IMS Sysplex Manager Functional Overview

Bob Magid

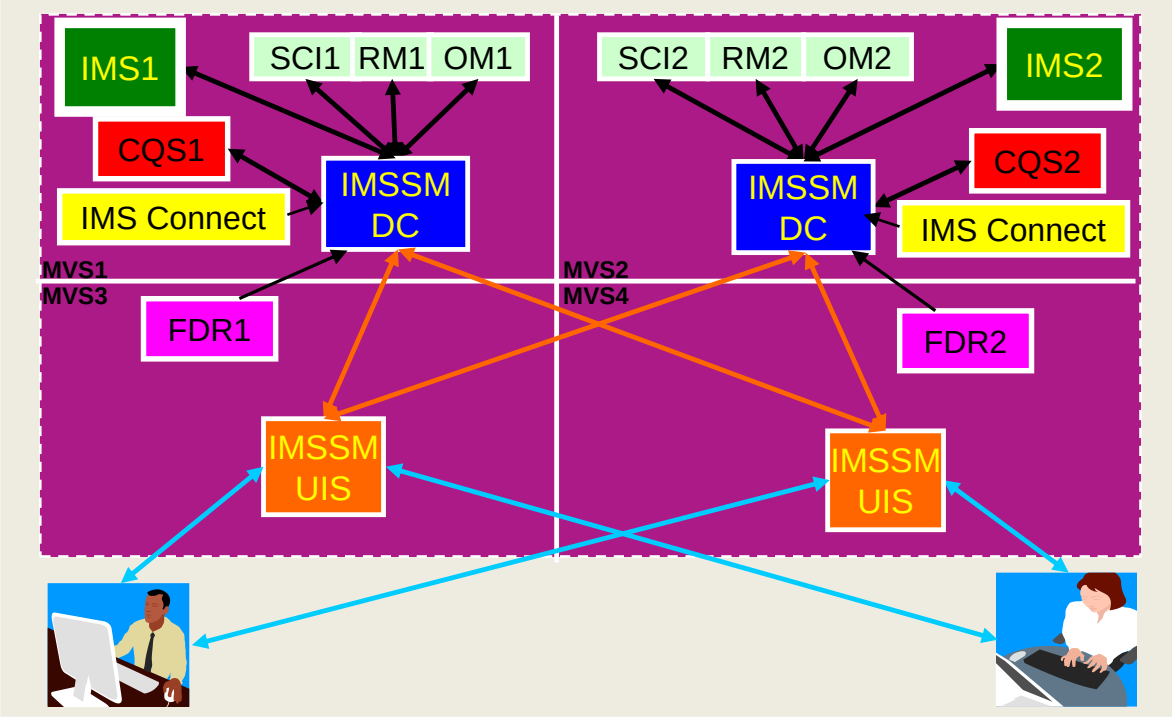
Agenda

- Product Highlights
- Data Sharing Management
  - SQ transaction affinity routing
  - SQ buffer overflow protection
  - IRLM long lock report
  - CSL RM structure management
- Other Product Functions

IMS Sysplex Manager Highlights

- Real-time management of the IMS Sysplex Environment
  - Single system image thru local and aggregate view of data
  - Simplified User Interface (TSO/ISPF)
  - Structured displays of IMS resources and CF structures
  - Global Type-1 command, OM Type-2 and IMS SPOC
  - Basic z/OS performance information and SVC dump capture
  - Statistics for CSL (OM, RM and SCI), IRLM and CQS
  - Dashboard with key system indicators and threshold monitoring
  - Intercept System exceptions and generate Console alerts
  - Produce real-time IRLM Long Lock Report
  - Browse, delete and recover messages on Shared Queues
  - Delete RM resource structure entries
  - Assign affinity for transactions in Shared Queues environment
  - Protect against buffer overflow in Shared Queues environment
- Support IMS DB/TM, DBCTL, and DCCTL for IMS v13 and later

IMS Sysplex Manager Sample Configuration



IMS Data Sharing

- Shared Queues
  - SQ transaction affinity routing
  - SQ buffer overflow protection
- Shared Databases
  - IRLM real-time and long lock report
- Shared Resources
  - CSL RM structure management

Shared Queue Transaction Affinity Routing

Shared Message Queues Transaction Affinity

- IMS Shared Message Queues provides
  - Enhanced scalability, throughput, and response time
  - Enhanced availability through redundancy
- IMS Shared Message Queues creates
  - Additional components to manage (CQS, structures, logstreams…)
  - Additional operational complexity
  - Possible false scheduling
  - Possible resource contention

Transaction Affinity Highlights

- Finer control of transaction scheduling
- Non-invasive to existing definition and operation
  - **No** omission of transaction definitions in sysgen
  - **No** stopping of transactions
  - **No** re-classing of dependent regions
  - **No** operational impact for loss of a system
- User defined affinity to route transaction messages
  - Any IMS in the shared queues group
  - Any subset of IMS systems
  - Equal or weighted distribution

Transaction Affinity Implementation

- User affinity definitions created in IMS Proclib
- Definitions “copied” to CQS list structure
  - IMS initialization
  - Shared by all IMS systems
  - Persistent across IMS restarts
  - Synchronized affinity definitions across Sysplex
- Seamless operations
  - Local informs/registration issued for transactions with affinity
  - Backup IMS system destination for planned and unplanned outages
  - Option to reject transaction if destination IMS systems not available
- Ability to tweaking affinity definitions dynamically

Transaction Affinity Implementation

Sample Proclib Definitions

OPTIONS(STRUCTURE(**GJESMAFN**),STATUS(**ENABLED**),
PGMREJECT(ABEND(U3303)),NETREJECT(2175))

SYSTEM(TARG(IMSGRP01),IMS(IMS1),STATUS(ENABLED))

SYSTEM(TARG(IMSGRP02),IMS(IMS2),STATUS(ENABLED))

SYSTEM(TARG(IMSGRP03),IMS(IMS3),STATUS(DISABLED))

SYSTEM(TARG(IMSGRP1A),IMS(IMS1,IMSA,IMS1),STATUS(ENABLED))

AFFINITY(TYPE(TRANSACT),TARG(IMSGRP1A,IMSGRP02),DISP(REJECT), DEST(NAME(APOL12)),STATUS(ENABLED))

AFFINITY(TYPE(TRANSACT),TARG(IMSGRP02,IMSGRP01),DISP(REJECT), **DEST(NAME(JAVC%NV*)),**STATUS(ENABLED))

AFFINITY(TYPE(TRANSACT),TARG(IMSGRP1A),DISP(**QUEUE**), **DEST(NAME(TRAN%%C,TRANAB*)),**STATUS(DISABLED))

AFFINITY(TYPE(TRANSACT),TARG(IMSGRP01), DEST(NAME(%%F3,%%F4)))

AFFINITY(TYPE(TRANSACT),TARG(IMSGRP1A),**DEST(CLASS(1,2,3)))**

Reducing False Scheduling Overhead

Example

- Three systems in group IMSA, IMSB, and IMSC
- Transaction TRAN1 causes false scheduling
- Balanced affinity definition
  - Arriving TRAN1 messages rotated to each

SYSTEM(TARG(SYSTEM1),IMS(IMSA,IMSB,IMSC))

