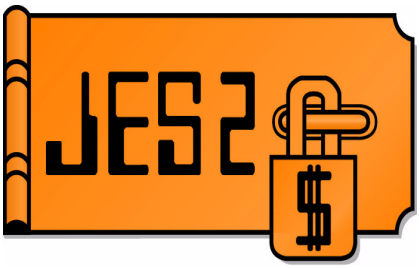


JES2 Product Update

SHARE 99, Session 2655

Monday, August 19, 2002

Chip Wood
JES2 Design/Development/Service
Poughkeepsie, NY

chipwood@us.ibm.com

JES2 z/OS releases

- **JES2 z/OS 1.2**
  - Greater than 64K jobs support
    - **Session 2656, Wed. 1:30**
  - Dynamic PROCLIB support
  - INCLUDE initialization statement
- **JES2 z/OS 1.4**
  - INCLUDE enhancements
  - JES2 Monitor
    - **Session 2657, Wed. 11:00**
  - HAM performance/restructure
  - End of Memory cleanup
  - // XMIT JCL
  - Miscellaneous enhancements

JES2 z/OS 1.2 installation

- From **JES2 OS/390 R3** or earlier
  - Migrate to more recent spool-compatible release first (preferably **R8)** to avoid **COLD** start
- From **JES2 OS/390 R4** or **R5**

  Note that **R5** and earlier releases are not supported on **z/OS 1.2** BCP (*enforced!!!*)
  - **$ACTIVATE** required to avoid **COLD** start
  - No MAS coexistence (all-member-warm start)
- MAS coexistence from **OS/390 R7-R10**
  - APAR **OW47328** needed on downlevel member
  - **$ACTIVATE** required on **R7-R8**
- **Session 2656, Wednesday 1:30**

JES2 z/OS 1.4 installation

- From **JES2 OS/390 R3** or earlier
  - Migrate to more recent spool-compatible release first (preferably **R8)** to avoid **COLD** start
- From **JES2 OS/390 R4**, **R5**, or **R7**

  Note that **R7** and earlier releases are not supported on **z/OS 1.4** BCP (*enforced!!!*)
  - **$ACTIVATE** required to avoid **COLD** start (**R4**, **R5**)
  - No MAS coexistence (all-member-warm start)
- MAS coexistence from **OS/390 R8-z/OS 1.2**
  - APAR **OW52833** needed on downlevel member
  - **$ACTIVATE** required on **R8**

JES2
z/OS 1.2

Dynamic PROCLIB

- **Problem:** PROCLIBs defined in the JES2 start proc require a JES2 restart to change
  - Change may require ALL MAS members to be restarted
  - Error in JES2 PROC may prevent restart
  - SHARE requirement ***SS-JES2-98.203***
- **Solution:** Allow dynamic allocation of PROCLIBs
  - **PROCLIB(*xxxx*)** initialization statement
  - **$ADD PROCLIB(*xxxxxxxx*)** command
  - **$T PROCLIB(*xxxxxxxx*)** command
  - **$DEL PROCLIB(*xxxxxxxx*)** command
  - **$D PROCLIB(*xxxxxxxx*)** command

PROCLIB statement

- New PROCLIB initialization statement

```
PROCLIB(xxxxxxxx)   DD(n)=(DSNAME=dsn,
                           VOLSER=volser,
                           UNIT=unit),

                    UNCONDITIONAL
```

  - Up to 255 DDs per PROCLIB
  - VOLSER and UNIT are optional (if cataloged)
  - UNCONDITIONAL - create even if allocations fail
- New operator commands
  - **$ADD PROCLIB(*xxxxxxxx*)**
  - **$T PROCLIB(*xxxxxxxx*)**
  - **$DEL PROCLIB(*xxxxxxxx*)**
  - **$D PROCLIB(*xxxxxxxx*)**

PROCLIB example

- Old way (Static PROCLIB)
  - In JES2 PROC:

```
//PROC01  DD   DSN=USER.PROCLIB1,VOL=SER=J2COM1,UNIT=3390
//        DD   DSN=USER.PROCLIB2,VOL=SER=J2COM1,UNIT=3390
//        DD   DSN=SYS1.PROCLIB
```

- New way (Dynamic PROCLIB)
  - In JES2 initialization stream

```
PROCLIB(PROC01) DD(1)=(DSN=USER.PROCLIB1,VOLSER=J2COM1,
                       UNIT=3390),
                DD(2)=(DSN=USER.PROCLIB2,VOLSER=J2COM1,
                       UNIT=3390),
                DD(3)=(DSN=SYS1.PROCLIB)
```

  - Modify using $T PROCLIB(PROC01)

Modifying dynamic proclibs

- To change concatenation for dynamic PROC01
  - Method 1:
    - **$T PROCLIB(PROC01),DD(1)=...,DD(2)=...**
    - Could require several commands due to command length limitations
    - Advantage: Simplest way if few datasets in concatenation
  - Method 2:
    - **$ADD PROCLIB(TEMP01),DD(1)=...**
    - **$T PROCLIB(TEMP01),DD(2)=...**
    - Test and update TEMP01 as required
    - **$T PROCLIB(TEMP01),NAME=PROC01**
    - Advantage: ATOMIC, Allows testing!

