



IBM Software Group

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### z/TPF Software Profiler

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**AIM Enterprise Platform Software**

IBM z/Transaction Processing Facility Enterprise Edition 1.1.0

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## What is the Software Profiler?

- Collections of tools to understand software performance characteristics
  - Applications
  - Middleware
  - Systems
- Based on ESPM
- Will be available on z/TPF

## EI - External Interrupt Analysis

- Used to determine usage patterns for programs and routines
  - ▶ Identify programs and areas of programs which are executed more frequently
- Samples instructions being executed
  - ▶ Based on external interrupts for the cpu timer
  - ▶ 20 samples per second
  - ▶ Samples are NOT every 50 milliseconds
    - One sample within a 50 millisecond period
    - Full coverage algorithm used so that every microsecond within the 50 millisecond is sampled

## Example of EI output for Application Programs

- Report for application programs include
  - ▶ Load module name
  - ▶ Object name and displacement into the object

```

*****
APR 18 2084                A P P L I C A T I O N   P R O G R A M   D E T A I L
*****
Note: 'MPCT' represents the percent of hits the program received out of all application hit
      'OPCT' represents the percent of hits the object received out of all application hit
SSU PROG OBJECT                MPCT      MTOT      OPCT      OTOT
HPN QZZ5
    qzz5. c                    67.75    67.75    59.67    59.67
    QZZ5                       8.09    67.75
HPN CI S0
    memcpy. c                  28.45    28.45    3.70    32.15
    CI S0                       3.70
    
```

# Example of EI output for an Application programs

```

*****
APR 18      2084      D E T A I L   F O R   A P P L I C A T I O N   P R O G R A M S

SSU  PROG DISP  INST  COUNT  I/O  PER  ADDRESS  STATE  MODE
      OFF  ON   31-BIT  SUPER  SVM  0

zSERIES BITS FOR BREAKDOWN ANALYSIS  bi t6=0  bi t1=1  31-32=01  bi t15=0  bi t16=1  bi t8-11
( HPN QZZ5 )
  qzz5. c
P 000000000000BE STG      12      0      0      0      0      0      0
P 000000000000CA AGHI     24      0      0      0      0      0      0
P 000000000000DA LG       30      0      0      0      0      0      0
P 000000000000E0 MVC  07   19      0      0      0      0      0      0
P 000000000000E6 BAS      7      0      0      0      0      0      0
P 000000000000EA LG      26      0      0      0      0      0      0
P 000000000000F0 LMG     25      0      0      0      0      0      0
P 000000000000F6 BR      27      0      0      0      0      0      0
  QZZ5
LM 00000000001608 LARL     7      0      0      0      0      0      0
LM 00000000001620 BR     17      0      0      0      0      0      0
IP 00000000A2006B0 LG     59      0      0      0      0      0      0
IP 00000000A2006B6 BR     28      0      0      0      0      0      0
** TOTAL FOR HPN QZZ5 = 1391 **
    
```

## EA - Entry Analysis

- Catch an ECB and record ECB trace until ECB exits
  - ▶ Macro trace
  - ▶ C function trace
  - ▶ Profile provided:
    - Summary of macros issued by ECB
    - CPU time used by this ECB
- Multiple ECBs can be traced in specified time period
  - ▶ Only one at a time
  - ▶ Gives average number of macros
- Can be used for diagnostics



## EA - Entry Analysis

- Selection criteria for catching an ECB includes one or more of the following:
  - ▶ Program name
  - ▶ Action code
  - ▶ LNIATA
  - ▶ SS / SSU
  - ▶ ECB flag
  - ▶ ECB owner name
  - ▶ ECB contents

# Example of EA output

```

*****
TRANSACTION NUMBER 1
  SS = BSS  SSU = HPN          ECB FORMAT FLAG = 85 CREM/CRED/CREE ECB
*****
NEST  LOAD          TRACE
LVL  MODULE  OBJECT  NAME      DI SP  MACRO  PARAMETERS
-----
  1  RLCH    rl ch    RLCH      7A    CI NFC
  1  RLCH    rl ch    RLCH     19E   GETCC  A-103D1000  T-0051  L-D1  CMB
  1  RLCH    rl ch    RLCH     2FA   KEYCC
  1  RLCH    rl ch    RLCH     302   KEYRC
  1  RLCH    rl ch    RLCH     1E2   DLAYC
  1  RLCH    rl ch    RLCH     1F6   FI NWC  F-00000000281240C6  L-D0
  1  RLCH    rl ch    RLCH     1FE   CI NFC
  1  RLCH    rl ch    XLI I    23C   RELFC  F-00000000281240C6
  1  RLCH    rl ch    RLCH     2A0   RELCC  A-10806E80  T-0021  L-D0
  1  RLCH    rl ch    RLCH     2FA   KEYCC
  1  RLCH    rl ch    RLCH     302   KEYRC
  1  RLCH    rl ch    RLCH     2C8   RELCC  A-103D1000  T-0051  L-D1
  1  RLCH    rl ch    RLCH     2CC   EXI TC
  
```



# Example of EA output (continued)

\*\*\*\*\*

TRANSACTION NUMBER 1

SS = BSS SSU = HPN ECB FORMAT FLAG = 85 CREM/CRED/CREE ECB

\*\*\*\*\*

## TRANSACTION SUMMARY REPORT MACRO COUNTS

MACRO NAME	NUMBER ISSUED	% of TOTAL	CUMMUL PCT	** PERTINENT DETAILS **
CI NFC	2	15.38	15.38	
KEYCC	2	15.38	30.77	
KEYRC	2	15.38	46.15	
RELCC	2	15.38	61.54	
DLAYC	1	7.69	69.23	
EXI TC	1	7.69	76.92	
FI NWC	1	7.69	84.62	X' D6D4' =1
GETCC	1	7.69	92.31	
RELFC	1	7.69	100.00	
TOTAL	13			

NOTE: Only top 80% of the macro hits shown.