AFFINITY(DEST(TRAN1),TARG(SYSTEM1))

- Weighted affinity definition
  - 50% of TRAN1 messages routed to IMSA

SYSTEM(TARG(SYSTEM1),IMS(**IMSA,IMSA**,IMSB,IMSC))

AFFINITY(DEST(TRAN1),TARG(SYSTEM1))

Reducing Database Lock Contention

Example

- Three systems in data sharing group IMSA, IMSB, and IMSC
- Transaction TRAN2 causes contention
- Affinity definition
  - Arriving TRAN2 messages limited rotation to subset
  - IMSC only used if IMSA and IMSB are unavailable

SYSTEM(TARG(SYS1),IMS(IMSA,IMSB))

SYSTEM(TARG(SYS2),IMS(IMSC))

AFFINITY(DEST(TRAN2),TARG(SYS1,SYS2))

SQ buffer overflow protection

SQ overflow protection

- What does it do?
  - Protect IMS control region from x78 abends (out of storage) caused by run-away/looping applications
- Features
  - Inactive mode – turn off overflow protection feature (default)
  - Report mode – help customers study local buffer usage
  - Enforce mode – automatic actions against incoming messages to avoid local buffer out of storage condition
- What does it NOT do?
  - Overflow protection against SQ *structure* overflow

Implementation Details

- Exploit Queue Space Notification Exit DFSQSSP0
  - SM exit does not interfere with dynamic buffer expansion/compressions by IMS
  - Terminates unit of work as follows:
    - ‘A7’ status code if message is from application
    - DFS0777I if message from LU 6.2 conversation
    - DFS1289I if message is from OTMA
- Requirements
  - IMS QBUFMAX parameter must be set for Enforce mode
  - Require IMS Tools Generic Exits common code to allow co-existence of multiple DFSQSSP0 exits

Implementation Details (Continued)

- Proclib member control parameters:
  - *LBUFMODE= INACTIVE| REPORT|ENFORCE*
    - specifies requested run mode
  - *LBUFREPT=(InitialValue,BufferPctIncrement,BufferNoIncrement,TimeInterval*
    - specifies REPORT mode parameters
  - *LBUFWARN=(InitialValue,BufferPctIncrement,BufferNoIncrement,TimeInterva*
    - specifies ENFORCE mode parameters for WARNING mode
  - *LBUFACTN=(InitialValue,BufferPctIncrement,BufferNoIncrement,TimeInterval*
    - specifies ENFORCE mode parameters for ACTION mode
  - *LBUFCRIT=(InitialValue,BufferPctIncrement,BufferNoIncrement,TimeInterval)*
    - specifies ENFORCE mode parameters for CRITICAL mode
  - LBUFLBUA= *###*
    - specifies no of buffers a caller must hold to be considered a large user in action mode. The exit will take actions against large user's only.
  - LBUFLBUC= *####*
    - specifies no of buffers a caller must hold to be considered a large user in critical mode. The exit will take actions against large user's only.

Sample Messages

- Report Mode (2 minutes interval reporting)
  - *07.45.10 JOB00123 GJE9010I DFSQSSP0 REPORT MODE: 22 BUF 11 PCT IMS1*
  - *07.47.10 JOB00123 GJE9010I DFSQSSP0 REPORT MODE: 29 BUF 15 PCT IMS1*
  - *07.49.10 JOB00123 GJE9010I DFSQSSP0 REPORT MODE: 36 BUF 18 PCT IMS1*
- Large buffer users (periodic messages):
  - *08.22.08 JOB00191 GJE9050I DFSQSSP0 LARGE USER: 17 BUF FOR BMP255 IMS1*
  - *08.22.08 JOB00191 GJE9050I DFSQSSP0 LARGE USER: 12 BUF FOR BMP255 IMS1*
- Warning Level
  - *08.31.20 JOB00191 GJE9020I DFSQSSP0 WARNING MODE: 26 BUF 13 PCT IMS1*
  - *08.34.20 JOB00191 GJE9020I DFSQSSP0 WARNING MODE: 27 BUF 14 PCT IMS1*
  - *08.37.21 JOB00191 GJE9020I DFSQSSP0 WARNING MODE: 28 BUF 14 PCT IMS1*
- Action Level
  - *08.22.48 JOB00191 GJE9030I DFSQSSP0 ACTION MODE: 151 BUF 76 PCT IMS1*
  - *08.24.48 JOB00191 GJE9030I DFSQSSP0 ACTION MODE: 158 BUF 79 PCT IMS1*
- Critical Level
  - *23.01.19 JOB00173 GJE9040I DFSQSSP0 CRITICAL MODE: 179 BUF 90 PCT IMS1*
  - *23.02.19 JOB00173 GJE9040I DFSQSSP0 CRITICAL MODE: 180 BUF 90 PCT IMS1*

