IBM Software Group

Update on VSAM and the VSAM tools from IBM

November 8, 2007

ON DEMAND BUSINESS

VSAM - Agenda

- *VSAM – Today and Tomorrow*
  - **Steve Branch, IBM Systems and Technology Group**
- *z/OS Problem Determination Tools for VSAM*
  - **Dan Brown, IBM System z Application Development Tools, Americas**
- *CICS Tools for VSAM*
  - **George Lees, IBM System z Application Development Tools, Americas**

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VSAM

Today and Tomorrow

Stephen Branch

November 2007

VSAM - History

- **AM1**
- **Virtual Storage Access Method**
- **Access Method and a Data Set Type**
- **VSAM Components**
  - ***VSAM Record Management***
  - ***VSAM Open/Close/EOV***
  - ***ICF Catalog***
  - ***IDCAMS***
- **VSAM is a part of base z/OS**

Types of VSAM Data Sets

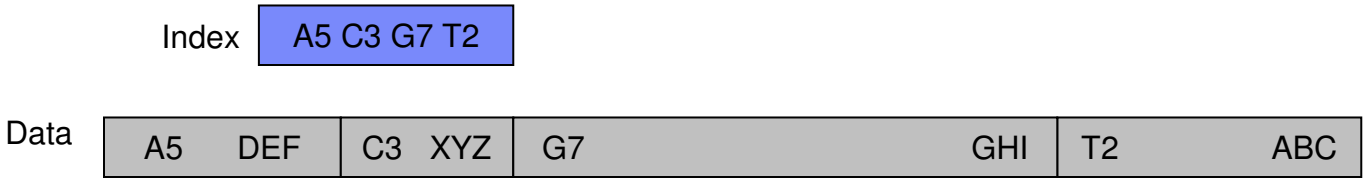
- **The Original Three Types**
  - ***Entry Sequenced Data Set (ESDS)***
  - ***Key Sequenced Data Set (KSDS)***
  - ***Relative Record Data Set (RRDS)***

ESDS

- **Simplest VSAM data set type**
- **Records are in time written sequence**
  - ***definition: record - logical unit of data. It has length.***
- **Records have no keys**
- **Records are variable length**
- **Position of record in the data set is not important**
- **An ESDS is similar to physical sequential data sets (PS)**

KSDS – Key Sequenced Data Set

- **Primary access data set type**
- **Records kept in sequence by a unique key**
- **An index of keys is kept and points into the data**
- **The index is used to search for records directly**
- **Records can be accessed sequentially**
- **Records can be variable length**
- **Faster than sequential searches, slower than relative record search, good performer nonetheless**



RRDS – Relative Record Data Set

- **Relative record position**
- **Allows fast access when key is the order number of the record**
  - ***Records must be fixed length.***
  - ***Records are located by multiplying the key by the record length.***
  - ***RRDSs are rare in the real world.***

LDS – Linear Data Set

- **Similar to ESDS**
- **No concept of records**
- **Processing by Control Interval (CI)**
- **A CI is like a block**
- **DB2 first user**

VRRDS – Variable Relative Record Data Set

- **Behaves like a RRDS, really a KSDS by key**
- **No way to compute position of record because records are variable length, so an index is used**
- **Requirement from U.S. Government**

VSAM Data Sets

- **Only reside on DASD**
- **Must be cataloged (except for temporary VSAM datasets)**
  - ***Entry in the Catalog – Catalog record***
  - ***Entries in the VVDS - VVRs***
  - ***Entries in the VTOC - DSCBs***

Access Method Services (AMS)

- **AKA - IDCAMS**
- **Purpose - Define, Delete, Alter, List, and Recover data sets - especially VSAM data sets**
- **Manual - SC26-7394**
- **Invoked via JCL, TSO or can be called by an Assembler program**

VSAM Alternate Index - AIX

- **Provides a means to reference an ESDS by a key**
- **Provides a means to reference a KSDS by other than the primary key**
- **Clusters pointed to by an AIX are called base clusters**
- **Allows duplicate keys**
- **An AIX is a KSDS itself – it has a data and an index component**

VSAM Enhancements Through the Years

- **Compression for KSDSs**
- **Striping – Data is spread across volumes**
- **Extended Addressability - allows for data sets greater than 4 gigabytes**
- **Partial Release – releases unused space at the end the data set**
- **System Managed Buffering – allows the system to choose the buffering technique**

VSAM Record Level Sharing and Transactional VSAM

- **Record Level Sharing (RLS)**
  - **Allows record level sharing between Sysplex**
  - **Done using the coupling facility**
  - **provides locking, two-phase commit, and logging facilities in an CICS online environment**
- **Transactional VSAM (TVS)**
  - **provides locking, two-phase commit, and logging facilities in a batch environment**
  - **allows multiple batch update jobs to run concurrently with CICS access to the same data sets while maintaining integrity and recoverability**

Sources of additional information

- **Manuals**
  - ***SC26-7394 DFSMS Access Method Services for Catalogs***
  - ***SC26-7410 DFSMS: Using Data Sets***
  - ***SC26-7409 DFSMS: Managing Catalogs***
  - ***SC26-7408 DFSMS Macro Instructions for Data Sets***
- **Redbooks**
  - ***URL for VSAM Redbooks: w3.itso.ibm.com/cgi-bin/searchsite.cgi?query=vsam***
  - ***SG24-6105 VSAM Demystified***
- **Hot Topics**
  - ***URL: www.ibm.com/zseries/zos/hot_topics.html***

Summary

VSAM is both a set of data set types and an access method that provides a rich assortment of options for your application needs.

VSAM is tested technology with a long history of reliability and performance.

z/OS customers depend upon VSAM for their business needs.

The End

If you have questions in the future, please contact

Stephen Branch

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IBM Software Group

z/OS Problem Determination and Deployment Tools For VSAM

Version 8

Dan Brown

November 2007

IBM's Solution

- Offer a set of tools that:
  - Exploits IBM's latest software and processor technology
  - Offer wide array of key features and functions
  - Can enhance the Application Development Lifecycle
  - Provide opportunity for increased user productivity
  - Are affordably priced
  - Have flexible terms and conditions
  - Have no license keys

File Manager for z/OS

What is File Manager?

- Integrated suite of functions to help z/OS ***application developers*** work with VSAM data across a wide range of formats and storage media: browsing, finding, editing, creating, copying, printing, comparing, and erasing data
- Ideal for creating and working with application test data, or locating problems in application data files
- Functions can be accessed via interactive panels, called in REXX or DFSORT procedures, and batch jobs

File Manager for z/OS (FM)

- Key features
  - Select, create, browse, copy, edit, print, and format or reformat VSAM data files
  - Manipulate VSAM data using COBOL and PL/I record layouts interactively or in batch.
  - Comprehensive, user-friendly, batch and interactive utilities extends standard ISPF
  - Access CICS VSAM resources with CICS transaction
  - Audit logging and data scrambling for VSAM
- IBM Product Support
  - Works with, CICS, DB2, IMS and z/OS (QSAM, VSAM, PDS, HFS) data
  - CICS TS V1 to V3, IMS V7 to V10, DB2 V7 to V9

New in FM V8.1

- **Integration with Rational Developer for System z**
- **Data scrambling support**
- **Load Module Compare**
- **File Manager edit and browse enhancements**
- **File Manager DB2, IMS and CICS enhancements**

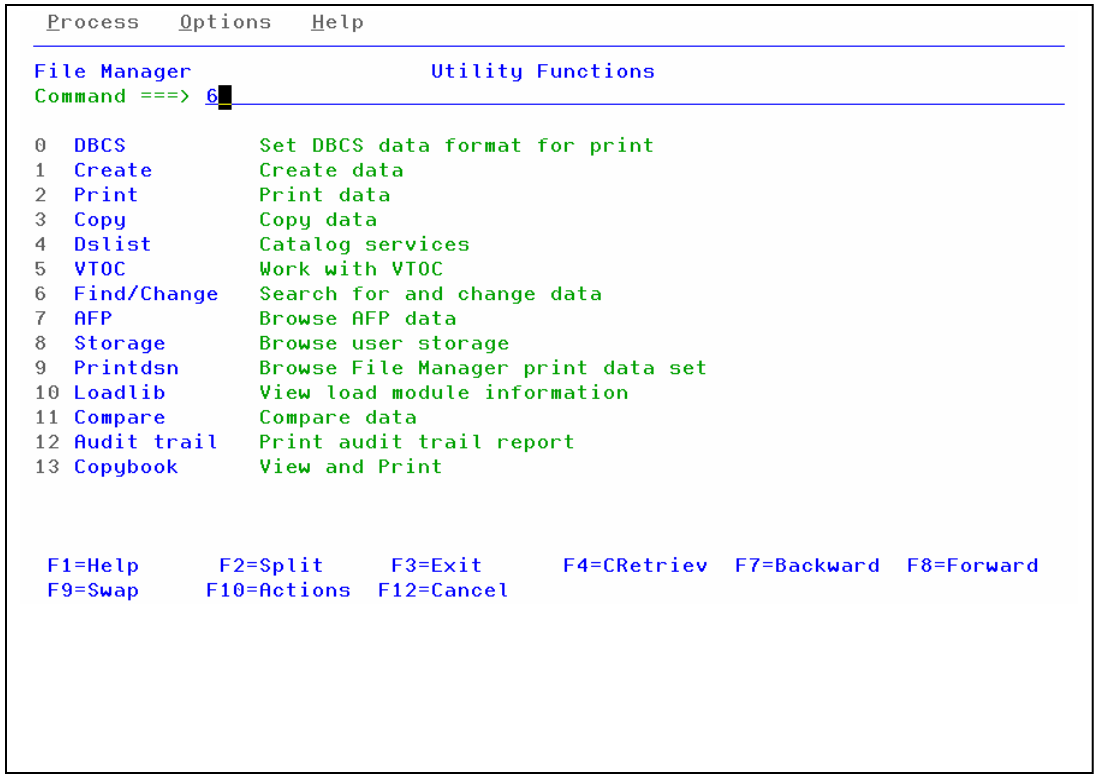
File Manager for z/OS (FM)

Problem

- **You want to modernise and extend your System z application inventory but it's taking too long to bring your new developers up to speed with the files and databases they need to work with**

Solution

- **File Manager identifies the structure of your VSAM records and displays and allows manipulation of each field according to its data type**



Value

- **Promotes understanding and speeds the development process**

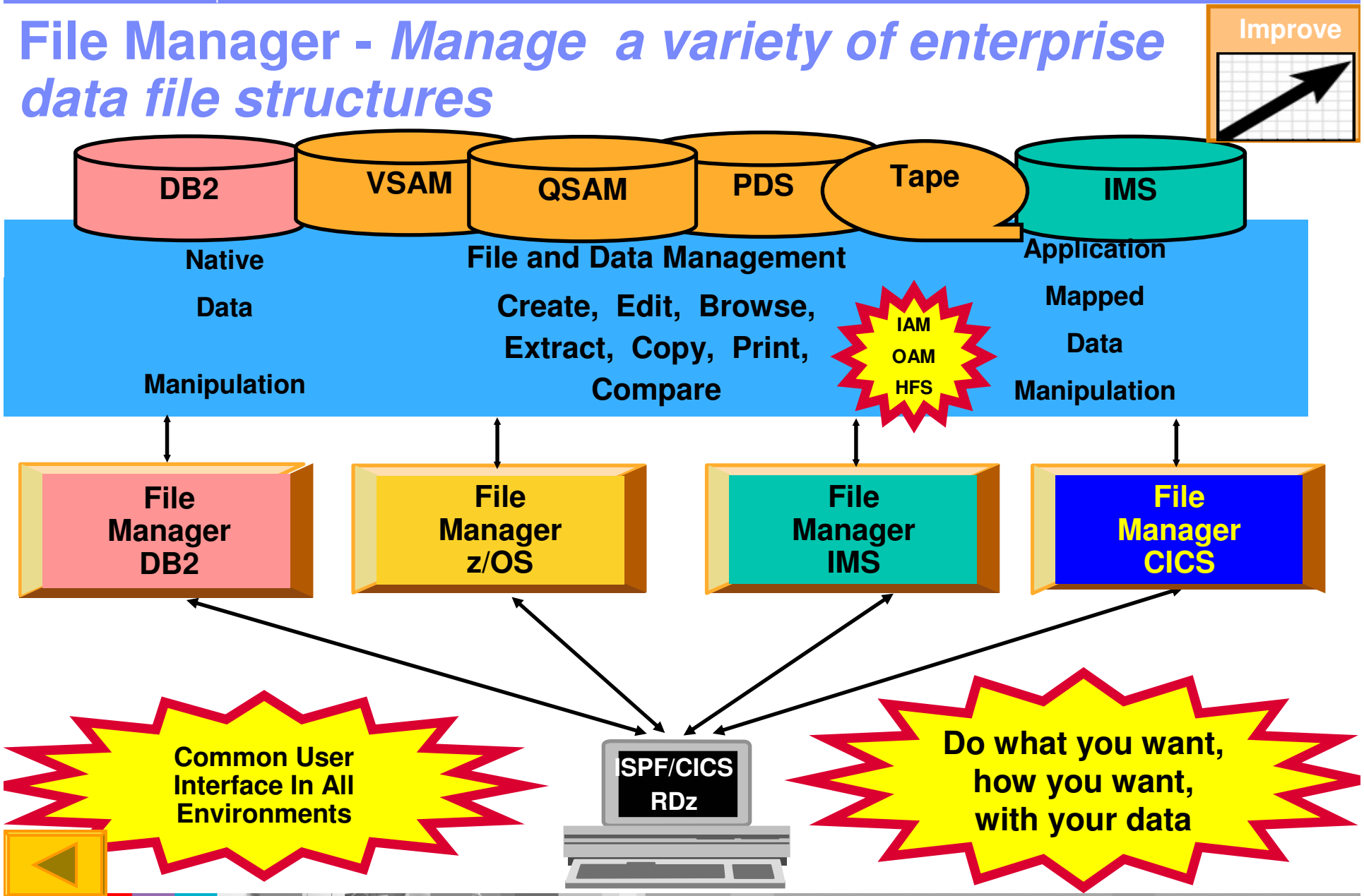
Advanced Functions

- **Aimed at application developers:**
  - Format VSAM and QSAM data according to definitions in a COBOL or PL1 copybook, displayed as either:
    - A table, under field column headings
    - A single record per panel, listing field values next to field names
  - Select records with Boolean conditions
  - Select fields
  - Copy selected records and fields between data sets, and insert/delete/reformat fields
  - Create test data according to user-specific patterns
  - Compare data between data sets according to user-specified patterns

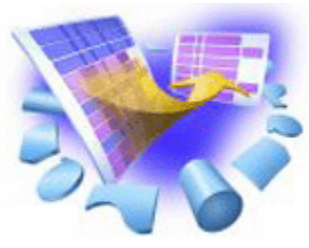
Highlights

- Find and change data within specific fields
- Identify fields that contain invalid values
- Use selection criteria and/or sampling to limit the number/type of records in Browse/Edit
- Edit entire VSAM file regardless of size
- Copy or print selected records and fields
- Test data generation for VSAM based on record layouts
- Compare data between datasets using field level mapping

File Manager - *Manage a variety of enterprise data file structures*



File Manager z/OS Features



- Full function edit and view
  - Table
  - Single
- Flexible selection criteria
  - Work with copybooks or templates
- Edit any file regardless of size
- Create data
- Print data
- Copy data
  - File reformatting
  - Scramble fields
- Catalog services
- Work with VTOC
- Compare
  - Data
  - Load Modules
- Search for and change data
  - Insert continuation JCL statement
- View or print
  - Copybooks
  - Templates
- Modes Of Operation
  - Interactive
  - Batch
- Interfaces
  - ISPF
  - CICS
  - RDz

File Manager Primary Option Menu

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager                      Primary Option Menu
Command ===> 2

0  Settings      Set processing options                 User ID . : ALLANS2
1  View          View data                              System ID : STLABF2
2  Edit          Edit data                              Appl ID . : ISR
3  Utilities     Perform utility functions              Version . : 8.1.0
4  Tapes         Tape specific functions                Terminal. : 3278A
5  Disk/VSAM     Disk track and VSAM CI functions       Screen. . : 1
6  OAM           Work with OAM objects                  Date. . . : 2007/09/19
7  Templates     Template and copybook utilities        Time. . . : 06:32
8  HFS           Access Hierarchical File System
X  Exit          Terminate File Manager
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager                      Edit Entry Panel
Command ===> ____________________________________________________________