Modifying static proclibs

- To change concatenation for static PROC01
  - Method 1:
    - **$ADD PROCLIB(PROC01),DD(1)=...,DD(2)=...**
    - Dynamic definition overrides static definition
    - **$T PROCLIB(PROC01)** to update as necessary
    - **$DEL PROCLIB(PROC01)** to revert to static definition
  - Method 2:
    - **$ADD PROCLIB(TEMP01),DD(1)=...**
    - **$T PROCLIB(TEMP01),DD(2)=...**
    - Test and update TEMP01 as required
    - **$T PROCLIB(TEMP01),NAME=PROC01**

$D PROCLIB example

- **$D PROCLIB(PROC01)**

```
        $HASP319 PROCLIB(PROC01)
$HASP319 PROCLIB(PROC01)  DD(1)=(DSNAME=USER.PROCLIB1,
$HASP319                  VOLSER=J2COM1,UNIT=3390),
$HASP319                  DD(2)=(DSNAME=USER.PROCLIB2,
$HASP319                  VOLSER=J2COM1,UNIT=3390),
$HASP319                  DD(3)=(SYS1.PROCLIB)
```

- **$D PROCLIB(PROC01),DEBUG**

```
        $HASP319 PROCLIB(PROC01)
$HASP319 PROCLIB(PROC01)  USECOUNT=0,DDNAME=SYS00006,
$HASP319                  CREATED=2001.149,20:42:22.36,
$HASP319                  DD(1)=(DSNAME=USER.PROCLIB1,
$HASP319                  VOLSER=J2COM1,UNIT=3390),
$HASP319                  DD(2)=(DSNAME=USER.PROCLIB2,
$HASP319                  VOLSER=J2COM1,UNIT=3390),
$HASP319                  DD(3)=(SYS1.PROCLIB)
```

  - May also display old concatenations with non-zero use counts, if $T command has been issued

INCLUDE statement

- **Problem:** Changing JES2 init deck concatenation requires changing JES2 PROC
  - If update is incorrect, JES2 will not start
  - May be difficult to fix when JES2 is down
- **Solution:** New INCLUDE initialization statement
  - Reduces need to update JES2 PROC

INCLUDE statement

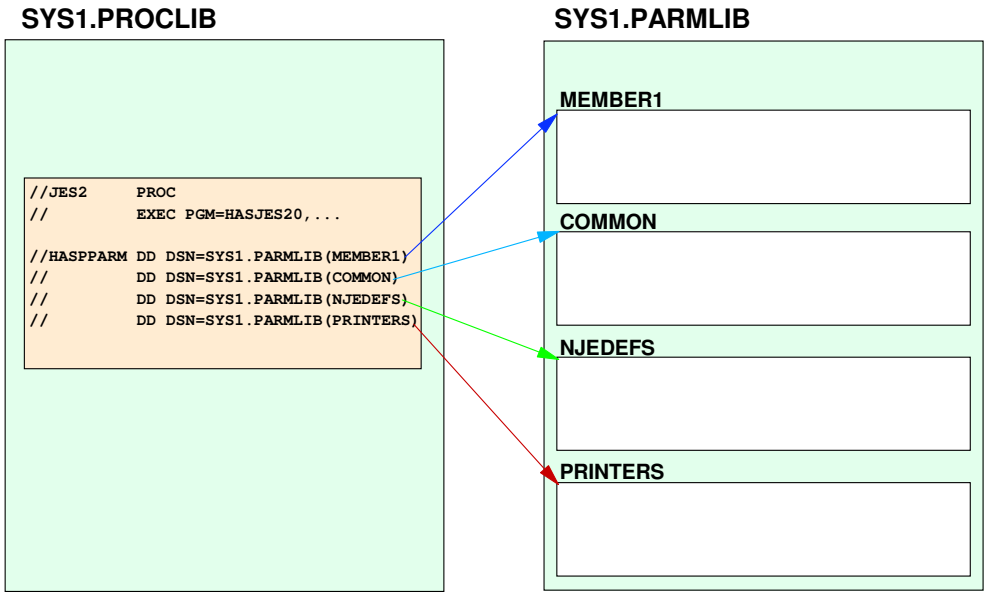
- New **INCLUDE** initialization statement

```
INCLUDE   DSNAME=dsn,
          VOLSER=volser,
          UNIT=unit
```