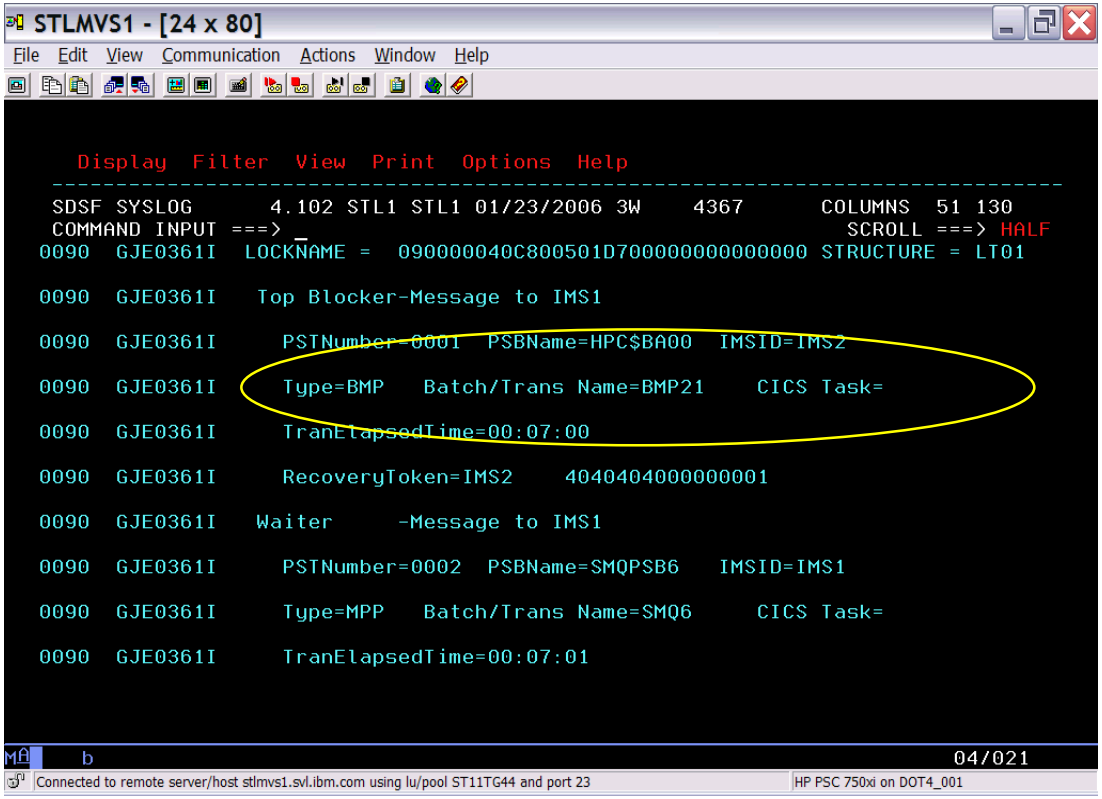
Managing IRLM locks

Data Sharing Long Locks

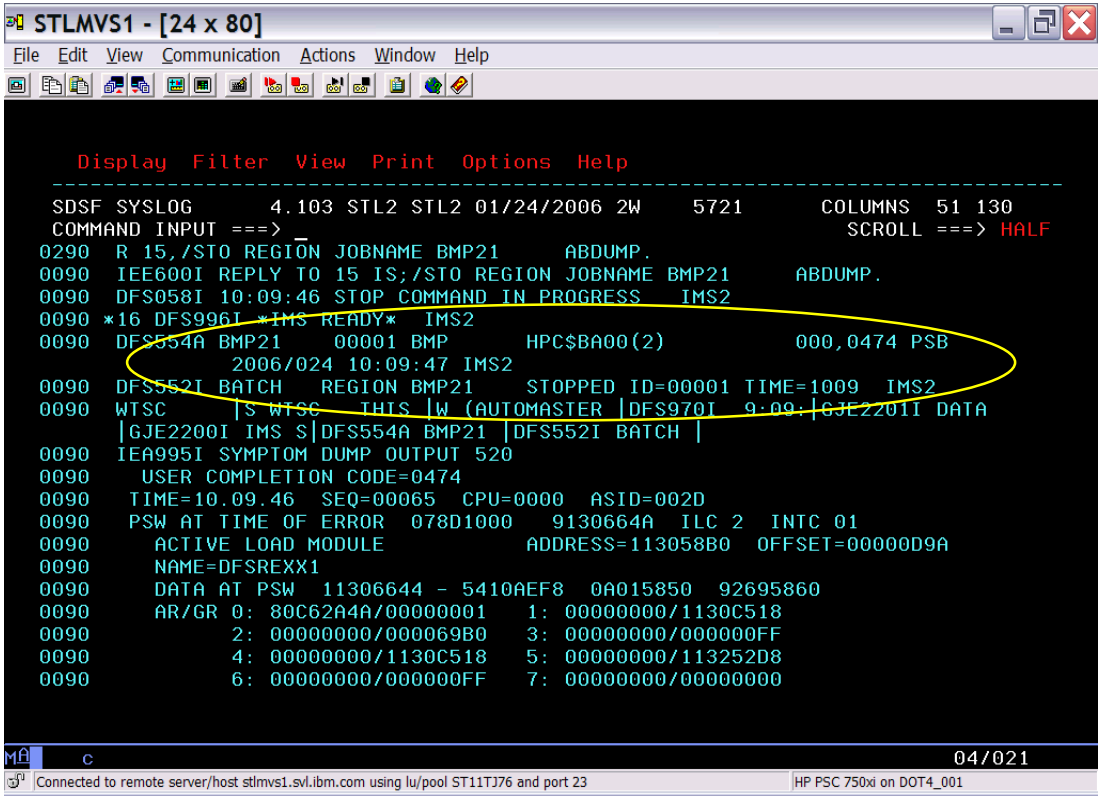
- DB Lockouts by applications holding IRLM locks for an inordinate amount of time
  - Could go unrecognized until it becomes critical
  - Lack of supported tools to assist in recognition and identification of problem
  - Manual intervention required to resolve

- Exception processing for Long Locks
  - Automatic real-time recognition when IRLM detects
  - Information consolidated, analyzed for top blocker, and presented
  - Information recorded in exceptions file and sent to z/OS console
  - Messages can be sent to z/OS console using user exit so that automated operations can resolve
  - Problem quickly resolved without manual intervention

Data Sharing Long Lock Exceptions



Data Sharing Long Lock Exceptions



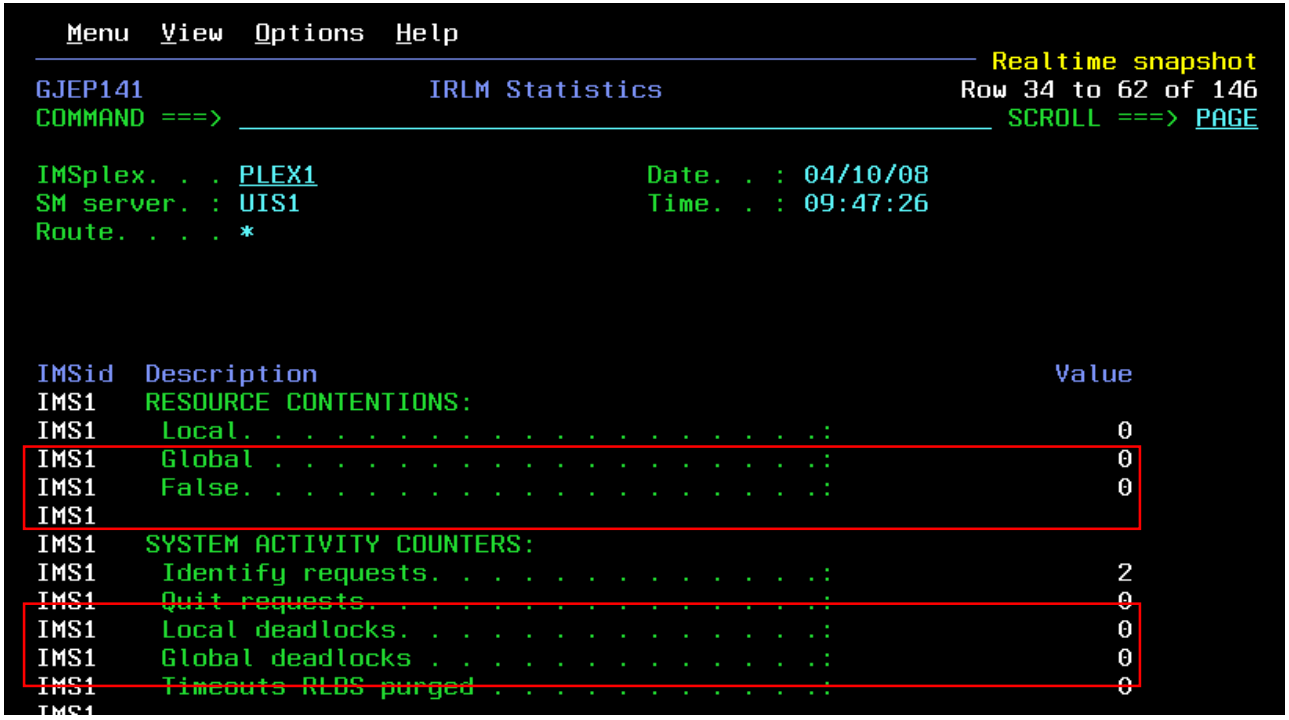
Aggregated IRLM Statistics

- Managing the well being of IRLM(s)
  - Deadlocks, false contentions, storage utilization?
  - Multiple IRLMs to check
- Information gathered from IRLMs across Sysplex
  - Aggregated into single system image
  - Drill down for information from individual IRLMs

