

# INFO3105 Week 7 Part 1

## Review

- Midterm

## DFSORT

This week we will look at a couple of mainframe utilities that we're going to utilize in our 2<sup>nd</sup> case study. Today, we'll get familiar with a utility called **DFSORT**. This utility will be used in conjunction with another utility called Access Method Services (**AMS**) to create the files needed for the 2<sup>nd</sup> case.

The sort concept is pretty simple:

1. Specify a file to be sorted (SORTIN)
2. Specify a different file where the sorted output will reside (SORTOUT)
3. Tell the utility the sort instructions, i.e. - Which fields to sort on.

We can use our salesperson master file from case 1 and use it as our input data. Currently this file is sorted on branch number. But let's say we wanted an alphabetical list of Salespeople by last & first name regardless of branch. To do so is relatively easy:

- Create a new JCL member called **JDFSRT1**.
- Create the sequential SORTOUT file called KC03xxx.SLSPBYNM that will be updated by the JCL with the salesperson master file sorted by name.
- Place the following JCL inside this member:

```
//-----1-----2-----3-----4-----5-----6-----  
//JDFSRT1 JOB JDFSRT1,NOTIFY=&SYSUID  
//*****  
//* DFSORT EXAMPLE TO SORT SLSPMAST ON SURNAME *  
//*****  
//STEP1 EXEC PGM=SORT,REGION=1024K  
//SYSOUT DD SYSOUT=*  
//SORTIN DD DSN=&SYSUID..SLSPMAST,DISP=SHR  
//SORTOUT DD DSN=&SYSUID..SLSPBYNM,DISP=SHR  
//SYSIN DD *  
SORT FIELDS(6,15,CH,A,21,10,CH,A)  
/*
```

The only new information in this JCL is the SORT FIELDS line:

- 6 – Start position
- 15 – Length of sort field - the salesperson last name
- CH – indicates character data
- A – indicates ascending

...etc. Submit the JCL and then look at the contents of the spooled output file first. What you are looking for is the number of records sorted, the sorted in and sorted out should be the same and equal to the number of records in the input file

```

Case1.cbl  LAB2.jcl  JDFSRT1.jcl  KC03O7F.SLSPMAST  JOB06898.sp
Line 69      Column 1      Insert      Browse
-----+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----6-----
ICE750I 0 DC 27950 TC 0 CS DSVVV KSZ 15 VSZ 15
ICE752I 0 FSZ=559 RC  IGN=0 E  AVG=52 0  WSP=38 C  DYN=0 0
ICE751I 1 DE-K61787 D5-K58148 D9-K61787 E8-K61439
ICE090I 0 OUTPUT LRECL = 50, BLKSIZE = 27950, TYPE = FB
ICE080I 0 IN MAIN STORAGE SORT
ICE055I 0 INSERT 0, DELETE 0
ICE054I 0 RECORDS - IN: 95, OUT: 95
ICE134I 0 NUMBER OF BYTES SORTED: 4750
ICE253I 0 RECORDS SORTED - PROCESSED: 95, EXPECTED: 559
ICE199I 0 MEMORY OBJECT USED AS MAIN STORAGE = 0M BYTES
ICE299I 0 MEMORY OBJECT USED AS WORK STORAGE = 0M BYTES
ICE180I 0 HIPERSPACE STORAGE USED = OK BYTES
ICE188I 0 DATA SPACE STORAGE USED = OK BYTES

