Appendix B

WORKSHOP

TM

**SYS-ED/
Computer
Education
Techniques, Inc.**

1 VSAM: Introduction and Overview

1.1 IDCAMS Processing

Objectives:

1. Print and create clusters that will be used as input to subsequent exercises.
2. List all datasets with a SYSED high level qualifier or the qualifier provided by the instructor.
3. Code and test IDCAMS JCL.
4. Code and test IDCAMS commands.

Instructions:

1. Use the LISTCAT command to list all datasets names with a specific qualifier. The instructor will provide the qualifier and dataset names.
2. Use the PRINT command to:
   - Print in character format a member in a PDS.
   - Print in HEX format a sequential file.
   - Print the first 10 records in a dataset.

2 Access Method Services

2.1 Create EDS Datasets

Objectives:

1. Define an ESDS cluster.
2. Program to load data into this cluster.

Instructions:

Create the following 3 ESDS datasets using these attributes:

```
INPUT: qual.ITEMFIL.INPUT
      Item number             3 bytes numeric
      Quantity                4 bytes numeric
      Filler                  73 bytes
                              80

INPUT: qual.SYSED.CUSTFIL.INPUT
      Customer number         3 bytes numeric
      Name                    50 bytes alpha
      State                   2 bytes alpha
      Filler                  25 bytes
                              80

Input file:SYSED.CUST.FILE.MAINT
Delete record:
      Type code               1 byte alpha 'D'
      Customer number         3 bytes numeric
      Filler                  76 bytes
                              80

Add record:
      Type code               1 byte alpha 'A'
      Customer number         3 bytes numeric
      Name                    50 bytes alpha
      State                   2 bytes alpha
      Filler                  24 bytes
                              80

Order record:
      Type code               1 byte alpha 'O'
      Customer number         3 bytes numeric
      Item number             3 bytes numeric
      Quantity ordered        4 bytes numeric
      Filler                  69 bytes
                              80
```

3. Use the REPRO command to copy data into each of the ESDS datasets.

4. Print three new ESDS datasets.

5. List all catalog datasets starting with the qualifier using the LEVEL parameter.

2.2 RRDS Processing

Objectives:

1. Define an RRDS cluster.

2. Program to load data into this cluster.

Instructions:

1. Define RRDS cluster.

```
Name: qual.TEAM#.ITEM.FILE  (replace # with your team number)
Record size: 11 bytes
Maximum records: 1000
```

2. Code a program to read the input file and store in the new RRDS dataset.

   Edit the Item Number to insure that it contains a valid numeric.

```
INPUT: qual.ITEMFIL.INPUT
      Item number             3 bytes numeric **
      Quantity                4 bytes numeric
      Filler                  73 bytes
                              80
```

** This field also will be the Relative Record Number.

```
OUTPUT:qual.TEAM#.ITEM.FILE
      Item number             3 bytes numeric
      Quantity                4 bytes numeric
      Quantity back ordered   4 bytes numeric (Zero fill)
                              11
```

3 VSAM Datasets

3.1 KSDS Processing - Load

Objectives:

1. Define a KSDS cluster.
2. Program to load data into this cluster.

Instructions:

1. Define cluster:

```
Name: qual.TEAM#.CUSTOMER.FILE
Record size: 18 to 59 characters
Maximum Number of Records: 3500
Free space: 10% CI and CA
```

2. Use REPRO to load only the header records.

```
INPUT: qual.SYSED.CUSTFIL.INPUT

Customer number              3 bytes numeric
Name                         50 bytes alpha
State                        2 bytes alpha
Filler                       25 bytes
                             80

OUTPUT: qual.TEAM#.CUSTOMER.FILE
Header record
      Customer number        3 bytes numeric**
      Suffix                 2 bytes numeric**
      State                  2 bytes alpha
      Name                   50 bytes alpha
      Number of orders       2 bytes numeric (zero fill)
                             59
```

The Trailer record will not be used until the next workshop.

```
Customer number              3 bytes numeric
Suffix                       2 bytes numeric
State                        2 bytes alpha
Item number                  3 bytes numeric
Quantity                     4 bytes numeric
Qty backordered              4 bytes numeric
```

4 Application programming

4.1 KSDS Processing - Update

Objectives:

1. Update Customer dataset.
2. Update Item dataset.

Instructions:

1. **I-O files** **qual.TEAM#.ITEM.FILE**
qual.TEAM#.CUSTOMER.FILE

   Refer to previous exercises for ITEM record and HEADER record layouts.