Aggregated IRLM Statistics

```
  Menu  View  Options  Help
                                                          Realtime snapshot
GJEP140                 Aggregated IRLM Statistics        Row 1 to 31 of 51
COMMAND ===> _____________________________________________ SCROLL ===> PAGE

IMSplex. . . PLEX1                    Date. . : 04/10/08
SM server. : UIS1                     Time. . : 09:47:26
Route. . . . *

 Enter 's' to view detailed IRLM statistics.  s

GLOBAL ACTIVITY COUNTERS:
 Total global LOCK request. . . . . .:                4
 Child locks propagated . . . . . .:                  0
 IRLM to IRLM notify request. . . . . .:              0

REQUESTS
 Lock . . . . . .:                                    4
 Unlock . . . . . .:                                  0
 Change . . . . . .:                                  0
 Synchronous notify . . . . . .:                      0
 Asynchronous notify. . . . . .:                      0
 Verify . . . . . .:                                  0
 Purge. . . . . .:                                    2
 Query. . . . . .:                                    0
 Takeover . . . . . .:                                0

EXIT COUNTERS
 Suspend. . . . . .:                                  6
 Resume . . . . . .:                                  6
 Status . . . . . .:                                  0
 Notify . . . . . .:                                  0
 Deadlock . . . . . .:                                0
 Timeout. . . . . .:                                  0

EXIT EXTENSION REQUESTS:
 Synchronously propagated locks . . . . .:            4
 Synchronously propagated change. . . . .:            0
 Synchronously propagated unlocks . . . .:            0
 Asynchronously propagated locks  . . . .:            0
 Visits to contention exits . . . . . .:              0
```