  - DSNAME=*dsn* may include a member name
  - VOLSER and UNIT are optional (if cataloged)
- **D INCLUDE**
  - Displays current INCLUDEd data set
  - If not in INCLUDE, displays current data set in HASPPARM concatenation
  - Useful to locate source of error when unexpectedly placed in CONSOLE mode due to error in initialization deck

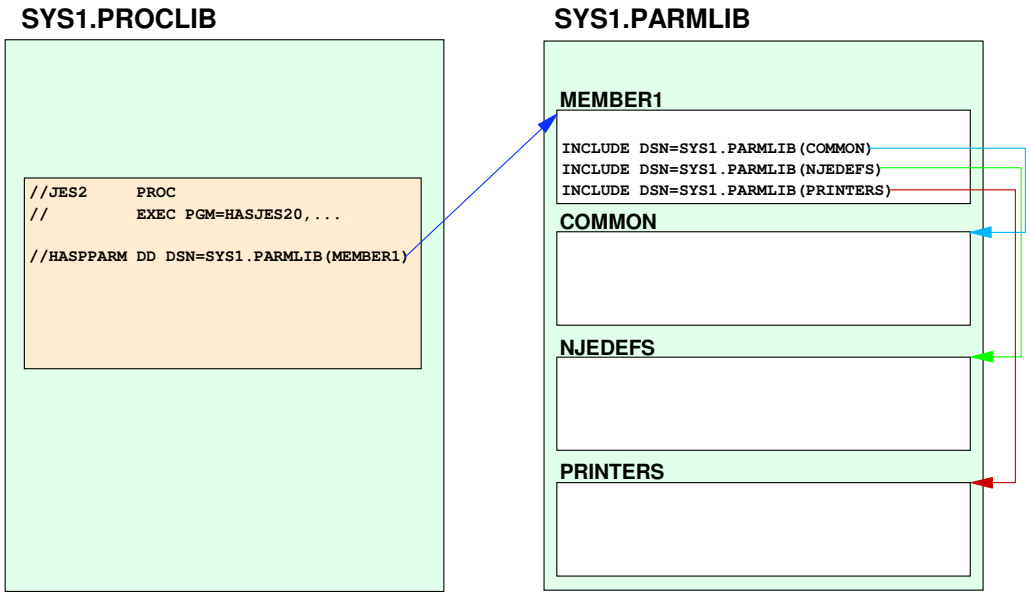
Include statement example

- Old way:



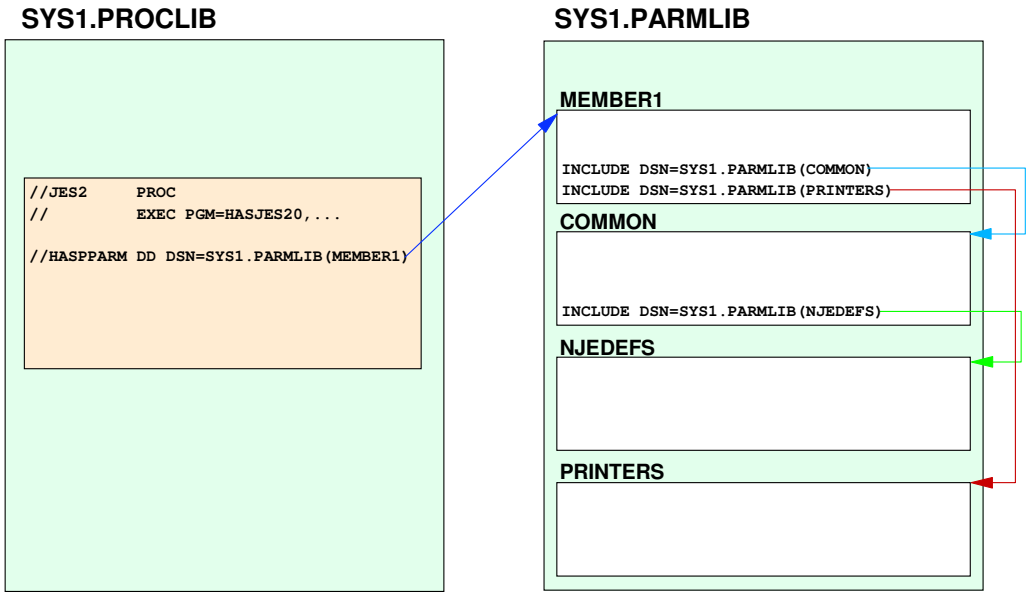
Include statement example

- New way:



Include statement example

- New way:



Combining INCLUDE and PROCLIB

- Simplify JES2 PROC
  - EXEC, one HASPPARM DD
  - Define PROCLIBS via PROCLIB statement
  - INCLUDE additional HASPPARM datasets
- In emergency, ***start JES2 without a PROC!***

```
S IEESYSAS,PROG=HASJES20,JOBNAME=JES2
```

  - Assumes **HASJES20** in LINKLIST (no STEPLIB)
  - When **HASPPARM** open fails, reply to **$HASP469** message with
    - **INCLUDE** statement(s) for correct init deck(s)
    - **PROCLIB** statements (if not in init decks)

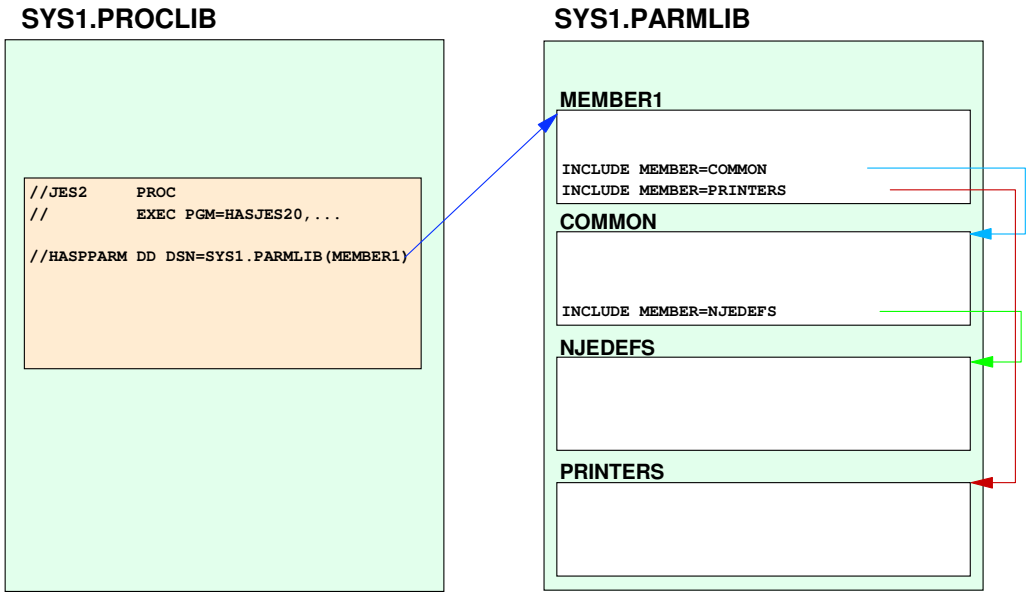
JES2
z/OS 1.4

Enhanced INCLUDE Externals

- Updates to INCLUDE initialization statement (new in z2) based on customer input
  - Current syntax of the INCLUDE init statement
    - **INCLUDE DSNAME=***dsn*,**VOLSER=***vol*,**UNIT=***unit*
  - New syntax added in z4
    - **INCLUDE MEMBER=***member*
      - *member* should be in current parmlib data set being processed
    - **INCLUDE PARMLIB_MEMBER=***member*
      - *member* should be in default logical parmlib
      - Specifying **MEMBER=** in a dataset included by **PARMLIB_MEMBER=** results in logical parmlib search, not just single dataset

Include statement example

- New way:



Default Parmlib Member

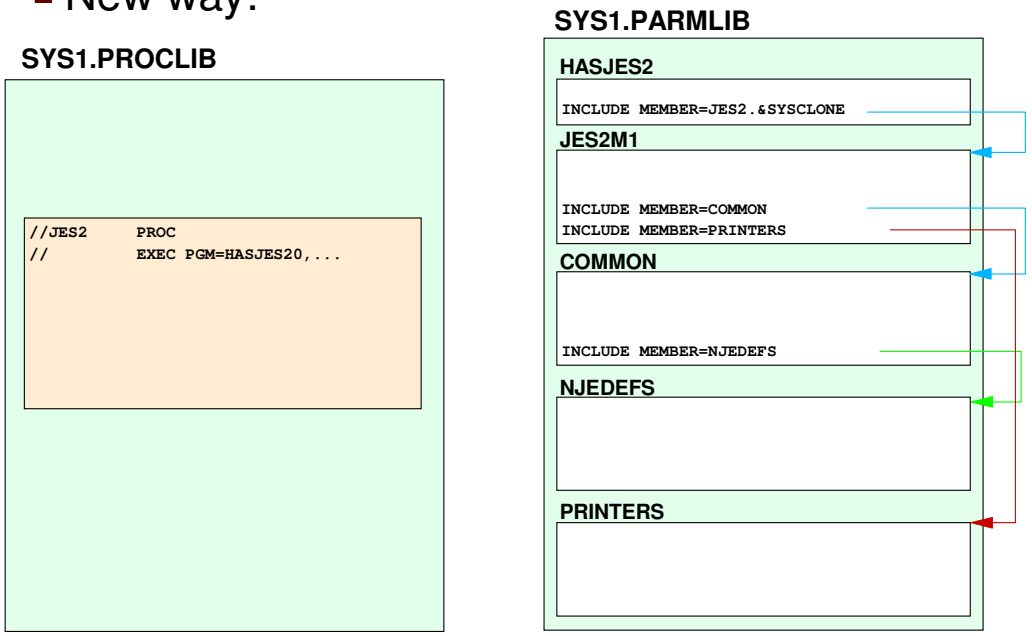
- New start option (to read from default PARMLIB)
  - **S JES2,PARM=('MEMBER=*member*')** or
  - **S JES2,PARM=('PARMLIB_MEMBER=*member*')**
  - Reply **MEMBER=*member*** to **$HASP467**
  - *member* should be the member of logical parmlib in each of these cases
  - **HASPPARM=*ddname*** and **MEMBER=** are mutually exclusive
  - If neither **HASPPARM=** nor **MEMBER=** is specified, then it will process from the default **HAS*jesx*** member of logical parmlib (***jesx*** is subsystem name)
    - IBM does not ship a default parmlib member

Search order

- If **HASPPARM=*ddname*** parameter is specified, use that DD
- If **MEMBER=/PARMLIB_MEMBER=** parameter is specifed, use that member from logical parmlib
- If neither is specified
  - Try to open DD with ddname of **HASPPARM**
  - If **HASPPARM** DD is not found, use **HAS*jesx*** member from logical parmlib

Include statement example

- New way:



Starting JES2 without a JES2 PROC

- In emergency, **start JES2 without a PROC!**

```
S IEESYSAS,PROG=HASJES20,JOBNAME=JES2
```

  - Assumes HASJES20 in LINKLIST (no STEPLIB)
  - When **HASPPARM** open fails, logical parmlib member **HASJES2** will be used
  - If **HASJES2** not found, **$HASP469** issued

```
S IEESYSAS,PROG=HASJES20,JOBNAME=JES2,
  PARM='MEMBER=MEMBER2'
```

  - Uses logical parmlib member **MEMBER2** (no open of **HASPPARM DD** attempted)
  - If **MEMBER2** not found, **$HASP469** issued

JES2 Monitor

- JES2 "Health" Monitor
  - Not a "performance" monitor (yet)
  - Some basic performance information is tracked
  - Intent is to surface **VERY SEVERE** performance problems (JES2 not responding, etc.)
- Separate address space
  - Name is ***jesx*MON** (***jesx*** - subsystem name)
  - Samples JES2 address space to determine current status of JES2 main task and resource utilization
  - Anomalies surfaced as "alerts" if not resolved in a few seconds (MVS WAITs, long running PCEs, etc)
  - **$J***xxx* commands to display when JES2 is sick
- **Session 2657, Wednesday 11:00**

HAM I/O Improvements

- **Problem:**
  - HAM I/O is single record (except FSS)
  - HAM code is old with RAS problems
- **Solution:**
  - Use multi record I/O to read and write SYSOUT and SYSIN data from/to SPOOL
  - Use EXCPVR to reduce overhead
  - Improve overall RAS
  - (Almost) No external changes
  - Massive internal changes