2. **Input file:SYSED.CUST.FILE.MAINT**

```
Delete record:

Type code                    1 byte alpha 'D'
Customer number              3 bytes numeric
Filler                       76 bytes
                             80

Add record:

Type code                    1 byte alpha 'A'
Customer number              3 bytes numeric
Name                         50 bytes alpha
State                        2 bytes alpha
Filler                       24 bytes
                             80

Order record:

Type code                    1 byte alpha 'O'
Customer number              3 bytes numeric
Item number                  3 bytes numeric
Quantity ordered             4 bytes numeric
Filler                       69 bytes
                             80
```

```
3.    Processing
      Keep total counts of:
            orders
            adds
            deletes
            duplicate adds
            invalid deletes
```

Delete Processing:

On a Delete transaction append two zeros to customer number and delete the appropriate header record.

Keep a count of the number of deletes processed and the number of invalid deletes - customer not on file.

Hints:

- The deletes are for headers only. There are no orders associated with headers to be deleted.
- There are invalid deletes.

Add Processing:

On an Add transaction append two zeros to customer number build and WRITE the appropriate header record.

Hints:

- The adds are for header records only.
- There are duplicate adds.

Order Processing:

On an Order transaction append two zeros to customer number. READ the header record and update the number of orders field. This number will become the suffix for the order record.

REWRITE the header record. READ and update the Item file by subtracting quantity ordered from quantity on the item record.

Rewrite the Item record. Build and WRITE the trailer record.

Hints:

- There are no orders for customers without headers.
- There are multiple orders for customers.
- For rapid coding ignore backorder fields.

Potential Problems:

1. Not updating the number of orders field in the header record.

5 Alternate Indexes and Paths

5.1 AIX Processing

Objectives:

1. Define an Alternate Index.
2. Define a Path.
3. Build an Alternate Index.
4. Program to display the number of customers per state.

Instructions:

1. Define the AIX using the STATE as an alternate key:

```
Name: qual.TEAM#.CUSTOMER.AIX
Record size:12 to 132
```

2. Define the Path:

```
Name: qual.TEAM#.CUSTOMER.PATH
```

3. Build theAlternate Index.

4. Code and test a program to read the customer file through the Path and print - DISPLAY Customer counts and Order counts for each state.

Potential Problems:

1. There must be defined in the Select statement both a Record Key and an Alternate Record Key.

2. JCL must include two DD statements.

   The first must have DDname as in the Select statement.

   Example: Select ... assign to MASTER from COBOL program.

```
//MASTER  DD DSN=TEAM#.CUSTOMER.FILE
```

   The second must have DDname appended with a 1.

```
//MASTER1 DD DSN=TEAM#.CUSTOMER.PATH
```

Sample Solution Output:

	CUST	
STATE	COUNT	ORDERS
AL	1	
AZ	1	
CA	5	3
CO	4	10
CT	1	
DC	1	
DE	1	
FL	1	
GA	1	
HI	3	3
IA	1	
LA	1	
MA	2	
MI	3	

6 VSAM Components and Evolution

6.1 Review Questions

1.	_____ is the utility used for VSAM and non-VSAM files.			
	a) IEBGENER	b) IDCAMS	c) IEHPROGM	
	d) RMF	e) None of the above.		

2.	The VSAM _____ serves as a namespace repository for the entire DASD environment.			
	a) VTOC	b) CVOL	c) CATALOG	
	d) LISTCAT	e) None of the above.		

3.	Which is not true of a Control Interval?
	a) All CIs in a dataset component are the same size.
	b) Size can be selected by the user or by VSAM.
	c) Size is device-independent; a CI may be larger than the DASD track.
	d) Size determines the number and size of physical records used to hold a CI on DASD.
	e) They are all true.

4.	Adjacent records of the same length are represented by _____ RDF(s) indicating length and record count.			
	a) 1	b) 2	c) 3	
	d) 4	e) 0		

5.	_____per CI contains the total length of the data in the CI, and the total length of the unused space.			
	a) VSAM Control Block	b) Block Definition Word	c) Record Definition Field	
	d) Control Interval Definition Field	e) a and b.		

