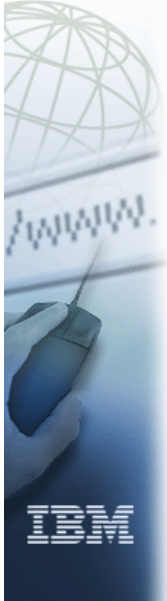


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JES2 V1R9 Enhancements



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eNetwork	DFSMS/MVS	IMS	RMF
geoManager	DFSMSdfp	IMS/ESA	RS/6000
AD/Cycle	DFSMSdss	IP PrintWay	S/390
ADSTAR	DFSMSshsm	IPDS	S/390 Parallel Enterprise Server
AFP	DFSMSrmm	Language Environment	SecureWay
APL2	DFSORT	Multiprise	StorWatch
APPN	Enterprise System 3090	MQSeries	Sysplex Timer
BookManger	Enterprise System 4381	MVS/ESA	System/390
BookMaster	Enterprise System 9000	Network Station	System REXX
C/370	ES/3090	NetSpool	SystemView
CallPath	ES/4381	OfficeVision/MVS	SOM
CICS	ES/9000	Open Class	SOMobjects
CICS/ESA	ESA/390	OpenEdition	SP
CICS/MVS	ESCON	OS/2	VisualAge
CICSPlex	First Failure Support Technology	OS/390	VisualGen
COBOL/370	FLowMark	Parallel Sysplex	VisualLift
DataPropagator	FFST	Print Services Facility	VTAM
DisplayWrite	GDDM	PrintWay	WebSphere
DB2	ImagePlus	ProductPac	3090
DB2 Universal Database	Intelligent Miner	PR/SM	3890/XP
DFSMS	IBM	QMFr	z/OS
	IBM System z	RACF	z/OS.e

Domino (Lotus Development Corporation)
 DFS (Transarc Corporation)
 Java (Sun Microsystems, Inc.)
 Lotus (Lotus Development Corporation)

Tivoli (Tivoli Systems Inc.)
 Tivoli Management Framework
 (Tivoli Systems Inc.)
 Tivoli Manger (Tivoli Systems Inc.)

UNIX (X/Open Company Limited)
 Windows (Microsoft Corporation)
 Windows NT (Microsoft Corporation)



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JES2 V1R9 Enhancements



- ❑ SSI requests authorization mitigation
 - Allows select JES2 SSIs to be invoked from unauthorized programs
 - Security and exit enhancements
- ❑ \$C Job command enhancements
- ❑ \$TRACE facility enhancements
- ❑ Changes to JES2 installation exits



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JES2 V1R9 Enhancements



- ❑ APAR OA21346 - Dynamic exits
 - Allows installation load modules to be refreshed dynamically
 - Allows list of routines associated with an exit point to be modified dynamically
 - Available for z/OS V1R8 and higher



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JES2 and the SSI



- ❑ JES2 supports API calls that allows applications to manage jobs and SYSOUT data sets
 - This API is implemented through the subsystem interface (SSI) - IEFSSREQ macro
- ❑ Before z/OS V1R9, most of the JES2 SSI requests required the callers to be authorized, running in supervisor state, or by system key
 - This requirement poses a security threat to the system since authorized callers can bypass system security and potentially harm the system
 - It was up to the caller to make sure that they do not compromise the system



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JES2 and the SSI



- ❑ JES2 in z/OS V1R9 addresses this security issue by enhancing much of the authorization requirements for the SSI requests it supports
- ❑ Many JES2 SSI requests are updated to allow unauthorized callers
 - JES2 SSI requests are changed to access data passed by the caller in the caller's key
 - This is now done for unauthorized callers as well as authorized callers
 - RACF authorization checks are added to protect sensitive JES2 data that is returned by some of the JES2 SSI requests



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Unauthorized SSI Calls



- ❑ JES2 SSI interfaces only support authorized callers
 - Applications must be in authorized libraries
 - Installation concerns over security, system integrity
 - Implies additional work and additional cost
- ❑ JES2 V1R9 allows unauthorized access to SSI functions for the following SSIs

SSI 11 - Destination validation and conversion

SSI 70 - SJF modify service

SSI 71 - JES2 router SSI sub functions

.. Obtain/Return JOBCLASS information

.. SPOOL read SSI

.. Convert device id (DEVID) to device name

.. Obtain/Return monitor information

SSI 75 - Notify user

SSI 79 - SYSOUT API (SAPI)