```

Once this is confirmed, just look at the new file contents:

```

-----+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----
01061Ade Julie 70872232118713000338
05976Anderson Susan 81512170910772000364
26927Appel Judy 84761773003362000122
24927Appel Anne 70813310210111000365
24930Baker Anna 70834110443371000378
24302Banasiak Nancy 70840521113911000300
22868Bogacz Martin 84736010141773000345
20804Bond Patricia 70838710436474000353
26865Boudos Lynn 70818580114783000330
04936Boyer Kenneth 21956710339994000309
84931Boyer Cathie 21954420149563000340
96948Breems Mark 70843040768093000382
01746Brockmann Nelson 21901020121922000286
26813Broderick Cathleen 70897612108553000308

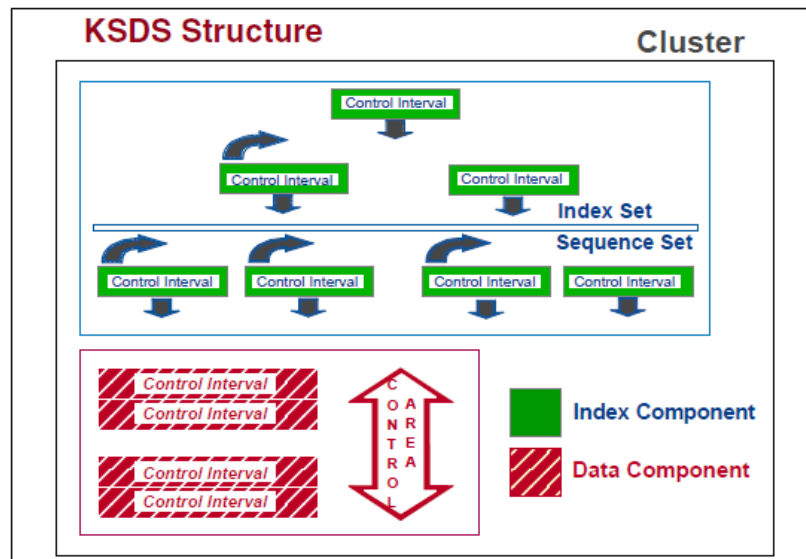
```

I have placed a new salesperson file on FOL in the week 7 content. This data is a bit different than the data above / in the first case study. In addition to the branch number there is now a **2 byte department number** adjacent to the branch number. The new file length is now **52** bytes.

## Introduction Access Method Services

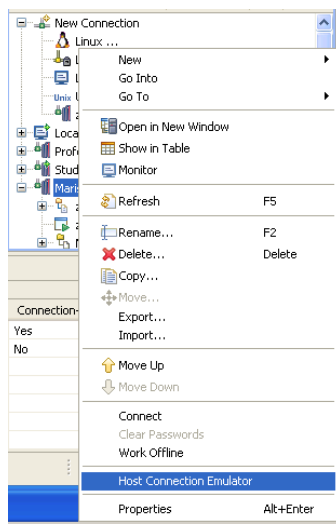
A lot of mainframe programs utilize indexed files. These kinds of files were the predecessors to relational databases. Like a database they can be updated and read randomly. In the mainframe world these kinds of files are used with a technology called

VSAM (Virtual Storage Access Method). To create and use these types of files we need to run a utility called **Access Method Services**. The theory for using VSAM files starts on **page 550** of the text, I am not going to repeat what the text says but you should understand the concepts of Control Intervals and Control Areas (**pages 550 and 551**) as this is how real records are stored on the hard drive. If you think about it, the architecture is conceptually the same as how a relational database stores its data (row, page, extent). Basically one or more real records are stored in a CI and one or more CI's are stored in a CA.