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
   Data set/path name 'ALLANS2.FMDEMO.VSAM'                              +
   Member . . . . . . ________     (Blank or pattern for member list)
   Volume serial  . . ______       (If not cataloged)
   Start position . . ____________________________________  +
   Record limit . . . ________     Record sampling  _
   Inplace edit . . . _            (Prevent inserts and deletes)
Copybook or Template:
   Data set name  . . 'ALLANS2.FMDEMO.COPYBOOK'
   Member . . . . . . DEMODATA     (Blank or pattern for member list)
Processing Options:
 Copybook/template   Start position type   Enter "/" to select option
 1  1. Above         _  1. Key             _  Edit template  _ Type (1,2,S)
    2. Previous         2. RBA             _  Include only selected records
    3. None             3. Record number   _  Binary mode, reclen 80
    4. Create dynamic                      _  Create audit trail
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Top of 78
Command ===> ____________________________________________________ Scroll PAGE
                                Type ESDS     RBA ______________ Format TABL
      REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
      #2       #3                            #4        #5       #6          #7
      AN 1:2   AN 3:20                   BI 23:2   BI 25:2  PD 27:4    BI 31:4
      <>       <---+----1----+---->      <---+>    <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000001 01        Graham Purdy               5512        24    68000          28
000002 01        Graham Purdy               5512        24    68000          28
000003 01        Al Tortorice               3101        39    53000          15
000004 01        Will Soper                 4412        28    68000           5
000005 01        Tyrone Dalais              3312        21    65000          14
000006 02        Grant Sutherland           0309      2373  ********    71124800
000007 02        Graham Purdy               0309      2373  ********    71124800
000008 01        Silvano Prez               2161        55    69000           1
000009 01        Liz Rushton                3349        40    65000          14
000010 02        Silvano Prez               5193      8535  ********    41413184
000011 02        Don Pharoah                5193      8535  ********    41413184
000012 01        John Nicholls              3349        40    69000          30
000013 01        Anna Waghorn               7812        33    65000           2
000014 01        Merrill Bani               7876        56    58000          18
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Top of 78
Command ===> X ALL                                             Scroll PAGE
SHAD                              Type ESDS     RBA ____________ Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4       #5       #6          #7
       AN 1:2   AN 3:20                   BI 23:2  BI 25:2  PD 27:4    BI 31:4
       <>       <---+----1----+---->      <---+>   <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000001 01       Graham Purdy                5512       24    68000          28
000002 01       Graham Purdy                5512       24    68000          28
000003 01       Al Tortorice                3101       39    53000          15
000004 01       Will Soper                  4412       28    68000           5
000005 01       Tyrone Dalais               3312       21    65000          14
000008 01       Silvano Prez                2161       55    69000           1
000009 01       Liz Rushton                 3349       40    65000          14
000012 01       John Nicholls               3349       40    69000          30
000013 01       Anna Waghorn                7812       33    65000           2
000014 01       Merrill Bani                7876       56    58000          18
000037 01       Graham Purdy                5512       54    68000          28
000038 01       Al Tortorice                3101       39    65000          15
000039 01       Will Soper                  4412       40    68000           5
000040 01       Tyrone Dalais               3312       21    66000          14
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                            Top of 78
Command ===> F 7812 #4                                          Scroll PAGE
Some shadows are off, so no records displayable
       REC-TYPE NAME                 EMPLOYEE-NO     AGE    SALARY     MONTH(1)
       #2       #3                         #4       #5        #6           #7
       AN 1:2   AN 3:20               BI 23:2 BI 25:2  PD 27:4     BI 31:4
       <>       <---+----1----+---->   <---+>  <---+> <---+--> <---+----1>
****** ****  Top of data  ****
****** ****  End of data  ****
```

Edit

```
 Process    Options    Help
 ------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                        Chars 7812 found
Command ===> F 40 (#2 #4 #5) ALL                             Scroll PAGE
SHAD                              Type ESDS     RBA          Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4       #5       #6          #7
       AN 1:2   AN 3:20                   BI 23:2  BI 25:2  PD 27:4     BI 31:4
       <>       <---+----1----+---->      <---+>   <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000013 01       Anna Waghorn                 7812       33    65000           2
****** ****  End of data  ****
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                      3 string(s) found
Command ===> RESET                                          Scroll PAGE
SHAD                              Type ESDS     RBA                 Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4        #5       #6          #7
       AN 1:2   AN 3:20                   BI 23:2  BI 25:2  PD 27:4    BI 31:4
       <>       <---+----1----+---->      <---+>   <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000009 01       Liz Rushton                 3349       40     65000          14
000012 01       John Nicholls               3349       40     69000          30
000013 01       Anna Waghorn                7812       33     65000           2
000039 01       Will Soper                  4412       40     68000           5
****** ****  End of data  ****
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Top of 78
Command ===> SHAD SUP ON                                       Scroll PAGE
SHAD                              Type ESDS     RBA ____________ Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4       #5       #6          #7
       AN 1:2   AN 3:20                   BI 23:2  BI 25:2  PD 27:4    BI 31:4
       <>       <---+----1----+---->      <---+>   <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000001 01       Graham Purdy                5512       24    68000          28
000002 01       Graham Purdy                5512       24    68000          28
000003 01       Al Tortorice                3101       39    53000          15
000004 01       Will Soper                  4412       28    68000           5
000005 01       Tyrone Dalais               3312       21    65000          14
000008 01       Silvano Prez                2161       55    69000           1
000009 01       Liz Rushton                 3349       40    65000          14
000012 01       John Nicholls               3349       40    69000          30
000013 01       Anna Waghorn                7812       33    65000           2
000014 01       Merrill Bani                7876       56    58000          18
000037 01       Graham Purdy                5512       54    68000          28
000038 01       Al Tortorice                3101       39    65000          15
000039 01       Will Soper                  4412       40    68000           5
000040 01       Tyrone Dalais               3312       21    66000          14
```

Edit

```
 Process    Options    Help
 ------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Top of 78
Command ===> ____________________________________________________ Scroll PAGE
SHAD                          Type ESDS     RBA ________________ Format TABL
       REC-TYPE NAME                  EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                          #4       #5       #6          #7
       AN 1:2   AN 3:20                 BI 23:2  BI 25:2  PD 27:4    BI 31:4
       <>       <---+----1----+---->     <---+>   <---+>  <---+-->  <---+----1>
****** ****  Top of data  ****
000001 01       Graham Purdy               5512       24    68000          28
000002 01       Graham Purdy               5512       24    68000          28
000003 01       Al Tortorice               3101       39    53000          15
000004 01       Will Soper                 4412       28    68000           5
000005 01       Tyrone Dalais              3312       21    65000          14
V - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 2 Line(s) suppressed
000008 01       Silvano Prez               2161       55    69000           1
000009 01       Liz Rushton                3349       40    65000          14
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 2 Line(s) suppressed
000012 01       John Nicholls              3349       40    69000          30
000013 01       Anna Waghorn               7812       33    65000           2
000014 01       Merrill Bani               7876       56    58000          18
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 20 Line(s) suppressed
000037 01       Graham Purdy               5512       54    68000          28
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Top of 78
Command ===> FS                                                Scroll PAGE
SHAD                          Type ESDS     RBA ____________   Format TABL
       REC-TYPE NAME                 JOB-TITLE      ADDR1                ADDR2
       #2       #3                   #4             #5                   #6  +
       AN 1:2   AN 3:20              AN 23:14       AN 37:20             AN 57
       <>       <---+----1----+----> <---+----1---> <---+----1----+----> <---+
****** ****  Top of data  ****
- - -  - - - - - - REC-TYPE01  - - - - - - - - - - 5 Line(s) suppressed
000006 02       Grant Sutherland     Developer      22  Montrose St      Thorn
000007 02       Graham Purdy         Developer      256 Hay St           Canni
- - -  - - - - - - REC-TYPE01  - - - - - - - - - - 2 Line(s) suppressed
000010 02       Silvano Prez         Programmer     48  Small Lane       Mt Pl
000011 02       Don Pharoah          Programmer     661 Ayton Way        Flore
- - -  - - - - - - REC-TYPE01  - - - - - - - - - - 3 Line(s) suppressed
000015 02       Grant Sutherland     Developer      22  Montrose St      Thorn
000016 02       Andrew Astle         Developer      44  Eagle Rise       River
000017 02       Graham Purdy         Developer      256 Hay St           Canni
000018 02       Bill Soper           Developer      84  Murchison Rd     Diane
000019 02       Tyrone Dalais        Developer      92  Smith St         Belmo
000020 02       Rod Turner           Manager        184 Alexander Dve    Swan
000021 02       Clive Nealon         Manager        28  Bern Rd          Middl
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Rec 6 of 78
Command ===> HEX ON                                          Scroll PAGE
                              Type ESDS     RBA 400          Format SNGL
                                                  Top Line is 2    of 7
Current 01: REC-TYPE02                                       Length 80
Field         Picture Typ Start   Len   Data
 2 REC-TYPE   XX      AN      1     2   02
 2 NAME       X(20)   AN      3    20   Grant Sutherland
 2 JOB-TITLE  X(14)   AN     23    14   Developer
 2 ADDR1      X(20)   AN     37    20   22  Montrose St
 2 ADDR2      X(20)   AN     57    20   Thornlie
 2 POSTCODE   X(4)    AN     77     4   6145
***  End of record  ***
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Rec 6 of 78
Command ===> FOR T                                             Scroll PAGE
                              Type ESDS     RBA 400            Format SNGL
                                                 Top Line is 2    of 25
Current 01: REC-TYPE02                                         Length 80
Field         Picture Typ Start   Len   Data
 2 REC-TYPE   XX      AN      1     2   02
                                        FF
                                        02

 2 NAME       X(20)   AN      3    20   Grant Sutherland
                                        C989A4EAA88998984444
                                        791530243859315400000

 2 JOB-TITLE X(14)    AN     23    14   Developer
                                        C8A89998944444
                                        45553675900000

 2 ADDR1      X(20)   AN     37    20   22  Montrose St
                                        FF44D99A99A84EA44444
                                        220046539625023000000
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Rec 6 of 78
Command ===> HEX OFF                                          Scroll PAGE
                              Type ESDS     RBA 400           Format TABL
       REC-TYPE NAME                 JOB-TITLE      ADDR1                ADDR2
       #2       #3                   #4             #5                   #6  +
       AN 1:2   AN 3:20              AN 23:14       AN 37:20             AN 57
       <>       <---+----1----+----> <---+----1--> <---+----1----+----> <---+
000006 02       Grant Sutherland     Developer      22  Montrose St      Thorn
       FF       C989A4EAA88998984444 C8A89998944444 FF44D99A99A84EA44444 E8999
       02       79153024385931540000 45553675900000 220046539625023000000 38695

000007 02       Graham Purdy         Developer      256 Hay St           Canni
       FF       C988894DA98A44444444 C8A89998944444 FFF4C8A4EA4444444444 C8998
       02       79181407494800000000 45553675900000 256081802300000000000 31559

- - -  - - - - - - - REC-TYPE01  - - - - - - - - - - - 2 Line(s) suppressed



000010 02       Silvano Prez         Programmer     48  Small Lane       Mt Pl
       FF       E89A8994D98A44444444 D9989899894444 FF44E98994D898444444 DA4D9
       02       29351560795900000000 79679144590000 480024133031550000000 43073
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Rec 6 of 78
Command ===> _____________________________________________________ Scroll PAGE
                              Type ESDS     RBA 400               Format TABL
       REC-TYPE NAME                 JOB-TITLE      ADDR1                ADDR2
       #2       #3                   #4             #5                   #6  +
       AN 1:2   AN 3:20              AN 23:14       AN 37:20             AN 57
       <>       <---+----1----+----> <---+----1--->  <---+----1----+----> <---+
000006 02       Grant Sutherland     Developer      22  Montrose St      Thorn
000007 02       Graham Purdy         Developer      256 Hay St           Canni
V - -  - - - - - - - REC-TYPE01  - - - - - - - - - - - 2 Line(s) suppressed
000010 02       Silvano Prez         Programmer     48  Small Lane       Mt Pl
000011 02       Don Pharoah          Programmer     661 Ayton Way        Flore
- - -  - - - - - - - REC-TYPE01  - - - - - - - - - - - 3 Line(s) suppressed
000015 02       Grant Sutherland     Developer      22  Montrose St      Thorn
000016 02       Andrew Astle         Developer      44  Eagle Rise       River
000017 02       Graham Purdy         Developer      256 Hay St           Canni
000018 02       Bill Soper           Developer      84  Murchison Rd     Diane
000019 02       Tyrone Dalais        Developer      92  Smith St         Belmo
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000021 02       Clive Nealon         Manager        28  Bern Rd          Middl
000022 02       Jim Alexander        Manager        123 Wellington St    Gilfo
000023 02       Silvano Prez         Programmer     48  Small Lane       Mt Pl
```

Edit

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                          Rec 7 of 78
Command ===> C ALL 65000 60000 #6                               Scroll PAGE
                              Type ESDS     RBA 480             Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4       #5        #6          #7
       AN 1:2   AN 3:20                   BI 23:2  BI 25:2  PD 27:4     BI 31:4
       <>       <---+----1----+---->      <---+>   <---+>  <---+-->  <---+----1>
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - 2 Line(s) suppressed
000008 01       Silvano Prez                2161       55     69000           1
000009 01       Liz Rushton                 3349       40     65000          14
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - 2 Line(s) suppressed
000012 01       John Nicholls               3349       40     69000          30
000013 01       Anna Waghorn                7812       33     65000           2
000014 01       Merrill Bani                7876       56     58000          18
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - 20 Line(s) suppressed
- - -  - - - - - - - - - - - - - - - - - - - - - - 2 Line(s) not selected
000037 01       Graham Purdy                5512       54     68000          28
000038 01       Al Tortorice                3101       39     65000          15
000039 01       Will Soper                  4412       40     68000           5
000040 01       Tyrone Dalais               3312       21     66000          14
- - -  - - - - - - - - - - - - - - - - - - - - - - 2 Line(s) not selected
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - 2 Line(s) suppressed
```

Edit

```
 Process    Options    Help
 ------------------------------------------------------------------------------
Edit              ALLANS2.FMDEMO.VSAM                    4 string(s) changed
Command ===> ____________________________________________________ Scroll PAGE
                                Type ESDS     RBA ______________ Format TABL
       REC-TYPE NAME                    EMPLOYEE-NO     AGE    SALARY    MONTH(1)
       #2       #3                            #4       #5       #6          #7
       AN 1:2   AN 3:20                   BI 23:2 BI 25:2  PD 27:4     BI 31:4
       <>       <---+----1----+---->      <---+>  <---+> <---+--> <---+----1>
****** ****  Top of data  ****
000001 01       Graham Purdy                 5512       24    68000          28
000002 01       Graham Purdy                 5512       24    68000          28
000003 01       Al Tortorice                 3101       39    53000          15
000004 01       Will Soper                   4412       28    68000           5
000005 01       Tyrone Dalais                3312       21    60000          14
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 2 Line(s) suppressed
000008 01       Silvano Prez                 2161       55    69000           1
000009 01       Liz Rushton                  3349       40    60000          14
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 2 Line(s) suppressed
000012 01       John Nicholls                3349       40    69000          30
000013 01       Anna Waghorn                 7812       33    60000           2
000014 01       Merrill Bani                 7876       56    58000          18
- - -  - - - - - - REC-TYPE02  - - - - - - - - - - - 20 Line(s) suppressed
- - -  - - - - - - - - - - - - - - - - - - - - - - - 2 Line(s) not selected
```

Utilities

- Copy data
  - Select records/fields using Boolean expressions
  - “Map” fields from an input file to an output file
  - Reformat and generate data while copying
  - Field values can be “scrambled” to protect sensitive data
  - Copy data into XML format
- Global Find/Change
  - Search for/change data across members in a PDS(E)
  - Perform a new search based on the results of a previous search
- Compare
  - Compare records/fields between files
  - Use field level mapping for comparison criteria
  - Special options for load module comparisons

Utilities

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager                      Primary Option Menu
Command ===> 3

0  Settings      Set processing options                 User ID . : ALLANS2
1  View          View data                              System ID : STLABF2
2  Edit          Edit data                              Appl ID . : ISR
3  Utilities     Perform utility functions              Version . : 8.1.0
4  Tapes         Tape specific functions                Terminal. : 3278A
5  Disk/VSAM     Disk track and VSAM CI functions       Screen. . : 1
6  OAM           Work with OAM objects                  Date. . . : 2007/09/19
7  Templates     Template and copybook utilities        Time. . . : 07:44
8  HFS           Access Hierarchical File System
X  Exit          Terminate File Manager
```

Utilities – Compare Data

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager                        Utility Functions
Command ===> 11

0  DBCS           Set DBCS data format for print
1  Create         Create data
2  Print          Print data
3  Copy           Copy data
4  Dslist         Catalog services
5  VTOC           Work with VTOC
6  Find/Change    Search for and change data
7  AFP            Browse AFP data
8  Storage        Browse user storage
9  Printdsn       Browse File Manager print data set
10 Loadlib        Load module utility functions
11 Compare        Compare data
12 Audit trail    Print audit trail report
13 Copybook       View and Print
```

Utilities – Compare Data

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager          Compare Utility : Old Data Set
Command ===> ____________________________________________________________________
                                                                        More:     +
"Old" Partitioned, Sequential or VSAM Data Set, or HFS file:
   Data set/path name  . . 'ALLANS2.FMDEMO.VSAM'                                 +
   Member  . . . . . . . . ________     (Blank or pattern for member list)
   Volume serial . . . . . ______       (If not cataloged)
   Start key . . . . . . . ____________________________ key or slot
   Skip count  . . . . . . 0_____       number of records to be skipped
   Compare count . . . . . ALL____      number of records to be compared

"Old" Copybook or Template:
   Data set name . . . . . 'ALLANS2.FMDEMO.TEMPLATE'
   Member  . . . . . . . . DEMODATA__   (Blank or pattern for member list)

Processing Options:
   Copybook/template usage              Enter "/" to select option
   1  1. Above                          _  Edit template  _ Type (1,2,S)
      2. Previous                       _  Advanced member selection
      3. None                           _  Skip member name list
      4. Create dynamic                 _  Batch execution
                                        _  Binary mode, reclen _____
```

Utilities – Compare Data

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager           Compare Utility : New Data Set
Command ===> ____________________________________________________________

"New" Partitioned, Sequential or VSAM Data Set, or HFS file:
   Data set/path name  . . 'ALLANS2.FMDEMO.COMPNEW'                          +
   Member  . . . . . . . . ________     (Blank or pattern for member list)
   Volume serial . . . . . ______       (If not cataloged)
   Start key . . . . . . . ____________________________ key or slot
   Skip count  . . . . . . ________     number of records to be skipped
   Compare count . . . . . ________     number of records to be compared

"New" Copybook or Template:
   Data set name . . . . . 'ALLANS2.FMDEMO.TEMPLATE'
   Member  . . . . . . . . COMPNEW__    (Blank or pattern for member list)

Processing Options:
   Copybook/template usage              Enter "/" to select option
   1  1. Above                          _  Edit template   _ Type (1,2,S)
      2. Previous                       _  Binary mode, reclen _____
      3. None
      4. Create dynamic
```

