

Lab Exercise 1 FA

Use the Online Interface to View a Real-Time Analysis Report

In this exercise you will:

- Use the Fault Analyzer Online Interface to find your Fault Entry
- Use the “V” line command to View a Real-Time report
- View the Real-Time report to see information about the abend

Part 1: Using the Online Interface

1. Log on to TSO (if you are not already logged on).
2. Navigate to the Fault Analyzer Online Interface. Ask your instructor for assistance, if you aren't sure how to get there on your system.

```
IBM Fault Analyzer - Fault Entry List                               Line 1 Col 1 80
Command ==> _____ Scroll ==> CSR_

Fault History File or View : 'DEFAULT.FAULT.HISTORY.FILE'█

{The following line commands are available: ? (Query), V (View real-time
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history).}

  Fault_ID Job/Tran User_ID Program Sys/Job Abend Date Time
  _____
  F00003 DNET074S DNET074 SAM2 DEMOMVS SOC7 2005/09/02 18:52:26
  F00002 DNET074S DNET074 SAM2 DEMOMVS SOC7 2005/09/02 18:40:24
  F00001 DNET074S DNET074 SAM2 DEMOMVS SOC7 2005/09/02 18:37:06

*** Bottom of data.
```

3. Check the name of the Fault History File shown. Verify that it is the history file where your Fault Analyzer stored your Fault Entry. Remember that Fault Analyzer displayed the history file name in the job log.
 - If the Fault History file shown is not the right one, type in the correct name, then press **ENTER**.
4. The correct Fault History file should be displayed. Next, find your fault entry. You can limit the display to only certain entries. Display only entries where the job name matches the first two characters of your job name:
 - Put your cursor on the first entry in the JOB/TRAN column.
 - Type in the first 2 characters of the job name, then asterisk, then space.
 - Press **ENTER**.

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```

Tran User_ID Sys/Job
T074F dn* 074 DEMOMVS
02912 SYS029 DEMOMVS
DT111 ADPDT11 DEMOMVS
    
```

- Notice that now only matching entries are displayed. You can match on any column, and you can even match on more than one column.

```

IBM Fault Analyzer - Fault Entry List                               Line 1 Col 1 80
Command ==>
Fault History File or View : 'FAULTANL.V6R1.HIST'

{The following line commands are available: ? (Query), V (View real-time
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history).}

  Fault_ID Job/Tran User_ID Sys/Job Abend Date Time
  ---
  F00667 DNET074F DNET074 DEMOMVS S0C7 2006/04/14 09:55:01
  F00626 CICSVTJ DNET356 DEMOMVS S013 2006/04/10 13:58:34
  F00625 DNET424G DNET424 DEMOMVS U4038 2006/04/10 07:16:38
  F00624 DNET3511 DNET351 DEMOMVS S0C4 2006/04/07 16:04:58
  F00623 DNET3511 DNET351 DEMOMVS S0C4 2006/04/07 15:36:04
  F00622 DNET3511 DNET351 DEMOMVS S0C4 2006/04/07 15:31:32
  F00621 DNET3511 DNET351 DEMOMVS S0C4 2006/04/07 15:27:27
  F00620 DNET3511 DNET351 DEMOMVS S806 2006/04/07 14:27:36
  F00619 GEN351 DNET351 6/04/07 10:30:36
  F00618 DNET924 DNET924 MATCH (User_ID) 6/04/07 03:16:43
  F1=Help F3=Exit F F d F6=Actions F7=Up
  F8=Down F10=Left F11=Right F12=MatchALL
    
```

Part 2: View a Real-Time Report

- Use the “V” line command to view the Real-Time Analysis Report:
 - Type **V** next to your Fault Entry, then **ENTER**.

```

IBM Fault Analyzer - Fault Entry List                               Line 1 Col 1 80
Command ==>
Fault History File or View : 'FAULTANL.V6R1.HIST'

{The following line commands are available: ? (Query), V (View real-time
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history).}

  Fault_ID Job/Tran User_ID Sys/Job Abend Date Time
  ---
  v F00667 DNET074F DNET074 DEMOMVS S0C7 2006/04/14 09:55:01
  F00626 CICSVTJ DNET356 DEMOMVS S013 2006/04/10 13:58:34
  F00625 DNET424G DNET424 DEMOMVS U4038 2006/04/10 07:16:38
  F00624 DNET3511 DNET351 DEMOMVS S0C4 2006/04/07 16:04:58
    
```

- The Real-Time Report is displayed. Notice that you can “Expand” and “Collapse” the report sections. Collapse all sections:

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- Put your cursor on the **-** (minus sign) next to “Collapse All”, then **ENTER**.
- Notice that the report sections are all collapsed.

```
Real-Time Report
Command ==> _____
+ Expand all / - Collapse all
*****
* IBM Fault Analyzer for z/OS V6R1M0 (UK
*
* (C) Copyright IBM Corp. 2000, 2005. A
*****

JOBNAME: DNET074F  SYSTEM ABEND: 0C7
```

8. Expand all sections:

- Put your cursor on the **+** (plus sign) next to “Expand All”, then **ENTER**.
- Notice that the report sections are all expanded.

```
Real-Time Report
Command ==> _____
+ Expand all / - Collapse all
*****
* IBM Fault Analyzer for z/OS V6R1M0 (UK
*
* (C) Copyright IBM Corp. 2000, 2005. A
*****

JOBNAME: DNET074F  SYSTEM ABEND: 0C7
```

9. You can navigate the report using the Find command (for example: **F** some-text), and the scroll PF keys: PF7 (up), PF8 (down), PF10 (left), and PF11 (right).

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10. Navigate through the report to familiarize yourself with it. Find answers to the following questions. (Answers are on the following page).

- What program was executing when the abend occurred?

- What COBOL statement was executing?

- The program abended because there was bad data in a variable. What variable had the bad data?

- SAM2 is a sub-program. What is the name of the main program?

- There is a variable named CUST-NAME in program SAM2. What value was stored in this variable when the abend occurred?

11. Answers to above questions:

- **What program was executing when the abend occurred?**
SAM2. This information is in the Synopsis section.
- **What COBOL statement was executing?**
COMPUTE CUST-ACCT-BALANCE = CUST-ACCT-BALANCE + WS-UPDATE-NUM. This information is in the Synopsis section.
- **The program abended because there was bad data in a variable. What variable had the bad data?**
CUST-ACCT-BALANCE. This variable is flagged as “Cause of error” in the Synopsis section. Also, the value is displayed in Hex in the Synopsis, which indicates that it has bad data.
- **SAM2 is a sub-program. What is the name of the main program?**
SAM1. This information is in the Event Summary section. The Event summary shows the active CALL chain. The first program in the list is the main program.
- **There is a variable named CUST-NAME in program SAM2. What value was stored in this variable when the abend occurred?**
“Aster, Dez”. This information is shown in the “Associated Storage Areas” section of the detail report for Event 3 (which is program SAM2). The easiest way to get this information is to do a Find command (for example: “F CUST-NAME”).

Lab Exercise 2 FA

Using Interactive Re-Analysis

In this exercise you will:

- Become familiar with navigating when using Interactive Re-Analysis
1. Log on to TSO (if you are not already logged on).
 2. Navigate to the Fault Analyzer Online Interface. Ask your instructor for assistance, if you aren't sure how to get there on your system.

```
IBM Fault Analyzer - Fault Entry List                               Line 1 Col 1 80
Command ==> _____ Scroll ==> CSR_

Fault History File or View : 'DEFAULT.FAULT.HISTORY.FILE'█

{The following line commands are available: ? (Query), V (View real-time
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history).}

  Fault_ID Job/Tran User_ID Program Sys/Job Abend Date Time
  ---      -
  F00003 DNET074S DNET074 SAM2 DEMOMVS S0C7 2005/09/02 18:52:26
  F00002 DNET074S DNET074 SAM2 DEMOMVS S0C7 2005/09/02 18:40:24
  F00001 DNET074S DNET074 SAM2 DEMOMVS S0C7 2005/09/02 18:37:06

*** Bottom of data.
```

3. Check the name of the Fault History File shown. Verify that it is the file where your Fault Analyzer stored your Fault Entry. Remember that Fault Analyzer listed the file name in the job log.
 - If the Fault History file shown is not the right one, type in the correct name, then press **ENTER**.
4. Use the “T” line command to view the Real-Time Analysis Report:
 - Type **I** next to your Fault Entry, then **ENTER**.

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```
IBM Fault Analyzer - Fault Entry List                               Line 1 Col 1 80
Command ==> _____ Scroll ==> CSR

Fault History File or View : 'FAULTANL.V6R1.HIST'

{The following line commands are available: ? (Query), V (View real-time
report), I (Interactive reanalysis), B (Batch reanalysis), D (Delete), H
(Duplicate history).}

  Fault_ID Job/Tran User_ID Sus/Job  Abend  Date      Time
I  F00667 DNET074F DNET074  DEMOMVS S0C7   2006/04/14 09:55:01
  F00626 CICSVTJ  DNET356  DEMOMVS S013   2006/04/10 13:58:34
  F00625 DNET424G  DNET424  DEMOMVS U4038  2006/04/10 07:16:38
  F00624 DNET3511  DNET351  DEMOMVS S0C4   2006/04/07 16:04:58
  F00623 DNET3511  DNET351  DEMOMVS S0C4   2006/04/07 15:36:04
  F00622 DNET3511  DNET351  DEMOMVS S0C4   2006/04/07 15:31:32
  F00621 DNET3511  DNET351  DEMOMVS S0C4   2006/04/07 15:27:27
  F00620 DNET3511  DNET351  DEMOMVS S806   2006/04/07 14:27:36
  F00619 GEN351  DNET351  DEMOMVS S0CB   2006/04/07 10:30:36
  F00618 DNET924  DNET924  DEMOMVS S0CB   2006/04/07 03:16:43
```

5. The Interactive Analysis Report panel is displayed:

```
File View Services Help
Interactive Reanalysis Report                                     Line 1 Col 1 80
Command ==> _____ Scroll ==> CSR
JOBNAME: DNET074F  SYSTEM ABEND: 0C7                          DEMOMVS  2006/04/14 09:55:01

Fault Summary:
Module SAM2, program SAM2, source line # 164 : Abend S0C7 (Data Exception).

Select one of the following options and press Enter to access further fault
information:
1. Synopsis
2. Event Summary
3. System-Wide Information
4. Abend Job Information
5. Options in Effect

{Fault Analyzer maximum storage allocated: 1.56 megabytes.

*** Bottom of data.

F1=Help      F3=Exit      F4=Dsect     F5=RptFind   F6=Actions   F7=Up
F8=Down      F10=Left     F11=Right
```

6. Refer to the Workshop manual, and turn to the section titled: “Analyze an Abend”. Perform the step-by-step activities that are shown on those slides. As you go through the process, you will see information about the application that will lead to the reason why this abend occurred.

Lab Exercise 3 FM

Using a Copybook Template

In this exercise you will:

- Use a copybook to create a Template
 - Specify selection criteria to limit records displayed
 - Specify field selection to limit fields displayed
 - Use the TE command to edit a template
 - Use a “temporary” template
 - Save a template
 - Save a copy of a template with a new name
1. Log on to TSO (if you are not already logged on).
 2. Navigate to the File Manager menu.

Part 1: Specify a Copybook

3. Select the Edit option.
 - Type **2** on the command line, then **ENTER**.

```
File Manager                                Primary Option Menu
Command ==>> 2
-----
0 Settings          Set processing options          User I
1 Browse           Browse data                     System
2 Edit             Edit data                       Appl I
3 Utilities        Perform utility functions       Versio
4 Tapes           Tape specific functions         Termin
5 Disk/VSAM       Disk track and VSAM CI functions Screen
6 OAM             Work with OAM objects          Date.
7 Templates       Template and copybook utilities Time.
8 HFS             Access Hierarchical File System
X Exit           Terminate File Manager
```

4. The Edit Entry Panel is displayed. Next, you will name a copybook that will be used to create a template.
 - Type (or verify) **ADLAB.CUST1** in the Data set/path name field.
 - Type **ADLAB.COPYLIB(CUST1)** in the Copybook or Template: Data set name field.

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- Type 1 (above) in the “Copybook / Template” option field.
- Press ENTER.

```

File Manager                               Edit Entry Panel
Command ==> _____

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
Data set/path name ADLAB.CUST1             +
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 . . ADLAB.COPYLIB(CUST1)
Member . . . . . 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 2. Previous       2. RBA             _ Include only selected records
3 3. None           3. Record number  _ Binary mode, reclen _____
4 4. Create dynamic _ Create audit trail
    
```

5. The Edit panel is displayed. File manager compiled the copybook and created a “template”, which is used to format the records.

```

Edit                                         DNET074.ADLAB.CUST1                               Rec 0 of 100
Command ==> █                               Scroll CSR
                                                Format TABL

      CUST-ID NAME                ACCT-BALANCE ORDERS-YTD ADDR
      #3      #4                    #5          #6 #7
      AN 1:5  AN 6:17                PD 23:5    BI 28:2 AN 30:20
      <---> <---+-----1-----> <---+-----1> <---+> <---+-----1----->
000000 **** Top of data ****
000001 01001 Lynn, Amanda                67.68          9 119 South Lake LANE
000002 02200 Graham, Anna                610.05         20 89 Clay Springs Rd
000003 02202 Major, Art                  1234.56         5 1512 Pine Bluff
000004 03003 Prentice, Anna              111.22          7 33 Renshaw
000005 00000
    
```

Part 2: Editing a Template

6. There are different ways to navigate to the Template Edit panel. The “TE” (Template Edit) command is one way.
 - Type TE (Template Edit) on the command line, then ENTER.

```

Edit                                         DNET074.ADLAB.CUST1
Command ==> TE █
    
```

7. The Template Edit panel is displayed.

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```

File Manager                               Field Selection/Edit                               Line 1 of 15
Command ==> █                               Scroll CSR

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id : _____ +
2 Sel: _____ +
Offset 0
Cmd Seq SHC Ref Field Name                Picture  Type Start Length
**** Top of data ****
_____ 1 1 CUST-REC                          AN       1    331
_____ 2 2 CUSTOMER-KEY                       AN       1     5
_____ 3 3 CUST-ID                            X(5)     AN       1     5
_____ 4 2 NAME                                X(17)    AN       6    17
_____ 5 2 ACCT-BALANCE                       S9(7)V99 PD     23     5
_____ 6 2 ORDERS-YTD                          S9(4)    BI     28     2
_____ 7 2 ADDR                                X(20)    AN     30    20
_____ 8 2 CITY                                X(14)    AN     50    14
_____ 9 2 STATE                                X(02)    AN     64     2
_____ 10 2 COUNTRY                            X(11)    AN     66    11
_____ 11 2 MONTH OCCURS 12 TIMES            S9(7)V99 PD     77     5
  
```

8. Note: From this panel, you can specify selection criteria and field formatting, among other things. **Remember that you can use the “TE” command at any time during your edit session to view or change the template.**
9. In a few steps you will update the template, but right now, exit from Template Edit:
 - Press **PF12** (Cancel).
10. The Edit panel is displayed. Exit from the editor:
 - Press **PF3**.
11. Next, you will specify record selection criteria in the template. There are two methods to specify criteria: 1) as a free format expression, or 2) “by field”. In the next steps you will use the free format method.
12. The Edit Entry panel is displayed. Leave all of the fields unchanged, except:
 - Type **/** (slash) in the Edit Template field.
 - Press **ENTER**.