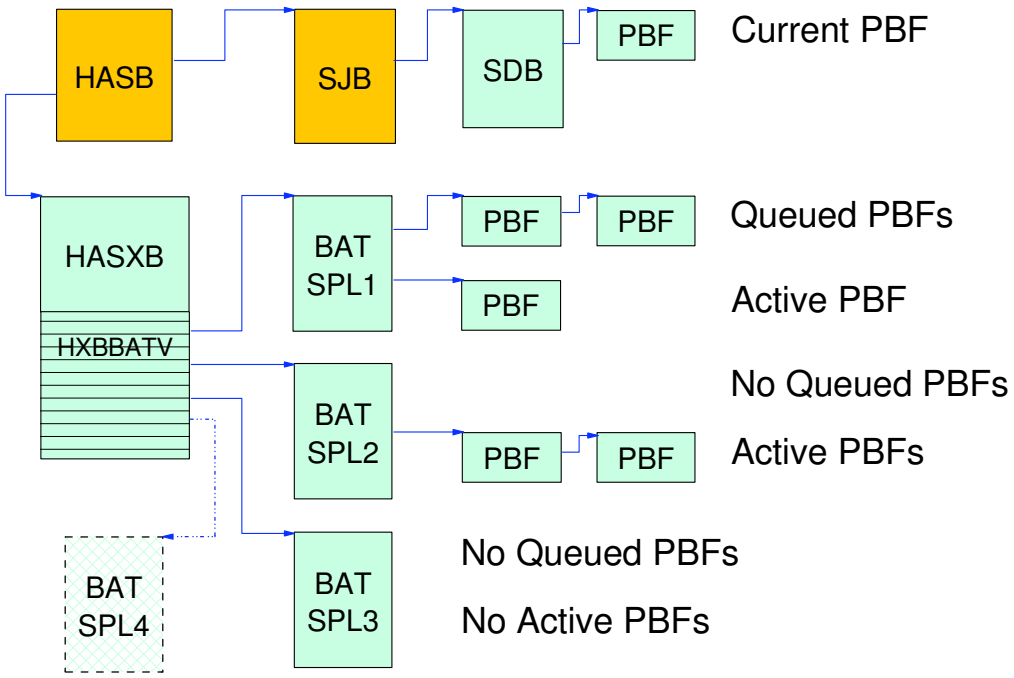
HAM internal changes

- Internal reader processing was unchanged
- SVC 111 only used for internal reader
  - PC routines used in all other cases
- New SDB lock to serialize all PC services
- EXCPVR used instead of EXCP
- Format 1 CCWs used (31 bit CCW)
- I/O associated with job step TCB not current
  - Less code needed at EOT
- SDBs are above the line
  - DEB pointer to SDB is 31 bit address shifted 7 bits
  - SDBs are obtained on appropriate boundary

HAM PUT internal changes

- HAMPUT does a PC for every record
  - No UBUF for PUT
- PUT can be from any key
- Serialized by new SDB lock
- Counts records as they are PUT
  - Not when buffer is full
  - May affect excession exit ($EXIT 9)
- PBUFs for PUT queued by volume not data set
- 1 EXCPVR can write up to 12 buffers

Data Structure (PUT)



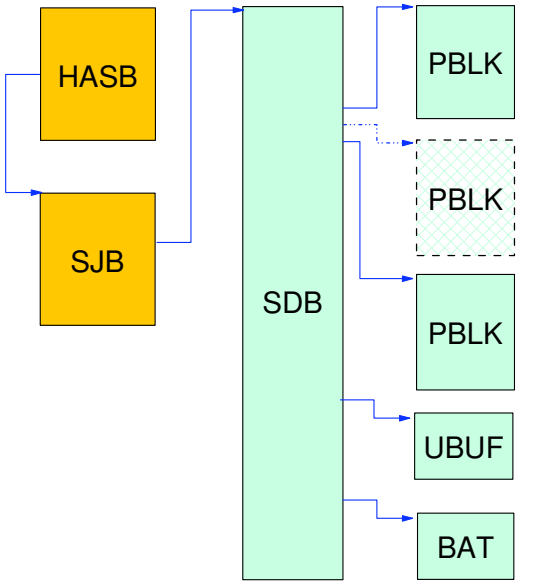
Data Areas (PUT)

- SDB - Subsystem data set block
  - One active PBF, no UBF
  - Full PBF gets queued to BAT for volume
- HXBBATV - BAT vector in the HASXB
  - One per potential SPOOL volume
  - BATs obtained as needed (for writes)
  - BATs are not freed until HASXB freed
- BAT - Buffer Auxiliary Table
  - Below the line IOB
  - Pending and active PBF chains

HAM GET internal changes

- HAMGET still uses a UBUF
  - PBUFs are no longer used
  - PBLKs are used instead
- PC when UBUF empty
- FSS and normal GETs all work the same
  - Track cell (and more) reads for all GETs

Data Structure (GET)