Aggregated IRLM Statistics

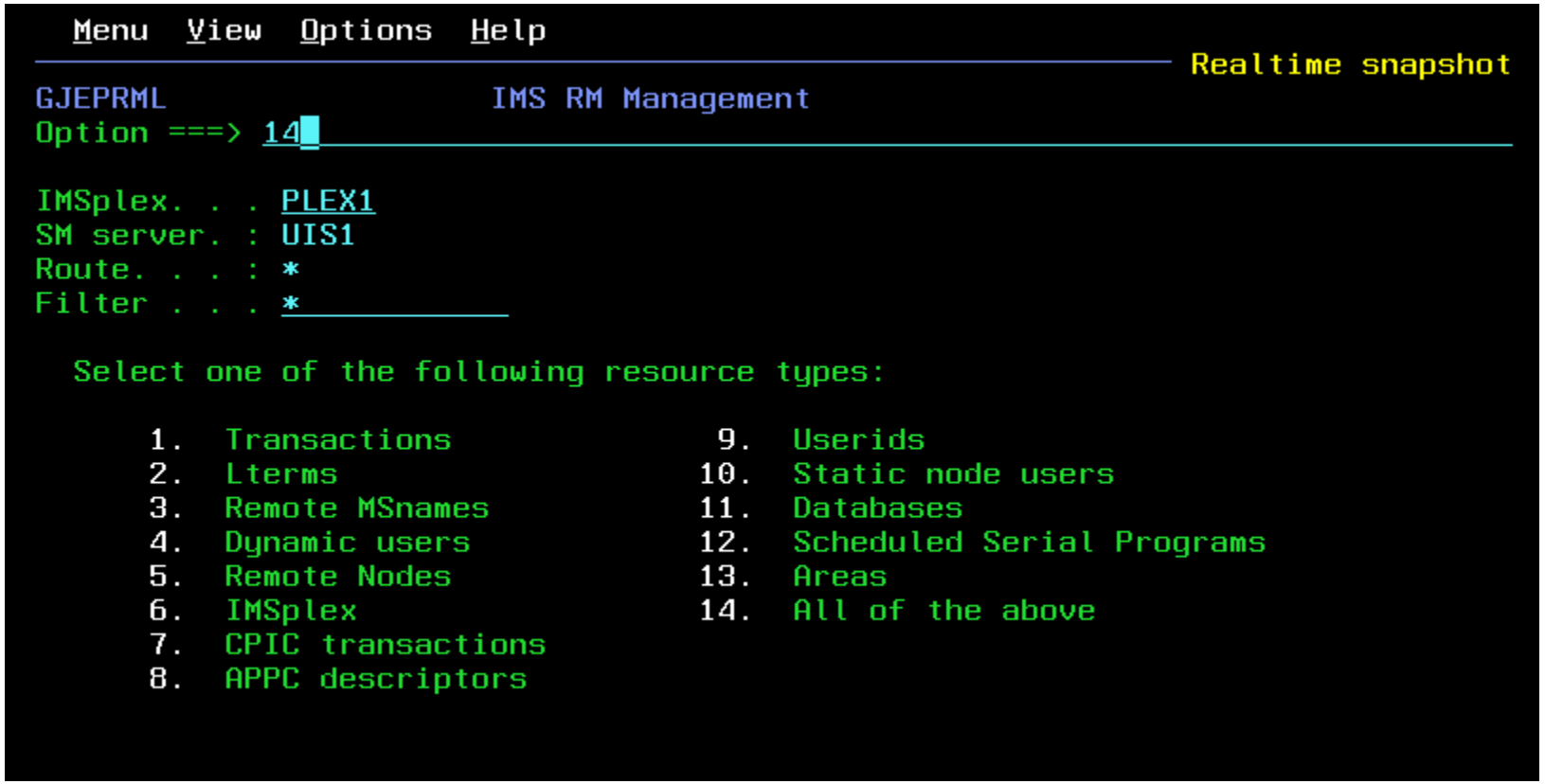


Managing CSL RM Structure

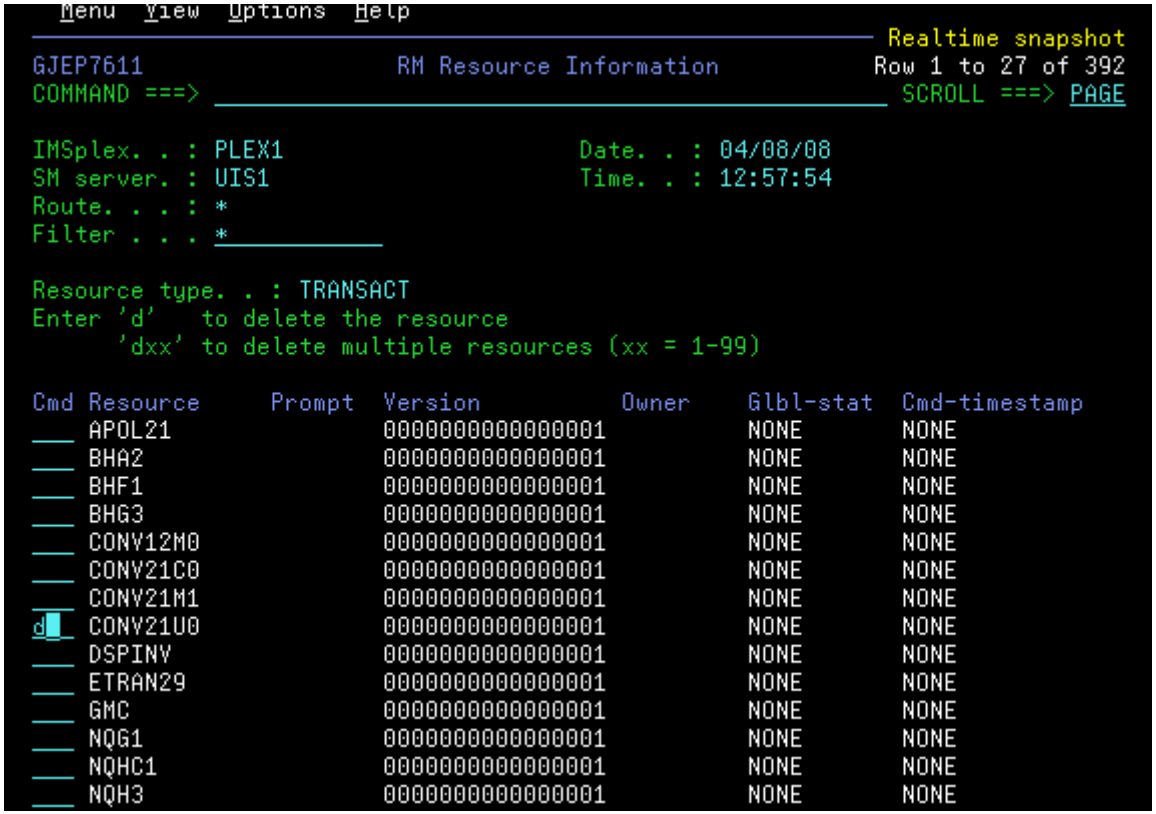
Managing CSL RM Structure

- Common Service Layer RM Structure Content
  - Holds global status of IMS Resources in IMSPlex
  - Determines IMSPlex wide status of Trans, LTERMs, Users
  - No capability to view content
  - No capability to alter/delete inconsistently defined resources
- Resource Management Structure display
  - Real-time display of structure content
  - Selectable via resource type and name filtering
  - Global status info to aid delete decision
  - Capability to delete selected resource definitions (multiple delete, delete by resource type or by owner)
  - Eliminates need to scratch and reallocate resource structure