```

File Manager                               Edit Entry Panel
Command ==> _____

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
  Data set/path name 'DNET074.ADLAB.CUST1' +
  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 . . 'DNET074.ADLAB.COPYLIB(CUST1)'
  Member . . . . . _____ 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 2. Previous     - 2. RBA         - Include only selected records
 3 3. None         - 3. Record number - Binary mode, reclen _____
 4 4. Create dynamic - Create audit trail
  
```

Part 3: Selecting Records

13. Note: The Field Selection / Edit panel is displayed. You can enter free format selection here.

14. Enter criteria to select all records where the Acct-Balance is greater than 1000:

- Type **#5 > 1000** in the Sel field.
- Note: this uses the field reference number (#5) for the ACCT-BALANCE field. Free format criteria have the syntax of a REXX condition. In free-format criteria, you can also use REXX functions and REXX-like functions that are provided by File Manager. The File Manager User's Guide and Reference manual describes available functions.
- You have the option to use the template without saving it ("run temporary"), or to save the template. Run the template without saving it:
 - __ 1. Press **PF6**. PF6 is set to the "RUNTEMP" (run temporary) command.

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```

File Manager                               Field Selection/Edit                               Line 1 of 15
Command ==>                               Scroll CSR

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id :                                     +
2 Sel: #5 > 1000                           +
Offset 0
Cmd Seq SHC Ref Field Name                Picture  Type Start Length
**** Top of data ****
-----
      1 1 CUST-REC                          AN      1    331
      2 2 CUSTOMER-KEY                      AN      1     5
      3 3 CUST-ID                            X(5)    AN      1     5
      4 2 NAME                              X(17)   AN      6    17
      5 2 ACCT-BALANCE                      S9(7)V99 PD    23     5
      6 2 ORDERS-YTD                        S9(4)   BI     28     2
      7 2 ADDR                              X(20)   AN     30    20
      8 2 CITY                              X(14)   AN     50    14
      9 2 STATE                              X(02)   AN     64     2
     10 2 COUNTRY                          X(11)   AN     66    11
     11 2 MONTH OCCURS 12 TIMES            S9(7)V99 PD    77     5
F1=Help   F2=Split   F3=Exit   F4=Expand   F5=RFind   F6=RunTemp
F7=Up     F8=Down    F9=Swap   F10=Left   F11=Right  F12=Cancel
  
```

15. The Edit panel is displayed. Notice that there are some “Not Selected” lines. These are the records that did not match the selection criteria. Verify that only records with Acct-Balance greater than 1000 are displayed, as shown:

- IF your results are not correct, then check that you entered your selection criteria correctly. Use the **TE** command to edit the template. This will give you a chance to test what you have learned so far about using a template. Hint: After fixing your selection criteria on the template Field Selection / Edit panel, use PF6 (Run Temporary) to return to the Edit panel.

```

Edit                                         DNET074.ADLAB.CUST1                               Rec 0 of 100
Command ==>                               Scroll CSR
                                           Format TABL

      CUST-ID NAME                          ACCT-BALANCE ORDERS-YTD ADDR
      #3 #4 #5 #6 #7
      AN 1:5 AN 6:17 PD 23:5 BI 28:2 AN 30:20
      <---> <---+-----1-----> <---+-----1> <---+> <---+-----1----->
000000 **** Top of data ****
-----
000003 02202 Major, Art                    1234.56      - - 2 Line(s) not selected
                                           5 1512 Pine Bluff
-----
000010 06900 Bacon, Chris P.              1001.01      - - 6 Line(s) not selected
                                           0 1134 Rosetta
-----
000021 11004 Ness, Luke                   1234.00      - - 10 Line(s) not selected
                                           3 5166 Sprinkle Road
-----
000035 30005 Wynn, Betty-May              8000.08      - - 13 Line(s) not selected
                                           7 9005 Murphy Road
-----
000046 39900 Dewitt, Howdy                15000.50     - - 10 Line(s) not selected
000047 40045 Wood, Holly                  25000.02     1 4111 Northside PkWay
000048 40000 Burr, Tim                    7766.55     7 90210 Mt. Lee Rd
                                           0 4111 Northside PkWay
  
```

16. The Edit panel is displayed. Exit from the editor:

- Press **PF3**.

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17. In the previous steps, you entered selection criteria using a free format expression. In the next steps, you will use a different method to enter selection criteria: the “by field” method.
18. The Edit Entry Panel is displayed. Leave all of the fields unchanged, except:
- Type / (slash) in the Edit Template field.
 - Press **ENTER**.

```

File Manager                               Edit Entry Panel
Command ==> _____

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
Data set/path name 'DNET074.ADLAB.CUST1' +
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 . . 'DNET074.ADLAB.COPYLIB(CUST1)'
Member . . . . . _____ 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 _____
4. Create dynamic - Create audit trail
  
```

19. The Field Selection / Edit panel is displayed. Choose “By Field” selection:
20. Type 2 on the command line, then **ENTER**.

```

File Manager                               Field Selection/Edit                               Li
Command ==> 2                               S

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id : _____
2 Sel: _____
Offset 0
Cmd Seq SHC Ref Field Name                               Picture Type S
  
```

21. The Record Selection Criteria panel is displayed. Enter criteria to select records where the Acct-Balance field is greater than 1000:
- On the line for the “Acct-Balance” field, type ≥ (greater than) in the Operator column.
 - On the line for the “Acct-Balance” field, type **1000** in the Value column.
 - Note: If needed, help is available by pressing PF1.
 - Press **PF3**.

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```

File Manager                               Record Selection Criteria                Line 1 of 14
Command ==>>                               Scroll CSR

Cmd Con ( Field Name                        Op Value                                )
<-> - <---+---1---+---2---+---3---> <-> <---+---1---+---2---+---
*** **** Top of data ****
--- AND - CUST-REC
--- AND - CUSTOMER-KEY
--- AND - CUST-ID
--- AND - NAME
--- AND - ACCT-BALANCE
--- AND - ORDERS-YTD
--- AND -
  
```

22. The Field Selection / Edit panel is displayed. Notice that File Manager automatically formatted the free format criteria on this panel. Exit from this panel:

- Press **PF3**.

```

File Manager                               Field Selection/Edit                    Line 1 of 15
Command ==>>                               Scroll CSR

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id : █
2 Sel: #5 > 1000
Offset 0
Cmd Seq SHC Ref Field Name                    Picture Type Start Length
-----
      1 1 CUST-REC
      2 2 CUSTOMER-KEY
      3 3 CUST-ID
      4 2 NAME
  
```

23. The Template Save panel is displayed. You have the option to save the template, or use the template without saving it (“run temporary”). Save the template:

- Type **ADLAB.TEMPLATE(CUST1)** in the Data set/path name field.
 - This will save the template with the name CUST1 in your template library. A template library can be any PDS or PDSE with LRECL=80 and RECFM=FB.
 - Note: depending on your TSO profile settings, you may need to type the full data set name with your personal file prefix.
- Press **PF3** to save the template.

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```

Template Save
Command ==> _____
F1=C
F2=C
F3=C
F4=C
F5=C
F6=C
F7=C
F8=C
F9=C
F10=C
F11=C
F12=C

To discard changes to your template, press PF12/Cancel.
To use changes without saving, press PF6/RunTemp.
To save changes, type a data set and member name below, then press
PF3/Exit.

Data set name  ADLAB.TEMPLATE(CUST1) █
Member        . . . . . _____

F1=Help      F2=Split    F3=Exit      F6=RunTemp   F7=Backward
F8=Forward   F9=Swap     F12=Cancel
  
```

24. The Edit Entry Panel is displayed.

- Notice that the template was saved, and the name of the new template was automatically filled in.
- Press **ENTER**.

```

File Manager                               Edit Entry Panel                               Template saved
Command ==> _____

Input Partitioned, Sequential or VSAM Data Set, or HFS file:
Data set/path name 'DNET074.ADLAB.CUST1' _____ +
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 . . . █DNET074.ADLAB.TEMPLATE'
Member . . . . . CUST1 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 2. Previous - 2. RBA - Include only selected records
3 3. None - 3. Record number - Binary mode, reclen _____
4 4. Create dynamic - Create audit trail
  
```

25. The Edit panel is displayed. Notice that there are some “Not Selected” lines. These are the records that did not match the selection criteria. Verify that only records with Acct-Balance greater than 1000 are displayed, as shown:

- IF your results are not correct, then check that you entered your selection criteria correctly. Use the **TE** command to edit the template.



```

Edit                               DNET074.ADLAB.CUST1                               Rec 0 of 100
Command ==> |                                                                Scroll CSR
                                                                Format TABL

  CUST-ID NAME                               ACCT-BALANCE ORDERS-YTD ADDR
  #3      #4                               #5          #6 #7
  AN 1:5  AN 6:17                          PD 23:5     BI 28:2 AN 30:20
  <--->  <---+-----1----->  <---+-----1>  <---+> <---+-----1----->
000000 **** Top of data ****
-----
000003 02202 Major, Art                      1234.56      - 2 Line(s) not selected
                                     5 1512 Pine Bluff
-----
000010 06900 Bacon, Chris P.                1001.01      - 6 Line(s) not selected
                                     0 1134 Rosetta
-----
000021 11004 Ness, Luke                     1234.00      - 10 Line(s) not selected
                                     3 5166 Sprinkle Road
-----
000035 30005 Wynn, Betty-May                8000.08      - 13 Line(s) not selected
                                     7 9005 Murphy Road
-----
000046 39900 Dewitt, Howdy                 15000.50     - 10 Line(s) not selected
                                     1 4111 Northside PkWay
000047 40045 Wood, Holly                   25000.02     7 90210 Mt. Lee Rd
000048 40000 Burr, Tim                      7766.55     0 4111 Northside PkWay
  
```

26. The Edit panel is displayed. “Not Selected” lines are one type of shadow line. You can use the SHADOW command to display or hide shadow lines:

- Type **SHADOW ALL OFF** on the command line, then **ENTER**.
- Notice that the “Not Selected” lines disappear.
- Type **SHADOW ALL ON** on the command line, then **ENTER**.
- Notice that the “Not Selected” lines are displayed.

27. The RECSTATS command can be used to get record counts.

- Type **RECSTATS** on the command line, then **ENTER**.
- Notice that information about the file is displayed, such as record lengths and how many changes are pending.
- Type **PF8** (scroll forward).
- Notice that the number of records selected, and not selected, are displayed.
- Press **PF3** to exit the RECSTATS display.

Part 4: Selecting Fields

28. In the next steps, you will select only certain fields for display. Edit the template:

- Type **TE** (Template Edit) on the command line, then **ENTER**.

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```

Edit                               DNET074.ADLAB.CUST1
Command ==> TE █

      CUST-ID NAME                ACCT-BALANCE ORDERS-YTD ADD
      #3      #4                  #5          #6 #7
      AN 1:5  AN 6:17             PD 23:5     BI 28:2 AN
      <--->   <---+---1---+>     <---+---1>   <---+> <--
000000 **** Top of data ****
-----
000003 02202 Major, Art          1234.56
-----
000010 06900 Bacon, Chris P.    1001.01
-----

```

29. By default, all elementary fields are displayed. Select the fields to be displayed, specify the order in which fields are displayed, and “hold” a field (to keep it on the display when scrolling)::

- Type **S** (select) in the Cmd column next to the following fields:
 - CUST-ID
 - NAME
 - ACCT-BALANCE
 - ADDR
 - CITY
 - OCCUPATION (you may need to scroll forward (PF8) to see this field)
- In the Seq (sequence) column:
 - Type **1** for the NAME field.
 - Type **2** for the OCCUPATION field.
- Press **ENTER**.

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```
File Manager                               Field Selection/Edit                               Line 1 of 15
Command ==>                               Scroll CSR

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id :                                     +
2 Sel: #5 > 1000                           +
Offset 0
Cmd Seq SHC Ref Field Name                Picture  Type  Start Length
-----
      1 1 CUST-REC                          AN      1    331
      2 2 CUSTOMER-KEY                       AN      1     5
s      3 3 CUST-ID                            X(5)    AN      1     5
s      4 2 NAME                               X(17)   AN      6    17
s      5 2 ACCT-BALANCE                       S9(7)V99 PD    23     5
      6 2 ORDERS-YTD                          S9(4)   BI    28     2
s      7 2 ADDR                               X(20)   AN    30    20
s      8 2 CITY                               X(14)   AN    50    14
      9 2 STATE                               X(02)   AN    64     2
      10 2 COUNTRY                            X(11)   AN    66    11
      11 2 MONTH OCCURS 12 TIMES              S9(7)V99 PD    77     5
s      12 2 OCCUPATION                        X(30)   AN   137    30
```

- Type **H** (hold) in the Cmd column for the NAME field.

```
      3 3 CUST-ID
h      4 2 NAME
      5 2 ACCT-BALANCE
```

- Press **PF3**.

30. The Edit panel is displayed. Notice that only the selected fields are displayed. Name and Occupation are the first fields displayed, as shown here:

```
Edit                               DNET074.ADLAB.CUST1                               Rec 0 of 100
Command ==>                               Scroll CSR
                                           Format TABL

      NAME                OCCUPATION                CUST-ID ACCT-BALANCE
      #4                #12                #3      #5
      AN 6:17           AN 137:30           AN 1:5   PD 23:5
      <---+---1---+> <---+---1---+---2---+---> <---> <---+---1>
000000 **** Top of data ****
-----
000003 Major, Art      College student      02202      1234.56
-----
000010 Bacon, Chris P. Chef                06900      1001.01
-----
                                24 Line(s) not selected
```

31. IF your results are not correct, then check that you selected the fields correctly. You can use the TE command to get started.

32. Scroll to the right.

- Press **PF11**.
- Notice that the NAME field is still displayed. It is a “held” field.

33. Switch to SNGL format.

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- Type **FS** on the command line, then **ENTER**.

34. Notice that only the selected fields are shown in SNGL format.

Part 5: Make a copy of a Template

35. Note: Sometimes you may want to save a copy of a template, so that you can make changes to the copy while leaving the original template unchanged. In the next steps you will make a copy of a template.

36. Edit the template:

- Type **TE** (Template Edit) on the command line, , then **ENTER**.