Inactive PBLOCK

Active PBLOCK

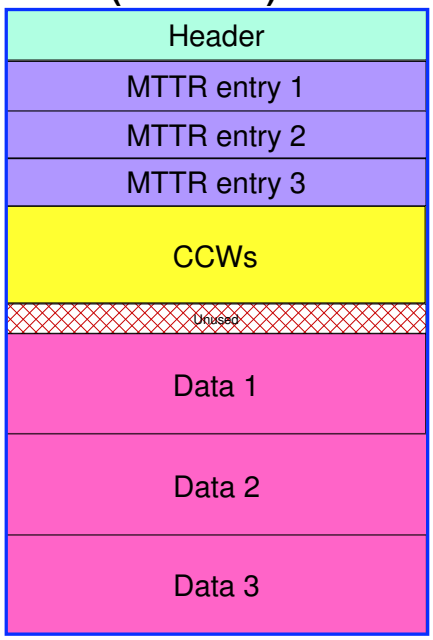
Full PBLOCK

Data Areas (GET)

- SDB - Subsystem data set block
  - Three queues of PBLKs
    - Inactive PBLKs (empty, no I/O active)
    - Active PBLKs (I/O active)
    - Full PBLKs (I/O completed, Buffers full)
  - 2 buffers obtained when SDB obtained
- BAT - Buffer Auxiliary Table
  - One per SDB
  - IOB used for I/O

Data Structure (PBLK)

PBLK (3 MTTRs)



- Always multiple of pages
- Data contiguous at end
- No headers in front of data
- Can have 1-12 MTTRs
  - 12 is one track
- Could be no unused space
- Entire PBLK read in one EXCPVR
- Can have unused entries
  - Short track group

Data Area (PBLK)

- PBLK - Protected Block
  - Buffer to read HDBs into
  - Size set at data set open
    - Non-trackcelled, 1 buffer
    - Trackcelled, TRKCELL buffers
    - SPIN, SYSIN, 1 tracks worth of buffers (3390)
  - MTTR entries correspond to buffers, contains
    - MTTR and address of buffer
    - Flags
    - IDAWs

Blank Truncation

- "Null" records no longer changed to "blank" records by HAM processing
  - No longer pad with single blank
  - Could affect line counts for some datasets
  - Consistent with NJE processing
- Blank truncation on FSS printers
  - Original LRECL now passed over the FSS interface
  - Allows FSS printers to pad out blanks that were deleted by JES2
  - Requires FSS exploitation
- New field in IAZIDX
  - **IDXORECL** - 2 byte original LRECL
  - Only in first in segment of record

$EXIT 9

- Records are counted for each PUT, not each full buffer
- Exit 9 gets control at exact excession count, not first full buffer after excession
- "Should" not affect most exits

Count on entry (pre-z4)	Count on entry (z4)
4039	4001
8067	8001
12095	12001
16017	16001
20045	20001
24073	24001
28101	28001
32023	32001
36051	36001

End of Memory (EOM)

- **Problem:**
  - The BCP began terminating EOM TCBs in z2 if they took too long to finish (abend 30D)
  - JES2's EOM activities entailed WAITing for the JES2 main task.
  - The JES2 main task could be down (JES2 abend) or awaiting access to the checkpoint
  - JES2 EOM could be abended resulting in lost (JES2) resources
- **Solution:**
  - Don't wait for JES2 main task from EOM processing

End of Memory (EOM)

- Solution details
  - Use the JES2 SJB (Subsystem Job Block) to represent an executing unit of work, but nothing else
    - PSO control block moved to dataspace (*jesx***PSO**) and used for communication with JES2 for PSO requests
    - New STAC control block in dataspace (*jesx***STAC**) used for communication with JES2 for status/cancel requests
    - Do not wait for the JES2 address space to update JQEs before allowing MVS to reuse the terminating address space
    - Do not wait for JES2 to finish Internal Reader Processing

EOM Line item side effect

- JES2 no longer checks TSO logons for duplicate logons. The same userid can be logged on more than once in a JESplex.
- Installation controls this by making **SYSIKJUA** be a **SYSTEMS** ENQ
  - New sample exit **HASX44B** can be enabled to restore checking to HASPCNVT
- Multiple instances of a single userid logged onto a JESplex is **not officially supported**.