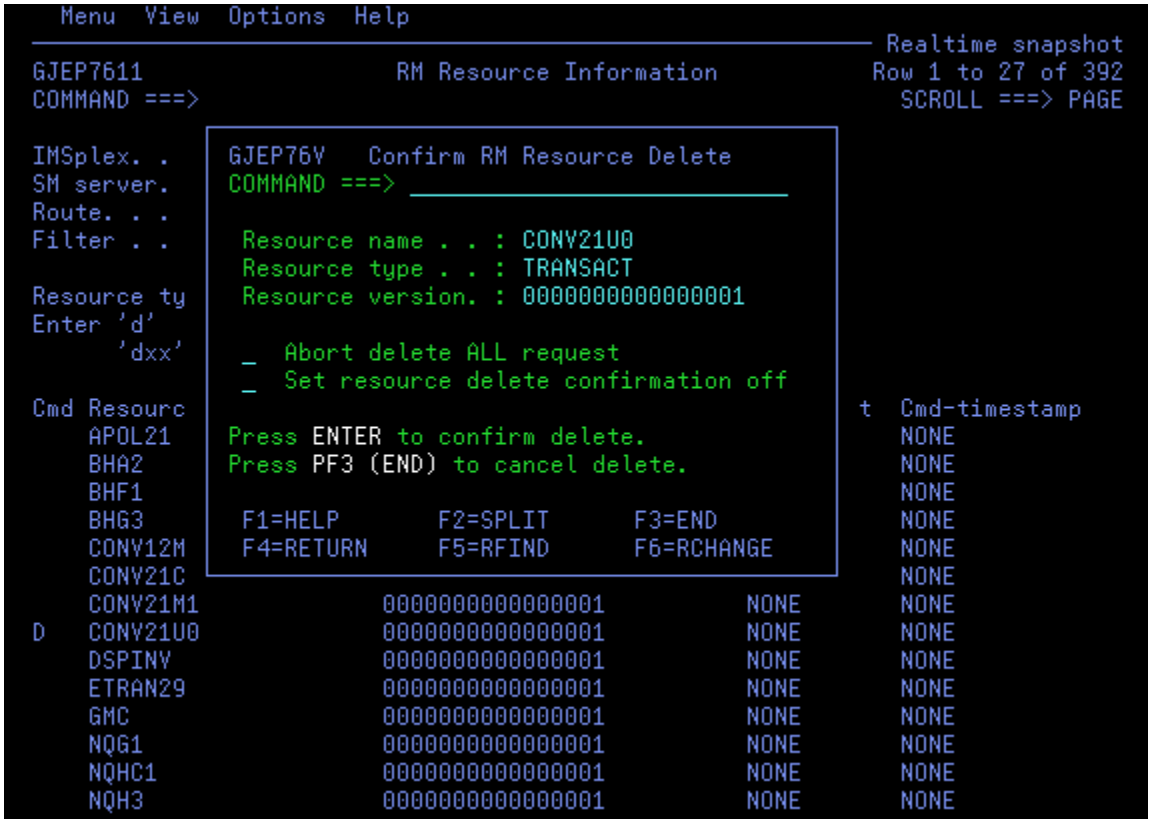
IMS Resource Structure Content



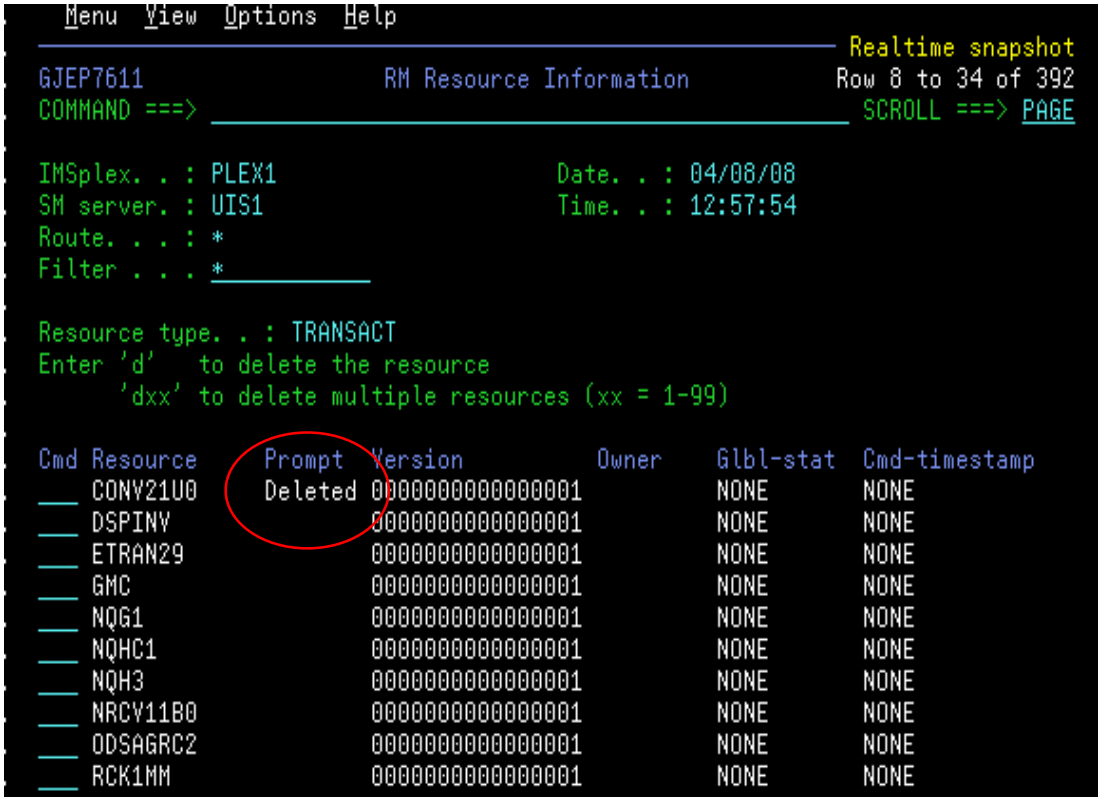
IMS Resource Structure Content



IMS Resource Structure Content



IMS Resource Structure Content



Other Product Use Scenarios

Scenario 1 – Taking Inventory and Capture Diagnostics

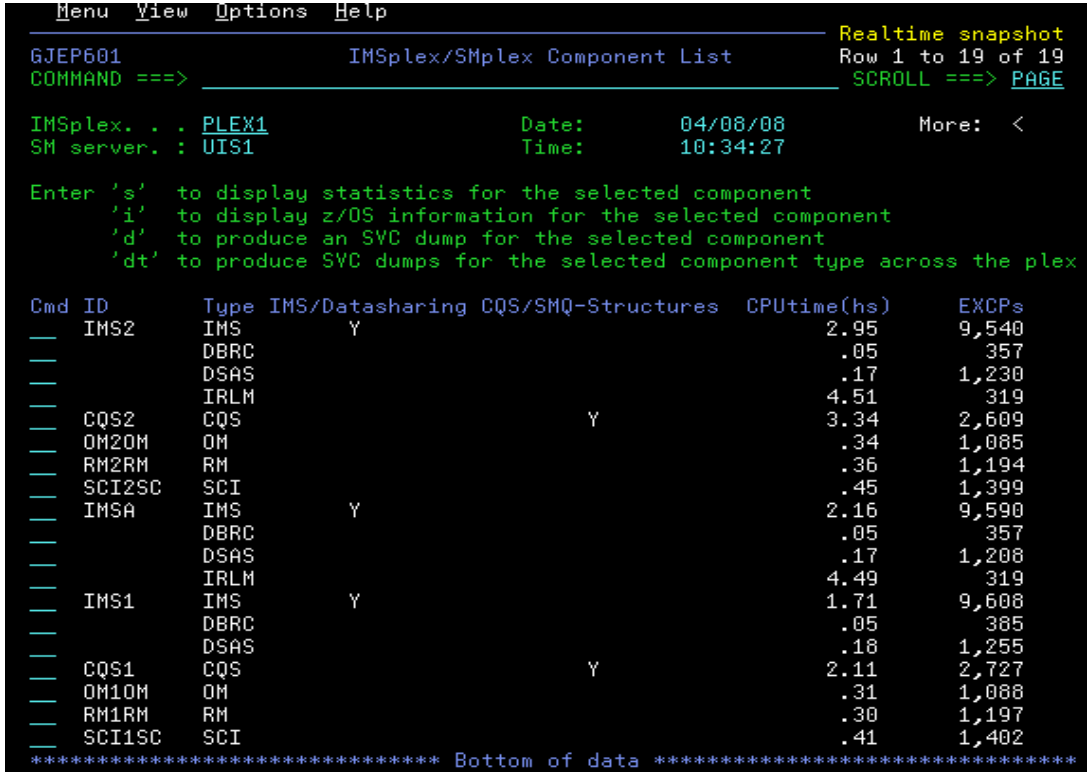
- Many address spaces – IMS Control Region, IMS DLI/SAS, IMS DBRC, IRLM, CQS, RM, OM, SCI, etc..
  - How do you identify related IMS components across the Sysplex?
  - What is the status of these components?
  - What version of IMS components are involved?
  - How much resource are they using from z/OS perspective?
  - How do you collect diagnostic data to debug sysplex problem?

- IMS Sysplex Manager structured TSO/ISPF interface
  - Guided display of IMS components
  - Provides component id, task or job name, version, status and basic z/OS information such as CPU time and EXCP counts
  - Drill-down to detailed component information
  - Easily capture console dumps for IMS components across the plex
  - Check DBRC RECON datasets placement and VSAM stats

Component List

```
  Menu  View  Options  Help
                                                          Realtime snapshot
GJEP600                 IMSplex/SMplex Component List     Row 1 to 19 of 19
COMMAND ===> _____________________________________________ SCROLL ===> PAGE

IMSplex. . . PLEX1                    Date:      04/08/08          More:  >
SM server. . : UIS1                   Time:      14:50:23

Enter 's'  to display statistics for the selected component
      'i'  to display z/OS information for the selected component
      'd'  to produce an SVC dump for the selected component
      'dt' to produce SVC dumps for the selected component type across the plex

Cmd ID       Type Version z/OSname Jobname  DBRCname DLIname  IRLMname Status
__  IMS2     IMS  9.1.0   ECTST22  IMS2     DBREASAJ DLIEASAJ IRLME2N  READY
__           DBRC 9.1.0   ECTST22  DBREASAJ                             READY
__           DSAS 9.1.0   ECTST22  DLIEASAJ                            READY
__           IRLM 2.1.0   ECTST22  IRLME2N                             READY
__  CQS2     CQS  1.4.0   ECTST22  CQSEJ2                              READY
__  OM2OM    OM   1.2.0   ECTST22  OM2                                 READY
__  RM2RM    RM   1.2.0   ECTST22  RM2                                 READY
__  SCI2SC   SCI  1.2.0   ECTST22  SCI2                                READY
__  IMSA     IMS  9.1.0   ECTST21  IMSA     DBREASBJ DLIEASBJ IRLME2N  READY
__           DBRC 9.1.0   ECTST21  DBREASBJ                            READY
__           DSAS 9.1.0   ECTST21  DLIEASBJ                            READY
__           IRLM 2.1.0   ECTST21  IRLME2N                             READY
__  IMS1     IMS  9.1.0   ECTST21  IMS1     DBREASAJ DLIEASAJ IRLME2N  READY
__           DBRC 9.1.0   ECTST21  DBREASAJ                            READY
__           DSAS 9.1.0   ECTST21  DLIEASAJ                            READY
__  CQS1     CQS  1.4.0   ECTST21  CQSEJ1                              READY
__  OM1OM    OM   1.2.0   ECTST21  OM1                                 READY
__  RM1RM    RM   1.2.0   ECTST21  RM1                                 READY
__  SCI1SC   SCI  1.2.0   ECTST21  SCI1                                READY
******************************** Bottom of data ********************************
```