37. The Field Selection / Edit panel is displayed. Save the template with a new name:

- Type **SAVEAS** on the command line, then **ENTER**.

```
File Manager                               Field Selection/Edit                               Line 1 of 15
Command ==> saveas_____ Scroll CSR_____

----- Criteria - Enter 1 or 2 to specify expression by field -----
1 Id : _____ +
2 Sel: #5 > 1000 _____ +
Offset _____ 0
Cmd Seq SHC Ref Field Name                               Picture   Type Start Length
          **** Top of data ****
          1 1 CUST-REC                                     AN        1    331
          2 2 CUSTOMER-KEY                                AN        1     5
          S 3 3 CUST-ID                                   X(5)      AN        1     5
          1 SH 4 2 NAME                                   X(17)     AN        6    17
```

- The Template Save panel is displayed.
- Type **ADLAB.TEMPLATE(CUST1NEW)** in the Data set name field.
 - Note: depending on your TSO profile settings, you may need to type the full data set name with your personal file prefix.
- Press **PF3**.

```
----- Template Save -----
Command ==> _____
F
C
To discard changes to your template, press PF12/Cancel.
-
1 To use changes without saving, press PF6/RunTemp.
2
0 To save changes, type a data set and member name below, then press
C PF3/Exit.
Data set name ADLAB.TEMPLATE(CUST1NEW)_____
Member . . . _____
```

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38. The Field Selection / Edit panel is displayed. The DESCRIBE command can be used to show information about a template:
- Type **DESCRIBE** on the command line, then **ENTER**.
39. Notice that you are now using the new template named CUST1NEW.
40. Exit from the editor:
- Press **PF3** several times until you exit from the editor.

Lab Exercise 3 DT

In this exercise you will:

- Run a TSO command to run an EXEC that will run a program and start Debug Tool
- Get ready for exercise 4 by starting a Debug Tool session

IMPORTANT NOTE:

- **This exercise will walk you through an easy way to run a sample program and start Debug Tool so you can do exercise 5. You will run a special REXX EXEC that will be used only for this workshop. This is not the method you will use to start Debug Tool with your own applications. Exercises 6, 7, 8, 9, and 10 will all show more general-purpose methods for starting Debug Tool with batch programs.**

1. Log on to TSO.
2. Navigate to the ISPF Command shell panel. (This is usually option 6 from the main menu).
3. Type in the following command:

EX 'your-tso-id.ADLAB.FILES (RUNSAM1) '

Press **ENTER**.

```
ISPF Command Shell
Enter TSO or Workstation commands below:
===> EX 'DNET074.ADLAB.FILES (RUNSAM1) '
-----
Place cursor on choice and press enter to Retrieve command
=> call 'dnet074.adlab.load(dtdemo)' '/test'
=> call 'dnet074.adlab.load(dtdemo)'
```

4. When the program executes, Debug Tool will appear on your TSO terminal.

SUCCESS! Debug Tool appears.

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```
COBOL      LOCATION: SAM1 initialization
Command ==>
MONITOR ---+---1---+---2---+---3---+---4---+---5---+---6 LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE: SAM1 +---1---+---2---+---3---+---4---+---5---+ LINE: 1 OF 624
1 *****
2 * LICENSED MATERIALS - PROPERTY OF IBM
3 * ALL RIGHTS RESERVED
4 *****
5 * PROGRAM: SAM1
6 *

LOG 0---+---1---+---2---+---3---+---4---+---5---+ LINE: 31 OF 34
0031 IBM Debug Tool Version 5 Release 1 Mod 0
0032 07/08/2005 11:53:27 AM
0033 5655-M18 and 5655-M19: (C) Copyright IBM Corp. 1992, 2004
0034 *** User preferences file commands end ***
PF 1:?      2:STEP      3:QUIT      4:LIST      5:FIND      6:AT/CLEAR
PF 7:UP     8:DOWN     9:GO      10:ZOOM     11:ZOOM LOG 12:RETRIEVE
```

Note: You may see error messages in the log window (bottom window) as Debug Tool tries to open the Preferences file (INSPREF) and the Log file (INSPLOG). IGNORE these errors. They are normal, and the files will not be needed yet.

5. You have an active Debug Tool session, and you are ready for exercise 4 DT.

Lab Exercise 4 DT

In this exercise you will:

- Learn the basic Debug Tool commands.

```
COBOL      LOCATION: SAM1 initialization
Command ==>                               Scroll ==> CSR
MONITOR  +-+---1---+---2---+---3---+---4---+---5---+---6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE:  SAM1 +-+---1---+---2---+---3---+---4---+---5---+ LINE: 1 OF 467
1 *****
2 * PROGRAM:  SAM1
3 *          Sample program for the ENTERPRISE COBOL Compiler
4 *
5 * AUTHOR :  Doug Stout
6 *          IBM PD TOOLS

LOG 0---+---1---+---2---+---3---+---4---+---5---+---6 LINE: 8 OF 11
0008
0009 EQA1745I SETTINGS restored from TSS16.DBGTOOL.SAVESETS
0010 EQA1872E An error occurred while opening file: INSPREF. The file may not
0011          exist, or is not accessible.
PF 1: ?          2: STEP          3: QUIT          4: LIST          5: FIND          6: AT/CLEAR
PF 7: UP         8: DOWN         9: GO           10: ZOOM         11: ZOOM LOG    12: RETRIEVE
```

- Notice that the Debug Tool screen has a command line and three windows. The “Monitor window” is typically used to view and change variables, as you will see later. The “Source window”, seen in the middle of the screen, is where program source is shown, and the “Log window” is where your commands are logged and Debug Tool messages are displayed.
- You can see all three windows on the screen at the same time, or you can “zoom” to one window. For example, you can zoom to the source window.
 - Type **ZOOM SOURCE** on the command line, then **ENTER**.

```
COBOL      LOCATION: SAM1 initialization
Command ==> ZOOM SOURCE
MONITOR  +-+---1---+---2---+---3---+
***** TOP OF M
***** BOTTOM OF
```

- The source window will be displayed in zoom (full screen) mode. Sometimes it is easier to zoom into a window so you can see more lines of information.

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- The ZOOM command will zoom in and also zoom out. Type **ZOOM** on the command line, then **ENTER**.
 - Notice that all three windows are displayed again. The zoom commands are: ZOOM MONITOR, ZOOM SOURCE, ZOOM LOG, and ZOOM MEMORY (for the memory window). Tip: Debug Tool commands can be abbreviated. For example, you can shorten ZOOM SOURCE to just Z S, or ZOOM MONITOR can be shortened to Z MO.
3. Notice that PF10 is set to the ZOOM command. It will zoom in and also zoom out.
- Press **PF10** to zoom to the log window.
 - Notice that only the log window is displayed.
 - Press **PF10** or **PF11** to zoom out.
 - Notice that all three windows are displayed again.
4. A “?” (question mark) character can be used to get help about Debug Tool commands. If “?” is entered as a command by itself, a list of all commands is displayed in the log.
- Type **?** on the command line and **ENTER**.
 - Notice that you can see some commands listed in the log window. Only the last few lines of the log are visible on the screen now, so zoom into the log: type **ZOOM LOG** on the command line, then **ENTER**.
 - Now you are zoomed into the log window.
5. A “?” typed as part of a command will result in a list of matching commands displayed in the log window. Next you will display the different options of the “AT” command (used to set breakpoints):
- Type **AT ?** on the command line and **ENTER**.
 - A list of the things that you can type in a command after the word “AT” is displayed.

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```
COBOL      LOCATION: SAM1 initialization
Command ==> █                               Scroll ==> CSR
LOG 0-----1-----2-----3-----4-----5----- LINE: 27 OF 45
0027 DISABLE          LDD          QUIT
0028 The partially parsed command is:
0029 AT
0030 The next word may be one of:
0031 {                      EVERY
0032 *                      EXIT
0033 %BLOCK                FROM
0034 %LINE                 GLOBAL
0035 %STATEMENT           LABEL
0036 block name           LINE
0037 compile unit specification LOAD
0038 statement number     OCCURRENCE
0039 APPEARANCE           OFFSET
0040 CALL                 PATH
0041 CHANGE               STATEMENT
0042 CURSOR               TERMINATION
0043 DATE                 TO
0044 DELETE              TOGGLE
0045 ENTRY
PF 1: ?                2: STEP          3: QUIT          4: LIST          5: FIND          6: AT/CLEAR
PF 7: UP              8: DOWN          9: GO           10: ZOOM         11: ZOOM LOG    12: RETRIEVE
```

6. Zoom out of the log window to display all three windows again. You can use either of these methods:

- Type **ZOOM** on the command line, then **ENTER**, or
- Press **PF10** or **PF11**.
- All three windows should be displayed again.

7. The STEP command can be used to execute statements. Try both of these methods:

- Type **STEP** on the command line, then **ENTER**.
- Press **PF2**.

8. You can scroll in the Source window by using the scroll keys: PF7 (up) and PF8 (down).

- Press **PF8** a few times to scroll the source window down.
- Press **PF7** a few times to scroll up.
- Tip: You can scroll the other windows (the Log and Monitor windows) by placing your cursor in those windows before you press PF7 or PF8.

9. Set breakpoints at program statements. Try each of these different methods:

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- First, scroll the source window until you can see statement 315. You can use either of these methods:
 - Scroll forward with **PF8** until you get to statement 315, **or**
 - Type **TOP** on the command line and press **ENTER**, then type **315** on the command line and then press **PF8**.
- Place the cursor on statement 315 in the Source window and then press **PF6**.
- Type **AT 317** on the command line (where 317 is a valid statement number) then **ENTER**.
- Type **A** (for AT) in the prefix area (the numbered area to the left of the program) of statement 319 in the Source window, then **ENTER**.

10. You should have some breakpoints set now. Notice that the colors are reversed in the prefix area (on the left side of the screen) next to the statements with breakpoints. Also notice that all of your commands have been written to the log (the bottom window).

```
COBOL      LOCATION: SAM1 initialization
Command ==> |                               Scroll ==> CSR
MONITOR -+----1-----2-----3-----4-----5-----6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE: SAM1 +----1-----2-----3-----4-----5--- LINE: 315 OF 467
 315      MOVE CUST-NAME          TO RPT-CUST-NAME
 316      MOVE CUST-OCCUPATION    TO RPT-CUST-OCCUPATION
 317      MOVE CUST-ACCT-BALANCE  TO RPT-CUST-ACCT-BALANCE
 318      MOVE CUST-ORDERS-YTD    TO RPT-CUST-ORDERS-YTD
 319      WRITE REPORT-RECORD FROM RPT-DETAIL AFTER 1
 320      ADD +1 TO NUM-DETAIL-LINES

LOG 0-----1-----2-----3-----4-----5----- LINE: 45 OF 48
0045 ENTRY
0046 AT 315 ;
0047 AT 317 ;
0048 AT 319 ;
PF  1: ?      2: STEP      3: QUIT      4: LIST      5: FIND      6: AT/CLEAR
PF  7: UP      8: DOWN      9: GO       10: ZOOM     11: ZOOM LOG  12: RETRIEVE
```

11. You can display (List) your breakpoints:

- Type **LIST AT** on the command line, then **ENTER**.

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- Your breakpoints are displayed in the log window. You *may* need to use PF11 (or the “Zoom Log” command) to see the entire log window. If you do, you can use PF11 again to re-display all windows.

12. Clear statement breakpoints. Try all of these different methods:

- Place the cursor on statement 319, and press **PF6**. Notice that PF6 will toggle breakpoints on and off.
- Type **CLEAR AT 315** on the command line (where 315 is a statement that already has a breakpoint) then **ENTER**.
- Type **C** (for Clear) in the prefix area (the numbered area to the left of the program) of a statement with a breakpoint, then **ENTER**.
- To clear all breakpoints with a single command, type **CLEAR AT** on the command line, then **ENTER**.

13. Set breakpoints at statements 315 and 319. It’s OK if you have other breakpoints set. If needed, you can scroll forward (**PF8**) and backward (**PF7**) to see these statements.

```

COBOL      LOCATION: SAM1 initialization
Command ==>
Scroll ==> CSR
MONITOR  +-+---1---+---2---+---3---+---4---+---5---+---6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE:  SAM1 +-+---1---+---2---+---3---+---4---+---5--- LINE: 315 OF 467
 315      MOVE CUST-NAME          TO RPT-CUST-NAME
 316      MOVE CUST-OCCUPATION    TO RPT-CUST-OCCUPATION
 317      MOVE CUST-ACCT-BALANCE  TO RPT-CUST-ACCT-BALANCE
 318      MOVE CUST-ORDERS-YTD    TO RPT-CUST-ORDERS-YTD
 319      WRITE REPORT-RECORD FROM RPT-DETAIL AFTER 1
 320      ADD +1 TO NUM-DETAIL-LINES

LOG 0 ---+---1---+---2---+---3---+---4---+---5---+---6- LINE: 50 OF 53
0050 CLEAR AT 317 ;
0051 CLEAR AT 319 ;
0052 AT 315 ;
0053 AT 319 ;

PF  1: ?      2: STEP      3: QUIT      4: LIST      5: FIND      6: AT/CLEAR
PF  7: UP      8: DOWN      9: GO       10: ZOOM     11: ZOOM LOG  12: RETRIEVE
  
```

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14. Run the program until it reaches a breakpoint.

- Type **GO** on the command line, then ENTER.
 - The program should be stopped at a breakpoint.
 - If you see messages from the program displayed on the screen with three asterisks (***), press ENTER to continue.
 - If the program ended (and the Debug Tool session ended), then you probably did not have a breakpoint set where it would be reached. If that happened, re-run the program (see exercise 3) to start Debug Tool again. Re-run the program as many times as needed throughout this exercise.
- PF9 is set to the GO command. Make sure you have a breakpoint that will be reached. Then, press **PF9** to GO.

15. Practice setting, clearing, and running to breakpoints at statements until you are familiar with:

- the “AT #” and “CLEAR AT #” commands
- PF6 as a toggle to turn breakpoints on or off
- the “A” (At) and “C” (Clear) line commands
- PF9 or the “GO” command to run the program until it reaches a breakpoint

16. You can use the JUMPTO command to “jump” to a statement and continue execution at this statement. This is sometimes helpful to re-execute a few statements in the program. Try the following:

- Make sure you have a breakpoint at statement 319.
- Run the program (GO or PF9) until it is stopped at statement 319.
- Type **JUMPTO 308** on the command line, then ENTER.
- The program should be stopped at statement 308.