SSI 80 - Extended Status

- In addition, SPOOL Browse (SVC 99 support) was also updated



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SSI Logic Changes



- ❑ Modification to SSI logic include
 - Logic to get SSI code authorized (new PC routine)
 - Accessing input data in SSI callers key
 - Always done now even if caller is authorized
 - Adding SAF calls to protect sensitive data
 - Existing authorized callers can turn on SAF calls
 - Alteration to JES2 exits to pass caller data in \$XPL
- ❑ Additionally, some SSIs have been functionally enhanced
- ❑ \$SSIBEGN macro has changed significantly
 - Changes should be transparent for JES environment SSIs
 - May require rework if used outside of a JES environment



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SSI Logic Changes



JES2 SSVT

1	3	0	0	5	0	0	7	0	0
0	0	0	0	9	0	0	0	0	0
0	11	0	0	0	0	0	0	0	0
0	0	0	0	13	0	15	0	0	0
0	0	0	17	0	0	0	0	0	0
@ PC interface routine									
@ \$\$\$IBEGN for SSI 1									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 2									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 5									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 8									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 16									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 22									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 35									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 37									
@ PC interface routine									
@ \$\$\$IBEGN for SSI 44									

PC Interface Routine

```
ISVR_BA1 STM R14,R12,12(R13)   Populate callers save area
IILH R15,xxxx                 Set 1st and
IILL R15,xxxx                 2nd half of PC
PC 0(R15)                     Call routine
BR R14                        Return to caller
```

\$\$\$IAUTH Routine

```
Verify SSCT/SSVT matches HCCT or is in the Subsystem table
Index into SSVT based on SSI function number in SSOB
Use SSVT index +1 (even value) to locate $$$IBEGN address
Validate caller's authorization to SSI
Enter $$$IBEGN at +4
```

\$\$\$IBEGN Macro

```
SSICMD J $EE1897             Jump over segment ID
J $4ICMD                      Alternate entry point
DC CL8'SSICMD'                HASP routine identification
$EE1897 STM R14,R12,12(R13)   Save caller's regs *****
BAKR R14,0                    Create LS Entry * Non
LR R11,R0                     Get addr of SSCVT * PC
LAE R11,0(R11,0)              Ensure AR11 is zero * entry
L R11,SSCTSUS2-SSCT(,R11)    Get HCCT addr * only
SPKA 0(0)                     Ensure key 0 *****
$4ICMD LAE R12,0(R15,0)       Establish base register
```



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Cancel Job Processing



- ❑ When an initiator is ready to run a new job, it uses the job select SSI request (SSI 5)
 - Requesting JES2 to scan the job queue and select a new job to run under this initiator
 - In early stages of job select processing, while JES2 and MVS are still building the environment, the initiator is no longer acting like an initiator, but it does not have the job
 - MVS CANCEL and FORCE commands cannot act on jobs or initiators in early stages of job selection
 - When a cancel an initiator at this stage, for example using a C INIT,A=n command, following message is issued:

```
IEE341I INIT NOT ACTIVE IN SPECIFIED ADDRESS SPACE
```



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Cancel Job Processing



- ❑ With z/OS V1R9, the JES2 \$C Job command is enhanced to support canceling jobs in early stages of job select
 - The JES2 cancel command uses the CALLRTM system service to terminate the job
 - Requesting a dump supported by the \$C Jnnn,DUMP

```
$cj18
JOB00018  $HASP890  JOB(JOBT)
$HASP890  JOB(JOBT)          STATUS=(EXECUTING/IBM1),CLASS=A,
$HASP890          PRIORITY=9,SYSAFF=(ANY),HOLD=(NONE),
$HASP890          CANCEL=YES
STC00017  IEF450I  INIT  INIT  -  ABEND=S422  U0000  REASON=00010204
          TIME=19.36.10
STC00017  $HASP395  INIT      ENDED
JOB00018  $HASP310  JOBT      TERMINATED AT END OF MEMORY
```



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Cancel Job Processing



- ❑ When the \$C Job command cannot cancel a job
 - To handle these situations, a new FORCE parameter is introduced in z/OS V1R9 for the \$C Job command
 - When \$C Jnnn,FORCE is used, JES2 issues the CALLRTM TYPE=MEMTERM system service to terminate the initiator address space
 - The address space is ended with ABEND code S422 and a reason code of X'00030208'



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\$TRACE Facility Enhancements



- ❑ The \$TRACE facility allows JES2 diagnostic information to be collected in order to help debugging problems in the system
 - Amount of collected trace information can be huge
 - Sometimes it is difficult to locate the interesting information in the trace output
- ❑ In z/OS V1R9, it is now possible to specify filters by:
 - Address space ID
 - Job name
 - Job number
 - TCB address