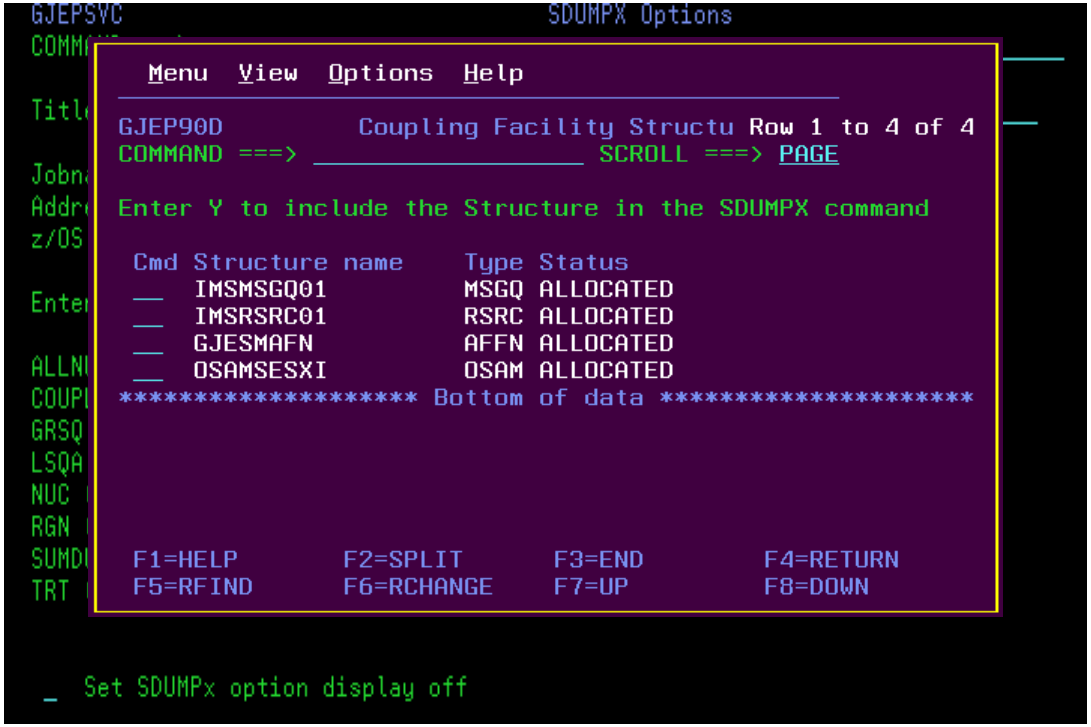
Component List (cont)



Capture Console Dumps

```
GJEPSVC                                SDUMPX Options
COMMAND ===> ____________________________________________________________

Title . . . IMSSM SDUMPX on 04/08/08 11:14:13_____________________________

Jobname . . . . . : IMS1
Address space type. : IMS
z/OS name . . . . . : ECTST21

Enter Y to include or N to exclude the SDUMPX option.

ALLNUC (All nucleus areas) . . . _     ALLPSA (All PSAs in system). . _
COUPLE (Couple). . . . . _     CSA. . . . . _
GRSQ . . . . . _     IO (I/O areas) . . . . . _
LSQA . . . . . _     LPA (Active LPAs for region) . _
NUC (Nucleus). . . . . _     PSA (Current PSA). . . . . _
RGN (Region private area). . . . _     SQA. . . . . _
SUMDUMP (Summary dump) . . . . . _     SWA (SWA for region) . . . . . _
TRT (Trace tables/GTF buffers) . _     XESDATA. . . . . _


 _  Set SDUMPx option display off
```

Capture IMS CF structures Dump



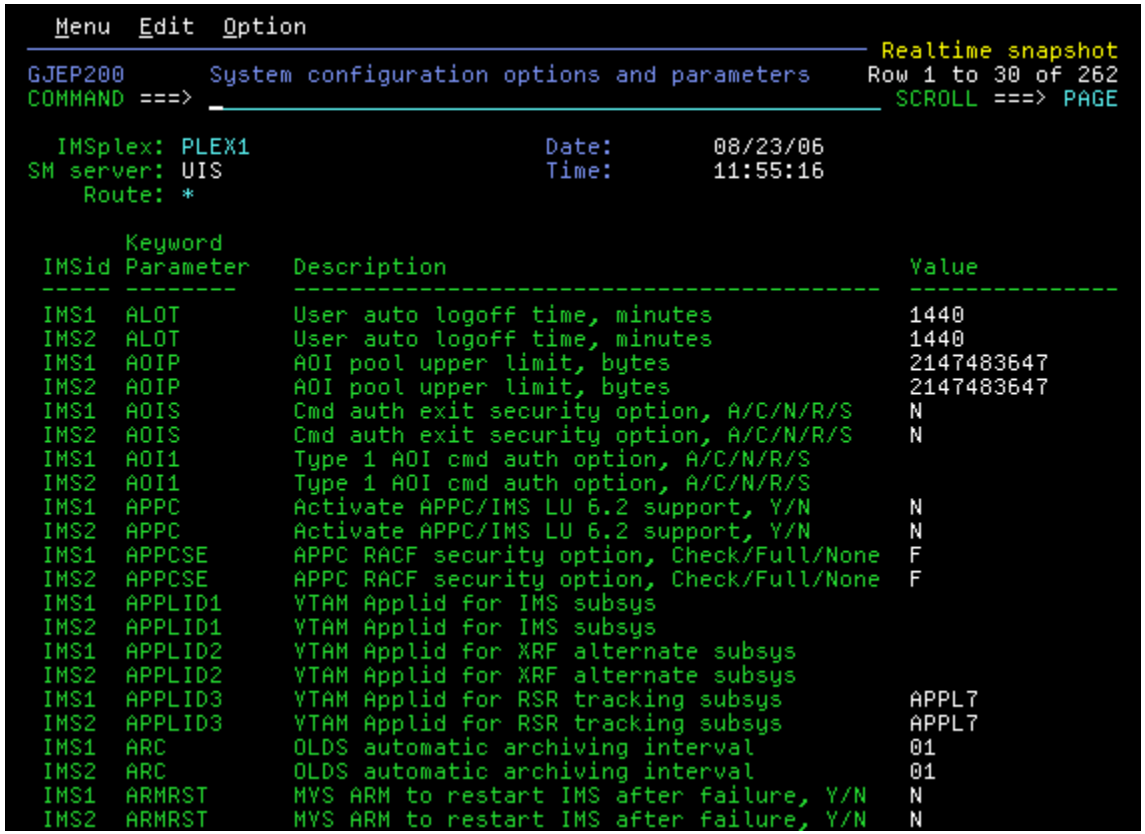
z/OS perspective for IMS address spaces

```
 Menu  View  Options  Help
                                                          Realtime snapshot
GJEPIAS        z/OS Information For IMS Address Spaces    Row 1 to 25 of 25
COMMAND ===> _____________________________________________ SCROLL ===> PAGE

IMSplex. . . PLEX1                    Date. . : 04/08/08
SM server. : UIS1                     Time. . : 11:23:40          More: >

      'd'  to produce an SVC dump for the selected address space
      'dt' to produce SVC dumps for the selected address space type plex-wide

Cmd Jobname  Type z/OSname Prty ASID  TCB time  SRB time   CPU time      EXCPs
__  IMS2     IMS  ECTST22  C9   0091      3.04       .70       3.74      9,540
__  DBREASAJ DBRC ECTST22  FE   0088       .05       .00        .05        357
__  DLIEASAJ DSAS ECTST22  FE   0097       .06       .15        .21      1,230
__  IRLME2N  IRLM ECTST22  FE   008C       .06      5.93       5.99        319
__  CQSEJ2   CQS  ECTST22  C2   002A      1.59      2.43       4.02      2,609
__  OM2      OM   ECTST22  C9   0031       .34       .11        .45      1,085
__  RM2      RM   ECTST22  C9   0095       .33       .11        .44      1,194
__  SCI2     SCI  ECTST22  C8   0028       .50       .08        .58      1,399
__  IMSA     IMS  ECTST21  C9   0032      2.16       .63       2.79      9,590
__  DBREASBJ DBRC ECTST21  FE   001A       .05       .00        .05        357
__  DLIEASBJ DSAS ECTST21  FE   0094       .06       .14        .20      1,208
__  IRLME2N  IRLM ECTST21  FE   008C       .06      5.89       5.95        319
__  IMS1     IMS  ECTST21  C9   0091      1.90       .55       2.45      9,608
__  DBREASAJ DBRC ECTST21  FE   008D       .05       .00        .05        385
__  DLIEASAJ DSAS ECTST21  FE   0093       .06       .15        .21      1,255
__  CQSEJ1   CQS  ECTST21  C5   002A       .61      2.38       2.99      2,727
__  OM1      OM   ECTST21  C9   0031       .30       .08        .38      1,088
__  RM1      RM   ECTST21  C9   0028       .30       .08        .38      1,197
__  SCI1     SCI  ECTST21  C8   0090       .51       .07        .58      1,402
__  MPP23    TP   ECTST22  C9   0030       .01       .00        .01        153
__  MPP22    TP   ECTST22  C9   0025       .01       .00        .01        153
__  MPP21    TP   ECTST22  C9   0032       .01       .00        .01        153
__  MPP13    TP   ECTST21  C9   002F       .01       .00        .01        153
__  MPP12    TP   ECTST21  C9   0030       .01       .00        .01        153
__  MPP11    TP   ECTST21  C9   002E       .01       .00        .01        153
****************************** Bottom of data ********************************
```