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```

COBOL      LOCATION: SAM1 :> 308.1
Command ==>
Scroll ==> CSR
MONITOR  +---1---+---2---+---3---+---4---+---5---+---6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE: SAM1 +---1---+---2---+---3---+---4---+---5--- LINE: 306 OF 467
306      210-PROCESS-CUSTFILE-RECORD.
307      PERFORM 730-READ-CUSTOMER-FILE.
308      IF WS-CUST-FILE-EOF NOT = 'Y'
309          IF CUST-RECORD-TYPE = 'C'
310          ADD +1 TO NUM-CUSTOMER-RECS
311      *      SUBROUTINE SAM2 WILL COLLECT CUSTOMER STATISTICS
LOG 0-----1-----2-----3-----4-----5----- LINE: 52 OF 55
0052 AT 315 ;
0053 AT 319 ;
0054 GO ;
0055 JUMPTO 308 ;
PF 1: ?      2: STEP      3: QUIT      4: LIST      5: FIND      6: AT/CLEAR
PF 7: UP     8: DOWN     9: GO      10: ZOOM     11: ZOOM LOG  12: RETRIEVE
  
```

- The program will continue to run from statement 308. Use the **STEP** command (or **PF2**) 2 or 3 times run a few statements.
17. You can use the **GOTO** command instead of **JUMPTO**. It is similar to **JUMPTO**, but it does not stop at the statement. It jumps to the statement and the program immediately continues to run. The program will automatically run to the next breakpoint (or the end of the program).
- Make sure you have a breakpoints at statements 315 and 319.
 - Run the program (the **GO** command or **PF9**) until it is stopped at statement 319.
 - Type **GOTO 308** on the command line, then **ENTER**.
 - The program continued to execute from statement 308, but Debug Tool did not wait there. A **GOTO** command will not stop at the target statement unless you have a breakpoint there. The program is stopped at the next breakpoint that it reached.
18. Display the value of a program variable in the Log. Try these different methods:
- Type **LIST CUST-NAME** on the command line and **ENTER**. (CUST-NAME is a variable in the program.)
 - Type **LIST** on the command line, then place the cursor directly on any variable that appears in the Source window, then press **ENTER**.

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- Place the cursor on any variable that is shown in the Source window, then **PF4**.

```

COBOL    LOCATION: SAM1 :> 315.1
Command ==>                               Scroll ==> CSR
MONITOR  -+----1-----2-----3-----4-----5-----6- LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE:  SAM1 +----1-----2-----3-----4-----5--- LINE: 313 OF 467
313      CUSTOMER-BALANCE-STATS
314      MOVE CUST-ID          TO RPT-CUST-ID
315      MOVE CUST-NAME        TO RPT-CUST-NAME
316      MOVE CUST-OCCUPATION  TO RPT-CUST-OCCUPATION
317      MOVE CUST-ACCT-BALANCE TO RPT-CUST-ACCT-BALANCE
318      MOVE CUST-ORDERS-YTD  TO RPT-CUST-ORDERS-YTD

LOG 0---+----1-----2-----3-----4-----5-----6- LINE: 57 OF 60
0057 LIST CUST-NAME ;
0058 CUST-NAME = 'Lynn, Amanda
0059 LIST ( CUST-OCCUPATION ) ;
0060 CUST-OCCUPATION = 'Musician
PF 1:?      2:STEP      3:QUIT      4:LIST      5:FIND      6:AT/CLEAR
PF 7:UP     8:DOWN     9:GO       10:ZOOM     11:ZOOM LOG  12:RETRIEVE
    
```

19. Display a variable in the monitor window. Try different methods:

- Type **MONITOR LIST CUST-NAME** then **ENTER**. Try abbreviating this command... For example: **MON LI** *variable-name*
- Type **MON LIS** (an abbreviation for MONITOR LIST) on the command line, then place the cursor on any variable that appears in the Source window, then **ENTER**.

```

COBOL    LOCATION: SAM1 :> 315.1
Command ==>                               Scroll ==> CSR
MONITOR  -+----1-----2-----3-----4-----5-----6- LINE: 1 OF 2
***** TOP OF MONITOR *****
-----1-----2-----3-----4-----
0001  1 CUST-NAME          'Lynn, Amanda
0002  2 CUST-OCCUPATION    'Musician
***** BOTTOM OF MONITOR *****

SOURCE:  SAM1 +----1-----2-----3-----4-----5--- LINE: 313 OF 467
313      CUSTOMER-BALANCE-STATS
314      MOVE CUST-ID          TO RPT-CUST-ID
315      MOVE CUST-NAME        TO RPT-CUST-NAME
316      MOVE CUST-OCCUPATION  TO RPT-CUST-OCCUPATION
317      MOVE CUST-ACCT-BALANCE TO RPT-CUST-ACCT-BALANCE
318      MOVE CUST-ORDERS-YTD  TO RPT-CUST-ORDERS-YTD

LOG 0---+----1-----2-----3-----4-----5-----6- LINE: 61 OF 64
0061 MONITOR
0062 LIST CUST-NAME ;
0063 MONITOR
0064 LIST ( CUST-OCCUPATION ) ;
PF 1:?      2:STEP      3:QUIT      4:LIST      5:FIND      6:AT/CLEAR
PF 7:UP     8:DOWN     9:GO       10:ZOOM     11:ZOOM LOG  12:RETRIEVE
    
```

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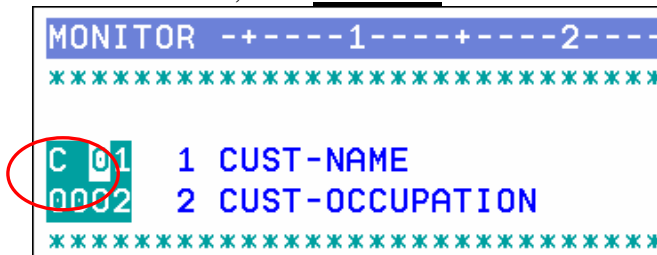
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20. Note: Most items that you can display in the log with a LIST command, you can also display in the monitor window with MONITOR LIST command.

21. Remove items from the Monitor Window:

- Type **C** (for Clear) next to a variable in the prefix area (the numbers on the left) of the Monitor window, then **ENTER**.



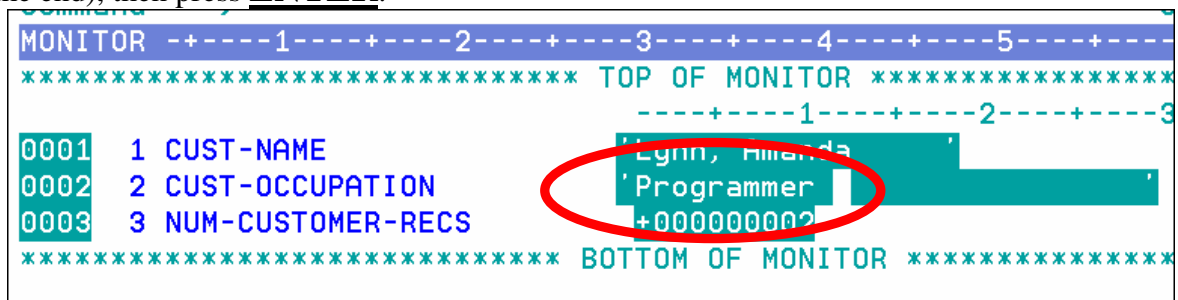
- To remove all items from the Monitor Window: Type **CLEAR MONITOR** on the command line, then **ENTER**. (Or abbreviate the command, for example : **CLE MON**)

22. Using MONITOR LIST commands, as described in the last few steps, put the following variables in the Monitor Window:

- NUM-CUSTOMER-RECS
- CUST-NAME
- CUST-OCCUPATION

23. Modify a variable value.

- Tab to the data area of the CUST-OCCUPATION variable in the Monitor window.
- Change the data to **'Programmer'**, blank out any remaining text (but leave the quote at the end), then press **ENTER**.



24. You can use the “automonitor” to automatically display active variables in the Monitor window.

- Turn on the Automonitor: Type **SET AUTO ON** on the command line, then **ENTER**.

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- The “Automonitor” appears at the bottom of the Monitor window. You may have to scroll forward in the Monitor to see it. This will automatically display variables referenced by the current statement in the program.
- Use **PF2** (or the STEP command) a few times. Notice that as you step, the Automonitor changes to show variables referenced by the current statement.

25. You can set a breakpoint that will stop when a variable changes.

- First, clear ALL of your breakpoints:
 - Type **CLEAR AT** on the command line, then **ENTER**.
- Verify that the CUST-NAME variable is already displayed in the monitor. If it is not, add it now with a MON LIST command.
- Set an ‘AT CHANGE’ breakpoint based on the CUST-NAME variable:
 - Type **AT CHANGE CUST-NAME** on the command line, then **ENTER**.
- Notice the value of CUST-NAME in the monitor.
- Press **PF9** (the GO command).
- Notice that the value of CUST-NAME has changed. Debug Tool has stopped at the statement AFTER the next statement that changed variable CUST-NAME. In this example, it stopped after reading a new input record, which changed the value of the variable.
- Tip: You can stop when a condition is true, using a “WHEN” clause. For example:
AT CHANGE NUM-CUSTFILE-RECS WHEN NUM-CUSTFILE-RECS > 5
Here’s another example. If a program reads a file, and a variable named CUST-ID is in the record, you could stop when the program gets to the right record by setting a breakpoint such as:
AT CHANGE CUST-ID WHEN CUST-ID = ‘07008’

26. Clear the AT CHANGE breakpoint:

- For your reference, list your breakpoints. Type **LIST AT** on the command line, then **ENTER**.
- Notice the CHANGE breakpoint is listed in the log.
- Type **CLEAR AT CHANGE CUST-NAME** on the command line, then **ENTER**.

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- Type **LIST AT** on the command line again, then **ENTER**. Notice that the last LIST AT command in the log does not show the breakpoint.

27. You can set a breakpoint to stop at a sub-program. In this example, the main program SAM1 calls a sub-program named SAM2.

- Set a breakpoint to stop when execution reaches (enters) sub-program SAM2:
 - Type **AT ENTRY SAM2** on the command line, then **ENTER**.
- Run the program:
 - Press **PF9** (the GO command) .
- The program should be stopped in sub-program SAM2. If your Debug session ended, restart the program and try again.
- Tip: You can also enter a sub-program by running the program to a CALL statement, and then using a STEP command (or PF2) at the CALL. You can use an 'AT CALL program-name' command or set a statement breakpoint manually on the CALL statement, and then run to the breakpoint. To enter a sub-program, it should be compiled correctly for Debug Tool.

28. Now that you are in a sub-program, you can set breakpoints in it and continue to run. If you want to continue execution until it returns to the main program, there are several ways to do it.

- Tip: If you already have breakpoints in the main program, you can use a GO command (or PF9) to run to the breakpoint.
- Tip: If you want to set new breakpoints in the main program, you could set them now. To do it, first "qualify" to the main program by overtyping the program name in the title line of the source window and pressing enter to display the main program. Once the main program is displayed in the source window, you can set new breakpoints.
- Tip: You could continue to STEP through the sub-program until it returns, and follow the logic back to the main program. But that could take you a long time if the sub-program is large.
- Run the sub-program until it returns to the program that called it:
 - Type **STEP RETURN** on the command line, then **ENTER**.
- The program is stopped in the main program, SAM1, immediately after the CALL statement.

29. You can easily locate the current statement:

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- First, scroll forward in the Source window by pressing **PF8** a few times.
 - Type **QUALIFY RESET** on the command line, then **ENTER**. (it can be abbreviated, such as **QUAL RES**).
30. You can copy one or more executed commands from the log window to the command line and re-execute them:
- Tab to the data area of the CUST-OCCUPATION variable in the Monitor window.
 - Change the data to **'Manager**, blank out any remaining text (but leave the quote at the end), then press **ENTER**.
 - Notice that a MOVE statement was added to the log. In the log window, overtype the word Manager with **Director**, leave your cursor on the changed line, then press **ENTER**.
 - The command is copied to the command line. You can make further changes (if desired), and **ENTER** to execute the copied command.
31. You can copy one or more program statements to the command line, and execute them.
- Put the cursor on any MOVE or COMPUTE statement in the source window, and overtype any character on that statement.
 - Hint: You can overtype a character with the same character. For example, change MOVE to mOVE
 - Press **ENTER**.
 - The statement is copied to the command line. If the command is long, or if you overtype multiple statements, they may be placed into a temporary expanded command area below the command line. You can make changes (if desired).
 - If the statement contains a period, you must remove it.
 - Press **ENTER** to execute the statement.
32. You can continue a long command with a dash (-). This can be helpful if you need to type a command that is too long to fit on the command line.
- On the command line type **MONITOR LIST -** then **ENTER**.
 - Debug Tool will prompt for the rest of the command.

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- On the command line, type any valid variable name, such as: **CUST-NAME** , then **ENTER**.

33. End the Debug Tool session:

- Type **QUIT** on the command line, then **ENTER**.
- When you receive the “Do you really want to ...” prompt, type Type **Y** on the command line, then **ENTER**.
- Tip: To avoid the “Do you really want to...” prompt, use the QQ command.

Lab Exercise 5 APA

In this exercise you will:

- Use the ‘R’ line command to view APA Reports
 - Navigate and review a sampling of reports including the:
 - Measurement Overview – S01 Report
 - CPU Usage by Category – C01 Report
 - Source Program Mapping – A01 Report
 - CPU Usage by Category (with drill down to source) – C01 Report
 - Wait Time by Task/Category – W01 Report
 - Wait Time Referred Attribution – W03 Report
 - Identify information on the reports by answering some common questions regarding the reports being reviewed
 - Discuss performance improvements to this example based on the reports viewed
1. Log on to TSO.
 2. Navigate to the Application Performance Analyzer main panel. Using the output of the previous exercise, select the report viewing panel.

Type “**R**” on the first character of the Request Number. Press “**Enter**”.

Did You Know: You can also use an “S” line command to select the report viewing screen? Either and “R” or and “S” will navigate you to the report selection panel.

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Lab Exercises



```
File View Navigate Help
```

R02: IBM APA for z/OS Observation List (CAZ0) Row 00001 of 00147
Command ==> Scroll ==> CSR

ReqNum	Owned By	Description	Job Name	Date/Time	Samples	Status
<u>R032</u>	DNET047		DNET047B	Jun-28 13:04	10,000	Ended
<u>0422</u> +	DNET047		DNET047X	Jun-28 12:17	1,000	STEPS
<u>0413</u> +	DNET047		DNET047X	Jun-28 11:43	1,000	STEPS
<u>0412</u>	DNET187	test 1	DNET187B	Jun-27 14:09	7,357	Ended
<u>0411</u>	DNET187	test 1	DNET187A	Jun-27 13:54	6,412	Ended
<u>0410</u>	DNET187	test 1	DNET187A	Jun-27 13:50	298	Ended
<u>0399</u>	DNET328		DNET3282	Jun-26 8:30	433	Ended
<u>0398</u>	DNET328		DNET3282	Jun-26 8:20	495	Ended
<u>0379</u>	SYS029	KJC - APA CICS	CICSAOR5	Jun-19 15:37	50,000	Ended
<u>0376</u> +	DNET427	XSAMY APA Demo	DNET427B	Nov-17 14:29	10,000	STEPS
<u>0375</u>	DNET603		CICSAOR1	Nov-17 12:41	20,000	Ended
<u>0374</u>	DNET603		DNET603	Nov-17 12:35	1,000	Ended
<u>0370</u> +	DNET603		DNET603W	Nov-17 12:25	10,000	STEPS
<u>0365</u>	ADPOT07	JIMMS TEST	ADPOT07J	Nov-16 1:16	100,000	Ended
<u>0360</u>	DNET100	TODAYS SAMPLES	DNET100R	Nov-14 0:58	100,000	Ended
<u>0358</u> +	DNET603		DNET603D	Nov-13 11:21	10,000	STEPS
<u>0357</u>	DNET603		CICSAOR1	Nov-13 11:18	10,000	Ended

MA a A 08/004

3. The resulting panel displays the reports that are available for this Observation Request. In this sample the reports that do not appear as highlighted (V, I, E, F Q, J, etc) indicate one of two things. Either the data collector (option) was not turned on to capture the information or that no information was observed for this data collector during the Observation Session.