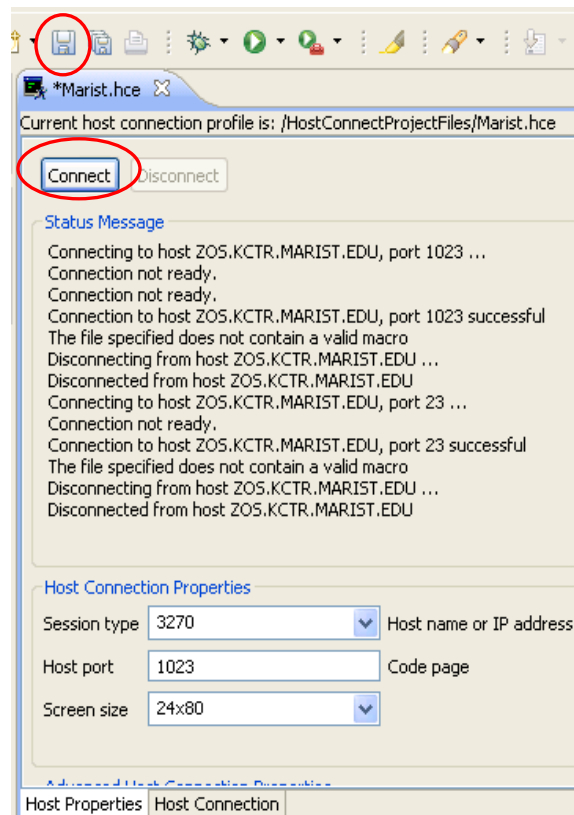
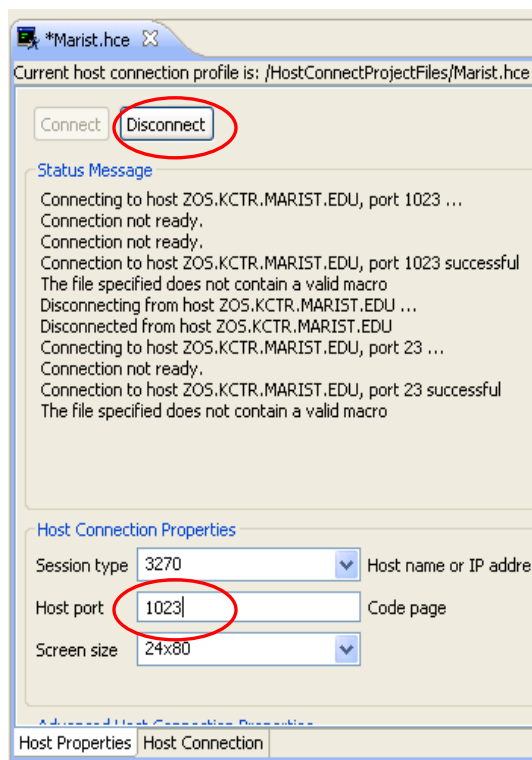
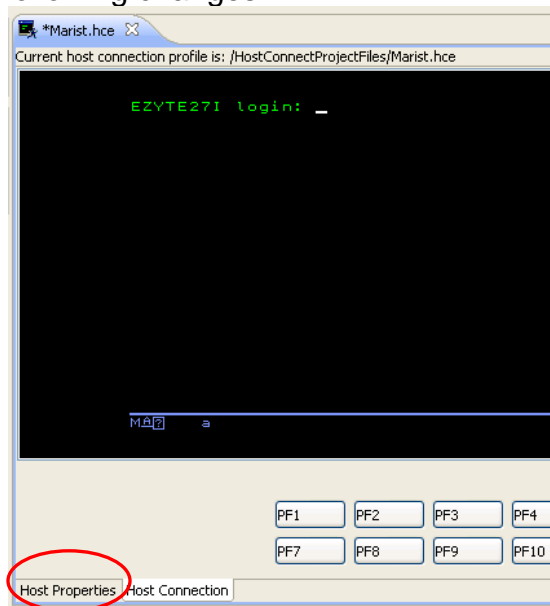
There are 3 types of files created in VSAM; ESDS (sequential), RRDS (Relative Record Data Set) and **KSDS** (Key Sequenced Data Set). Both KSDS and RRDS allow for better access than sequential files but KSDS's are used more frequently so we're going to focus on that type for the second case study.

Our first task is to define a KSDS to house our new Salesperson data. What a KSDS allows, is to look up things randomly; we can't do this with our current sequential file. The KSDS has an index based on a key and we can look up or update individual records based on that key. So we'll start and define our KSDS using a utility in **ISPF** for manipulating VSAM files. Note you **might be able to** define KSDS files with the IDZ client software, but it is important to learn how to use the ISPF environment, so you must **define these directly on the host** using **emulator** software called the the **Host Connection Emulator** option (also see week 1's notes for logging into TSO).



Then we will connect to the system (right click **Marist** choose **Host Connection Emulator** option:

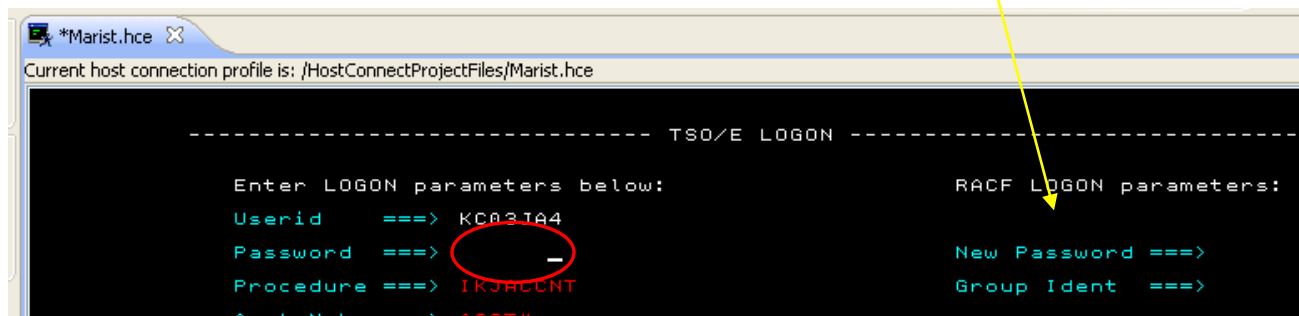
Note this will default to port 23, we actually want to use **port 1023**, so make the following changes:



Save these settings with the save icon before connecting



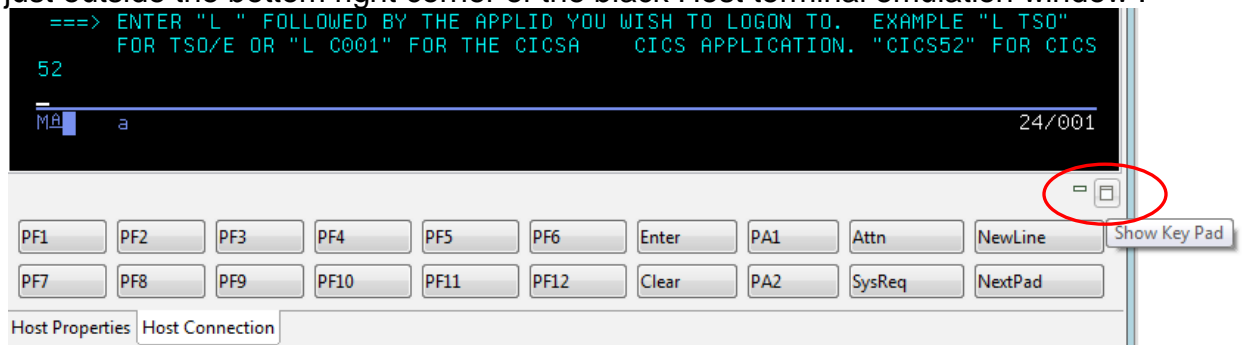
Notice where the cursor is - and use TAB vs using a mouse click to get to the correct field. Note password rules min 6, max 8 characters.



**Note ==>** You will need to use the TAB key to move from one input field to the next (not the mouse ... ). If you type in a place on the screen that is not an input field, you will see a capital X with a little stick person in the middle of arrows pointing left and right (this just means you have "locked up your screen / session" ).



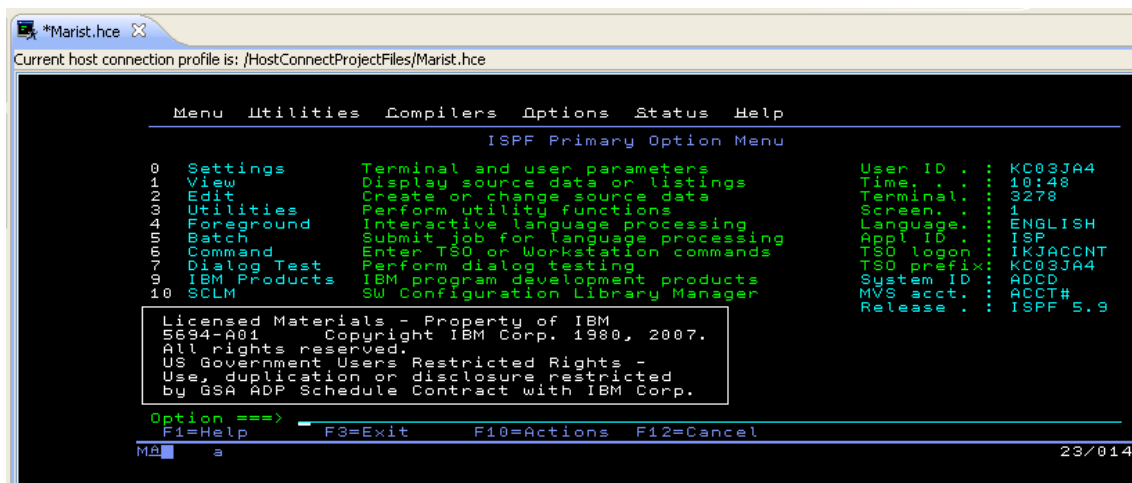
**IF** this happens, you may be able to clear it by pressing Esc, or you will need to click just outside the bottom right corner of the black Host terminal emulation window :



to Show Key Pad, then click on the Attn button, then Enter to allow the host to accept your keyboard input.

You will see a bunch of red screens appear, just keep hitting enter until you see the following:





We are now logged on!