Utilities – Compare Data

```
 Process    Options    Help
-------------------------------------------------------------------------------
File Manager                 Compare Utility : Options
Command ===> _____________________________________________________________

                                                                More:      +
Compare Options:
   Compare type       Synchronization    Listing type       Long Report
   2  1. Record       1  1. One-to-one   2  1. Summary      Enter "/" to exclude
      2. Formatted          2. Read-ahead     2. Delta        _  Inserted
                            3. Keyed          3. Matching     _  Deleted
                                              4. Long         _  Changed
                                              5. None         _  Matched

Processing Options:                      Listing Options:
   Enter "/" to select option               Enter "/" to select option
   _  Edit template mapping                 /  Wide listing
   /  Clear print data set                  _  Show hex chars
   _  Create result data sets               /  Highlight changes
                                            _  Show field attributes
   ISPF Packing                             _  Show changed fields only
   1  1. Unpack if packed                   _  Always show SELECTed fields
      2. None
      3. Skip                            Number of differences to report ALL
```

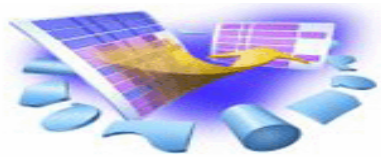
Utilities – Compare Data - Output

```
 Process   Options   Help
 Print Browse            ALLANS2.FMN.LIST                    Rec 18 of 122
 Command ===> ____________________________________________________ Scroll CSR
                                  Record 18      Col 2        Format CHAR
 ---+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
* * * * Formatted comparison with one-to-one synchronization
* * New data set: ALLANS2.FMDEMO.COMPNEW
* *               using template ALLANS2.FMDEMO.TEMPLATE(COMPNEW)
* * Old data set: ALLANS2.FMDEMO.VSAM
* *               using template ALLANS2.FMDEMO.TEMPLATE(DEMODATA)
New data set fields:   REC-TYPE NAME                EMPLOYEE-NO     AGE   SALAR
ID NREC-# OREC-#       <>       <---+----1----+---->     <---+>  <---+> <---+--
C  000005              01       Tyrone Dalais             3312      21    6500
Old data set fields:   REC-TYPE NAME                EMPLOYEE-NO     AGE   SALAR
ID NREC-# OREC-#       <>       <---+----1----+---->     <---+>  <---+> <---+--
O         000005       01       Tyrone Dalais             3312      21    6000
                                                                      |||||||
C  000009              01       Liz Rushton               3349      40    6500
O         000009       01       Liz Rushton               3349      40    6000
                                                                      |||||||
C  000013              01       Anna Waghorn              7812      33    6500
O         000013       01       Anna Waghorn              7812      33    6000
                                                                      |||||||
```

Utilities – Compare Data - Output

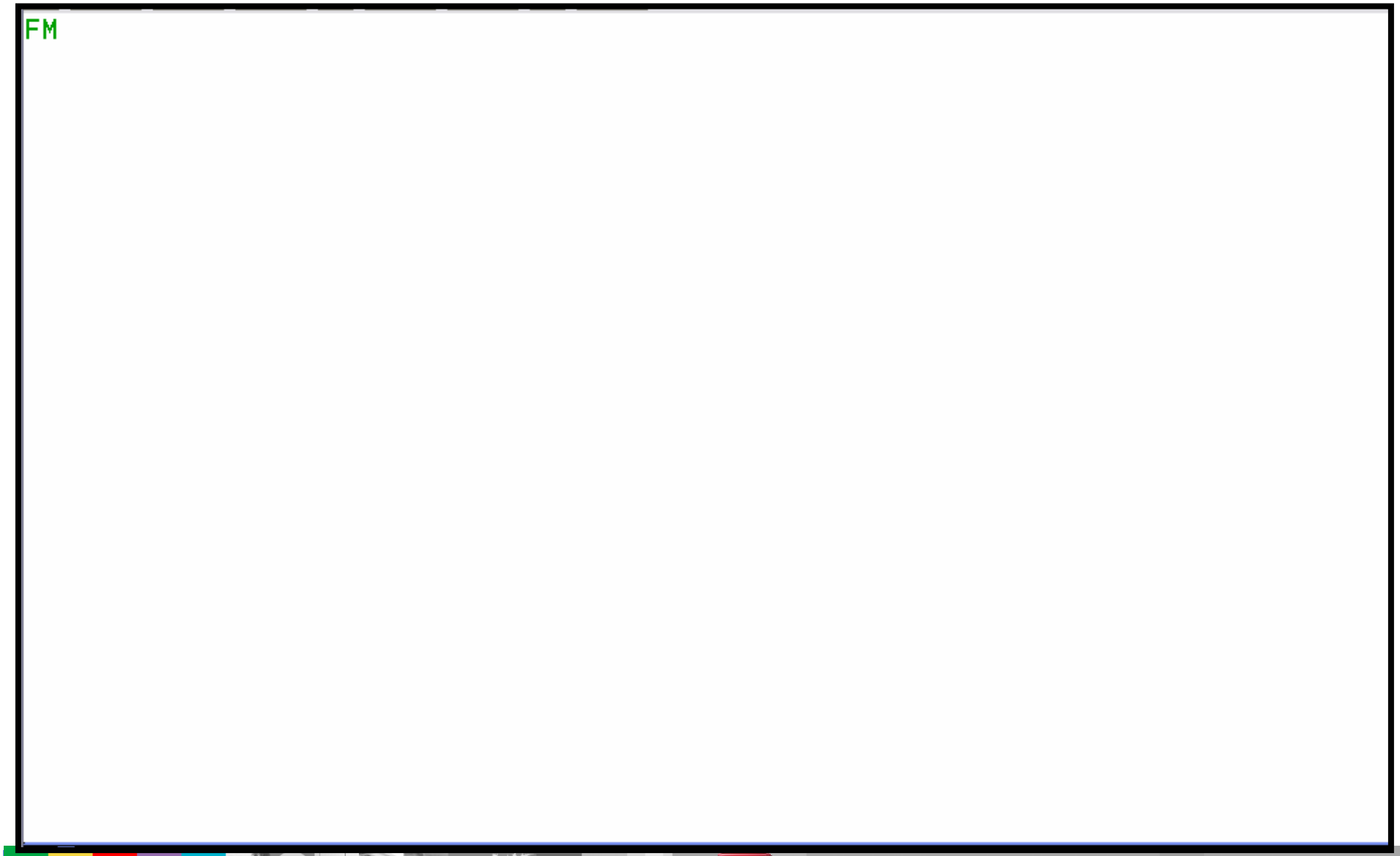
```
 Process    Options    Help
 ------------------------------------------------------------------------------
 Print Browse            ALLANS2.FMN.LIST                    Rec 37 of 122
 Command ===> _____________________________________________ Scroll CSR
                                 Record 37      Col 2        Format CHAR
 ---+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
IBM File Manager for z/OS
Comparison summary:

              Old data set records processed:          62
              New data set records processed:          62
                      Matching records found:          59
                             Changed records:           3
                   Old records not selected:          16
                   New records not selected:          16
                   Old records not compared:           0
                   New records not compared:           0
                Old data set records deleted:          0
               New data set records inserted:          0
                             Synchronization: One-to-one
                             Comparison type: Formatted
                                Listing type: Delta
                             Listing options: Wide listing
                                              Highlight changes
```

File Manager CICS Features



- ISPF-like panels
- Full function edit and view
  - Table
  - Single
- Flexible selection criteria
  - Work with copybooks or templates
- CICS Resource
  - File
  - Temporary Storage
  - Transient Data
- Print data
- List Resources
- Support for extended addressability ESDSs
- Interface to File Manager z/OS
- Interface to File Manager IMS
- Modes Of Operation
  - Interactive
- Interfaces
  - CICS
- Support for IBM Software
  - CICS TS V3.2

Starting File Manager for CICS



FM / CICS Primary Option Menu

```
 Process    Options    Help
-------------------------------------------------------------------------------
FM/CICS                          Primary Option Menu

0  Settings      Set processing options                 User ID . : ALLANSC
1  View          View data                              CICS User : ALLANSC
2  Edit          Edit data                              CICS Appl : CICSC31F
3  Utilities     Perform utility functions              Date. . . : 2007/09/27
4  Templates     Template and copybook utilities        Time. . . : 06:26
FM FM            File Manager z/OS
FI FM/IMS        File Manager for IMS z/OS
X  Exit          Terminate FM/CICS

Processing Options:
 CICS Resource
 1   1. File
     2. Temporary Storage
     3. Transient Data



Command ===>  2
F1=Help      F3=Exit      F4=CRetriev F7=Backward F8=Forward  F10=Actions
F12=Cancel
```

Edit - CICS File

```
 Process    Options    Help
-------------------------------------------------------------------------------
FM/CICS                      Edit CICS File Entry Panel

Input CICS VSAM File:
   File name  . . . . FMCUST__
   Sysid  . . . . . . ____
   Start position . . ________________________________  +
   Record limit . . . ________      Record sampling  _
   Inplace edit . . . _             Prevent inserts and deletes
   Lock resource  . . _             Name ____________________________________
Copybook or Template:
   Data set name  . . 'ALLANSC.ADDEMO.FMCICS.COPYBOOK'_____________________
   Member . . . . . . CUSTFILE__    (Blank or pattern for member list)
Processing Options:
 Copybook/template   Start position type   Enter "/" to select option
 1  1. Above         _  1. Key             _  Edit template   _ Type (1,2,S)
    2. Previous         2. RBA             _  Include only selected records
    3. None             3. Record number   _  Create audit trail
    4. Create dynamic

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

Edit - CICS File