```
File View Navigate Help
```

R01: IBM APA for z/OS Performance Reports (0432) Row 00001 of 00007
Command ==> Scroll ==> CSR

Select a category from the list to the right to view the available reports in the selection list below.

- A Admin/Miscellaneous	- I IMS Measurement
- S Statistics/Storage	- E CICS Measurement
- C CPU Usage Analysis	- F DB2 Measurement
- D DASD I/O Analysis	- Q MQ Measurement
- W CPU WAIT Analysis	- G Coupling Facility
- V Variance Reports	- J Java Measurement

More: +

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

- 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 a A 04/015

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Lab Exercises



4. Select the S01 Measurement Profile report for viewing

Type “S” next to the report number S01. Press “Enter”.

Did You Know: Each report is numbered for ease of navigation? As you become more familiar with APA you may navigate to specific reports simply by typing the report number, such as “C01” directly on the Command Line followed by an Enter.

```
File View Navigate Help
-----
R01: IBM APA for z/OS Performance Reports (0432)          Row 00001 of 00007
Command ==>                                           Scroll ==> CSR

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

More: +
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

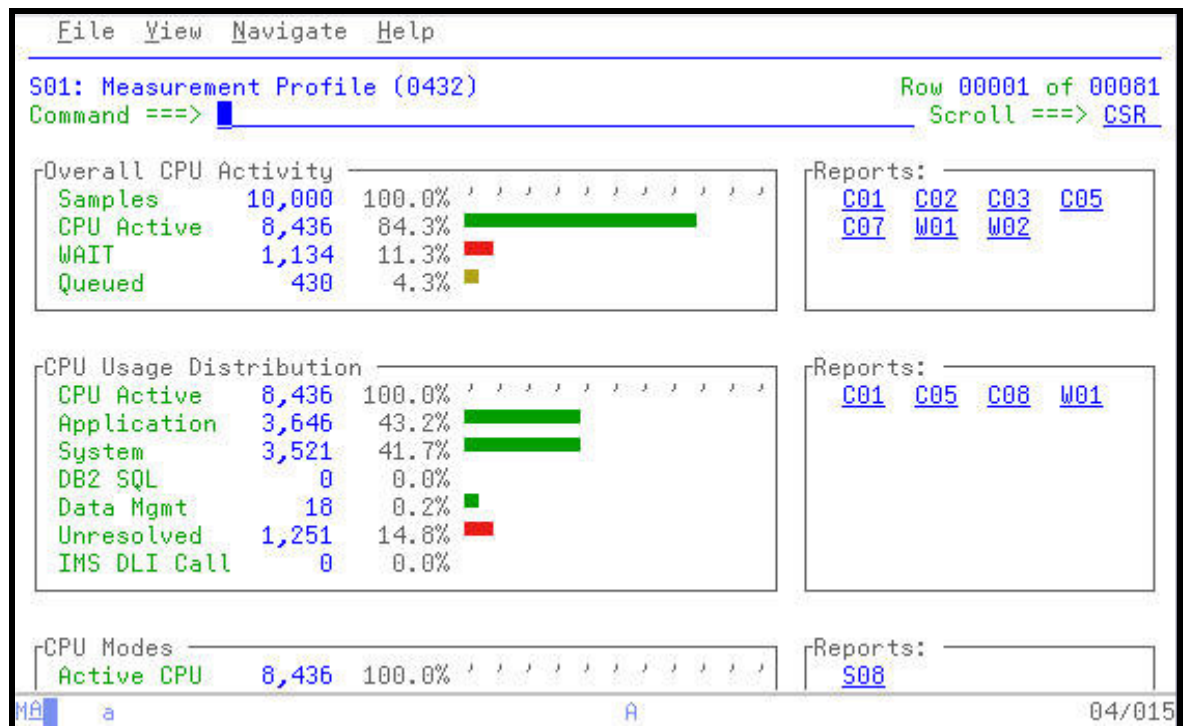
MA a A 16/042
```

5. The Measurement Profile report is displayed. During the Observation Session a majority of the samples collected, 84+% occurred when the CPU was active. An additional 11+% occurred when the application was in a WAIT state. These statistics appear in the first box of the report. To the right are ISPF “Hot Spots” that can quickly link to other APA reports where more detail on the statistics to the left can be found.

Notice the next box down. The CPU Usage Distribution uses the number from the CPU Active Samples to further define what occurred during the Observation Session. In this case almost and equal number of samples were attributed to the Application code and the System level. Again, to the box at the right you can see additional APA reports that provide more detail on these statistics.

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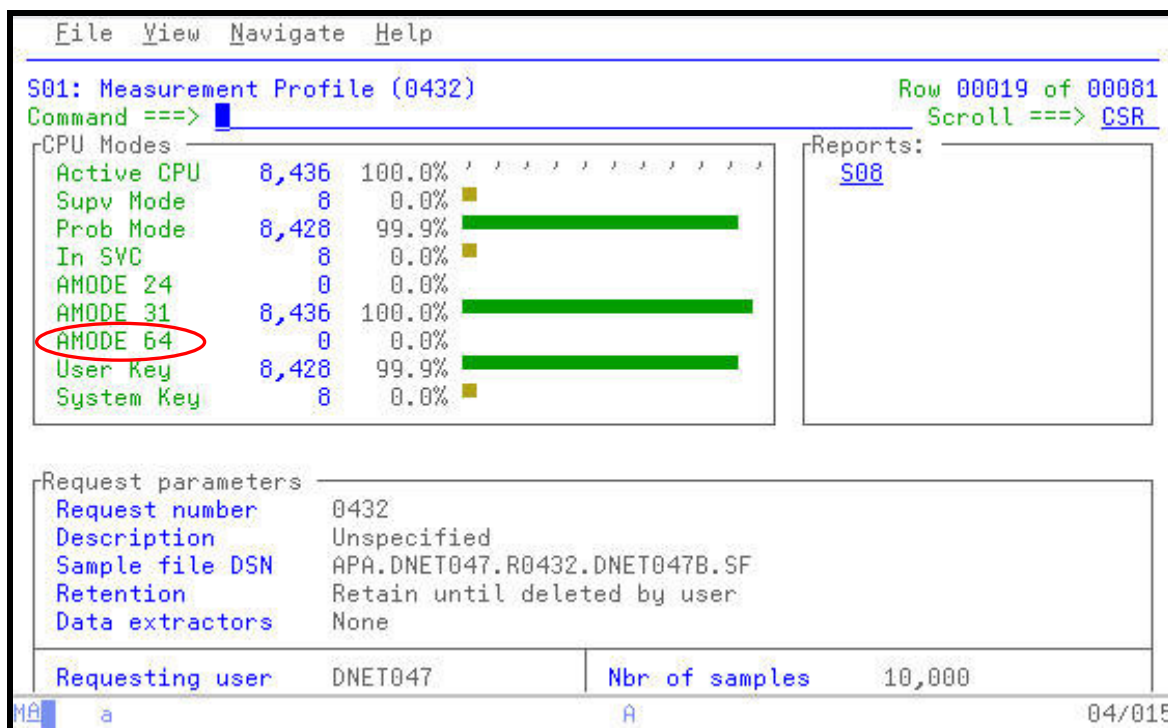


6. Press “**PF8**” to PageDn to other areas of the Measurement Profile.

99+% of the samples observe red occurred in the Problem Mode, indicating that the application was not waiting on any assignment or Supervisor Mode (system resources) to be allocated to the application. Notice also, that the application did not take advantage of any resources above the 64M line.

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7. Press “**PF8**” to PageDn to other areas of the Measurement Profile.

- Notice the name of the Sample File that was automatically created by APA to hold the results of the Observation Session. This file is tied directly to the Observation Request Number. When the Observation Session is deleted using a “D” line command on the main APA panel, the accompanying Sample File is automatically deleted.

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```
File View Navigate Help
S01: Measurement Profile (0432) Row 00031 of 00081
Command ==> Scroll ==> CSR
Request parameters
Request number 0432
Description Unspecified
Sample file DSN APA.DNET047.R0432.DNET047B.SF
Retention Retain until deleted by user
Data extractors None
Requesting user DNET047 Nbr of samples 10,000
Time of request 13:03:08 Duration 60 sec
Date of request Thu Jun-28-2007 Active/pending Active
Job name DNET047B Proc step name n/a
Step name/number n/a Delay time none
Step program n/a
Measurement environment
Job name DNET047B Region size <16MB 4,160K
Job number JOB02404 Region size >16MB 32,768K
Step name RUNSAM Step program SAM1V
Proc step name Region type Batch
```

-
- Press “PF8” to PageDn to further into the Measurement Profile.

APA indicates the number of CPU’s in use at the SYSPLEX.

Did You Know: ZIPP and ZAPP processors used in many DB2 and IMS environments are supported by APA. These processors are included in the Number of CPUs count. The S08 Processor Utilization Summary provides a further breakdown of the CPU usage by the application. ZIPP and ZAPP processors appear in this report simply as an available engine. No distinction is made in the processor name or number.

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```
File View Navigate Help
S01: Measurement Profile (0432) Row 00046 of 00081
Command ==> Scroll ==> CSR
Measurement environment
Job name DNET047B Region size <16MB 4,160K
Job number JOB02404 Region size >16MB 32,768K
Step name RUNSAM Step program SAM1V
Proc step name Region type Batch
ASID 331 DB2 Attach type n/a
System ID DEMOMVS IBM APA Version 7.100F
SMFID MVSA
O/S level z/OS 01.08.00
Nbr of CPUs 7 CPU model 2094
CPU rate factor 626 CPU version 00
MIPS per CPU 526 SUs per second 25559.1
Measurement statistics
Start time 13:03:09 Start date Thu Jun-28-2007
End time 13:04:09 End date Thu Jun-28-2007
MA a A 04/015
```

8. Press **“PF8”** once more to move the bottom of the report.

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9. APA is a non-intrusive 'self reporting' tool. In other words it does not attach anything to the application in order observe the application running AND it reports how much time it took to conduct the Observation Session. This can be found Measurement SRB value. The application will run as slow or as fast as it normally would if APA was not active.

```
File View Navigate Help
S01: Measurement Profile (0432) Row 00062 of 00081
Command ==> Scroll ==> CSR
Measurement statistics
Start time 13:03:09 Start date Thu Jun-28-2007
End time 13:04:09 End date Thu Jun-28-2007
Total samples 10,000 Duration 59.99 sec
Sampling rate 166.69 per sec Sample file size 2.29MB
CPU/WAIT samples 9,570 Meas significance 95.70%
TCB samples 10,000 CPU queued samples 430
Overall CPU 19.72%
Pages in 0 EXCPs 2,408
Pages out 0
CPU consumption
CPU active samples 8,436 CPU time TCB 49.97 sec
CPU active time 84.36% CPU time SRB 0.15 sec
CPU WAIT samples 1,134 Service Units 1,281,022
CPU WAIT time 11.34% Measurement SRB 0.33 sec
MA a A 04/015
```

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Lab Exercises



10. Return to the Performance Reports panel and select the CPU Usage Analysis category of reports.

- Press “**PF3**” to return to the main Performance Reports panel .
- Type an “**S**” next to the CPU Usage Analysis reports category, then **ENTER** .

```
File View Navigate Help
R01: IBM APA for z/OS Performance Reports (0432) Row 00001 of 00007
Command ==> Scroll ==> CSR

Select a category from the list to the right to view the available reports in the selection list below.

- A Admin/Miscellaneous - I IMS Measurement
- S Statistics/Storage - E CICS Measurement
- C CPU Usage Analysis - F DB2 Measurement
- D DASD I/O Analysis - Q MQ Measurement
- W CPU WAIT Analysis - G Coupling Facility
- V Variance Reports - J Java Measurement

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

- 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 a A 08/056
```

11. Select the CPU Usage by Category report.

Place and “**S**” next to the C01 CPU Usage by Category report, then **ENTER**.

Tip: You could also type “**C01**” in the Command Line followed by **ENTER** to bring up this report.

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```

File View Navigate Help
R01: IBM APA for z/OS Performance Reports (0432) Row 00001 of 00007
Command ==> Scroll ==> CSR

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

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

S C01 CPU Usage by Category - C07 CPU Usage by Procedure
- C02 CPU Usage by Module - C08 CPU Referred Attribution
- C03 CPU Usage by Code Slice - C09 CPU Usage by PSW/ObjCode
- C04 CPU Usage Timeline
- C05 CPU Usage Task/Category
- C06 CPU Usage Task/Module
    
```

12. The CPU Usage by Category shows the major collections of CPU activity with drill down capabilities to the Load Modules, CSECTS, and Program Source statements in each category.

```

File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00004
Command ==> Scroll ==> CSR

Name Description Percent of CPU Time * 10.00% ±1.0%
*.....1....2....3....4....5....6....7....8
APPLCN Application Code 43.21 ██████████
SYSTEM System/OS Services 41.73 ██████████
NOSYMB No Module Name 14.82 ████████
DATAMG DataMgmt Processing 0.21 ██████
    
```

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13. Open the APPLCN collection to see the names of the Load Modules which appear in the sampling.

Type “+” line command over the APPLCN group, then **ENTER**.

Did You Know: Similar to a workstation product, APA uses familiar “+” and “-” signs to expand and collapse various sections of the reports. Remember the “/” is always available to provide a quick command help pop-up!

```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00004
Command ==> Scroll ==> CSR
Name Description Percent of CPU Time * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8
+APPLCN Application Code 43.21
SYSTEM System/OS Services 41.73
NOSYMB No Module Name 14.82
DATAMG DataMgmt Processing 0.21
```

14. The only Load Module in the APPLCN collection is the SAV2V Load Module. SAM2V consumed all of the CPU resource attributed to the APPLCN collection.

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```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00006
Command ==> Scroll ==> CSR
```

Name	Description	Percent of CPU Time * 10.00% ±1.0%	
<u>APPLCN</u>	Application Code	43.21	████████████████████
+ <u>SAM2V</u>	Application Program	43.21	████████████████████
<u>SYSTEM</u>	System/OS Services	41.73	████████████████████
<u>NOSYMB</u>	No Module Name	14.82	████████
<u>DATAMG</u>	DataMgmt Processing	0.21	

MA a A 08/002

15. Since Load Modules can contain multiple programs or CSECTS which are link-edited together for execution, expand the SAM2V program to reveal the individual programs that were observed during the Observation Session.

Type a “+” over the SAM2V Load Module Name, and then **ENTER**.

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```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00006
Command ==> Scroll ==> CSR
```

Name	Description	Percent of CPU Time * 10.00% ±1.0%	
APPLCN	Application Code	43.21	████████████████████
+ AM2V	Application Program	43.21	████████████████████
SYSTEM	System/OS Services	41.73	████████████████████
NOSYMB	No Module Name	14.82	████████
DATAMG	DataMgmt Processing	0.21	

MA a A 09/005

16. The resulting panel shows that only one application level CSECT was observed during the Observation Session.

Tip: You can easily expand all collection to the lowest level in a single command. Place the same “+” used to open a collection level over the column heading and press **ENTER**.