NOTE : You must **press the <ENTER> key to process each “command” or option # in this TSO/ISPF environment.** Once in TSO, to get into this utility you need to enter the following ISPF menu commands (in **BLUE on screen shots**) , starting from the Main Menu in ISPF:

- **3 – Utilities**
  - **2 – Data Set**
    - VSAM Data Set : Name - **SLSPKSDS**
    - Command – **V**
      - VSAM UTILITIES
        - **1 – Define**
        - **3 – Cluster**
        - **DEFINE CLUSTER**
          - Space Units – **3** Records
          - Primary – **50**
          - Secondary – **5**
          - **<ENTER>** to get into the editor

```
Menu Utilities Compilers Options Status Help
-----
ISPF Primary Option Menu                                     Invalid option
More: +
0 Settings      Terminal and user parameters                User ID . . : KC03JA4
1 View          Display source data or listings           Time. . . : 14:19
2 Edit          Create or change source data              Terminal. . : 3278
3 Utilities     Perform utility functions                 Screen. . . : 1
4 Foreground    Interactive language processing           Language. . : ENGLISH
5 Batch         Submit job for language processing        Appl ID . . : ISR
6 Command       Enter TSO or Workstation commands         TSO logon . : IKJACCNT
7 Dialog Test   Perform dialog testing                     TSO prefix: KC03JA4
8 LM Facility   Library administrator functions              System ID . : S0W1
9 IBM Products  IBM program development products                 MVS acct. . : ACCT#
10 SCLM         SW Configuration Library Manager             Release . . : ISPF 6.1
11 Workplace    ISPF Object/Action Workplace

----- Other Install Products -----

SD SDSF        System Display and Search Facility
D2 DB2I        Perform DB2 Interactive functions
Option ==> 3
F1=Help      F2=Split    F3=Exit    F7=Backward F8=Forward  F9=Swap
F10=Actions  F12=Cancel

MA A 22/017
```

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help
Host: zos.kctr.marist.edu Port: 1023 LU Name: Disconnect
Menu Help
-----
Utility Selection Panel
More: +
1 Library       Compress or print data set. Print index listing. Print,
                rename, delete, browse, edit or view members
2 Data Set      Allocate, rename, delete, catalog, uncatalog, or display
                information of an entire data set
3 Move/Copy     Move, or copy members or data sets
4 Dslist        Print or display (to process) list of data set names.
                Print or display VTDC information
5 Reset         Reset statistics for members of ISPF library
6 Hardcopy      Initiate hardcopy output
7 Transfer      Download ISPF Client/Server or Transfer data set
8 Outlist       Display, delete, or print held job output
9 Commands      Create/change an application command table
11 Format        Format definition for formatted data Edit/Browse
12 SuperC       Compare data sets (Standard Dialog)
13 SuperCE      Compare data sets Extended (Extended Dialog)
14 Search-For   Search data sets for strings of data (Standard Dialog)
15 Search-ForE  Search data sets for strings of data Extended (Extended Dialog)
Option ==> 2
F1=Help      F2=Split    F3=Exit    F7=Backward F8=Forward  F9=Swap
F10=Actions  F12=Cancel

MA A 22/015
Connected to remote server/host zos.kctr.marist.edu using lu/pool TCP21600 and port 1023
```



```

Menu RefList Utilities Help

Data Set Utility

A Allocate new data set          C Catalog data set
R Rename entire data set        U Uncatalog data set
D Delete entire data set        S Short data set information
blank Data set information      V VSAM Utilities

ISPF Library:
Project . . . _____      Enter "/" to select option
Group . . . _____        / Confirm Data Set Delete
Type . . . _____

Other Partitioned, Sequential or VSAM Data Set:
Name . . . _____ SLSPKSDS
Volume Serial . . . _____ (If not cataloged, required for option "C")

Data Set Password . . . _____ (If password protected)

Option ==> V_____
F1=Help F2=Split F3=Exit F7=Backward F8=Forward F9=Swap
F10=Actions F12=Cancel

```

Name ... SLSPKSDS      AND      Option ==> V

```

Menu Utilities Help

VSAM Utilities

Process Request      Data Type
1 1. Define          3 1. Alias
2 2. Delete          2 2. Alternate Index
3 3. Information (Listcat) 3. Cluster
                        4. Generation Data Group
                        5. Non-VSAM
                        6. Page Space
                        7. Path
                        8. User Catalog
                        9. Data *
                       10. Index *
                       11. NVR **
                       12. Truename **
                       13. VVR **