Scenario 2 – Managing IMS System Parameters

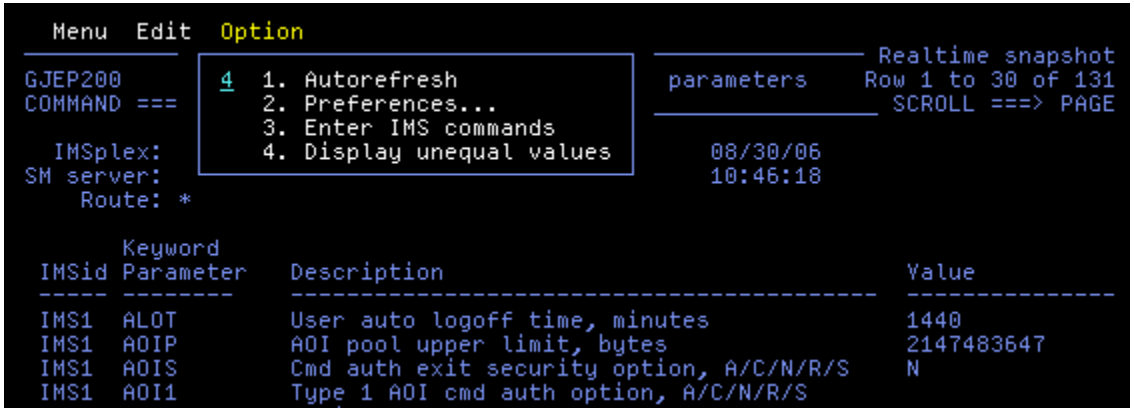
- Many system run-time parameters
  - Sources: DFSPBxxx, overrides via Control Region PARM=
  - Which ones are being used?
  - Are the parameters the same across the Sysplex?
- System parameter display
  - Real-time scrollable display of “resolved” values
  - Parameter values across all IMS systems for easy comparison
  - New – System Parameter Tutor for instant description

IMS System Parameters



```
  Menu  Edit  Option
                                                              Realtime snapshot
GJEP200      System configuration options and parameters     Row 1 to 30 of 262
COMMAND ===> _                                               SCROLL ===> PAGE

  IMSplex: PLEX1                    Date:       08/23/06
SM server: UIS                      Time:       11:55:16
    Route: *

      Keyword
 IMSid Parameter   Description                                Value
 ----- --------    ----------------------------------------   ---------------
 IMS1  ALOT        User auto logoff time, minutes             1440
 IMS2  ALOT        User auto logoff time, minutes             1440
 IMS1  AOIP        AOI pool upper limit, bytes                2147483647
 IMS2  AOIP        AOI pool upper limit, bytes                2147483647
 IMS1  AOIS        Cmd auth exit security option, A/C/N/R/S   N
 IMS2  AOIS        Cmd auth exit security option, A/C/N/R/S   N
 IMS1  AOI1        Type 1 AOI cmd auth option, A/C/N/R/S
 IMS2  AOI1        Type 1 AOI cmd auth option, A/C/N/R/S
 IMS1  APPC        Activate APPC/IMS LU 6.2 support, Y/N      N
 IMS2  APPC        Activate APPC/IMS LU 6.2 support, Y/N      N
 IMS1  APPCSE      APPC RACF security option, Check/Full/None F
 IMS2  APPCSE      APPC RACF security option, Check/Full/None F
 IMS1  APPLID1     VTAM Applid for IMS subsys
 IMS2  APPLID1     VTAM Applid for IMS subsys
 IMS1  APPLID2     VTAM Applid for XRF alternate subsys
 IMS2  APPLID2     VTAM Applid for XRF alternate subsys
 IMS1  APPLID3     VTAM Applid for RSR tracking subsys        APPL7
 IMS2  APPLID3     VTAM Applid for RSR tracking subsys        APPL7
 IMS1  ARC         OLDS automatic archiving interval          01
 IMS2  ARC         OLDS automatic archiving interval          01
 IMS1  ARMRST      MVS ARM to restart IMS after failure, Y/N  N
 IMS2  ARMRST      MVS ARM to restart IMS after failure, Y/N  N
```

IMS System Parameters



IMS System Parameters – Showing Unequal Parms

```
  Menu  Edit  Option
                                                              Realtime snapshot
GJEP201      System configuration options and parameters       Row 1 to 6 of 6
COMMAND ===>                                                  SCROLL ===> PAGE

  IMSplex: PLEX1                      Date:       08/23/06
SM server: UIS                        Time:       11:55:16
    Route: *

       Keyword
 IMSid Parameter   Description                                 Value
 ----- --------    ------------------------------------------  ---------------
 IMS1  DC          DC proclib member suffix                     C01
 IMS2  DC          DC proclib member suffix                     C02
 IMS1  IMSID       IMS subsystem identifier                     IMS1
 IMS2  IMSID       IMS subsystem identifier                     IMS2
 IMS1  SHAREDQ     DFSSQxxx shared queues member suffix         EI1
 IMS2  SHAREDQ     DFSSQxxx shared queues member suffix         EI2
********************************* Bottom of data ********************************
```

IMS System Parameters – Tutor