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```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00007
Command ==> Scroll ==> CSR
```

Time	Description	Percent of CPU Time * 10.00% ±1.0%
APPLCN	Application Code	43.21
+ SAM2V	Application Program	43.21
+ SAM2V	CSECT in SAM2V	43.21
SYSTEM	System/OS Services	41.73
NOSYMB	No Module Name	14.82
DATAMG	DataMgmt Processing	0.21

MA a A 06/003

17. APA provides the ability to view the Program Source statements for CSECTS.

Use the TAB Key to navigate to the SAM2V CSECT entry.

Type "P" over the SAM2V entry to access the Program Source, and then ENTER.

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```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00084
Command ==> Scroll ==> CSR
```

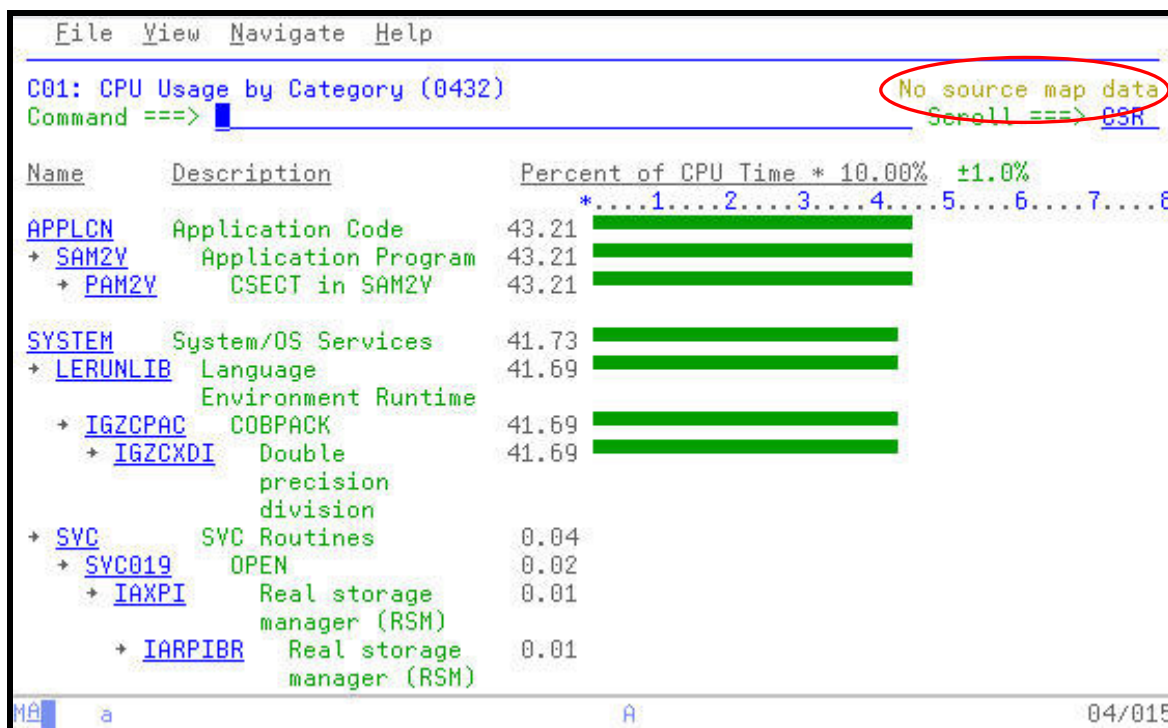
Name	Description	Percent of CPU Time * 10.00% ±1.0%	
		*.....1.....2.....3.....4.....5.....6.....7.....8	
APPLCN	Application Code	43.21	████████████████████
+ SAM2V	Application Program	43.21	████████████████████
+ PA12V	CSECT in SAM2V	43.21	████████████████████
SYSTEM	System/OS Services	41.73	████████████████████
+ LERUNLIB	Language Environment Runtime	41.69	████████████████████
+ IGZCPAC	COBPACK	41.69	████████████████████
+ IGZCXDI	Double precision division	41.69	████████████████████
+ SVC	SVC Routines	0.04	
+ SYC019	OPEN	0.02	
+ IAXPI	Real storage manager (RSM)	0.01	
+ IARPIBR	Real storage manager (RSM)	0.01	

MA a A 10/007

18. Notice the short message area in the upper right hand corner. This message, “No source map data” indicates that APA does not know where to find the compiler listings to display the Program Source.

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Lab Exercises



19. Defining the location of the compiler/source files is an administrative function in APA. COBOL, Assembler, and PL/I compiler listings may be defined on the A01 panel. Navigate to the A01 Source Program Mapping panel:

Type "A01" in the command line, and then ENTER.

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```
File View Navigate Help
C01: CPU Usage by Category (0432)           No source map data
Command ==> A01                             Scroll ==> CSR

Name      Description                          Percent of CPU Time * 10.00% ±1.0%
*.....1.....2.....3.....4.....5.....6.....7.....8
APPLCN    Application Code                          43.21 ██████████
+ SAM2V   Application Program                       43.21 ██████████
+ PAM2V   CSECT in SAM2V                           43.21 ██████████

SYSTEM    System/OS Services                        41.73 ██████████
+ LERUNLIB Language                          41.69 ██████████
  Environment Runtime
+ IGZCPAC COBPACK                               41.69 ██████████
+ IGZCXDI Double precision
  division
+ SVC     SVC Routines                             0.04
+ SYC019 OPEN                               0.02
+ IAXPI   Real storage manager (RSM)              0.01
+ IARPIBR Real storage manager (RSM)         0.01

MA      a                                     A                                     04/018
```

20. For this exercise, our compiler listings were stored in a SYSDEBUG formatted datasets. To communicate this to APA:

Type “**D**” in the File Type prompt, for SYSDEBUG.

At the Data Set Name prompt, type “**your-tso-id.ADLAB.SYSDEBUG**” replacing your-tso-id with your userID.

Type the name of the CSECT, “**SAM2V**” in the Member Name prompt, and then **ENTER**.

Did You Know: APA can accept several compiler/assembly listing formats. Consult the APA Users Guide for the meaning of each dataset type or your Systems Program for the listing type used by your installation.

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```
File View Navigate Help
A01 - Source Program Mapping (0432) Row 00001 of 00004
Command ==> Scroll ==> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

File type . . . . D (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
Data set name . . 'DNET047.ADLAB.SYSDEBUG'
Member name . . . SAM2V

Seqn ID-ReqNum Load Type/Status Lang Member DSN
0001 CAZ0-0118 NO D-Inact COB SAM2V DNET047.ADLAB.SYSDEBUG
0002 CAZ0-0141 Auto D-Inact COB SAM2V DNET047.ADLAB.SYSDEBUG
0003 CAZ0-0366 Auto D-Inact COB SAM2V DNET047.ADLAB.SYSDEBUG
0004 CAZ0-0372 Auto D-Inact COB SAM2V DNET047.ADLAB.SYSDEBUG
```

21. APA ties the program listings to the specific Observation Session request number. In this case, the request number being viewed is 0432. The pop-up Help panel is also available on this panel.

Type a “?” over the first character in the Seqn (sequence number) column, and then **ENTER**.

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Lab Exercises



```
File View Navigate Help
A01 - Source Program Mapping (0432) Source map data loaded
Command ==> Scroll ==> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

File type . . . . _ (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
Data set name . . . .
Member name . . . .

Segn ID-ReqNum Load Type/Status Lang Member DSN
/001 CAZ0-0432 NO D-Loaded COB SAM2Y DNET047.ADLAB.SYSDEBUG
0002 CAZ0-0118 NO D-Loaded COB SAM2Y DNET047.ADLAB.SYSDEBUG
0003 CAZ0-0141 Auto D-Loaded COB SAM2Y DNET047.ADLAB.SYSDEBUG
0004 CAZ0-0366 Auto D-Loaded COB SAM2Y DNET047.ADLAB.SYSDEBUG
0005 CAZ0-0372 Auto D-Loaded COB SAM2Y DNET047.ADLAB.SYSDEBUG

MA a A 14/003
```

22. The entries which appear in the pop-up help panel allow for simple management of the Source Program Mapping entries via line commands.

Tip: Source Program Mapping is loaded by APA when the entry is first defined. To have APA automatically load the Source Program Mapping entry the next time this request number is viewed, type an “A” line command on the source entry.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
-
A
C Enter S to select a function from this menu. The line
E command (Yellow) can also be entered on the main panel.
U
S To Perform the Following LineCmd
- display context help information ?
- show additional details about this line ++
- copy into current request number C
- delete this entry D
S - load this source mapping data L
/ - toggle on/off autoloading map file A
0
0
0
0
001 of 00005
ll ==> CSR
o be
D=SYSDEBUG)
AB.SYSDEBUG
AB.SYSDEBUG
AB.SYSDEBUG
AB.SYSDEBUG
AB.SYSDEBUG
MÁ a A 03/005
```

23. Return to the C01 CPU Usage by Category report and use the Program Source command to access the source listing for the CSECT SAM2V.

Press “**PF3**” which returns back to the C01 report.

Type “**P**” over the SAM2V CSECT name, and then press **ENTER**.

PD Tools Safari 2008 Workshop

Lab Exercises



File View Navigate Help			
C01: CPU Usage by Category (0432)			Row 00001 of 00084
Command ==>			Scroll ==> CSR
Name	Description	Percent of CPU Time * 10.00%	±1.0%
		*.....1.....2.....3.....4.....5.....6.....7.....8	
APPLCN	Application Code	43.21	████████████████████
+ SAM2V	Application Program	43.21	████████████████████
+ PAH2V	CSECT in SAM2V	43.21	████████████████████
SYSTEM	System/OS Services	41.73	████████████████████
+ LERUNLIB	Language Environment Runtime	41.69	████████████████████
+ IGZCPAC	COBPACK	41.69	████████████████████
+ IGZCXDI	Double precision division	41.69	████████████████████
+ SVC	SVC Routines	0.04	
+ SYC019	OPEN	0.02	
+ IAXPI	Real storage manager (RSM)	0.01	
+ IARPIBR	Real storage manager (RSM)	0.01	

24. The Count column indicates how many times APA saw this statement executing during the sampling process.

Did You Know: You may use ISPF “**FIND**” commands to review data items or to find other areas of the listing. You may also use the “**SETUP**” command to customize the view of this listing.

Question?: From reviewing the source listing with the APA counts, what have you observed from the statements indicated as high usage/executed statements?

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00001 of 00038
Command ==> Scroll ==> CSR

LineNo Offset Count Source Statement
000090 00036C          MOVE 'PROGRAM ENDED' TO WS-PROGRAM-STATUS.
000091 00037C          GOBACK.
000092
000093 000384          050-CALC-BALANCE-STATISTICS.
000094 000384          MOVE 0 TO LOOP-COUNT.
000095 00038E 130          PERFORM 100-CRUNCH-LOOP
000096          UNTIL LOOP-COUNT > CRUNCH-CPU-LOOPS .
000097
000098 0003C2 47          100-CRUNCH-LOOP.
000099 0003C2 47          MOVE 'CALCULATING BALANCE STATS' TO WS-PROGRAM-
000100          * *** Increment Record Count ***
000101 0003D2 420          ADD +1 TO BALANCE-COUNT
000102          * *** Add this customer's BALANCE to the grand tot
000103 0003EA 814          COMPUTE BALANCE-TOTAL =
000104          BALANCE-TOTAL + CUST-ACCT-BALANCE
000105          * *** Calculate Average ***
000106 000412 1046          COMPUTE BALANCE-AVERAGE =
```

25. APA also indicates when system level activity is taking place on behalf of a source statement. In this example the Count column carries a high number and the statement under the Compute indicates that the SYSTEM is executing logic on behalf of the Compute statement.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00017 of 00038
Command ==> Scroll ==> CSR

LineNo Offset Count Source Statement
000105 * *** Calculate Average ***
000106 000412 1046 COMPUTE BALANCE-AVERAGE =
4093 <- CPU time attributed to above statement
000107 BALANCE-TOTAL / BALANCE-COUNT
000108 * *** Calculate Minimum ***
000109 00045A 138 IF WS-FIRST-TIME-SW = 'Y'
000110 00046A MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000111 000474 186 IF CUST-ACCT-BALANCE < BALANCE-MIN
000112 000486 MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000113 * *** Calculate Maximum ***
000114 000490 100 IF WS-FIRST-TIME-SW = 'Y'
000115 0004A0 MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000116 0004AA 212 IF CUST-ACCT-BALANCE > BALANCE-MAX
000117 0004BC MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000118 * *** CALCULATE RANGE ***
000119 0004C6 195 COMPUTE BALANCE-RANGE = BALANCE-MAX - BALANCE-MI
000120 0004D8 358 ADD 1 TO LOOP-COUNT.
000121
```

26. Navigate to the WAIT series of reports to investigate the cause of the WAITs in the Observation Session.

Type “**W01**” in the command line to access the WAIT Time by Task/Category report, and then **ENTER**.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
C01: CPU Usage by Category (0432) Row 00001 of 00084
Command ==> W01 Scroll ==> CSR
```

Name	Description	Percent of CPU Time * 10.00% ±1.0%	*...1...2...3...4...5...6...7...8
APPLCN	Application Code	43.21	████████████████████
+ SAM2V	Application Program	43.21	████████████████████
+ SAM2V	CSECT in SAM2V	43.21	████████████████████
SYSTEM	System/OS Services	41.73	████████████████████
+ LERUNLIB	Language Environment Runtime	41.69	████████████████████
+ IGZCPAC	COBPACK	41.69	████████████████████
+ IGZCXDI	Double precision division	41.69	████████████████████
+ SVC	SVC Routines	0.04	
+ SYC019	OPEN	0.02	
+ IAXPI	Real storage manager (RSM)	0.01	
+ IARPIBR	Real storage manager (RSM)	0.01	

MA a A 04/018

27. Most the WAIT activity is indicated to have occurred in the SAM1V module.

Did You Know: APA reports usage down to the hundredth of a percent. The modules prefixed by IEA and IEF are internal IBM modules and appear on the this report with a 0.00% entry because their activity was in the thousandth of a percent, but still contributed to a WAIT condition.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
W01: WAIT Time by Task/Category (0432) Row 00001 of 00005
Command ==> Scroll ==> CSR
Name Description Percent of Time in WAIT * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8.
SAM1V-001 TCB=006C9B08 11.34
IEAYAR00-002 TCB=006FDF30 0.00
IEAYTSDT-003 TCB=006FD350 0.00
IEESB605-004 TCB=006FD038 0.00
IEFIIC-005 TCB=006FF290 0.00
```

M&A a A 04/015

28. Expand the SAM1V entry to reveal additional levels of detail on the WAIT.

Type “+4” to indicate to APA that it should expand the SAM1V CSECT to 4 levels of detail, then press **ENTER**.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
W01: WAIT Time by Task/Category (0432) Row 00001 of 00005
Command ==> Scroll ==> CSR
Name Description Percent of Time in WAIT * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8.
+4 IY-001 TCB=006C9B08 11.34
IEAYAR00-002 TCB=006FDF30 0.00
IEAYTSDT-003 TCB=006FD350 0.00
IEESB605-004 TCB=006FD038 0.00
IEFIIC-005 TCB=006FF290 0.00
```

MA a A 08/004

29. The report now shows 4 levels of detail on the WAIT condition.

Question?: What is occurring in the application that is causing a majority of the 10.47% WAIT? What DD statement is being observed by APA? What is the module name? Is there a specific location in the module where this condition is occurring?