* Listcat Only

Command ==> _____
F1=Help F2=Split F3=Exit F7=Backward F8=Forward
F9=Swap F10=Actions F12=Cancel

```

1 1. Define      AND      3      for Cluster

Note if this doesn't work correctly you will need to back out (F3=Exit) to here and chose option 2 . Delete to delete this VSAM Cluster/file

```

Menu  Function  Utilities  Help

                                Define Cluster

                                Enter "/" to select option
                                /  Edit IDCAMS command
                                /  Browse errors only

Cluster Name . . . . . KC03JA4.SLSPKSDS

                                Cluster Level Information:

Space Units . . . . . 3 1. Cylinders Primary Quantity . . . 50
                        2. Tracks Secondary Quantity . . . 5
                        3. Records
                        4. Kilobytes
                        5. Megabytes

Volumes . . . . .
Buffer Space . . . . .
Control Interval Size . . .
Data Class . . . . .
Management Class . . . . .
Command ==>

F1=Help      F2=Split    F3=Exit    F7=Backward  F8=Forward  F9=Swap
F10=Actions  F12=Cancel

MA  A  A  22/017

```

You will need to add 3 lines (you can't cut and paste, but must Use the line command "I" for Insert and then type them in ):

- INDEXED –
- RECORDSIZE (52 52) –
- KEYS (5 0) –

Like this :

```

Enter CANCEL, END, or RETURN command to cancel request.
***** ***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
000001  /* IDCAMS COMMAND */
000002  DEFINE CLUSTER (NAME(KC03OFF.SLSPKSDS) -
i 003    RECORDS(50 5) -
000004    ) -
000005    DATA (NAME(KC03OFF.SLSPKSDS.DATA) -
000006    ) -
000007    INDEX (NAME(KC03OFF.SLSPKSDS.INDEX) -
000008    )
***** ***** Bottom of Data *****
Command ==> Scroll ==> PAGE
F1=Help      F2=Split    F3=Exit    F5=Rfind    F6=Rchange  F7=Up

```

And this :

```
Menu Utilities Help
Columns 00001 00072

Instructions:

Enter EXECute command to issue request.

Enter CANCEL, END, or RETURN command to cancel request.
***** ***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG> your edit profile using the command RECOVERY ON.
000001 /* IDCAMS COMMAND */
000002 DEFINE CLUSTER (NAME(KC03DFF.SLSPKSDS) -
000003 RECORDS(50 5) -
000004 INDEXED -
000005 RECORDSIZE (52 52) -
000006 KEYS (5 0) -
000007 ) -
000008 DATA (NAME(KC03DFF.SLSPKSDS.DATA) -
000009 ) -
Command ==>
F1=Help F2=Split F3=Exit F5=Rfind F6=Rchange F7=Up
```

- Remember to include the Hyphen - at the end of each line – it is a **continuation character and is required or you will get an execution error**
- When the inserts are all ready they should look like this:

```
JCS2LDRN.jdl ZOSKCTRMARISTEDU.hce
Current host connection profile is: /HostConnectProjectFiles/ZOSKCTRMARISTEDU.hce

Menu Utilities Help
Columns 00001 00072

Instructions:

Enter EXECute command to issue request.

Enter CANCEL, END, or RETURN command to cancel request.
***** ***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG> your edit profile using the command RECOVERY ON.
000001 /* IDCAMS COMMAND */
000002 DEFINE CLUSTER (NAME(KC03KD0.SLSPKSDS) -
000003 RECORDS(50 5) -
000004 INDEXED -
000005 RECORDSIZE(52 52) -
000006 KEYS(5 0) -
000007 ) -
000008 DATA (NAME(KC03KD0.SLSPKSDS.DATA) -
000009 ) -
Command ==> EXECUTE
F1=Help F2=Split F3=Exit F5=Rfind F6=Rchange F7=Up
F8=Down F9=Swap F10=Left F11=Right F12=Cancel
```

**NOTE: THE HYPHEN - AT THE END of each line is REQUIRED ...** Then enter the **EXECUTE** in the command area and after you press Enter to execute this, look for **Return Code 0**

```
Menu Utilities Help

Return Code 0

Instructions:

Enter EXECute command to issue request.

