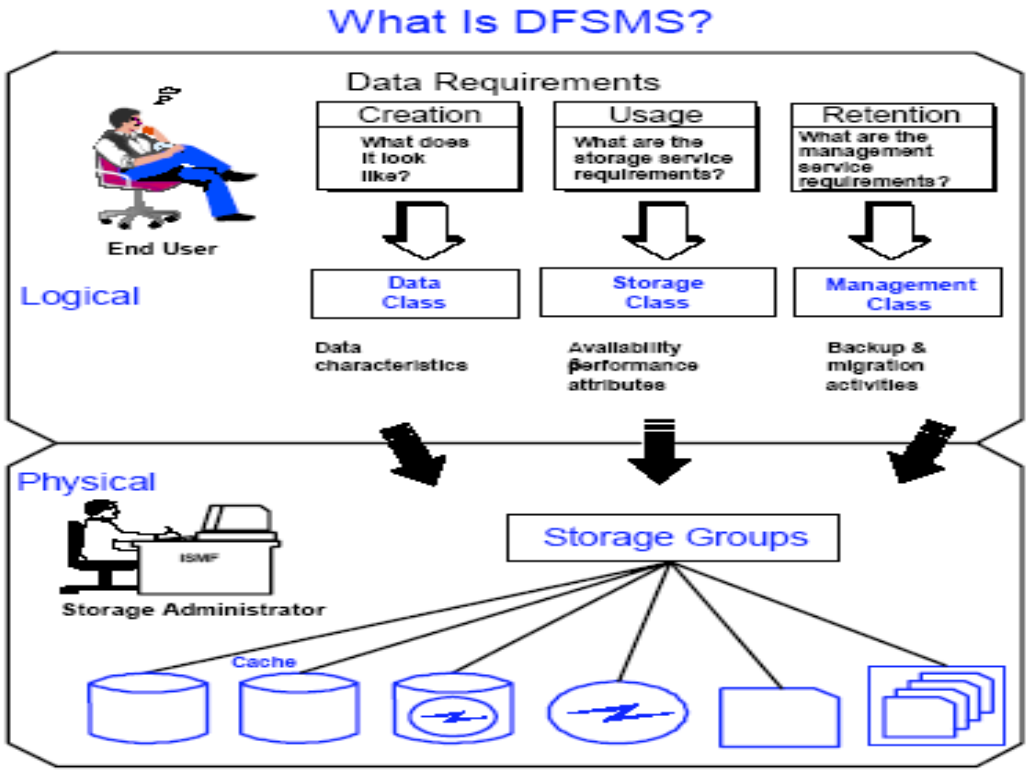
Data Set List Utility: Volume View



Data Set List Utility: Volume DS List



DFSMS


What Is DFSMS?
Data Requirements
Creation
What does it look like?
Usage
What are the storage service requirements?
Retention
What are the management service requirements?
End User
Logical
Data Class
Storage Class
Management Class
Data characteristics
Availability performance attributes
Backup & migration activities
Physical
ISMF
Storage Administrator
Storage Groups
Cache

Automatic Class Selection (ACS)

ACS uses coded criteria to determine allocation parameters:

1. Data Class (RECORG, RECFM, LRECL, PDS/PDSE, SPACE, ...)
2. Management Class (migration, backup frequency, automatic deletion, ...)
3. Storage Class
4. Storage Group (device media)

ACS uses the DD's DATACLS, MGTMCLAS, STORCLAS, DSN and DISP operands for criteria determination.

Copying between Data Sets and UNIX Files

In order to copy files from or to UNIX, use the following commands in the ISPF Command Shell:

```
OGET '/u/$USER/file' KC02292.FOO(BAR)
OPUT KC02292.FOO(BAR) '/u/$USER/file'
```

Questions

?