PD Tools Safari 2008 Workshop

Lab Exercises



File View Navigate Help		
W01: WAIT Time by Task/Category (0432)		Row 00001 of 00086
Command ==>		Scroll ==> CSR
Name	Description	Percent of Time in WAIT * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8.		
SAM1V-001	TCB=006C9B08	11.34
+ DATAMG	Data Mgmt Processing	10.47
+ CST2FILE-005	VSAM	1.83
+ ERASE	SAM1V+185A	1.78
+ IDA019L1	Virtual I/O (VIO) and VSAM	1.78
+ PUT	SAM1V+1796	0.04
+ IDA019L1	Virtual I/O (VIO) and VSAM	0.04
+ GET	SAM1V+185A	0.01
+ IDA019L1	Virtual I/O (VIO) and VSAM	0.01
+ CST2FILE-004	VSAM	1.81

MA a A 04/015

30. At it's lowest level of detail, APA can display pop-up panels containing information about specific components of the application being Observed.

Type **“++”** over the CUST2FLE entry, followed by **ENTER**.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
W01: WAIT Time by Task/Category (0432) Row 00001 of 00086
Command ==> Scroll ==> CSR
Name Description Percent of Time in WAIT * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8.
SAM1V-001 TCB=006C9B08 11.34 ██████████
+ DATAMG Data Mgmt 10.47 ██████████
Processing
+ ++CST2FILE-005 VSAM 1.83 █
+ ERASE SAM1V+185A 1.78 █
+ IDA019L1 Virtual 1.78 █
I/O (VIO)
and VSAM
+ PUT SAM1V+1796 0.04
+ IDA019L1 Virtual 0.04
I/O (VIO)
and VSAM
+ GET SAM1V+185A 0.01
+ IDA019L1 Virtual 0.01
I/O (VIO)
and VSAM
+ CST2FILE-004 VSAM 1.81 █
```

31. The pop-up panel shows information about the VSAM file in use. This scrollable panel shows detailed information on how the file and its components were allocated and the results of processing this file during the Observation Session.

PD Tools Safari 2008 Workshop

Lab Exercises



File View Navigate Help

More: +

The following report line was selected

+ CST2FILE-005 VSAM 1.83

Calculation Details

Data management wait time measurements	183
Servicing I/O requests for DD Name	CST2FILE
Total measurements	10,000
Percent of total	1.83%

VSAM file CST2FILE(5) OPENed at 13:03:49.34 Thursday Jun 28 2007

DDNAME	CST2FILE
Open Intent	KEY,DIR,SEQ,OUT
Dataset Name	DNET047.ADLAB.CUST2.WORK.KSDS.DATA
Management Class	USRMGMT

I/O (VIO) and VSAM

+ CST2FILE-004 VSAM 1.81

MA a A 03/004

32. “PF7” and “PF8” will scroll up and down through the open windows. Performance tuning can include the initial and last counts columns, number of data buffers, and other aspects of the VSAM definition.

File View Navigate Help

More: - +

Storage Class	USRBASE		
Device Type	3390		
% Free Bytes in CI	0%		
Volume Serial	DMPU18	<u>CI Splits</u>	<u>14</u> <u>15</u>
CI Size	26,624	<u>CA Splits</u>	<u>0</u> <u>0</u>
Record Size (LRECL)	2,048	Logical Records	101 101
Number of Extents	1	Deleted Records	123,600 123,999
SHAREOPTIONS	(1 3)	Insrted Records	67,889 68,088
Organization	KSDS	Retrvd Records	123,600 123,999
CI's per CA	30	Updated Records	0 0
Free CIs per CA	0	Bytes Free Space	372,736 346,112
Free Bytes per CI	0	Number of EXCPs	124,680 125,084
% Free CIs in CA	0%		
Strings	1		
DATA Buffers	2		
INDEX Buffers	1		

I/O (VIO) and VSAM

+ CST2FILE-004 VSAM 1.81

MA a A 03/004

PD Tools Safari 2008 Workshop

Lab Exercises



33. APA displays information on the both the Cluster and Index portion of the VSAM file.

```
File View Navigate Help
Index Component of CST2FILE(5)
Dataset Name          DNET047.ADLAB.CUST2.WORK.KSDS.INDEX
Management Class     USRMGMT
Storage Class        USBASE
Device Type          3390
% Free Bytes in CI   0%
Volume Serial        DMPU18
CI Size              512
Record Size (LRECL) 505
Number of Extents    1
SHAREOPTIONS         (1 3)
Organization         KSDS
CIs per CA           49
Free CIs per CA      0
Free Bytes per CI    0
% Free CIs in CA     0%
CI Splits            0
CA Splits            0
Logical Records      1
Deleted Records      0
Insrted Records      0
Retrvd Records       0
Updated Records      73
Bytes Free Space     24,576
Number of EXCPs     460
Initial             0
Last                0
Initial             0
Last                0
Initial             1
Last                1
Initial             0
Last                0
Initial             0
Last                0
Initial             0
Last                0
Initial             73
Last                74
Initial             24,576
Last                24,576
Initial             460
Last                461

I/O (VIO)
and VSAM
+ CST2FILE-004 VSAM 1.81
MA a A 03/004
```

34. Review the W03 Referred Attribution by Task report.

Press “**PF3**” to exit the detail pop-up windows.

Type “**W03**” in the command line, followed by **ENTER** to navigate to the W03 report.

PD Tools Safari 2008 Workshop

Lab Exercises



```
File View Navigate Help
W01: WAIT Time by Task/Category (0432) Row 00001 of 00086
Command ==> W03 Scroll ==> CSR
```

Name	Description	Percent of Time in WAIT * 10.00% ±1.0%
SAM1V-001	TCB=006C9B08	11.34
+ DATAMG	Data Mgmt Processing	10.47
+ CST2FILE-005	VSAM	1.83
+ ERASE	SAM1V+185A	1.78
+ IDA019L1	Virtual I/O (VIO) and VSAM	1.78
+ PUT	SAM1V+1796	0.04
+ IDA019L1	Virtual I/O (VIO) and VSAM	0.04
+ GET	SAM1V+185A	0.01
+ IDA019L1	Virtual I/O (VIO) and VSAM	0.01
+ CST2FILE-004	VSAM	1.81

MA a A 04/018

35. Expand all of the entries in the W03 report.

Type “+” on the column heading “Name”, followed by **ENTER**. (not shown)

```
File View Navigate Help
W03: WAIT Referred Attribution by Task (0432) Row 00001 of 00001
Command ==> Scroll ==> CSR
```

Name	Description	Percent of Time in WAIT * 10.00% ±1.0%
SAM1V-001	TCB=006C9B08	11.34

MA a A 04/015

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Lab Exercises



36. In this report it is easier to see that all of the 11.34% is attributed to the SAM1V Load Module and CSECT. Specifically, 10.28% of the 11.34% total occurs at offset 00185A in the SAM1V CSECT.

```
File View Navigate Help
W03: WAIT Referred Attribution by Task (0432) Row 00001 of 00038
Command ==> Scroll ==> CSR
```

Name	Description	Percent of Time in WAIT * 10.00%	±1.0%
SAM1V-001	TCB=006C9B08	11.34	
+ SAM1V	Application	11.34	
Program			
+ SAM1V	CSECT in SAM1V	11.34	
+ 00185A	Attribution	10.28	
Offset in			
SAM1V			
+ IDA019L1	Virtual	10.28	
I/O (VIO)			
and VSAM			
+ 001594	Attribution	0.47	
Offset in			
SAM1V			
+ IGG0CLHA	Data	0.43	
Management			
services			
+ ISGGWAIT	Global	0.03	

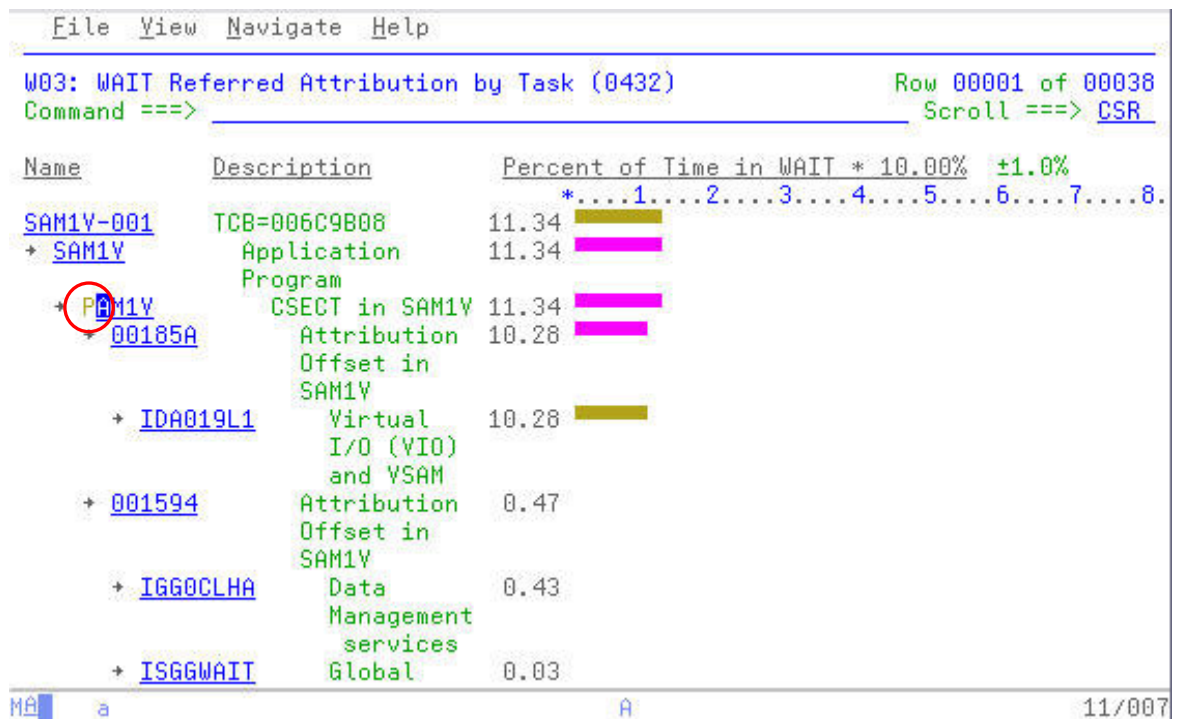
MA a A 06/002

37. Display the Program Source for the SAM1V CSECT.

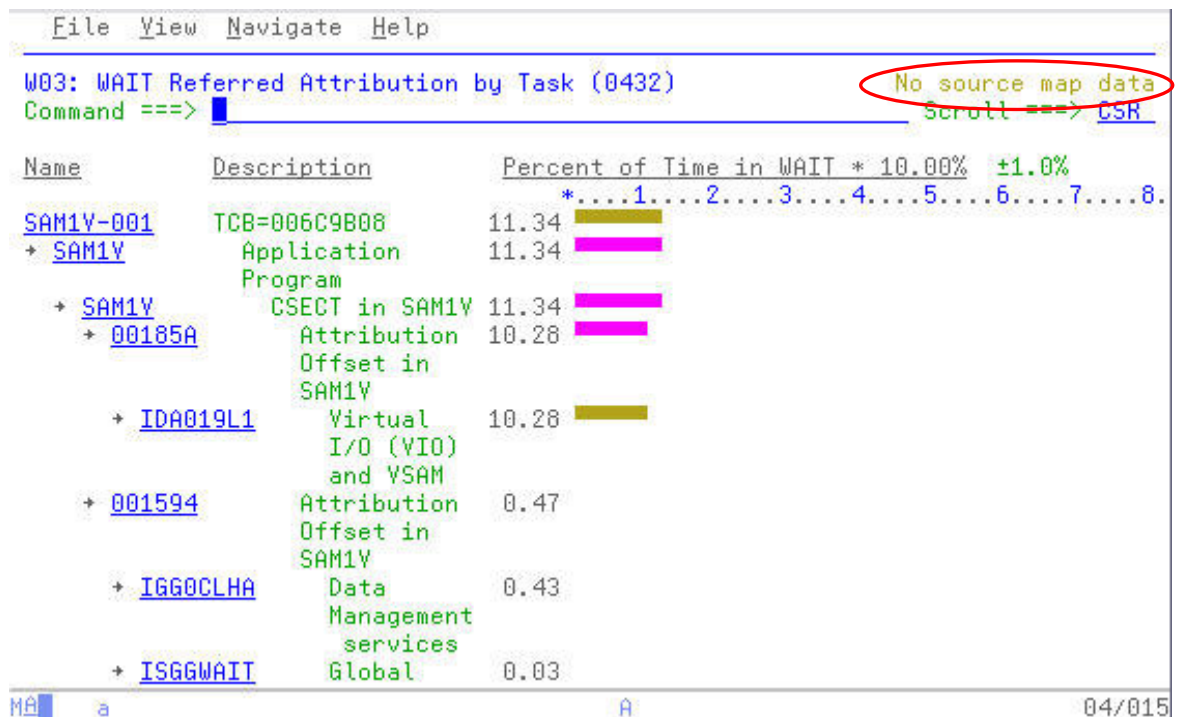
Type "**P**" on the line containing the SAM1V CSECT name, followed by **ENTER**.

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Lab Exercises



38. The short message area displays an informational message that the source for this program, SAM1V has not been defined to APA.



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Lab Exercises



39. Navigate to the A01 Source Program Mapping panel to define the location of the source listing for the SAM1V module.

Type “**A01**” in the command line, followed by **ENTER**. (not shown)

Type “**D**” in the File Type prompt, for SYSDEBUG.

At the Data Set Name prompt, type “**your-tso-id.ADLAB.SYSDEBUG**” replacing your-tso-id with your userID.

Type the name of the CSECT, “**SAM1V**” in the Member Name prompt, and then **ENTER**.