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TRACE Initialization Statement and \$T TRACE command



- ❑ To control trace filters, new keywords to the TRACE initialization statement and the \$T TRACE command
 - ASID= - Specifies the ASID used when filtering this JES2 trace point
 - JOBNAME= - Specifies the job name used when filtering this JES2 trace point
 - JOB_NUMBER= - Specifies the job number used when filtering this JES2 trace point
 - TCB_ADDRESS= - Specifies the TCB address in to further limit tracing to the specified TCB
 - This operand is ignored if ASID=, JOBNAME=, and JOB_NUMBER= are not specified



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Using \$T TRACE Command



- ❑ **\$T TRACE** command sets filters for ASID number X'AB'
 - ASID X'AB' is actually a TSO/E user who is just about to submit a job by the name PELEGTSO
 - START=YES to start trace IDs 1, 2,18,19 to see JQRP PCE calls to \$SAVE and \$RETURN

```
$T TRACE(1-2,18-19),START=YES,ASID=AB,JOBNAME=PELEGTSO
$HASP667 TRACE(1)
$HASP667 TRACE(1)      START=YES,ASID=00AB,
$HASP667                JOBNAME=PELEGTSO
$HASP667 TRACE(2)
$HASP667 TRACE(2)      START=YES,ASID=00AB,
$HASP667                JOBNAME=PELEGTSO
$HASP667 TRACE(18)
$HASP667 TRACE(18)     START=YES,ASID=00AB,
$HASP667                JOBNAME=PELEGTSO
$HASP667 TRACE(19)
$HASP667 TRACE(19)     START=YES,ASID=00AB,
$HASP667                JOBNAME=PELEGTSO
```



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\$TRACE Facility Enhancements



- ❑ Use the **\$T TRACEDEF** command to start the \$TRACE facility and set the output class and log size

```
$T TRACEDEF,ACTIVE=YES,LOG=(START=YES,CLASS=A,SIZE=10000)
$HASP698 TRACEDEF
$HASP698 TRACEDEF  ACTIVE=YES, TABLES=3, PAGES=9,
$HASP698           TABWARN=80, TABFREE=3, LOG=(CLASS=A,
$HASP698           START=YES, SIZE=10000),
$HASP698           STATS=(TOTDISC=0, DISCARDS=0, IDS=(1, 2,
$HASP698           18, 19))
$HASP800 $TRCLOG  THE JES2 EVENT TRACE LOG IS NOW ACTIVE
```



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\$TRACE Facility Enhancements



- ❑ To stop the trace, use the \$T TRACEDEF command and SPIN parameter to spin off the \$TRCLOG trace data set
- ❑ Turn off trace IDs 1, 2, 18 and 19, with \$P TRACE command

```
$T TRACEDEF,ACTIVE=NO,SPIN
$HASP698 TRACEDEF
$HASP698 TRACEDEF ACTIVE=NO, TABLES=3, PAGES=9,
$HASP698 TABWARN=80, TABFREE=2, LOG=(CLASS=A,
$HASP698 START=YES, SIZE=10000),
$HASP698 STATS=(TOTDISC=0, DISCARDS=0, IDS=(1, 2,
$HASP698 18, 19))
$HASP801 $TRCLOG JES2 EVENT TRACE LOG QUEUED TO CLASS A (OUTDISP=WRITE)
$P TRACE(1-2,18-19)
$HASP667 TRACE(1) START=NO, ASID=00AB, JOBNAME=PELEGTSO
$HASP667 TRACE(2) START=NO, ASID=00AB, JOBNAME=PELEGTSO
$HASP667 TRACE(18) START=NO, ASID=00AB, JOBNAME=PELEGTSO
$HASP667 TRACE(19) START=NO, ASID=00AB, JOBNAME=PELEGTSO
```



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INTRDR Tracing



- ❑ New keywords added to INTRDR initialization statement and \$T INTRDR to control internal readers trace filters
 - These filters are used only when INTRDR TRACE= and Trace data is collected if any one of the filters is matched
 - TRACE=YES is set, the filters do not apply and all internal reader PUTs in the system are traced
 - The new keywords are:
 - ASID_TRACE= - Specifies the ASID used when filtering this internal reader
 - JOBNAME_TRACE= - Specifies the job name used when filtering this internal reader
 - JOB_NUMBER_TRACE= Specifies the job number used when filtering this internal reader



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INTRDR Tracing



- ❑ Using the \$TRACE facility and setting internal reader filters
 - Once the filters for the internal reader are defined:
 - Turn on the selective trace IDs 11 and 12 to trace \$SAVE and \$RETURN for the internal reader

```
$T INTRDR,TRACE=NO,ASID=AB,JOBNAME=PELEGTSO
$HASP838 INTRDR
$HASP838 INTRDR AUTH=(DEVICE=YES,JOB=YES,SYSTEM=YES),
$HASP838 BATCH=YES,CLASS=A,HOLD=NO,HONORLIM=NO,
$HASP838 PRTYINC=0,PRTYLIM=15,SYSAFF=(ANY),
$HASP838 TRACE=NO,ASID_TRACE=00AB,
$HASP838 JOBNAME_TRACE=PELEGTSO
$T TRACE(11-12),START=YES
$HASP667 TRACE(11) START=YES
```



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Changes to JES2 Exits



- ❑ \$JCT eye catcher
 - This change that affects most exits with the JCT eye catcher field name in the \$JCT mapping macro
- ❑ Prior to z/OS V1R9, the \$JCT eye catcher field name was JCTID
- ❑ In z/OS V1R9, the \$JCT eye catcher field name is changes to JCTIDENT
 - Resolves the conflict between the JES \$JCT mapping macro eye catcher and MVS JCT mapping macro with an eye catcher field named JCTID
 - If your exit routines refer to the JCTID field in the \$JCT - change them to refer to JCTIDENT



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Exit 8 - User Environment \$CBIO



- ❑ Before z/OS V1R9, JES2 exit 8 used the MTTR parameter to specify a track address
- ❑ Starting with z/OS V1R9, JES2 exit 8 uses the MQTR parameter instead
 - MQTR introduced in z/OS V1R7 for large spool volumes
 - The use of MQTR will eventually replace the use of MTTR
 - If you have exit routines that examine field CBMTTR, change them to examine field CBMQTR instead of field CBMTTR

Exit 31 - Allocation SSI



- ❑ Before z/OS V1R9, there was no mapping macro for the exit 31 parameter list
 - Just an area pointed to by a register, with the contents at all applicable offsets
- ❑ z/OS V1R9 exit 31 uses the \$XPL data area instead
 - If you use exit 31, change your exit routine
 - The \$XPL is passed in R0 and contains the same information as the old parameter list
 - R1 still points to an area that maps the same as the old parameter list, except the condition and response bytes
 - These are no longer at offsets +1 and +2 in the area pointed to by R1, they are only in the \$XPL

Exit 42 and Exit 45



- ❑ The notify user and SWB modify SSIs in z/OS V1R9 allow unauthorized callers
- ❑ The SSOB extensions they pass are now potentially in a user key
 - The storage the SSOB extensions are allocated in must be referenced and updated using the caller's key
 - To help exit writers, the fields in the SSOB and extensions are now passed individually to the exit in the \$XPL



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\$DSPL Performance



- ❑ Logic for the \$DSPL command was extremely inefficient when displaying status of DRAINING volumes, possibly causing noticeable performance degradation
- ❑ z/OS V1R9 changes
 - Job queue scan begins at the last job number examined by command processing - replaces entire job queue scan
 - A JQA is fetched only if necessary - replaces each job
 - Once all possible status information is gathered, job queue scan is terminated - replaces continuing the scan



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Stunted Volume Processing



- ❑ When starting a spool volume, there may not be enough room in the track group map for the entire volume
 - The operator is given a chance to decide if they want to use as much as possible space for the volume by:
 - The HASP811 (\$SSPL command) or
 - HASP853 (initialization) message
 - If they reply YES, it is called a stunted volume
 - It remains that way unless the volume is drained and restarted
- ❑ With z/OS V1R9, JES2 detects stunted volumes when appropriate and expands them to full defined capacity



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Stunted Volume Processing



- ❑ JES2 now reclaims “stunted” space in the TGM
- ❑ Mark “stunted” spool volume by turning on DAS3STUN
- ❑ Initialization detects any stunted volumes and communicate their existence to the SPOL PCE
- ❑ When TGM space becomes available, JES2 will attempt to reclaim space for “stunted” volumes
- ❑ A “stunted” volume may still be “stunted” after DADSTUNT routine completes