## MA - Macro Analysis

- Provides mix of system service calls
- Collects information on SVC and enter / back macros which have been executed
  - ▶ Sampling is used
- Selection criteria for collection includes
  - ▶ All ECBs
  - ▶ Program name
  - ▶ SS / SSU
  - ▶ ECB owner name
- Data collected for the application includes
  - ▶ Load module name
  - ▶ Object name and displacement
  - ▶ If SVC macro is executed in CTAL, include CTAL caller

# Example of MA output

```
*****
APR 18      2084
MACRO      COUNT      PERCENT      RATE
ATTAC       653        4.07        3.049
CINFC      3086       19.23       14.409
CREEC        1         0.01        0.005
CSONC       20         0.12        0.093
ENTDC        5         0.03        0.023
EVNTC      421         2.62        1.966
FDCTC       26         0.16        0.121
FINWC      181         1.13        0.845
GETCC      249         1.55        1.163
KEYCC       44         0.27        0.205
LMONC     1556         9.70        7.265
MPIFC       4         0.02        0.019
PROGC      711         4.43        3.320

T P F      M A C R O      S U M M A R Y
MACRO      COUNT      PERCENT      RATE
BACKC      766         4.77         3.577
CLHSC      118         0.74         0.551
CRETSM      5         0.03         0.023
DETAC      650         4.05         3.035
ENTNC      315         1.96         1.471
EVNWC      188         1.17         0.878
FICLEC     10         0.06         0.047
FIWHC      85         0.53         0.397
GETFC       1         0.01         0.005
KEYRC      822         5.12         3.838
MONTC     3906        24.34        18.237
PAUSC       6         0.04         0.028
RELCC      440         2.74         2.054
*****
```

# Example of MA output (continued)

```
*****
=====>  FI NWC      USAGE SUMMARY  <=====
I SN SSU   NAME      DI SPLACEMENT      COUNT  PERCENT  SECONDS  RATE
  1 HPN   CJ00   P  00000000002AD448      1     0.01   214.18   0.005
  1 HPN   CJ00   P  00000000002C241A     20     0.12   214.18   0.093
  1 HPN   CJ00   P  00000000002CA078     11     0.07   214.18   0.051
  1 HPN   CMVO   P  000000000000219C    136     0.85   214.18   0.635
  1 HPN   CTAD   ST 0000000000000242      3     0.02   214.18   0.014
  1 HPN   CTAL   ST 0000000000000242      6     0.04   214.18   0.028
  1 HPN   CVAA   P  00000000000023DE      4     0.02   214.18   0.019
TOTAL FOR SSU HPN                181     1.13   214.18   0.845
TOTAL FOR MAIN I-STREAM          181     1.13   214.18   0.845
SVC TOTAL                        181     1.13                0.845
```

## RC - Resource Consumption

- Collect ECB statistics at exit time
  - ▶ Sampling is used
- Data collected and reported includes
  - ▶ CPU time
  - ▶ Number of Finds
  - ▶ Number of Files
  - ▶ Number of GETFCs
  - ▶ Number of 4 KB frames used by this ECB
  - ▶ Number of 1 MB frames used by this ECB
- Selection criteria for collection includes
  - ▶ All ECBs
  - ▶ SS / SSU
  - ▶ ECB owner name

## Example of RC output

\*\*\* RESOURCE CONSUMPTION REPORT \*\*\*\*\*

=====> Detail File Rate <=====

PROGRAM	SSU	ECBS	SECS OF MAX	MAX	AVG	MIN
CMVP	HPN	4	0.6427	128.00	128.00	128.00
CEL5	HPN	27	0.0164	8.00	8.00	8.00
CVFD	HPN	3	0.0059	2.00	2.00	2.00
CVFE	HPN	4	0.0107	2.00	2.00	2.00
XLDD	HPN	5	0.0017	2.00	1.40	1.00
CL23	HPN	284	0.0002	1.00	0.04	0.00
CSPA	HPN	4	0.0283	1.00	1.00	1.00
CVI Q	HPN	2	0.0006	1.00	0.50	0.00
CVI T	HPN	1	0.0004	1.00	1.00	1.00

\*\*\* RESOURCE CONSUMPTION REPORT \*\*\*\*\*

=====> Detail Find Rate <=====

PROGRAM	SSU	ECBS	SECS OF MAX	MAX	AVG	MIN
CMVP	HPN	4	0.6427	128.00	128.00	128.00
CRIC	HPN	9	0.1164	128.00	128.00	128.00
CEL5	HPN	27	0.0164	25.00	25.00	25.00
CDNE	HPN	3	0.0334	22.00	18.67	13.00
CDNF	HPN	3	0.0385	21.00	16.33	14.00
CJ03	HPN	57	0.0085	14.00	7.11	6.00
CGL7	HPN	1	0.0036	2.00	2.00	2.00
CVFD	HPN	3	0.0059	2.00	2.00	2.00



## PR - Page Range Accesses

- Determine if areas of core memory are being accessed
- Intended to identify whether format 1 global records are being used

## Other items of note

- Data is written to RTA tape
- Post processing is done in z/OS

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