```
File View Navigate Help
A01 - Source Program Mapping (0432) Row 00001 of 00005
Command ==> Scroll ==> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

File type . . . . D (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
Data set name . . 'DNET047.ADLAB.SYSDEBUG'
Member name . . . SAM1V

Seqn ID-ReqNum Load Type/Status Lang Member DSN
0001 CAZ0-0432 NO D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0002 CAZ0-0118 NO D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0003 CAZ0-0141 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0004 CAZ0-0366 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0005 CAZ0-0372 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
```

40. The resulting screen shows that the listing file has been added for this request number.

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Lab Exercises



```
File View Navigate Help
A01 - Source Program Mapping (0432) Source map data loaded
Command ==> | Scroll ==> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

File type . . . . - (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
Data set name . . |
Member name . . . |

Seqn ID-ReqNum Load Type/Status Lang Member DSN
0001 CAZ0-0432 NO D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0002 CAZ0-0432 NO D-Loaded COB SAM1V DNET047.ADLAB.SYSDEBUG
0003 CAZ0-0118 NO D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0004 CAZ0-0141 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0005 CAZ0-0366 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG
0006 CAZ0-0372 Auto D-Loaded COB SAM2V DNET047.ADLAB.SYSDEBUG

MA a A 04/015
```

41. Navigate back to the W03 report and access the Program Source for the SAM1V module.

Press “**PF3**” to return to the W03 report.

Type “**P**” on the SAM1V CSECT, followed by **ENTER** to access the Program Source for SAM1V.

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Lab Exercises



File View Navigate Help

W03: WAIT Referred Attribution by Task (0432) Row 00001 of 00038
 Command ==> Scroll ==> CSR

Name	Description	Percent of Time in WAIT * 10.00% ±1.0%
SAM1V-001	TCB=006C9B08	11.34
+ SAM1V	Application	11.34
+ PAM1V	Program	11.34
+ 00185A	CSECT in SAM1V	10.28
	Attribution	10.28
	Offset in SAM1V	
+ IDA019L1	Virtual I/O (VIO) and VSAM	10.28
+ 001594	Attribution	0.47
	Offset in SAM1V	
+ IGG0CLHA	Data Management services	0.43
+ ISGGWAIT	Global	0.03

MA a A 11/007

42. The resulting screen shows the source listing positioned at the first line containing an APA observation count. From here you could scroll up and scroll down to review the listing and specific offset(s) in question.

File View Navigate Help

P01: Source Program Attribution (0432) Row 00001 of 00049
 Command ==> Scroll ==> CSR

LineNo	Offset	Count	Source Statement
000488	00153E		500-CRUNCH-CONTROL.
000489	00153E		COMPUTE CRUNCH-IO-LOOPS = WS-CRUNCH-IO * 10.
000490	001550		COMPUTE CRUNCH-CPU-LOOPS = WS-CRUNCH-CPU * 500.
000491			
000492	001562		IF CRUNCH-IO-LOOPS > 0
000493	001570		OPEN I-O CUSTOMER-FILE2
		47	<- Wait time attributed to above statement
000494	001594		EVALUATE WS-CST2FILE-STATUS
000495			WHEN '00'
000496	0015A2		MOVE 'Y' TO WS-CUST2-FILE-OPEN
000497	0015A6		CONTINUE
000498			WHEN OTHER
000501			WS-CST2FILE-STATUS
000502	0015C6		DISPLAY 'Terminating Program due to Fil
000503			END-EVALUATE
000504	0015D4		IF WS-CUST2-FILE-OPEN = 'Y'
000505	0015E0		PERFORM 510-CRUNCH-CUSTFILE

MA a A 04/015

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Lab Exercises



43. End your Application Performance Analyzer session by exiting the product by pressing “**PF3**”.

Answers for Lab Exercise 4

In this section you will find the answers to some of the basic questions posed during the course of the previous exercise. You may also see some additional commands that were discussed but not demonstrated during the course of Exercise 4.

1. One of the steps in the previous exercise asked the following:

Question?: From reviewing the source listing with the APA counts, what have you observed from the statements indicated as high usage/executed statements?

```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00001 of 00038
Command ==> Scroll ==> CSR
LineNo Offset Count Source Statement
000090 00036C MOVE 'PROGRAM ENDED' TO WS-PROGRAM-STATUS.
000091 00037C GOBACK.
000092
000093 000384 050-CALC-BALANCE-STATISTICS.
000094 000384 MOVE 0 TO LOOP-COUNT.
000095 00038E 130 PERFORM 100-CRUNCH-LOOP
000096 UNTIL LOOP-COUNT > CRUNCH-CPU-LOOPS .
000097
000098 0003C2 47 100-CRUNCH-LOOP.
000099 0003C2 47 MOVE 'CALCULATING BALANCE STATS' TO WS-PROGRAM-
000100 * *** Increment Record Count ***
000101 0003D2 420 ADD +1 TO BALANCE-COUNT
000102 * *** Add this customer's BALANCE to the grand tot
000103 0003EA 814 COMPUTE BALANCE-TOTAL =
000104 BALANCE-TOTAL + CUST-ACCT-BALANCE
000105 * *** Calculate Average ***
000106 000412 1046 COMPUTE BALANCE-AVERAGE =
```

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Lab Exercises



```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00017 of 00038
Command ==> Scroll ==> CSR

LineNo Offset Count Source Statement
000105 * *** Calculate Average ***
000106 000412 1046 COMPUTE BALANCE-AVERAGE =
4093 <- CPU time attributed to above statement
000107 BALANCE-TOTAL / BALANCE-COUNT
000108 * *** Calculate Minimum ***
000109 00045A 138 IF WS-FIRST-TIME-SW = 'Y'
000110 00046A MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000111 000474 186 IF CUST-ACCT-BALANCE < BALANCE-MIN
000112 000486 MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000113 * *** Calculate Maximum ***
000114 000490 100 IF WS-FIRST-TIME-SW = 'Y'
000115 0004A0 MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000116 0004AA 212 IF CUST-ACCT-BALANCE > BALANCE-MAX
000117 0004BC MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000118 * *** CALCULATE RANGE ***
000119 0004C6 195 COMPUTE BALANCE-RANGE = BALANCE-MAX - BALANCE-MI
000120 0004D8 358 ADD 1 TO LOOP-COUNT.
000121
```

In the two previous source panels a pattern begins to emerge. Notice that many of the statements with counts are using data items beginning with the word BALANCE. The highest usage statement, which is causing some system resources to be expended uses three of these data items BALANCE-AVERAGE, BALANCE-TOTAL, and BALANCE-COUNT.

Using ISPF FIND commands it would be prudent to look at how these data items are defined to the application. In the panel below we can see that each variable is defined as a decimal numeric in using a print format. However our application is using these three variables to perform arithmetic functions. Each time the statement is encountered the system will internally convert these variables into a COMP-3 format for processing. Hence, the system resources being expended on behalf of the COMPUTE statements. More efficient processing would take place if these were defined as COMP-3 data items instead of forcing the system to convert these each time for processing.

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Lab Exercises



```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00070 of 00133
Command ==> Scroll ==> CSR
Count Source Statement
      05 CUST-OCCUPATION      PIC X(28).
*
  01 CUST-BALANCE-STATS.
    05 BALANCE-COUNT      PIC S9(13)V99.
    05 BALANCE-TOTAL      PIC S9(15)V99.
    05 BALANCE-MIN        PIC S9(7)V99      COMP-3.
    05 BALANCE-MAX        PIC S9(7)V99      COMP-3.
    05 BALANCE-RANGE      PIC S9(7)V99      COMP-3.
    05 BALANCE-AVERAGE    PIC S9(15)V99.
*
  01 CRUNCH-CPU-LOOPS      PIC S9(9) COMP-3.

*****
PROCEDURE DIVISION USING CUST-REC, CUST-BALANCE-STATS,
                        CRUNCH-CPU-LOOPS.

000-MAIN.
  MOVE 'PROGRAM STARTED' TO WS-PROGRAM-STATUS.
  IF WS-FIRST-TIME-SW = 'Y'
```

2. In the previous exercise one of the steps posed the following questions using the W01 WAIT Time by Task/Category report.

Question?: What is occurring in the application that is causing a majority of the 10.47% WAIT? What DD statement is being observed by APA? What is the module name? Is there a specific location in the module where this condition is occurring?

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Lab Exercises



```
File View Navigate Help
W01: WAIT Time by Task/Category (0432) Row 00001 of 00086
Command ==> | Scroll ==> CSR
Name Description Percent of Time in WAIT * 10.00% ±1.0%
*...1...2...3...4...5...6...7...8.
SAM1V-001 TCB=006C9B08 11.34 ██████████
+ DATAMG Data Mgmt 10.47 ██████████
Processing
+ CST2FILE-005 VSAM 1.83 █
+ ERASE SAM1V+185A 1.78 █
+ IDA019L1 Virtual 1.78 █
I/O (VIO)
and VSAM
+ PUT SAM1V+1796 0.04
+ IDA019L1 Virtual 0.04
I/O (VIO)
and VSAM
+ GET SAM1V+185A 0.01
+ IDA019L1 Virtual 0.01
I/O (VIO)
and VSAM
+ CST2FILE-004 VSAM 1.81 █
```

Each of the questions can be answered from the W01 report, although other reports might present this same information more readily. You become familiar with the various reports as you use and apply APA.

What is occurring in the application that is causing a majority of the 10.47% WAIT? Using “PF7” and “PF8” to scroll up and down in the W01 report shows that the ERASE function, when totaled, makes up a majority of the 10.47% being consumed by the application in WAITS.

What DD statement is being observed by APA? The DD statement is the CUST2FILE DD.

What is the module name? In case where the ERASE function is consuming resource, APA is pointing to the SAM1V Load Module and the SAM1V CSECT.

Is there a specific location in the module where this condition is occurring? Each the ERASE function is observed it points to a single location in the SAM1V CSECT, offset 185A.

3. Instead of using the “PF7” and “PF8” keys to scroll up and down through the listing, the SETUP command could be used to customize you ISPF view of the list and consolidate the listing. In the display below note that each line which contains an APA count is preceded and proceeded by 4 or 5 lines of additional source code.

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Lab Exercises



```

File View Navigate Help
P01: Source Program Attribution (0432) Row 00001 of 00049
Command ==> | Scroll ==> CSR

LineNo Offset Count Source Statement
000488 00153E          500-CRUNCH-CONTROL.
000489 00153E          COMPUTE CRUNCH-IO-LOOPS = WS-CRUNCH-IO * 10.
000490 001550          COMPUTE CRUNCH-CPU-LOOPS = WS-CRUNCH-CPU * 500.
000491
000492 001562          IF CRUNCH-IO-LOOPS > 0
000493 001570          OPEN I-O      CUSTOMER-FILE2
47  <- Wait time attributed to above statement
000494 001594          EVALUATE      WS-CST2FILE-STATUS
000495          WHEN '00'
000496 0015A2          MOVE 'Y' TO WS-CUST2-FILE-OPEN
000497 0015A6          CONTINUE
000498          WHEN OTHER
000501          WS-CST2FILE-STATUS
000502 0015C6          DISPLAY 'Terminating Program due to Fil
000503          END-EVALUATE
000504 0015D4          IF WS-CUST2-FILE-OPEN = 'Y'
000505 0015E0          PERFORM 510-CRUNCH-CUSTFILE
MA  a                               A                               04/015

```

4. These lines can be reduced or even eliminated by customizing the view of the listing.

Type “**SETUP**” on command line, followed by **ENTER**.

```

File View Navigate Help
P01: Source Program Attribution (0432) Row 00019 of 00049
Command ==> SETUP | Scroll ==> CSR

LineNo Offset Count Source Statement
000506 0015FC          CLOSE CUSTOMER-FILE2
40  <- Wait time attributed to above statement
000507          END-IF
000508          END-IF .
000509
000510 001626          510-CRUNCH-CUSTFILE.
000511 001626          MOVE CUST-REC TO CUST2-REC .
000535 00172C          PERFORM 514-DEL-CUST2-RECORD
          UNTIL WORK-KEY-NUM > CRUNCH-IO-LOOPS .
000536
000537
000538 001762          512-ADD-CUST2-RECORD .
000539 001762          MOVE WORK-KEY TO CUST2-KEY .
000540 00176C          WRITE CUST2-REC .
19  <- Wait time attributed to above statement
000541 001796          IF WS-CUSTFILE-STATUS NOT = '00'
000542 0017A4          DISPLAY 'I/O ERROR ON CUST2 VSAM WRITE' .
000543          * GENERATE CPU USAGE IN SAM2V
000544 0017B2          MOVE CRUNCH-BALANCE-STATS-ZEROS TO CRUNCH-BALANC
MA  a                               A                               04/020

```

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Lab Exercises



- The report customization panel for the Source Program Mapping report is displayed. The first entry on this pop-up panel allows you to customize the “Nbr of adjacent lines to display” before and after a line containing an APA count.

Other options on this panel allow to display the source listing in its entirety or to remove columns of information from the report display.

Type “1” in the “Nbr of adjacent lines to display” prompt, followed by **ENTER**.

```
File View Navigate Help
Options for Source Program Mapping
Nbr of adjacent lines to display . . . . 1
This specifies the number of statements without
measured activity to be displayed before/after
lines with activity.
Enter "/" to select an option
  █ Display ALL statements of the source program.
  (Otherwise only those at or near statements
  with measured activity are displayed.)
  / Include assembler object code.
  / Show statement count graphically.
  - Show detailed information in heading.
  / Show C/C++ pseudo-assembly
000540 00176C          WRITE CUST2-REC .
                19  <- Wait time attributed to above statement
000541 001796          IF WS-CUSTFILE-STATUS NOT = '00'
000542 0017A4          DISPLAY 'I/O ERROR ON CUST2 VSAM WRITE' .
000543                * GENERATE CPU USAGE IN SAM2V
000544 0017B2          MOVE CRUNCH-BALANCE-STATS-ZEROS TO CRUNCH-BALANC
MA a                                     A                                     11/009
```

- The resulting display consolidates the lines containing APA counts while still providing one line to context around each count line.

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Lab Exercises



```
File View Navigate Help
P01: Source Program Attribution (0432) Row 00001 of 00017
Command ==> Scroll ==> CSR

LineNo Offset Count Source Statement
000492 001562 IF CRUNCH-IO-LOOPS > 0
000493 001570 OPEN I-O CUSTOMER-FILE2
47 <- Wait time attributed to above statement
000494 001594 EVALUATE WS-CST2FILE-STATUS
000505 0015E0 PERFORM 510-CRUNCH-CUSTFILE
000506 0015FC CLOSE CUSTOMER-FILE2
40 <- Wait time attributed to above statement
000507 END-IF
000539 001762 MOVE WORK-KEY TO CUST2-KEY .
000540 00176C WRITE CUST2-REC .
19 <- Wait time attributed to above statement
000541 001796 IF WS-CUSTFILE-STATUS NOT = '00'
000550 00182C MOVE WORK-KEY TO CUST2-KEY .
000551 001836 DELETE CUSTOMER-FILE2 .
1028 <- Wait time attributed to above statement
000552 00185A IF WS-CUSTFILE-STATUS NOT = '00'
```

Notice that the offset mentioned with the ERASE function, 185A is shows at Statements 551 and 552.