7 KSDS Structure

7.1 Review Questions

1.	Given an index CISIZE=1024 and key length= 15, the approximate number of keys in an index CI will be:
	# Of Keys in CI = (Index CISZ-31)/((Key Length/3)+3)
	# Of Keys in CI = (1024-31)/((15/3)+3)
	# Of Keys in CI = 124

2.	Given the dataset _____, obtain the following information from a LISTCAT:	
	Number of CI in a CA	CI Splits
	CA Splits	Index Level
	FREESPACE specified at creation time.	

3.	Given a VSAM dataset with fixed length records and a CISIZE of 4096, how many RDF are in each CI?

4.	Given a CISize = 4096, FRSPC% = 10%Control Interval FREESPACE , and RecSize = 200, calculate the number of records within a CI: Control Interval when the CI is first loaded.

8 The Cluster on the Disk

8.1 Calculating CA Size

Given this space allocation, the CA Size would be:

Unit	Primary, Secondary	CA Size
TRACKS	50,2	
TRACKS	2,50	
KILOBYTES	500,50	
RECORDS	1000,1	
CYLINDERS	100,1	

9 Tuning AMS: DEFINE CLUSTER

9.1 Review Questions

1.	Code IDCAMS to:
	Copy (REPRO) from uid.MYDATA.DATA to uid.MYDATA2.DATA.
	If the REPRO generates a LASTCC of ZERO, print the output dataset.
	If the REPRO generates a LASTCC of non-ZERO, print the input dataset.
	If the REPRO generates a LASTCC of non-ZERO, set MAXCC to 16.

2.	Given the files uid.DATA1.VSAM, uid.DATA2.VSAM, merge two key sequenced files by having the records replaced with like keys using REPRO.

3.	Alter the SHAREOPTION to 2,3 for the dataset uid.DATA1.VSAM.
Answer	ALTER uid.DATA1.VSAM SHAREOPTIONS(2 3)

4.	Given a CI in a CA = 30, records= 100000, and CI SIZE = 8096, what number of data records can fit into one CA of a fixed length cluster?

10 Alternate Indexes and Paths

10.1 Defined AIX Record Length

Given these parameters, what should the defined AIX record length be?

Unique	AIX Key Length	Base Cluster Key Length	Number of Possible Duplicate Key Values	Record Length
N	5	9	1	
N	20	9	1	
N	100	9	1	
Y	9	9	100	

11 Programming for Performance

11.1 Review Questions

1.	With direct processing which is true?	
	a) Access is restricted to only those CIs required.	b) No preparation of sequential input is required.
	c) Applications with random action, such as customer service inquiries, will be well suited.	d) a and b.

2.	With sequential processing_____ activity reduces redundant I/O.	
	a) CPU caching	b) full lookaside
	c) RAID processing	d) index lookup
	e) None of the above.	

3.	SKP: Skip Sequential Processing will read through the _____pointers of the sequence set records to the specified generic or full key.	
	a) horizontal	b) vertical
	c) double linked	d) null
	e) None of the above.	

4.	With the COBOL language, ACCESS IS RANDOM only is used with random processing. Insert activity is always _____ mode.	
	a) SIS	b) NSI
	c) Random	d) Default
	e) None of the above.	

5.	Generic keys:	
	a) Can be shorter than the specified file key.	b) Will be padded with low values to the right and compared left justified to the file key.
	c) Can be a full length key handled programmatically.	d) a and b.
	e) a, b, and c.	

12 Strings and Buffers Pools

1.	A reason not to use NSR for a VSAM dataset is:	
	a) The dataset receives many on-line insertions which create a large number of CI/CA splits.	b) The dataset only is browsed occasionally.
	c) There is a heavy activity dataset which can monopolize the buffer pool if placed into LSR due to a high number of requests.	d) a and b.
	e) a, b, and c.	

2.	Adding more strings will require additional data and index _____	
	a) pools	b) buffers
	c) channels	d) a and b.
	e) a, b and c.	

3.	The benefit in using LSR is the reduction of _____requirements.	
	a) virtual storage	b) I/O
	c) spooling	d) queue
	e) channels	

4.	A dataset that has a lot of CA: Control Area splits should be placed in the:	
	a) LSR pool	b) cached queue
	c) NSR pool	d) permanent storage class
	e) None of the above.	

5.	A string is acquired before an access and is released:	
	a) when the function is finished.	b) when the end of the transaction is reached.
	c) after every I/O operation.	d) a and b.
	e) a, b, and c.	

13 Monitoring for Performance

Instructor will provide the specifications and guidelines.