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Migration Considerations



- ❑ **From JES2 OS/390 V2R10 or earlier**
 - Migrate to more recent spool-compatible release first (z/OS V1R5) to avoid cold start
 - \$ACTIVATE,LEVEL=z2 on that release (no \$ACTIVATE support in z/OS V1R9)
- ❑ **From JES2 z/OS V1R2 or z/OS V1R4**
 - \$ACTIVATE,LEVEL=z2 required to avoid cold start
 - No MAS coexistence (all member warm start)
- ❑ **From JES2 z/OS V1R5**
 - \$ACTIVATE,LEVEL=z2 required to bring up z/OS V1R9
 - APAR OA20935 needed on z5 member to coexist in MAS with z/OS 1.9
- ❑ **From JES2 z/OS V1R7 or z/OS V1R8**
 - APAR OA20935 needed on R7/R8 member to coexist in MAS with z/OS V1R9



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Migration Considerations



- ❑ **Can coexist in a MAS with z/OS V1R7, z/OS V1R8**
- ❑ **APAR OA17226 required on down level members with following PTF numbers:**
 - z/OS V1R7 – UA90373
 - z/OS V1R8 – UA90374

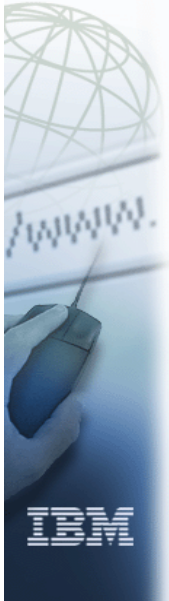


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JES3 V1R9 Enhancements



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Relief of the OSE buffer number limit



- ❑ JES3 output service was limited by its original design to 2 bytes for the Output Scheduling Element (OSE) buffers for each job
 - Limit of 32K OSE buffers
- ❑ JES3 code that worked with the buffer numbers did so with signed instructions per job
 - APAR OW55574 introduced changes to JES3 to process the 2 bytes fields with unsigned instructions
 - This reduced the problem by allowing for 64K OSE buffers per job
- ❑ Long running applications with many SYSOUT data sets, such as printing applications, may reach the 64K limit
 - IAT6718 OSE BUFFER LIMIT REACHED

Relief of the OSE buffer number limit



- ❑ In z/OS V1R9, all the 2 bytes OSE buffer numbers are extended to 4 bytes
 - This makes it possible for a job to have 64K times as many buffers
 - The support for extended OSE buffer numbers is enabled by default when you IPL you JES3 global on a z/OS V1R9 system
 - Not required to read the initialization deck to take this default
 - Once the support for extended OSE buffer numbers is enabled, jobs are able to create OSE buffers after the old limit is reached

Migration Considerations



- ❑ For fall back to previous versions of JES3 and for migration purposes
 - A new keyword is provided on the OUTSERV initialization statement to control the creation of extended OSE buffer numbers beyond the old limit
 - The new keyword is EXTOSENUM= and it takes the values of YES or NO
 - YES is the default
 - Specifying EXTOSENUM=NO requires a hot start with refresh

Migration Considerations



- ❑ The job's output cannot be processed by a JES3 global on a lower release
- ❑ A DSI to a processor running a lower release or a fall back to a lower release causes the following message to be issued for each job that exceeds the old limit:

IAT7604 JOB jobname(jobid) EXCEEDS OSE BUFFER NUMBER LIMIT, JOB REMOVED FROM OUTPUT SERVICE



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Migration Considerations



- ❑ The fall back support is provided by APAR OA16731
 - The APAR allows earlier releases of JES3 to use the dump job (DJ) facility to dump a job that exceeded the old OSE buffers limit to tape and then restore it back to the spool
 - When the job is restored, JES3 renumbers the OSE buffer records and removes any gaps



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More Efficient Use of Spool Space



- ❑ Previously to z/OS V1R9, when a spool data set was spun off and printed, the spool space for the job was not reclaimed
- ❑ Additional spool data sets allocated by the job could not reuse the space of spun off and printed spool data sets, and would rather use more spool space until the job is ended and purged
- ❑ Long running jobs would sometimes need to be recycled in order to reclaim the spool space they no longer use



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More Efficient Use of Spool Space



- ❑ A new control block is introduced to keep a list of available spool records (ASR)
 - The control block is mapped by macro IATYASR.
- ❑ ASR keeps a list of unused OSE and WOSE records
 - Then, when new OSE or WOSE records are needed for the job, JES3 scans the job's ASR to check if there are any available spool records that can be reused instead of allocating a new record and increasing the spool space allocated to the job
- ❑ Using the *START,DC command, you can also request to snap only the job's ASR
 - *S DC OPTION=(SNP=ASR) J=15456



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