Enter CANCEL, END, or RETURN command to cancel request.

***** ***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
000001 /* IDCAMS COMMAND */
000002 DEFINE CLUSTER (NAME (USER001.SLSPKSDS)
```

**Make sure to capture / save a screen shot at this point as it is part of the lab today.**

What we have accomplished is that we now have created a VSAM KSDS (indexed file) called SLSPKSDS with a record length of 52 and the key defined in bytes 1-5.

Once complete use the PF3 function key (or the Exit Option/Command) to back out back to the main ISPF menu.

The IDZ Remote System Explorer view of these files may not allow us to view (or change) these VSAM files, so we will use the ISPF F (for File Manager) option to view them. This is how to do this:

- Options from Main ISPF menu are :

- F (not FM – that was a previous version of File Manager... ) , then option 1 View, then specify your VSAM file beside Data Set Name ===>

## How to Screen shots

```
zos.kctr.marist.edu Port: 1023 LU Name: Disconnect
Menu Utilities Compilers Options Status Help
-----
ISPSP Primary Option Menu
More: +
Invalid option

0 Settings      Terminal and user parameters      User ID   : KC03F10
1 View          Display source data or listings    Time     : 16:31
2 Edit          Create or change source data       Terminal : 3278
3 Utilities      Perform utility functions         Screen   : 1
4 Foreground     Interactive language processing   Language : ENGLISH
5 Batch          Submit job for language processing  Appl ID  : ISR
6 Command        Enter TSO or Workstation commands   TSO logon: IKJACCNT
7 Dialog Test    Perform dialog testing            TSO prefix: KC03F10
8 LM Facility    Library administrator functions   System ID: SOW1
9 IBM Products   IBM program development products   MVS acct.: ACCT#
10 SCLM          SW Configuration Library Manager   Release  : ISPF 6.1
11 Workplace     ISPF Object/Action Workplace

----- Other Install Products -----

SD SDSF          System Display and Search Facility
D2 DB2I          Perform DB2 Interactive functions
Option ==> forward
F1=Help          F2=Split          F3=Exit          F7=Backward    F8=Forward    F9=Swap
F10=Actions      F12=Cancel
```

are

```
zos.kctr.marist.edu Port: 1023 LU Name: Disconnect
Menu Utilities Compilers Options Status Help
-----
ISPSP Primary Option Menu
More: -

9 IBM Products   IBM program development products   User ID   : KC03F10
10 SCLM          SW Configuration Library Manager    Time     : 16:31
11 Workplace     ISPF Object/Action Workplace        Terminal : 3278
                                           Screen   : 1
                                           Language : ENGLISH
                                           Appl ID  : ISR
                                           TSO logon: IKJACCNT
                                           TSO prefix: KC03F10
                                           System ID: SOW1
                                           MVS acct.: ACCT#
                                           Release  : ISPF 6.1

----- Other Install Products -----

SD SDSF          System Display and Search Facility
D2 DB2I          Perform DB2 Interactive functions
DM DB2 ADMIN     Perform DB2 Administration Functions
IP IPCS          Inter Problem Control Facility
EQ DEBUG         Debug Tool 10.1.0
FM File Manager  File Manager for z/OS 10.1.0
FD FM/DB2        File Manager/DB2
FI File Manager  File Manager/IMS
QW Quick/Ref     Quickref
SI Selcopy       Selcopy
D XDC           Interactive Debugging with XDC
Option ==> FM
F1=Help          F2=Split          F3=Exit          F7=Backward    F8=Forward    F9=Swap
F10=Options      F12=Cancel
```

Option is F (FM is previous version of the File Manager Editor ).

```
host: zos.kctr.marist.edu Port: 1023 LU Name: Disconnect
Process Options Help
File Manager Primary Option Menu
0 Settings Set processing options User ID : KC03F10
1 View View data System ID : SOW1
2 Edit Edit data Appl ID : FMN
3 Utilities Perform utility functions Version : 10.1.0
4 Tapes Tape specific functions Terminal : 3278
5 Disk/VSAM Disk track and VSAM CI functions Screen : 1
6 OAM Work with OAM objects Date : 2015/05/28
7 Templates Template and copybook utilities Time : 16:35
8 HFS Access Hierarchical File System
9 WebSphere MQ List, view and edit MQ data
X Exit Terminate File Manager

Command ==> 1 NOT 2
F1=Help F2=Split F3=Exit F4=CRetriev F7=Backward F8=Forward
F9=Swap F10=Actions F12=Cancel
```