EOM Line item side effect *(continued)*

- What will happen if multiple logons of same userid?
  - TSO GR (Generic Resource) will fail to determine what MVS should be used for reconnect.
  - An MCS **SEND** command to a given user will work if user is logged onto same MVS image as SEND command. The message will go only to the "local" instance
  - An MCS **SEND** command will not go to any of the multiple instances if none are logged onto the "local" MVS image
  - Notify messages will only be sent to first instance found

XMIT JCL card

- JES2 now supports the // **XMIT** JCL card to route job execution to another node.
  - Previously only supported by JES3
  - Requirement ***SO-JES2-93.006***
  - The **SUBCHARS=** keyword is not supported by JES2 (JCL error)
  - **/*XMIT**, **/*XEQ** and **/*ROUTE XEQ** still supported

Invalid Jobname Character

- Invalid JOBNAME character now specifiable
  - Requirement ***SO-JES2-97.203***
  - Was always a **?**
    - For displays, treated as generic
    - **$DJOBQ(*?*)** does not display all jobs with a bad jobname character
  - **JOBDEF BAD_JOBNAME_CHAR=**
    - Can now be **? / + : _ - !** or alpha/numeric/special
    - Only affects newly arriving jobs
  - Example
    - **JOBDEF BAD_JOBNAME_CHAR=!**
    - **$DJOBQ(*!*)** displays all jobs with an !

$TRACE 32

- **$TRACE 32** - $#REM
  - Traces every $#REM call
  - Use to determine why output is disappearing unexpectedly
  - Dumps JOE contents in hexadecimal and EBCDIC

```
14.47.51.42  ID =  32 $#REM    JOB00009   COMM      06B7B3C8  JOE REMOVAL
       0  80000000 C1000006 00000000 00000005   20000000 48000005 00000000 02000000  *....A..
      20  00000000 09000000 0C001005 0000001D   00000000 00000000 00000000 0B001004  *.......
      40  00000000 00010000 F1404040 40404040   00010001 B7F86252 4E4E4E4E 4E4E4E4E  *.......
      60  00000000 00000000                                                         *.......
```

$TRACE 33

- **$TRACE 33** - NJE Header/Trailer
  - Traces every NJE Header or Trailer
  - No need to decode $TRACE 4 or 5
  - Specify **TRACE=YES** on **OFFLOAD**, **LINE**, or **NODE**

```
14.58.14.14  ID =  33 NJEHDR   STC00011   L19.ST1   06B17180  TRANSMIT JOB HEADER
JOB HEADER PREFIX
           NJHLEN=0170 NJHFLAGS=00 NJHSEQ=00
JOB HEADER GENERAL SECTION
           JOBNAME=DEALLOC  JOB NUMBER=11  ORIGIN=NODE1   """""""" EXECUTION=NODE1
         0  00D40000 000BD0C1 400F0F01 00000000   00000000 00000000 C4C5C1D3 D3D6C340  *.M....
        20  00000000 00000000 00000000 00000000   00000000 00000000 B7F8646C A62E3245  *......
        40  D5D6C4C5 F1404040 00000000 00000000   D5D6C4C5 F1404040 40404040 40404040  *NODE1
        60  D5D6C4C5 F1404040 40404040 40404040   D5D6C4C5 F1404040 40404040 40404040  *NODE1
        80  E2E3C440 40404040 00000002 00015180   3B9AC618 000F423F 40404040 40404040  *STD
        A0  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040  *
        C0  40404040 0000001D 0000000B 00000000   00000000                            *    ..
JES2 SECTION OF THE JOB HEADER
         0  00348400 01000000 00000000 00000000   00000000 00000000 00000000 00000000  *..d...
        20  00000000 00000000 00000000 00000000   00000000                            *......
JOB SCHEDULING SECTION OF THE JOB HEADER
         0  000C8A00 000F423F 7FFFFD78                                                *......
SECURITY SECTION OF THE JOB HEADER
         0  00588C00 00048000 50012006 C0010000   00000000 00000000 D5D6C4C5 F1404040  *......
        20  00000000 00000000 D5D6C4C5 F1404040   00000000 00000000 E2E3C3C9 D5D9C4D9  *......
        40  00000000 00000000 4E4E4E4E 4E4E4E4E   00000000 00000000                   *......
```

Miscellaneous changes

- **INITDEF PARTNUM=0** now valid
  - No JES initiators defined
- JES2 now passes a count of jobs that can run only on constrained systems in WLM sampling data.
  - WLM can better decide whether to start initiators on constrained systems
  - **$DPERFDATA(SAMPDATA)** displays count

```
$HASP660 $DPERFDATA(SAMPDATA)
$HASP660 SERVICE CLASSES KNOWN TO JES2:
$HASP660 SRVCLASS(WLMSHORT)=(TOKEN=16748000,REGISTERED,SYSTEMS=
$HASP660 (AQFT,AQTS))
$HASP660 SERVICE CLASS SAMPLING DATA:
$HASP660 SRVCLASS(22)=(SYS_QUEUE=0,SYS_INEL=9,SYS_LIMIT=0,
$HASP660 LOCAL_QUEUE=0,CONSTRAINT_AFFINITY=0,LOCAL_INEL=9)
$HASP660 REPORT CLASS SAMPLING DATA:
```