```
 Process    Options    Help
-------------------------------------------------------------------------------
Edit              FI:FMCUST DS:ALLANSC.ADDEMO.CU  +                    At top
     Key _____________________  + Type KSDS                          Format TABL
       Customer Name          NO-SHARES BUY-FROM-NO BUY-TO
       #2                            #6 #8          #9
       AN 1:81                  ZD 82:4 AN 94:4     AN 98:8
       <---+----1----+---->     <---> <-->          <---+-->
****** ****  Top of data  ****
000001 helena_smith            1200 0500          00080.00
000002 helena_smith             300
000003 helena_smith             420 0200          00215.00
000004 justine_grose           5200 1000          00026.00
000005 justine_grose            500
000006 justine_grose            800
000007 justine_grose            400               00200.00
- - -  - - - - - - - - - - - - - - - - - - - - - - - - - - 1 Line(s) not selected
000009 keiron_casey             480
000010 peter_niblett           5000               00012.00
000011 peter_niblett            600 0200          00120.00
- - -  - - - - - - - - - - - - - - - - - - - - - - - - - - 5 Line(s) not selected
Command ===> X ALL                                                 Scroll PAGE
F1=Help      F2=Zoom      F3=Exit      F4=Expand    F5=RFind     F7=Up
F8=Down      F10=Left     F11=Right    F12=Cancel
```

Application Performance Analyzer

Application Performance Analyzer Features

- Application Performance Analyzer for z/OS collects samples from a monitored address space and analyzes the system or resource application in the following categories:
- Total address space utilization of all modules in the address space
-
- CSECT utilization within each load module
-
- Instruction or statement utilization within each CSECT
-
- Assembler, COBOL and PL/I statements utilization within each module
-
- MQSeries® queue information
-
- DASD statistics, including VSAM information
-
- CPU usage

Application Performance Analyzer for z/OS (APA)

- Key features
  - Measure and report resource use in virtually any IBM z/OS® address space
  - Isolate application performance problems
  - Pinpoint performance bottlenecks
  - Identify constraints
  - Non-intrusive
  - Helps with design, development and maintenance
  - Shares side files with Fault Analyzer and Debug Tool
- IBM Product Support
  - Supports C/C++, Assembler, COBOL, PL/I, Java and CICS, DB2, IMS, WebSphere MQ and WebSphere Application Server
  - CICS TS V1 to V3, IMS V7 to V10, DB2 V7 to V9

New in APA V8.1

- **Java Enhancements**
- **Unix System Services support**
- **Report Enhancements**
- **Usability Enhancements**

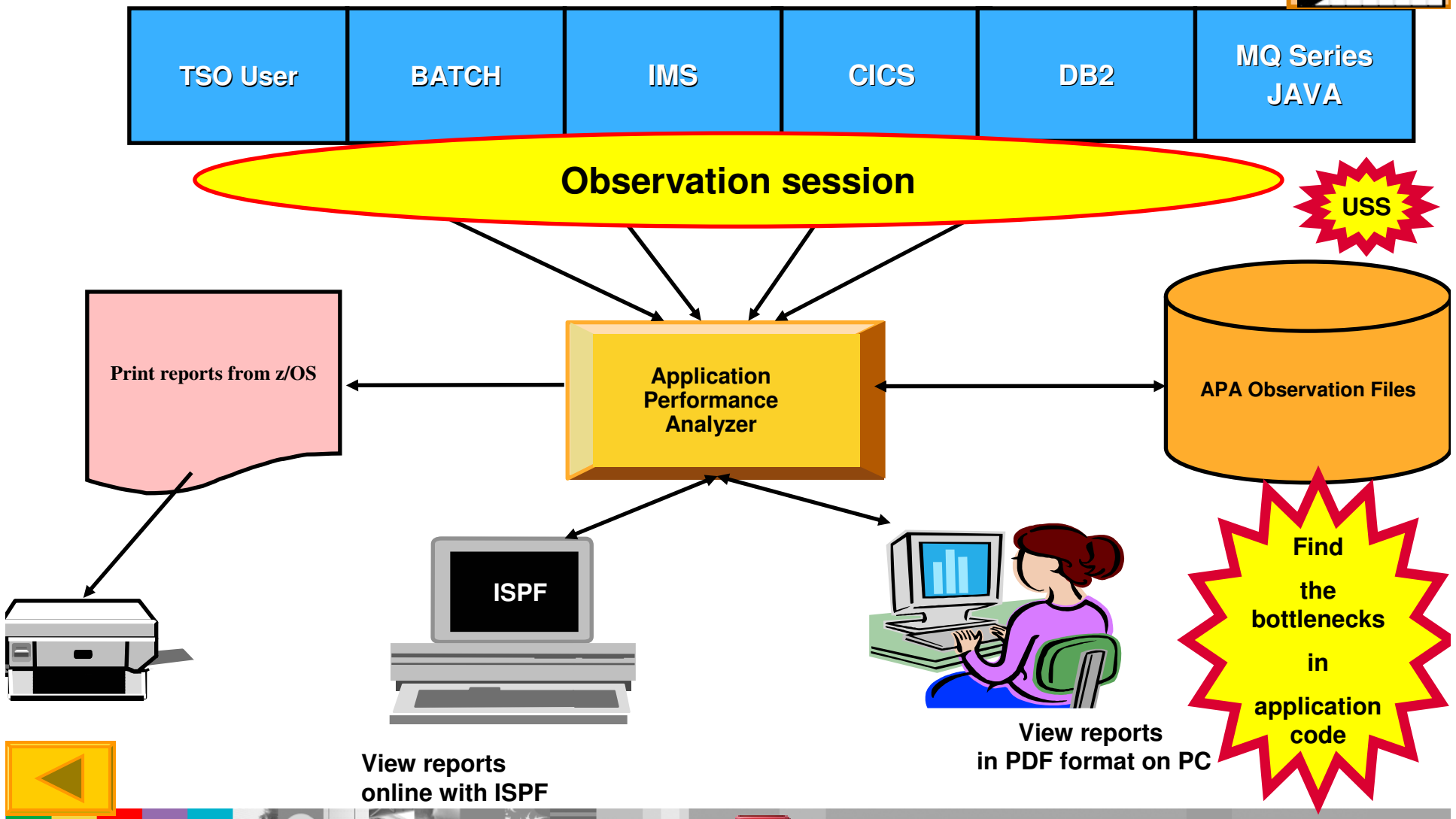
Application Performance Analyzer Features

- Summary/Profile reports with drill down into detailed levels via an ISPF interface or PDF hardcopy
- CPU, Load Module, and CSECT analysis of all modules in the address space
- Source statement (COBOL or PL1) or instruction utilization in each CSECT
- Supports Fault Analyzer / Debug Tool Sidefiles
- Wait time analysis by category, task/module, or attribution
- DASD I/O analysis by device, DDNAME, dataset and dataset attributes, EXCP's, VSAM with buffer pool, I/O wait, over time
- SYSPLEX coupling facility reports
- CICS session statistics, transaction analysis by CPU usage, mean and total service time, and waits by transaction

Application Performance Analyzer Features

- Types of Observation Sessions
  - Real-Time
  - Scheduled
  - Via batch submission
- Non-intrusive performance analyzer for applications and systems programmerss to
  - Improve response time in online applications
  - Improve batch turn around time
  - Identify excessive I/O activity
  - Identify excessive CPU usage
  - Test the effects of increasing workload
  - Isolate performance problems in new and existing applications
- Support for IBM Software
  - CICS TS V3.2
  - DB2 V9
  - IMS V10

Application Performance Analyzer - *Provides rapid pinpointing of enterprise application bottlenecks*



Application Performance Analyzer Report Summary

CICS
Session Statistics
CPU Usage by Txn
Mean Service Time by Txn
Total Service Time by Txn
Service Time by Task Id
Wait Time by Txn

Wait
Time by Task/Category
Time by Task/Module
Time Referred Attribution

MQSeries
Activity Summary
Serv Time by Txn
CPU Usage by Queue
Wait Time by Queue
CPU Usage by Request
Wait Time by Reque
CPU Usage by Txn
Wait Time by Txn
Serv Time by Queue
Serv Time by Request

Storage & Statistics
Measurement Profile
Load Module Attributes
Load Module Summary
TCB Summary
Memory Usage Timeline
Data Space Usage Timeline
TCB Execution Summary
Processor Utilization Summary

CPU
Usage by Category
Usage by Procedure
Usage by Module
Referred Attribution
Usage by Code Slice
Usage Timeline
Usage Task/Category
Usage Task/Module

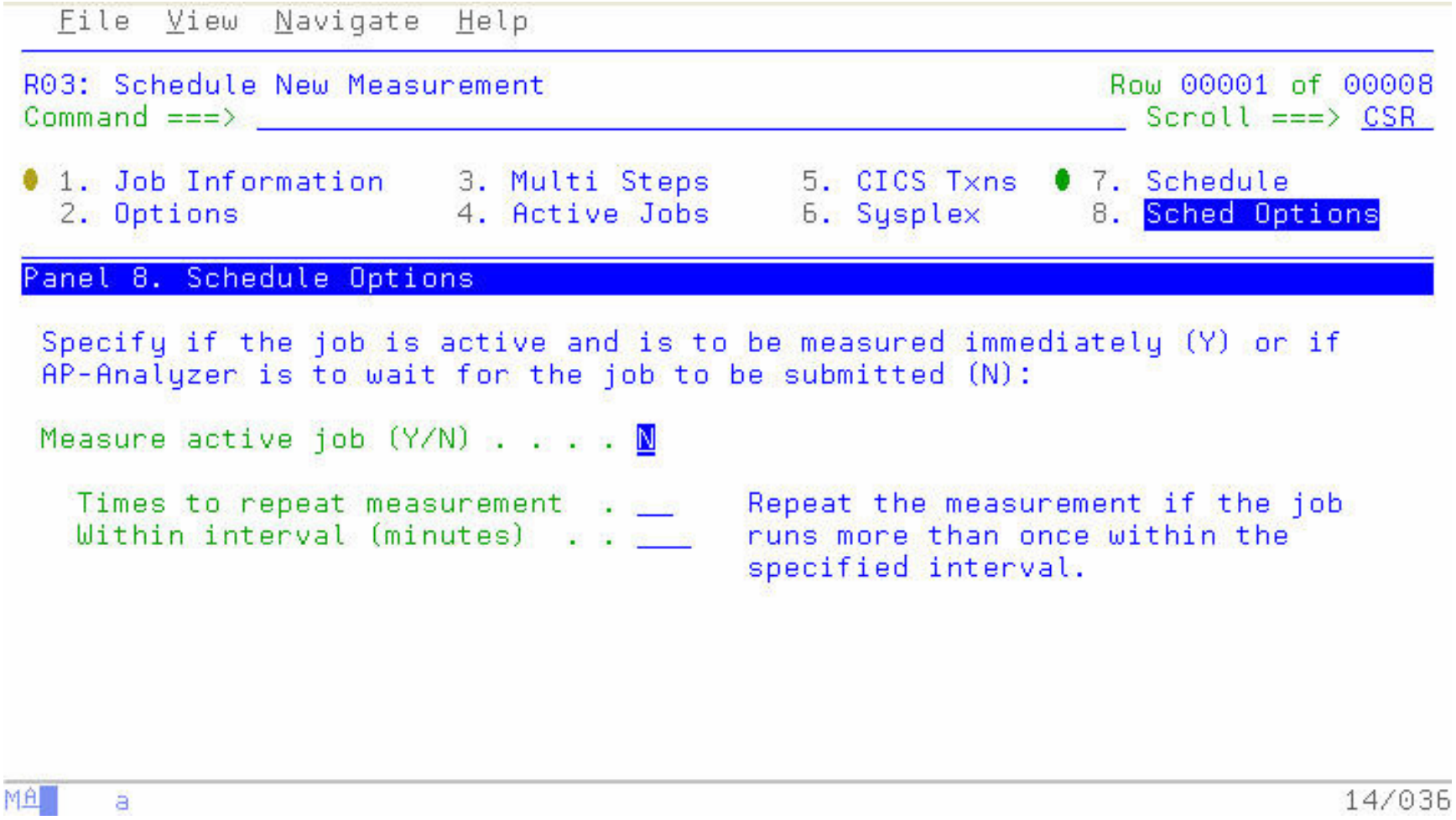
DASD
Usage by Device
Activity Timeline
Usage by DDNAME
I/O Wait Time
Usage by Dataset
VSAM Buffer Pool Usage
Dataset Attributes
Summary
DASD VSAM Statistics

DB2
Measurement Profile
SQL Wait Time by Statement
SQL Activity Timeline
SQL Wait Time by Plan
SQL Activity by DBRM
SQL CPU/Svc Time by DBRM
SQL Activity by Statement
SQL CPU/Svc Time by Stmt
SQL Activity by Plan
SQL CPU/Svc Time by Plan
SQL Statement Attributes
SQL Threads Analysis
SQL Wait Time by DBRM
CPU by Plan/Stored Proc

IMS
Measurement Profile
DL/I Call Timeline
DL/I Transaction Timeline
Transaction Activity Timeline
Usage by PSB
Usage by Transaction
Usage by DL/I Call
Transaction Service Times
Transaction DL/I Counts

Coupling Facility
Summary
Mean Times
Facility Total Times

Schedule Options

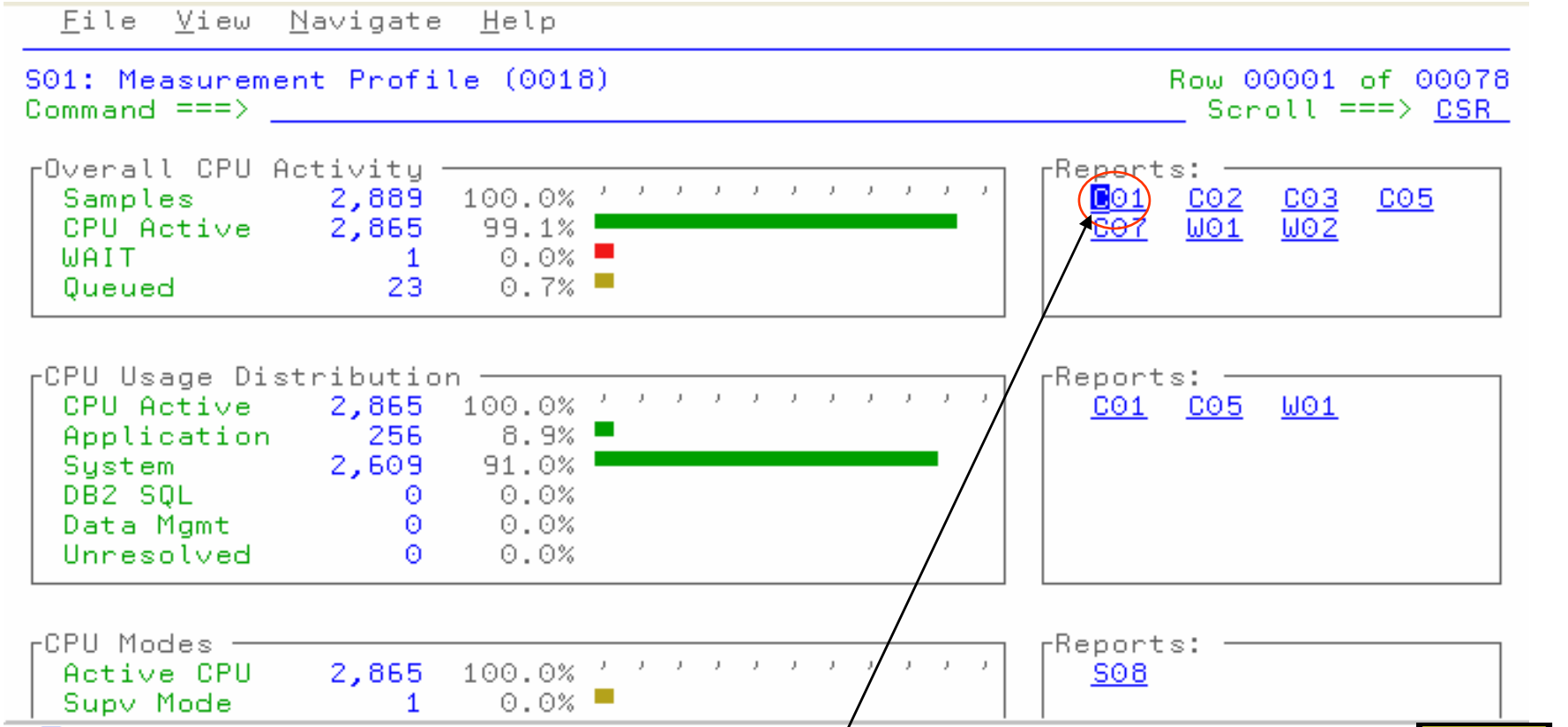


S01: Measurement Profile - Suggested Start for Navigation

```
  File  View  Navigate  Help
R01: IBM APA for z/OS Performance Reports (0018)          Row 00001 of 00007
Command ===> _____________________________________________ Scroll ===> CSR

  Select a category from      _ A Admin/Miscellaneous   _ I IMS Measurement
  the list to the right       _ S Statistics/Storage    _ E CICS Measurement
  to view the available       _ C CPU Usage Analysis    _ F DB2 Measurement
  reports in the selection    _ D DASD I/O Analysis     _ Q MQ Measurement
  list below.                 _ W CPU WAIT Analysis     _ G Coupling Facility

Enter S to make a selection or enter the report code on the command line

  S S01 Measurement Profile              _ S07 TCB Execution Summary
  _ S02 Load Module Attributes           _ S08 Processor Utilization Summary
  _ S03 Load Module Summary
  _ S04 TCB Summary
  _ S05 Memory Usage Timeline
  _ S06 Data Space Usage Timeline

MA    b
```

Enter

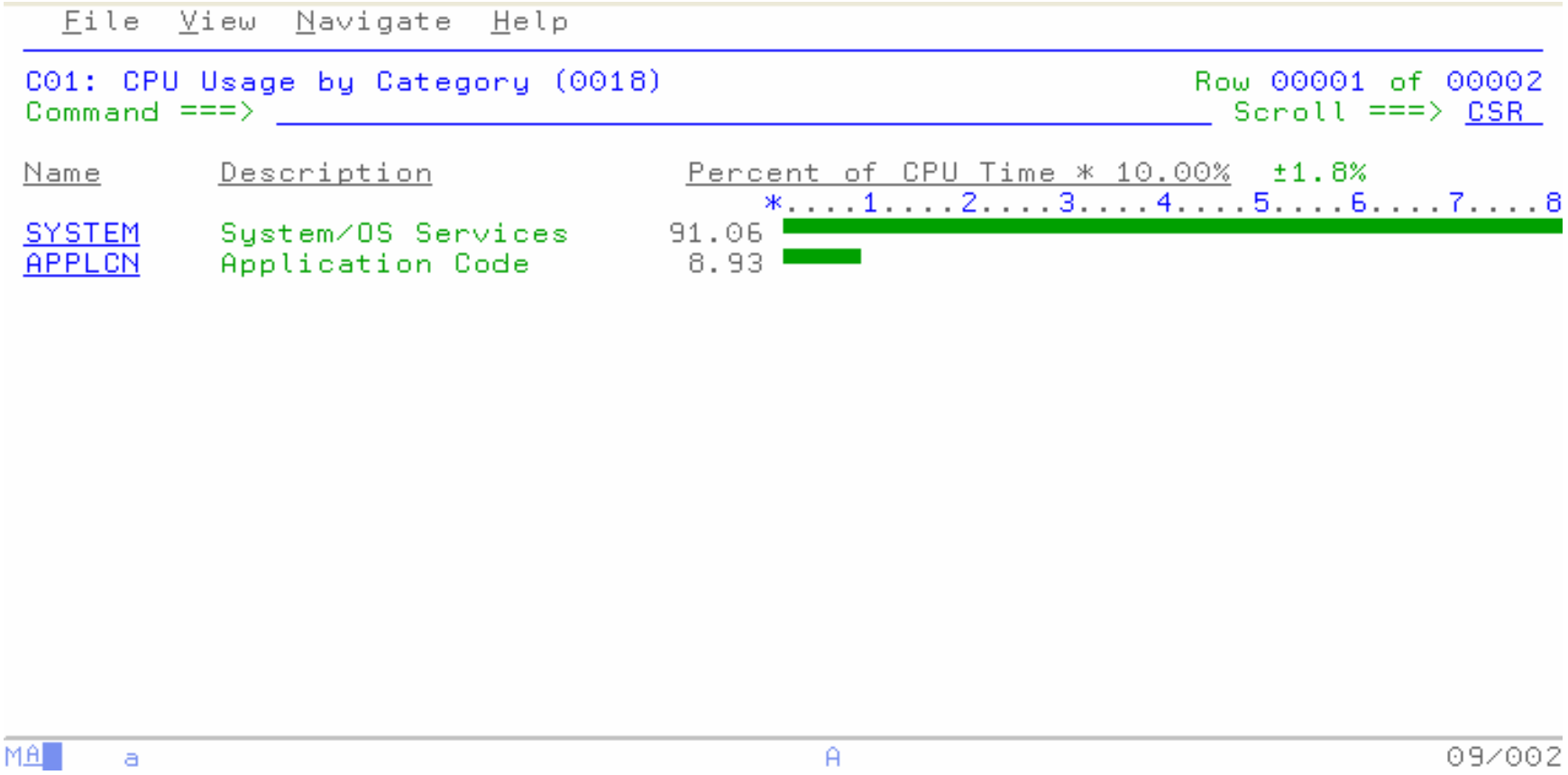
S01: Measurement Profile - Summary



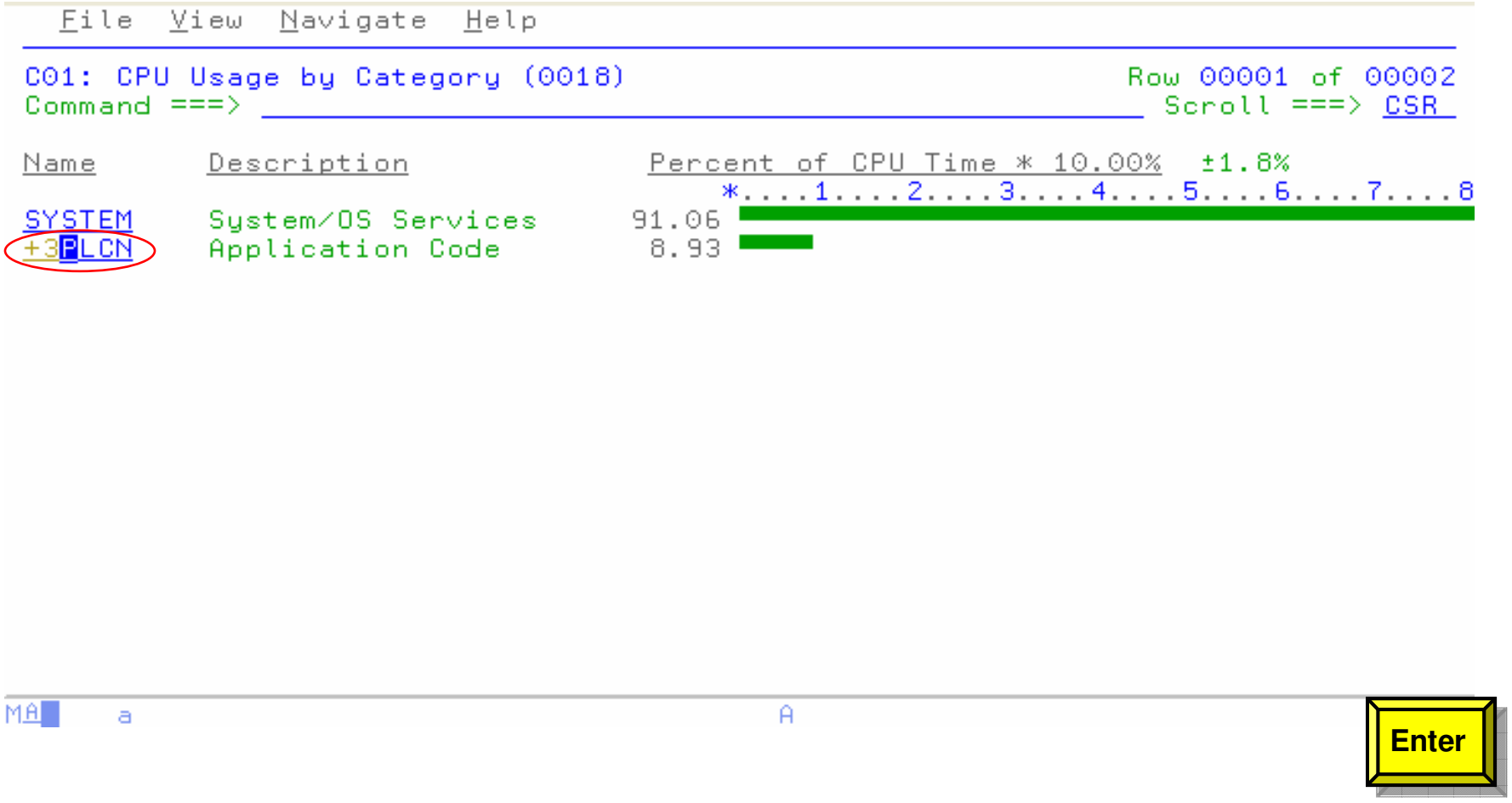
Navigate to more detailed information by selecting the desired report with the cursor

Enter

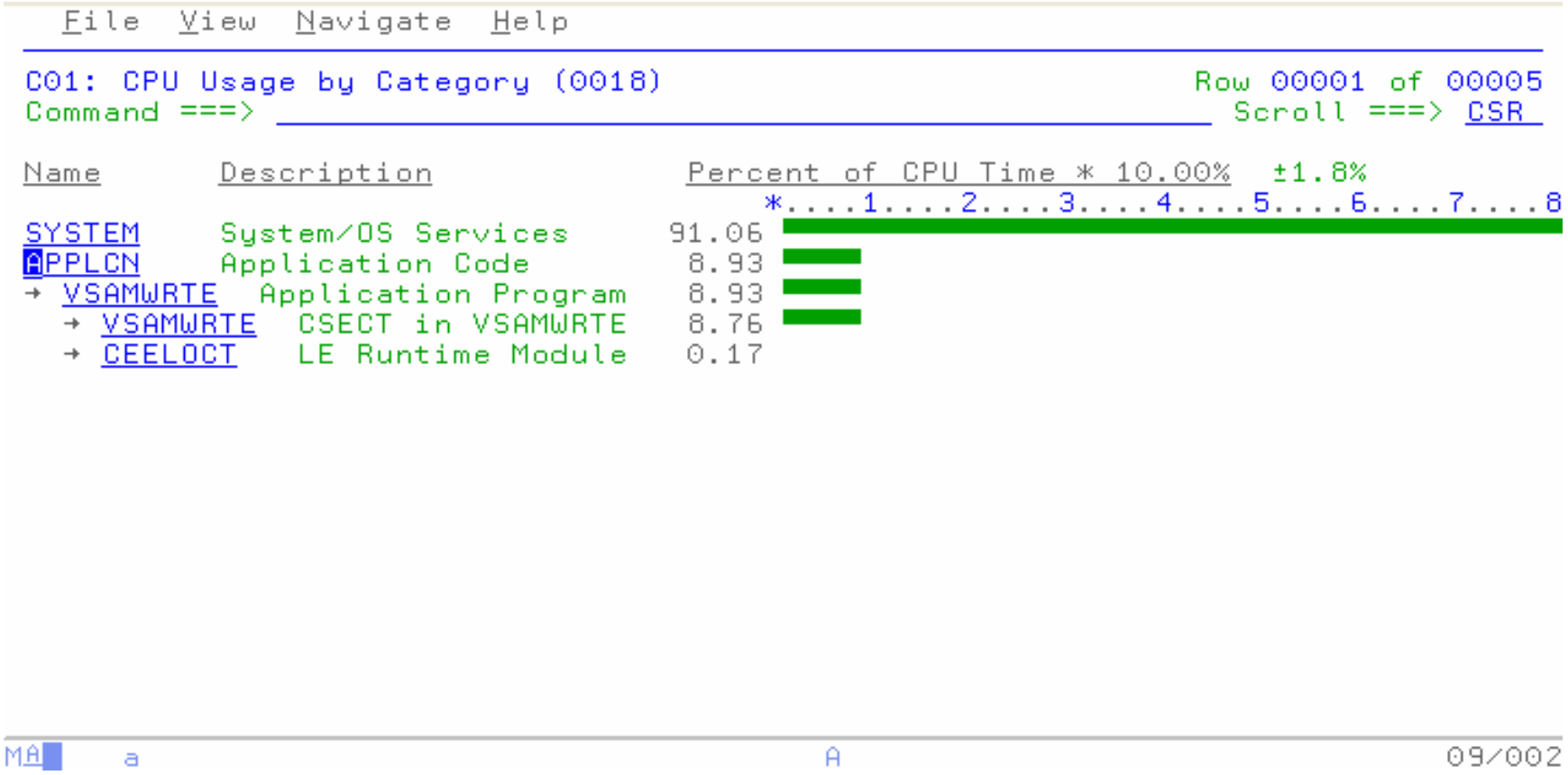
C01: CPU Usage by Category



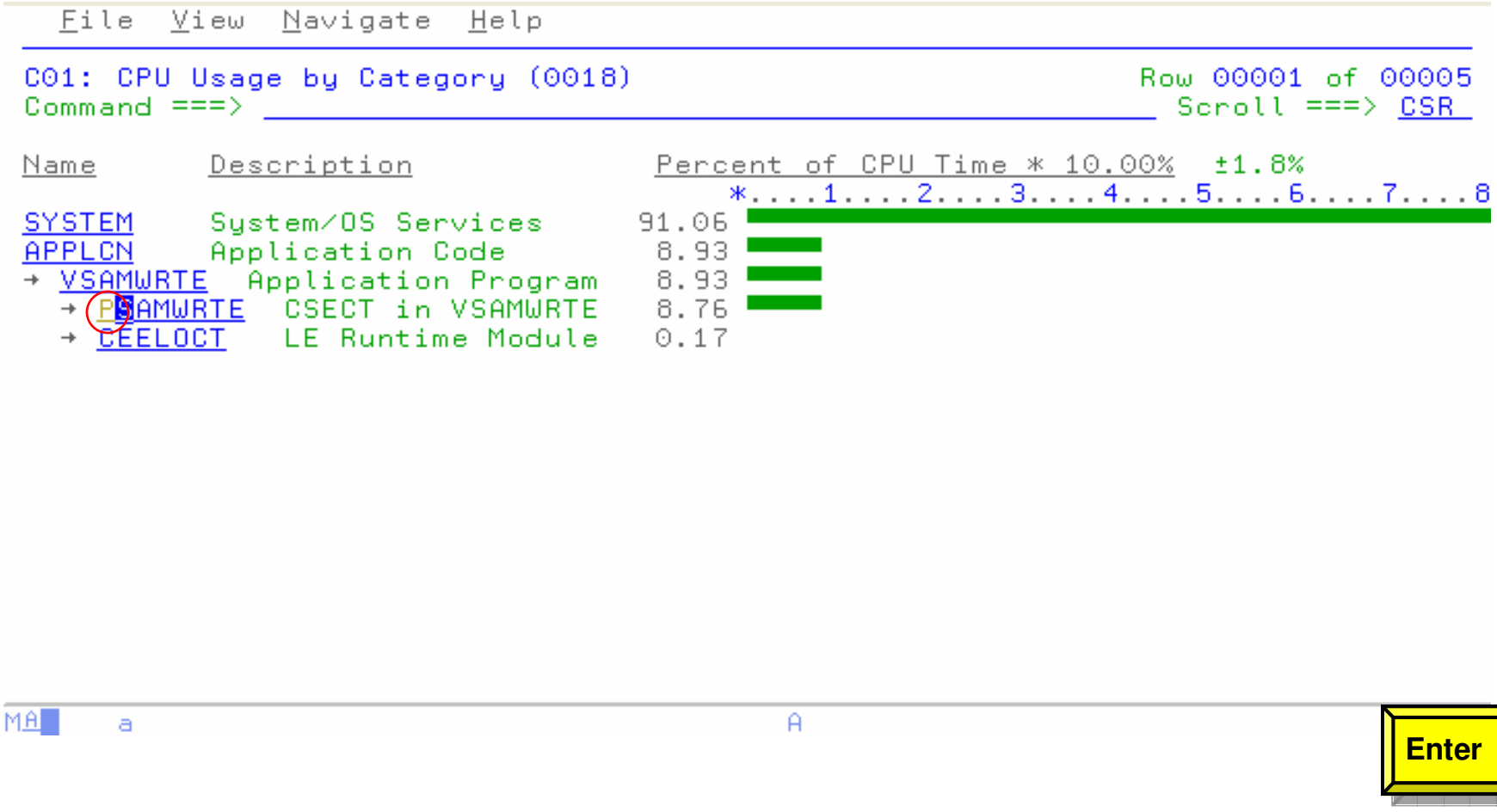
Shortcut - Expand 3 levels



C01: CPU Usage by Category - Expanded



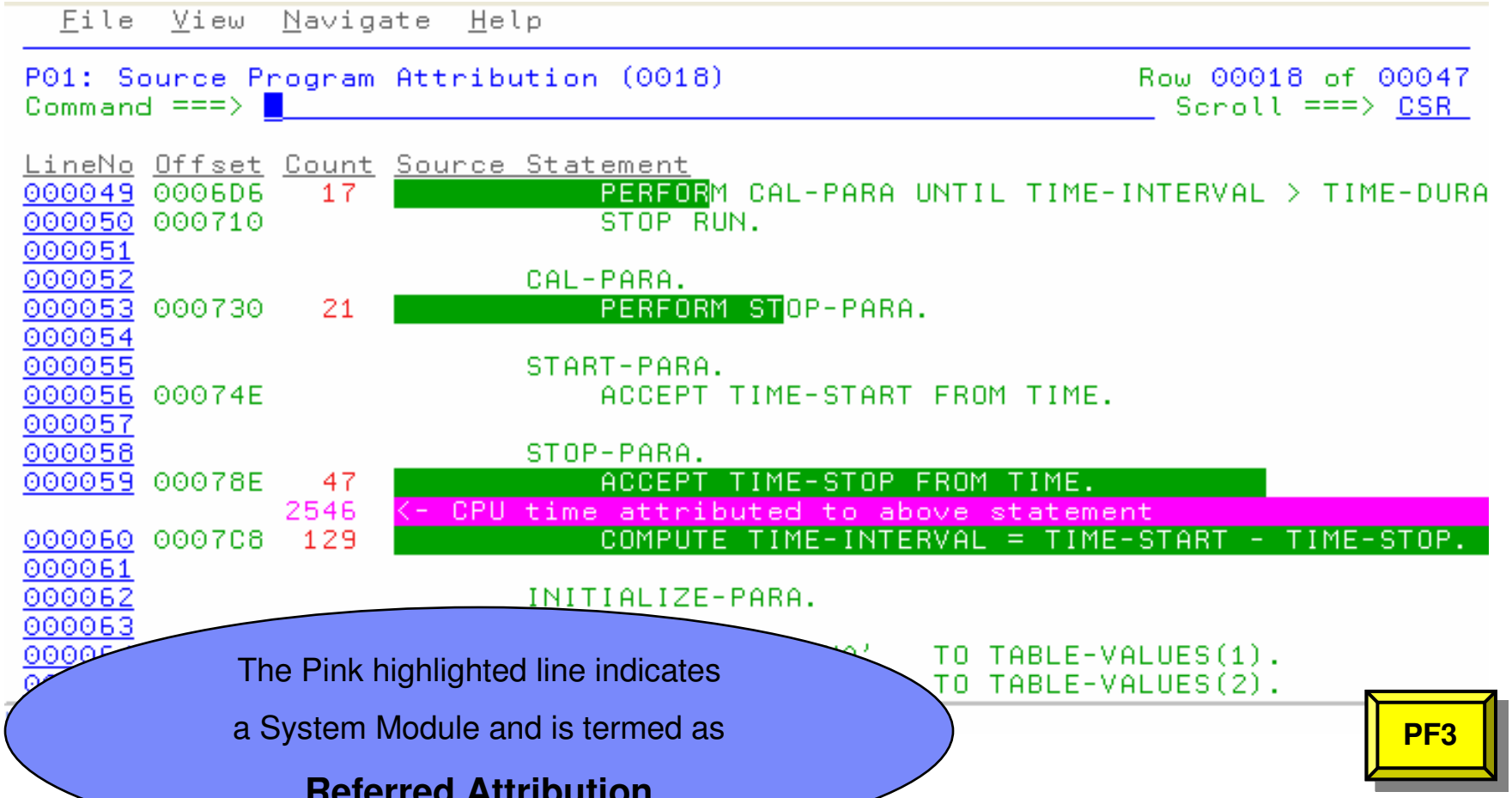
Enter P to view program source



P01 Source Program Attribution

```
File  View  Navigate  Help

P01: Source Program Attribution (0018)                    Row 00001 of 00047
Command ===>                                               Scroll ===> CSR

LineNo Offset Count Source Statement

000033
000034                      PROCEDURE DIVISION.
000035                      MAIN-PARA.
000036 000536                   DISPLAY 'START PARA'.
000037 000544                   PERFORM START-PARA.
000038 00055C    17             PERFORM CAL-PARA UNTIL TIME-INTERVAL > TIME-DURA
000039 000596                   PERFORM OPEN-PARA.
000040 0005AE                   INITIALIZE TIME-START , TIME-STOP , TIME-INTERVA
000041 0005C0                   PERFORM START-PARA.
000042 0005DC    20             PERFORM CAL-PARA UNTIL TIME-INTERVAL > TIME-DURA
000043 000616                   DISPLAY 'WRITE PARA'.
000044 000624                   PERFORM INITIALIZE-PARA.
000045 00063C                   PERFORM WRITE-PARA VARYING I FROM 1 BY 1 UNTIL I
000046 000690                   INITIALIZE TIME-START , TIME-STOP , TIME-INTERVA
000047 0006A2                   PERFORM CLOSE-PARA.
000048 0006BA                   PERFORM START-PARA.
000049 0006D6    17             PERFORM CAL-PARA UNTIL TIME-INTERVAL > TIME-DURA
MA    a                                    A
```

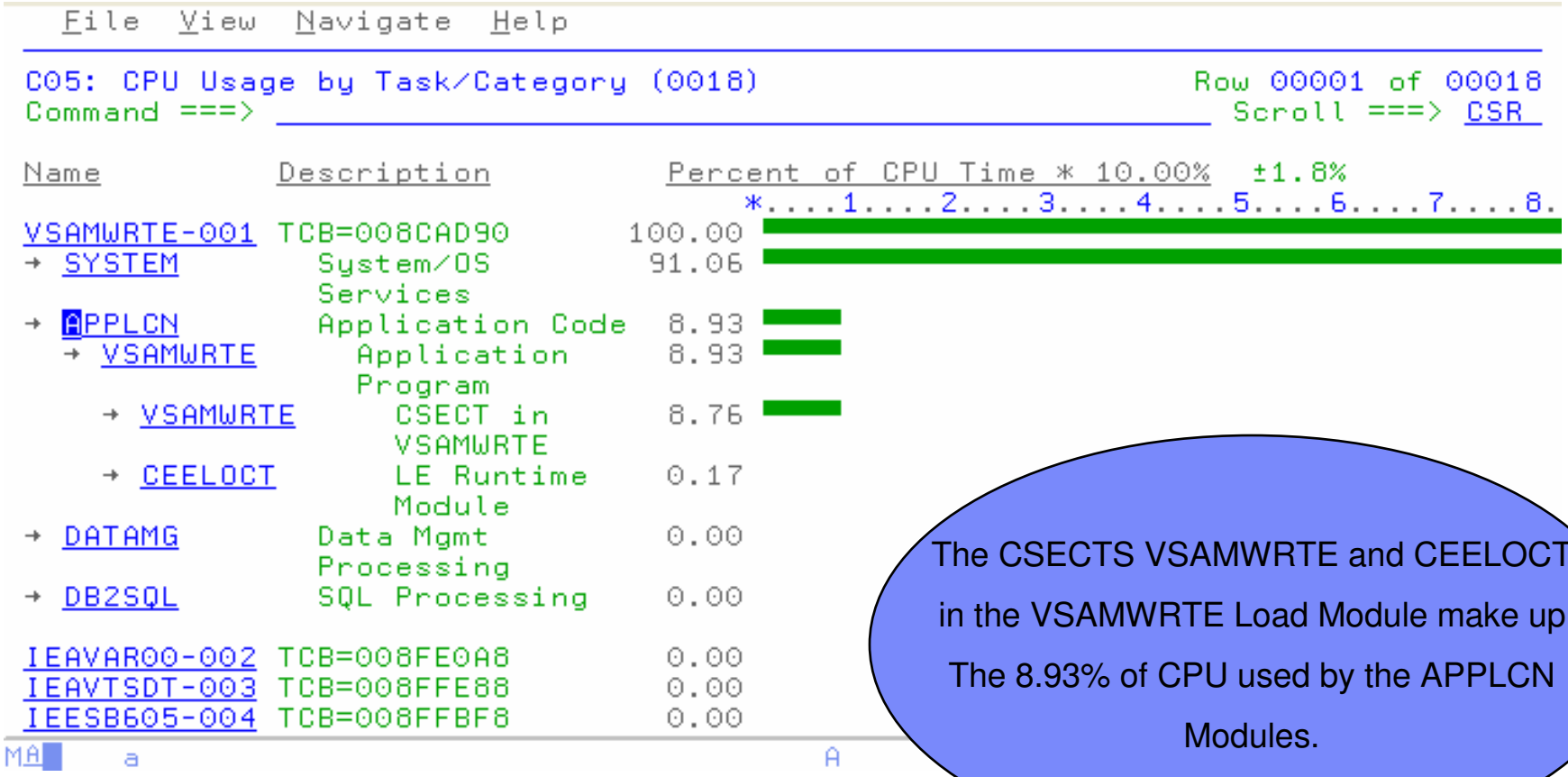
P01: Source Program Attribution



The Pink highlighted line indicates a System Module and is termed as **Referred Attribution**

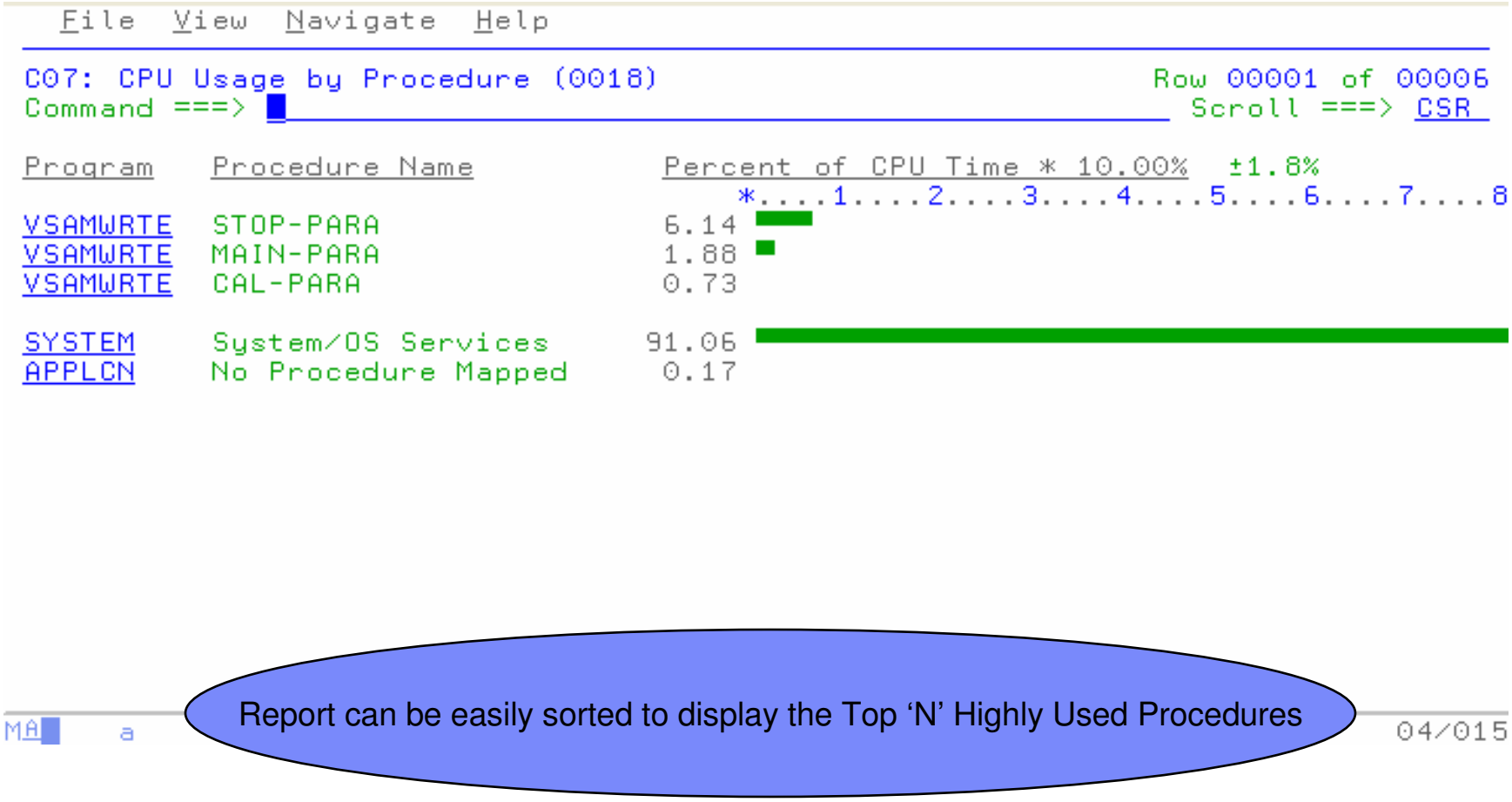
PF3

C05: CPU Usage by Task/Category - Expanded



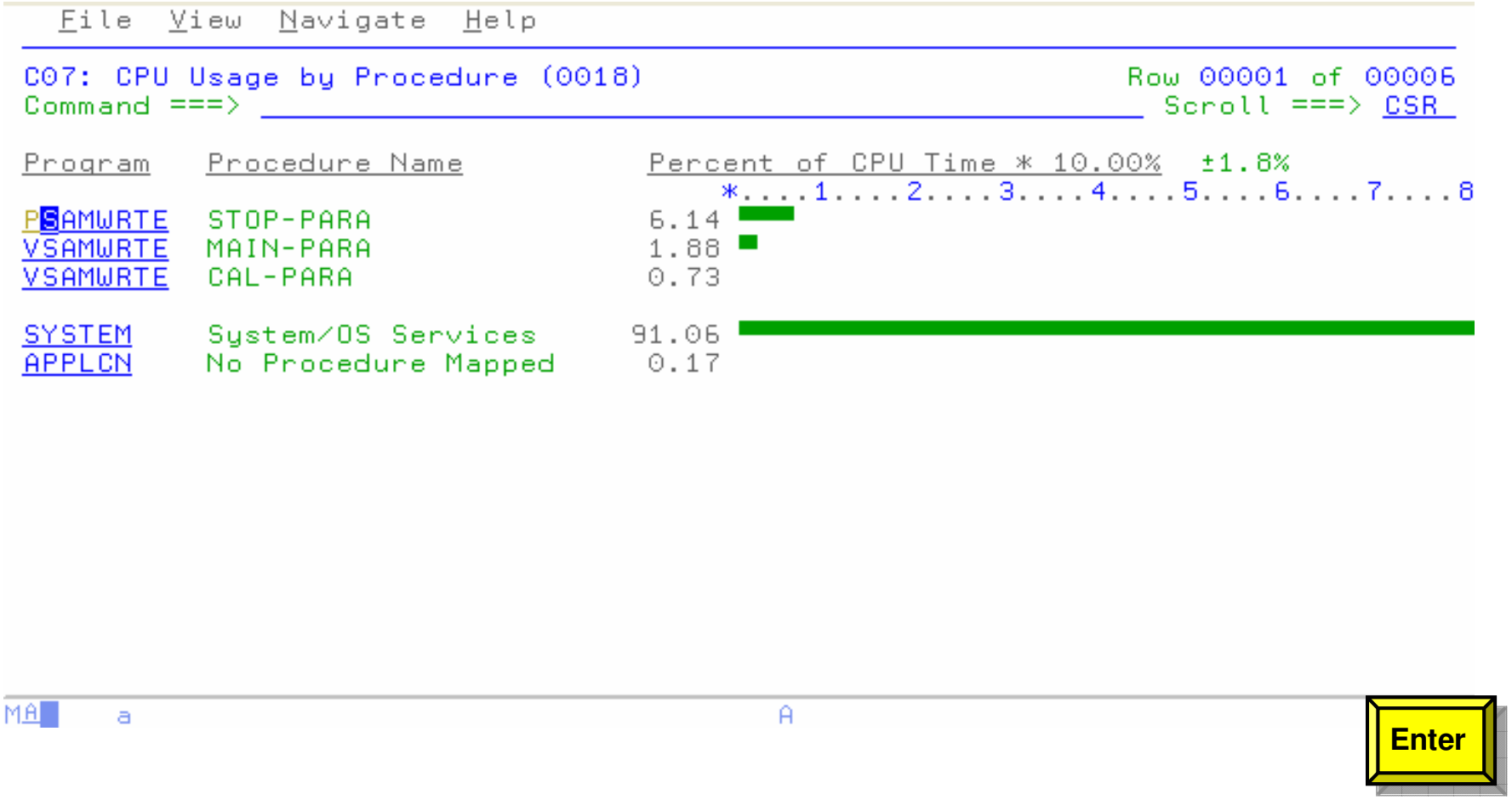
The CSECTS VSAMWRTE and CEELOCT in the VSAMWRTE Load Module make up The 8.93% of CPU used by the APPLCN Modules.

C07 CPU Usage by Procedure

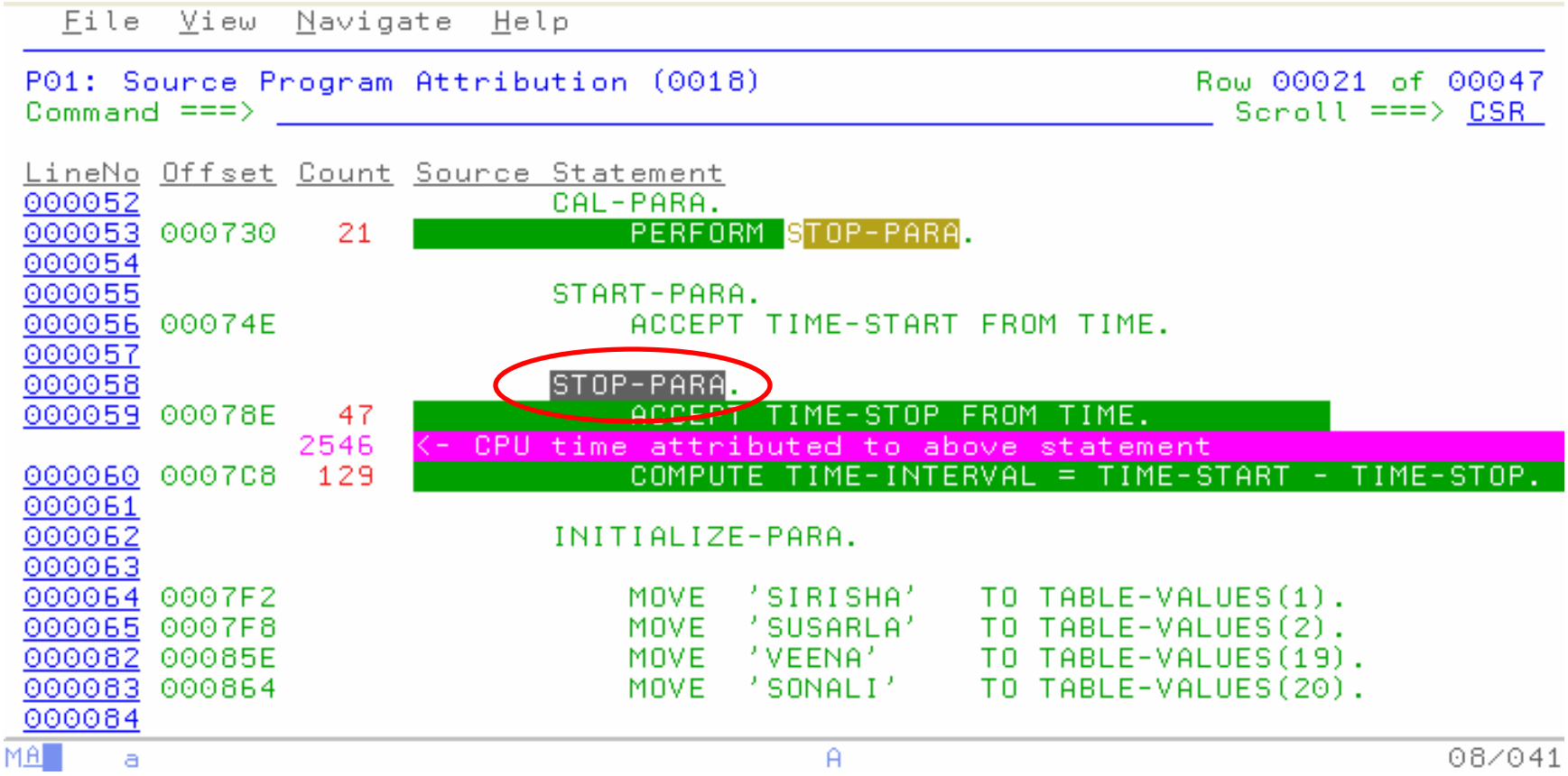


Report can be easily sorted to display the Top ‘N’ Highly Used Procedures

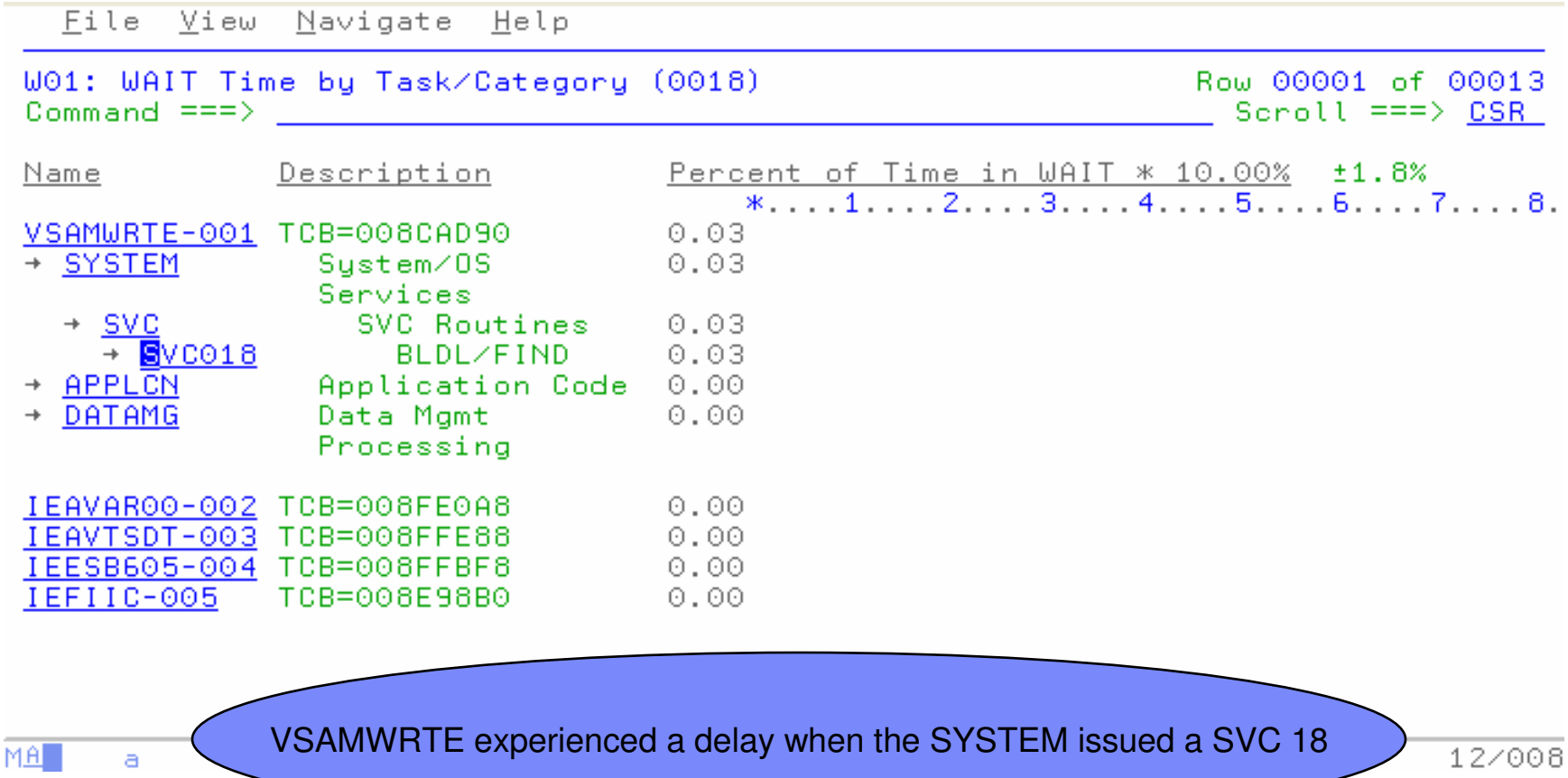
Enter P to View the Source Listing



P01: Source Program Attribution

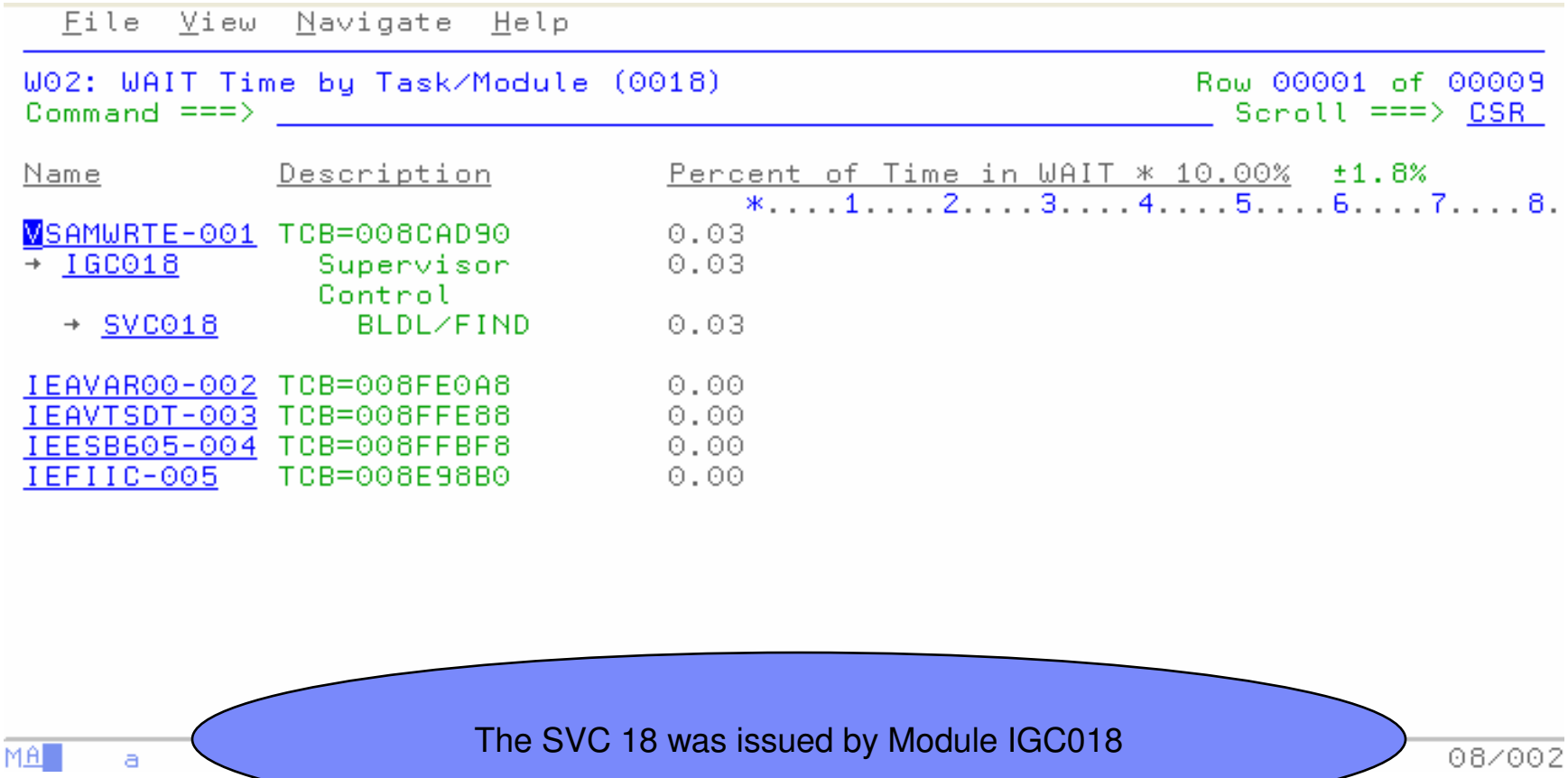


W01: WAIT Time by Task/Category - Expanded



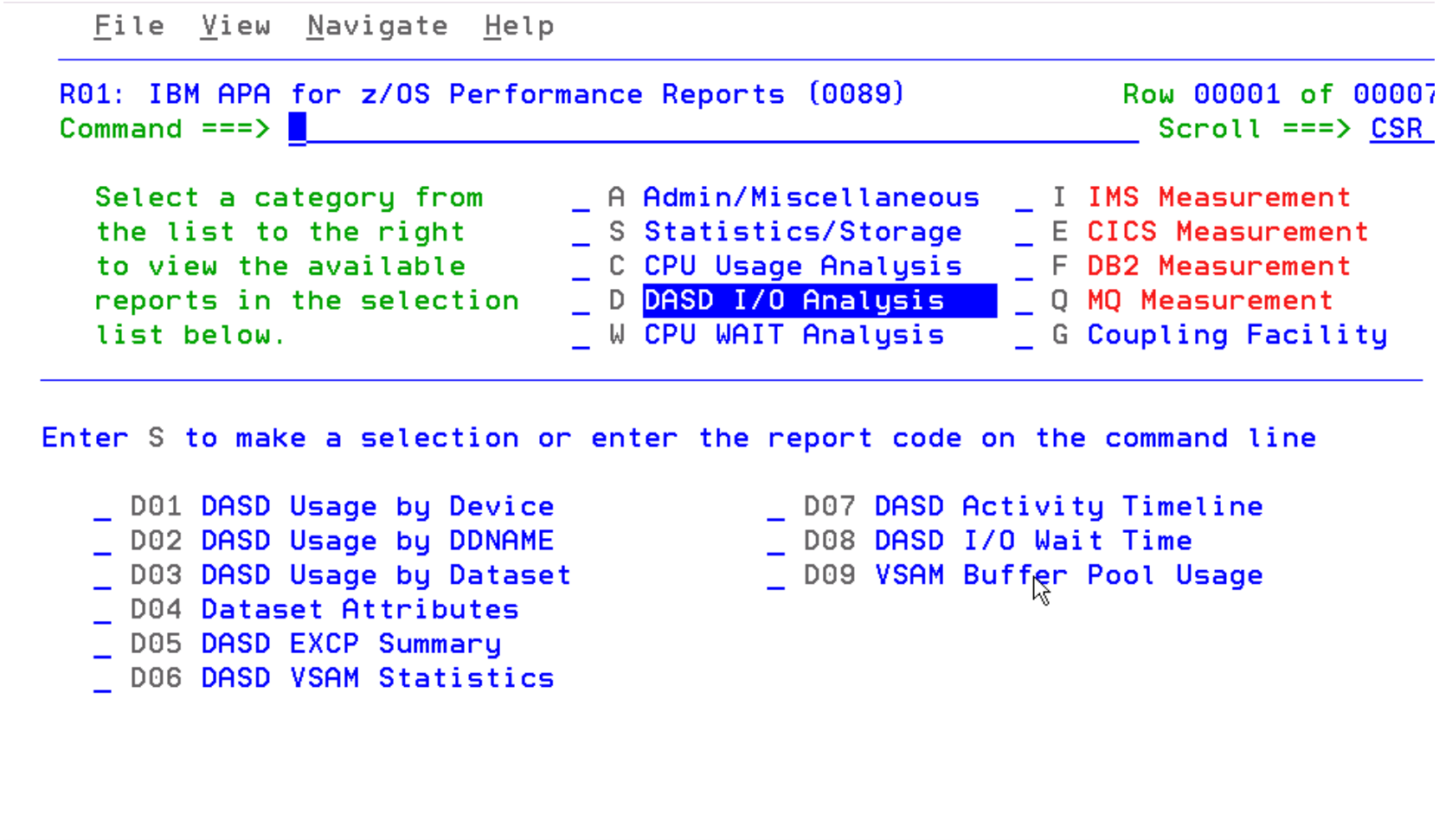
VSAMWRTE experienced a delay when the SYSTEM issued a SVC 18

W02: WAIT Time by Task/Module - Expanded



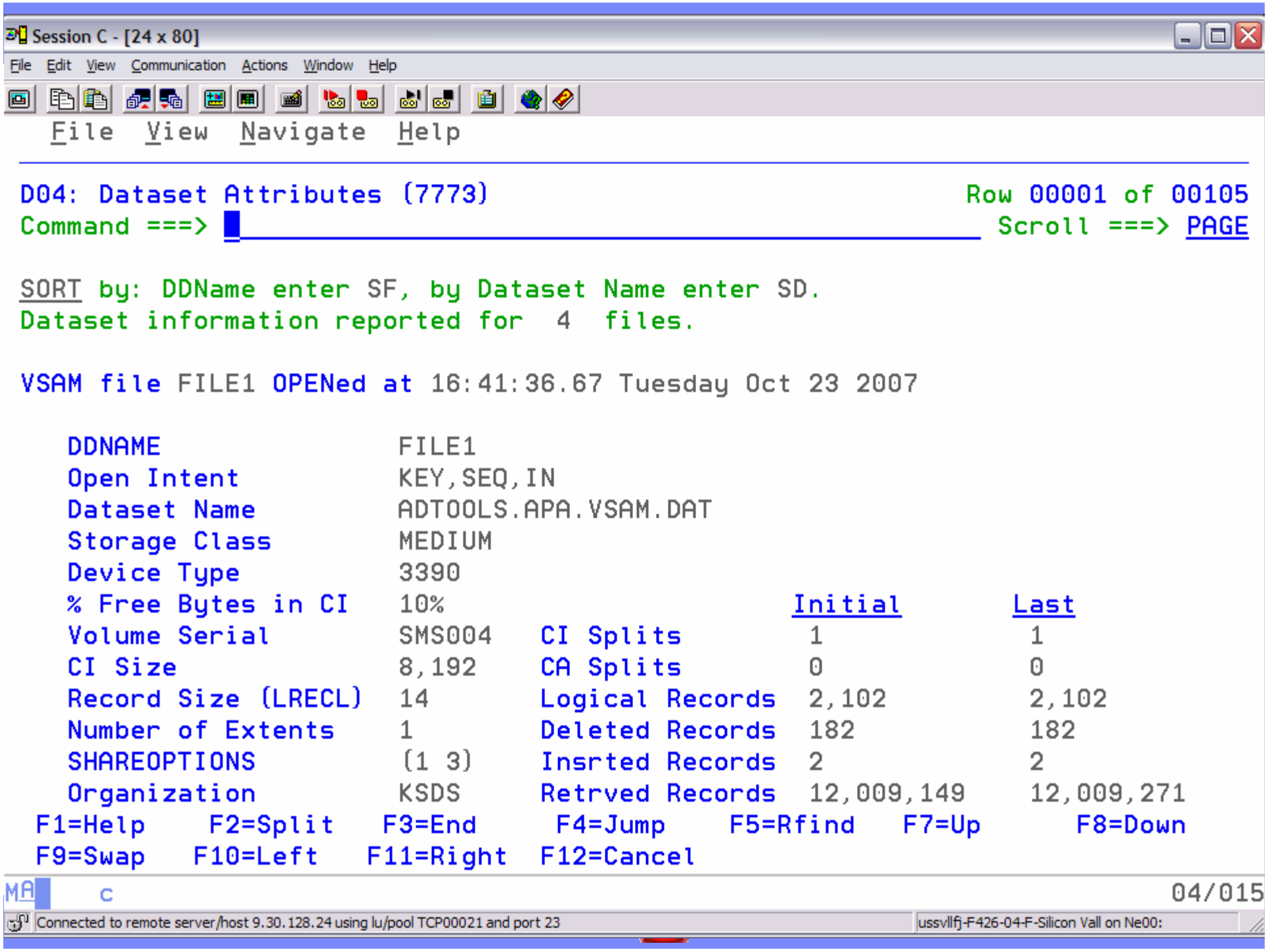
The SVC 18 was issued by Module IGC018

DASD I/O Analysis "D" Reports



D03: DASD Usage Time By Dataset - Expanded

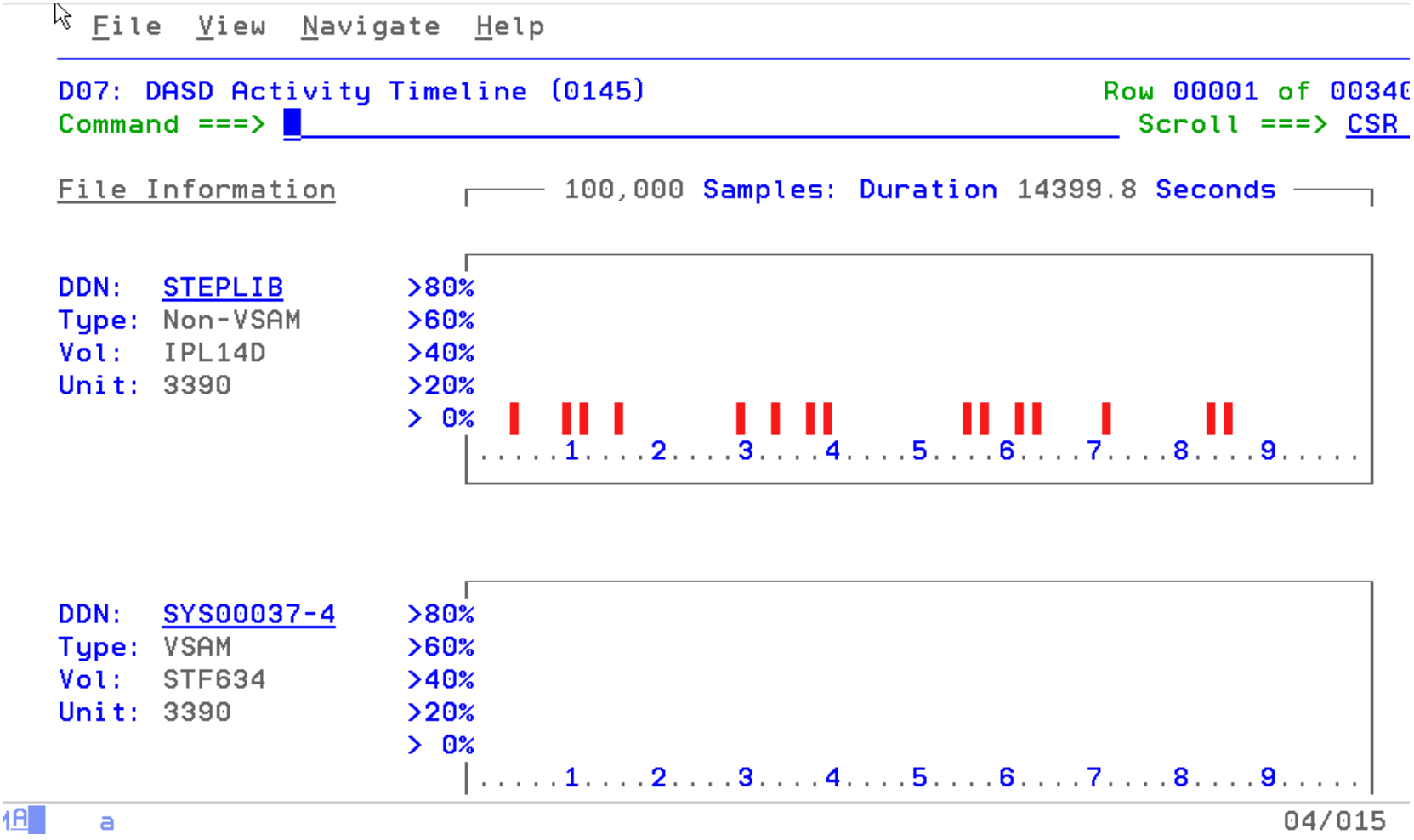
```
D03: DASD Usage Time by Dataset (0145)                    Row 00001 of 00005
Command ===> _____________________________________________ Scroll ===> CSR

Dataset_Name>DDName                    Percent of Time * 10.00%  ±1.0%
                                           *....1....2....3....4....5....6....7.
MACHIND.TEST.ESDS10M.JAN05             1.05 ■
MACHIND.FMN@$@$.TEMP@$@1               0.91
MACHIND.TEST.ESDS10M.MSTAPR03          0.56
ISP.SISPLOAD                           0.01
→ STEPLIB     IPL14D                   0.01
```


Session C - [24 x 80]
File Edit View Communication Actions Window Help
File View Navigate Help
D04: Dataset Attributes (7773)
Row 00001 of 00105
Command ===>
Scroll ===> PAGE
SORT by: DDName enter SF, by Dataset Name enter SD.
Dataset information reported for 4 files.
VSAM file FILE1 OPENed at 16:41:36.67 Tuesday Oct 23 2007
DDNAME FILE1
Open Intent KEY,SEQ,IN
Dataset Name ADTOOLS.APA.VSAM.DAT
Storage Class MEDIUM
Device Type 3390
% Free Bytes in CI 10%
Volume Serial SMS004
CI Size 8,192
Record Size (LRECL) 14
Number of Extents 1
SHAREOPTIONS (1 3)
Organization KSDS
Initial
Last
CI Splits 1 1
CA Splits 0 0
Logical Records 2,102 2,102
Deleted Records 182 182
Insrted Records 2 2
Retrved Records 12,009,149 12,009,271
F1=Help F2=Split F3=End F4=Jump F5=Rfind F7=Up F8=Down
F9=Swap F10=Left F11=Right F12=Cancel
MA c
04/015
Connected to remote server/host 9.30.128.24 using lu/pool TCP00021 and port 23
ussvllfj-F426-04-F-Silicon Vall on Ne00:

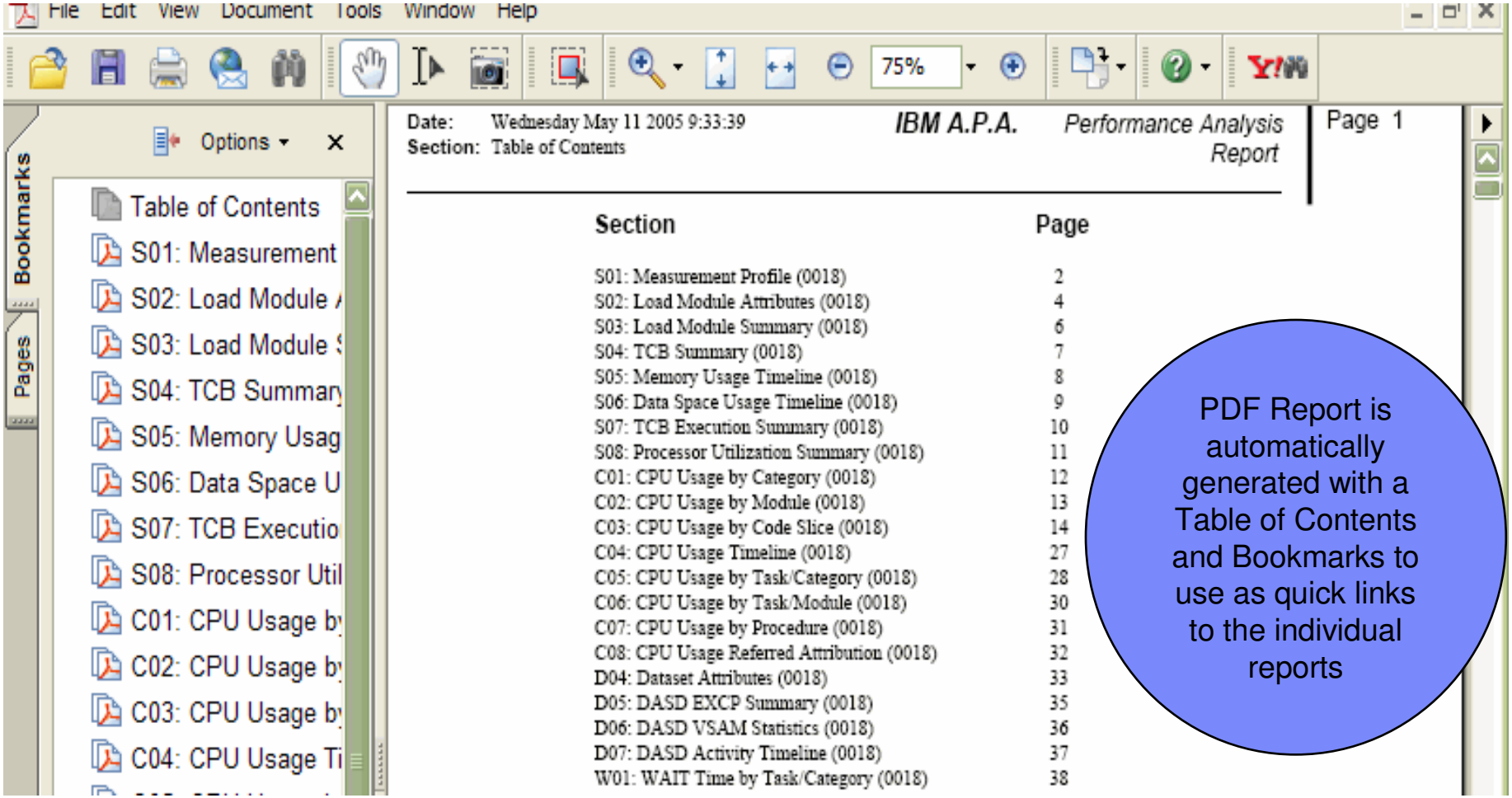
D05: EXCP Summary – Expanded Detail

```
File  View  Navigate  Help

                                                              More:      +
          The following report line was selected
 SYS00038-1      VSAM-DATA                  11        220              209

VSAM file SYS00038(1) OPENed at 6:49:55.48 Tuesday May 10 2005

   DDNAME                 SYS00038
   Open Intent            KEY,DIR,SEQ,OUT
   Dataset Name           MACHIND.FMN@$@$.TEMP@$@1.DATA
   Storage Class          MEDIUM
   Device Type            3390
   % Free Bytes in CI     0%                          Initial       Last
   Volume Serial          STF630    CI Splits          0             0
   CI Size                18,432    CA Splits          0             0
   Record Size (LRECL)    84        Logical Records    55,080        1,084,655
   Number of Extents      1         Deleted Records    0             0
   SHAREOPTIONS           (2 3)     Insrted Records    0             0

STEPLIB         Non-VSAM      +3          28          250              222
STEPLIB         Non-VSAM      +4          28          250              222
SYS00038-3      VSAM-DATA                2777         2888             111

1A  a                                                              03/004
```

D07: DASD Activity Timeline



Viewing the PDF Report



Advantages

- z/OS Problem Determination and Deployment Tools that:
  - Exploits IBM's latest software and processor technology
  - Offer wide array of key features and functions
  - Can enhance the Application Development Lifecycle
  - Provide opportunity for increased user productivity
  - Are affordably priced
  - Have flexible terms and conditions
  - Have no license keys

For More Information

- **z/OS Problem Determination and Deployment Tools**
  - www.ibm.com/software/awdtools/deployment
  - www.ibm.com/software/awdtools/faultanalyzer
  - www.ibm.com/software/awdtools/filemanager
  - www.ibm.com/software/awdtools/debugtool
  - www.ibm.com/software/awdtools/apa
  - www.ibm.com/software/awdtools/apaaa
  - www.ibm.com/software/awdtools/workloadsimulator
  - www.ibm.com/software/awdtools/tester/functional
  - www.ibm.com/software/awdtools/tester/performance/zos
  - www.ibm.com/software/awdtools/migration
  - www.ibm.com/software/awdtools/tictoc/
  - www.ibm.com/software/awdtools/ispfproductivitytool
  - www.ibm.com/software/awdtools/fileexport

For more information

- **Help Center**
  - http://publib.boulder.ibm.com/infocenter/pdthelp/v1r1/index.jsp
- **Redbooks**
  - www.redbooks.ibm.com/abstracts/sg247372.html

For More Information

- **Training**
  - Services
    - Mentor Workshops
  - Free Web-based
    - **Application Performance Analyzer**
      - http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp
    - **Debug Tools Utilities and Advanced Functions**
      - http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp
    - **Fault Analyzer**
      - http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp
    - **File Manager**
      - http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp
    - **Workload Simulator**
      - http://www-128.ibm.com/developerworks/websphere/education/enablement/wbt/sw747.html
- **z/OS Problem Determination and Deployment Tools Can Be Ordered From Your IBM z/Series Sales Representative**

IBM PD Tools Product Identification

- Fault Analyzer for z/OS (5655-S15)
- File Manager for z/OS (5655-S14)
- Debug Tool Utilities and Advanced Functions for z/OS (5655-S16)
- Application Performance Analyzer for z/OS (5697-N63)
- Application Performance Analyzer Automation Assistant for z/OS (5799-HGC)
- Workload Simulator for z/OS & OS/390 (5655-I39)
- Rational Functional Tester (5726-J07)
- Rational Performance Tester for z/OS (5724-J96)
- Migration Utility (5697-N44)
- Application Time Facility (5697-N42)
- ISPF Productivity Tool (5698-A81)
- File Export Utility (5697-I12)
- Rational Developer for System z

IBM Software Group

CICS VSAM Recovery

Risk Management for Your Mission Critical VSAM Data

George Lees

ON DEMAND BUSINESS

November 2007

CICS VSAM Recovery

- **What does it do?**
  - Recovers lost or damaged VSAM data
  - Recovers updates made to data by CICS and/or batch applications
  - Provides assistance and processes for VSAM Disaster Recovery
  - Automates VSAM backup and restore processes
  - Provides intelligent decision automation for certain VSAM error conditions
  - Fully supports log records written by Transactional VSAM (DFSMStvs)

Benefits

- Automates recovery for physically or logically damaged or lost VSAM files
- Quickens recovery from batch window errors
- Reduces overall VSAM recovery time
- Provides database type recovery for your VSAM files

CICS VSAM Recovery for z/OS (CICS VR)

Key features

- Automated recovery
- Extensive functionality and authorization management the from ISPF panel interface
- Provide test-only forward recovery and backout
- Disaster recovery report
- Export and Import commands
- Change accumulation
- Batch support including logging
- NOTIFY support for IBM and non-IBM backups

CICS Support

- CICS Transaction Server for z/OS, V2 and V3
- CICS Transaction Server for OS/390 V1.3

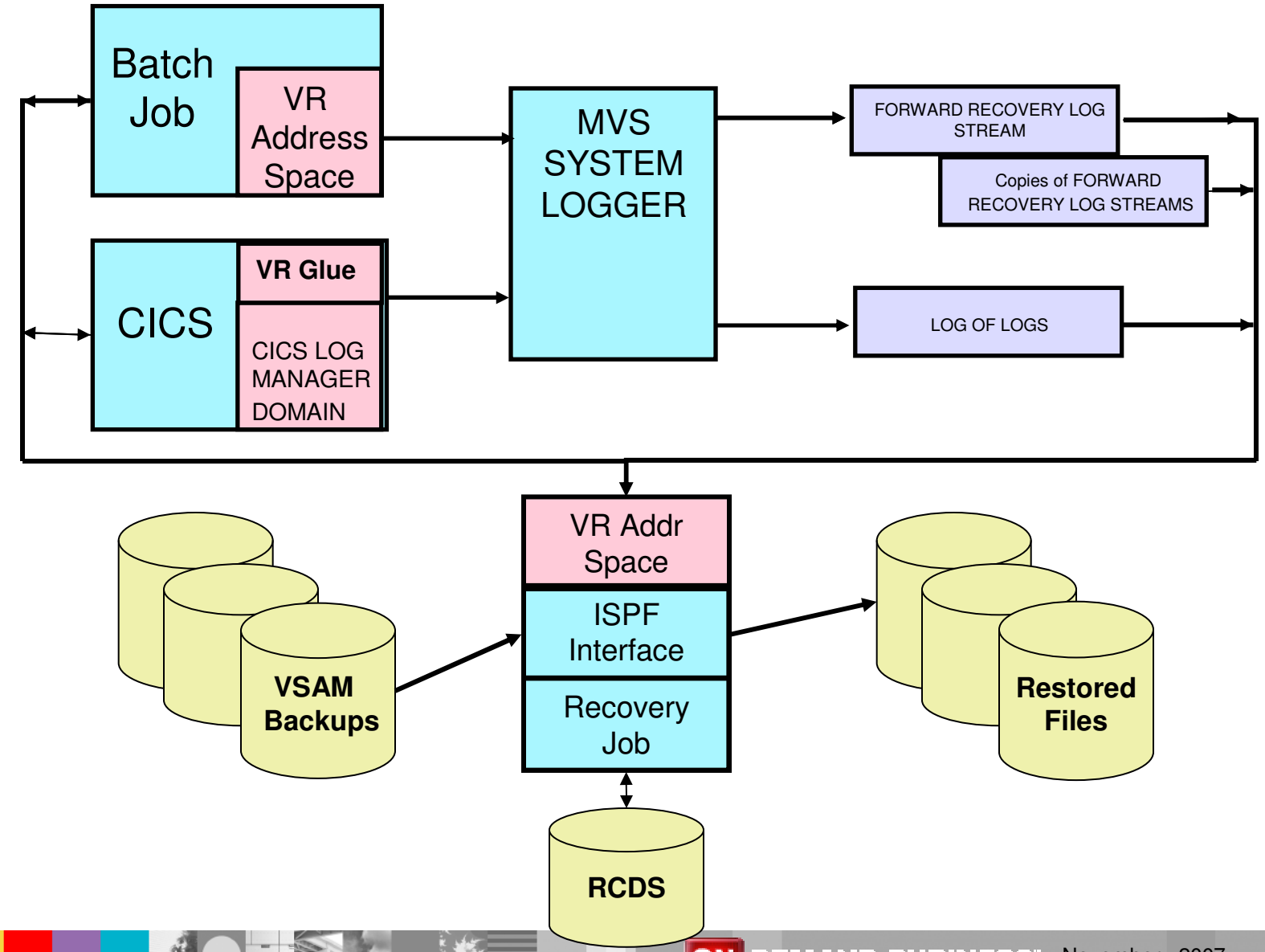
New in CICS VR V4.2

- **CICS TS V3.2 support**
  - **Extended addressability Entry Sequenced Data Sets (ESDSs)**
  - **Backout failure detection operates in a thread-safe mode**
- **Integration with external backup products, including IBM ABARS**
- **Enhanced logging support**

Coming Soon

- ***Additional functionally for the ISPF dialog***
- ***Automation enhancements***
- ***Extend support for non IBM backups***

Architecture



CICS VR – Business Value

- Insurance protection for your mission critical VSAM files
- Use familiar database recovery techniques reducing the learning curve for implementation
- Provide consistency for all VSAM processing types
- Reduce cost of operator intervention and on call support with automation of VSAM file error detection
  - Detect VSAM errors and take corrective action
- Potential savings in the batch cycle by reducing number of backups
- Assistance at Disaster Recovery with exported RCDS and quicker automated recovery
- Reduce human errors with automated recovery processes

CICSVR and Disaster recovery

- **CICSVR disaster recovery utilities**
  - ***Log stream copy***
    - **Create sequential data set copy of a forward recovery log stream**
  - ***RCDS import/export***
    - **Create sequential data set that contains essential recovery information**
      - **Includes information related to logstreams, backups and change accumulation data sets**
  - ***Remote site change accumulation***
    - **Create change accumulation data sets for use at a remote recovery site**
    - **Will accumulate latest unread portion of forward recovery log stream**
  - ***Shadow recovery***
    - **Maintain updated copies of VSAM spheres at a remote recovery site**

CICSVR Summary

- CICS VR is your insurance policy for your Corporate VSAM data
  - Data can be lost through operational error, hardware or software failure or total disaster
- Helps automate recovery in the following scenarios
  - Recover physically damaged or lost VSAM files at the primary site
  - Recover VSAM files in a disaster recovery scenario (at a remote site)
  - “Logically” recover VSAM files from particular updates
  - Remove updates made by failed batch jobs steps
- Helps quicken recovery from batch window errors
- Reduces recovery time
- Recovers from updates made by CICS, batch, or both
- Supports CICS TS, Version 3, Version 2, and 1.3

IBM Software Group

CICS VSAM Transparency

Exploit the Value of Your Business Data that Resides on VSAM

ON DEMAND BUSINESS

November 2007

CICS VSAM Transparency

- **What does it do?**
  - Move your data from VSAM to DB2 without application program changes
  - Clean data via utilities to eliminate bad data “surprises”
  - Re-engineer data to increase corporate value
- **Benefits**
  - Low Risk migration strategy
  - Modify application programs at a controlled pace
  - Can help lower the total cost of ownership of your zSeries platform

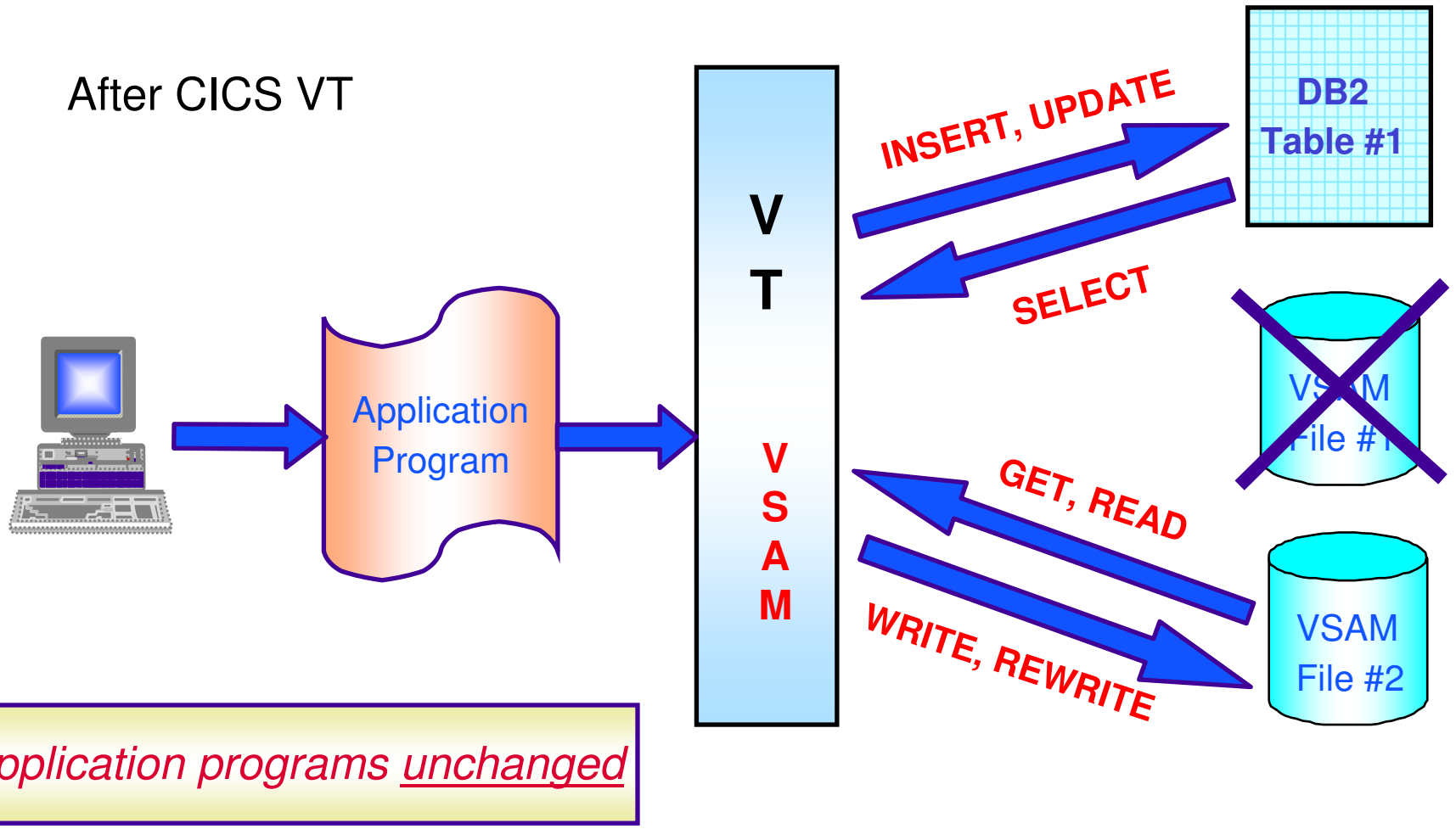
CICS VSAM Transparency

- Tool to migrate VSAM files to DB2 without changing applications programs
  - *Single Instance of the data is maintained!!*
- Both CICS *and* Batch programs can access data in DB2 under the control of CICS VT
- Migrated data can be accessed via SQL by *new* programs
- Low risk migration strategy
  - *Fast path to move VSAM data to DB2*
  - *Not all VSAM files need to be migrated*
  - *Modify application programs at a controlled pace*

CICS VT Capabilities

- Completely separate from application program
- Transparent access to data in DB2
- 100% static SQL
- Migrate on a file by file basis
- Data can be re-engineered
  - **Same data returned to VSAM programs**
  - **Enhanced data available using SQL**

WHAT EXACTLY IS CICS VT?



Application programs unchanged

CICS VSAM Transparency for z/OS (CICS VT)

- Key features
  - Migrate VSAM files to DB2
    - without changing application programs
    - single copy of the data
  - CICS programs access data via GLUE/TRUE access
  - Batch programs access DB2 via CICS VT
  - Cleansing migration utilities
  - Add SQL to existing programs
  - No additional region / STC required

CICS Support

- CICS Transaction Server for z/OS, V2 and V3
- CICS Transaction Server for OS/390 V1.3

New in CICS VT V1.2

- **CICS TS V3.2 support without modification**
- **CICS TS V3.2 threadsafe File Control API performance benefits**
- **Dual Mode Facility assists with testing of migrated data**
- **Automated Mapping Facility now supports PL/I and Assembler**
- **Re-entrant SQL driver modules**

For more information

Tools WEB sites

- CICS tools, including library: www.ibm.com/cics/tools
- WebSphere zSeries tools: www.ibm.com/software/websphere/zadportal
- Try CICS tools for free for 60 days
  www.ibm.com/software/os/zseries/trials/cicstools

Program numbers

5655-P30: CICS VSAM Recovery
5697-I76: CICS VSAM Transparency

Polling Questions

Q1. Please evaluate your level of satisfaction with today's teleconference
If it was High, press STAR ONE
If it was Medium, press STAR TWO
If it was low, press STAR THREE

Q2. Was the level of technical information presented in this teleconference
If it was At the right level, press STAR ONE
If it was Not technical enough press STAR TWO
If it was More technical than I needed to hear, press STAR THREE

Q3. Would you like more information on IBM's File Manager product?
If yes press star one
If no press star two

Q4. Would you like more information on IBM's Application Performance Analyzer product?
If yes press star one
If no press star two

Q5. Would you like more information on IBM's CICS VSAM Recovery product?
If yes press star one
If no press star two

Q6. Would you like more information on IBM's CICS VSAM Transparency product?
If yes press star one
If no press star two

Q7. We hope you have enjoyed the teleconference today. Please let us know if you are interested in receiving additional information or follow-up regarding the products discussed today.
If yes press star one
If no press star two

Question and Answer

Thank You for Joining Us today!

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