```
host: zos.kctr.marist.edu Port: 1023 LU Name: Disconnect
Process Options Help
File Manager View Entry Panel
Input Partitioned, Sequential or VSAM Data Set, or HFS file:
Data set/path name SLSPKSDS +
Member . . . . . (Blank or pattern for member list)
Volume serial . . . . . (If not cataloged)
Start position . . . . . +
Record limit . . . . . Record sampling _

Copybook or Template:
Data set name . . . . .
Member . . . . . (Blank or pattern for member list)
Processing Options:
Copybook/template Start position type Enter "/" to select option
3 1. Above - 1. Key - Edit template _ Type (1,2,9)
2. Previous - 2. RBA - Include only selected records
3. None 3. Record number - Binary mode, reclen 80
4. Create dynamic

Command ==>
F1=Help F2=Split F3=Exit F4=Expand F7=Backward F8=Forward
F9=Swap F10=Left F11=Right F12=Cancel
```

Eventually your screenshot will look like this (once we load the file with data ... for now it will not show any records ... (just Top of data and Bottom of data):

```

Host: | zos.kctr.marist.edu | Port: | 1023 | LU Name: | | Disconnect
Process Options Help
View KC03F10.SLSPKSDS Top of 95
Key Type KSDS RBA Col 1 Insert Length 52
***** **** Top of data ****
000001 00176Roe Eileen 7082438011883500200394
000002 00895Wood Ann 7081973021850400300255
000003 00898Kredens Richard 7088333043322300400320
000004 00940Waymel Bradley 7082689154499400100387
000005 01061Ade Julie 7087223211871300100338
000006 01163Dube Jason 3124251098008500100325
000007 01535Gehl Adriane 7087221012681400100346
000008 01746Brockmann Nelson 2190102012192200400286
000009 01877McCoy Hanah 7088816021262400100301
000010 01951DeRenzo Dianne 7087878200674300500329
000011 02153Yourlast Yourfirst 6322223424432100100333
000012 02158Flynn Ashley 7737453012738100100333
000013 02279Rotatori Cynthia 8157156112949300200256
000014 02458Novak Mary 2195595200447300300378
Command ==> Scroll PAGE
F1=Help F2=Zoom F3=Exit F4=CRetrie F5=RFind F6=RChange
F7=Up F8=Down F9=Swap F10=Left F11=Right F12=Cancel

```

Notice the Key field is highlighted in white – this is the view once we add data to this file, which we will be doing shortly.

**Make sure to capture / save a screen shot at this point as it is part of the lab today.**

Note if you try to Delete/define this file while you are viewing this file in the FM editor, you will get an error!

You should now see a new entry in the IDZ Remote System Explorer for our new VSAM file with a little/tiny **red v** beside it. **Capture / save a screen shot of this too.**

## Lab 8 - 2%

- Create a new sequential file on the host called **CS2SLSPU** (case2 salesperson unsorted) and place the contents from the FOL file into it (remember to specify the correct Record Length)
- Edit the file and change Yourlast Yourfirst to your name
- Create another sequential file called **CS2SLSPS** (case2 salesperson sorted)
- Create a **NEW** JCL job that will sort CS2SLSPU to CS2SLSPS as follows:
  - Sorts on branch # as the primary sort field
  - Sorts on department # as a secondary sort field
  - Sorts on last name within department #, within branch # as the 3<sup>rd</sup> sort field
- To specify additional sort fields for secondary sort criteria, just add on to the same SYSIN command line:

Primary Start, Primary Length, Primary Type, Primary sequence, Secondary Start, Secondary Length, Secondary Type, Secondary Sequence....

## Submit

- A screen shot of the newly sorted file showing your name
- A screen shot of the jcl you used

Line 1	Column 1	Insert
24302	Banasiak	Nancy 708405211139100100300
02690	DeGaetano	Catherine 4151679023182100100485
02158	Flyn	7737453012738100100333
26002	Hau	7089627001329100100239
07700	Orla	7081429032258100100294

If there are errors they will show up in the spooled output. We'll be using similar JCL in an upcoming class fyi.

- Screen shot of online utility defining SLSPKSDS with return code of 0
- Screen shot of F (File Manager) view of the new (empty) SLSPKSDS file.
- Screen shot of Remote System Explorer showing the tiny V for new VSAM file:

