JES2 Common Challenges

SHARE 95, Session 2665

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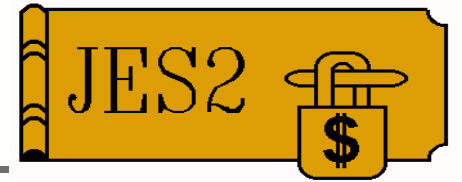**jinkins@us.ibm.com**

Agenda

Learn from other people's misfortunes

- Plan ahead
- Solving everyday problems
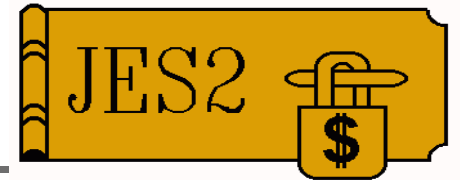- Hints, tips, tools, etc.
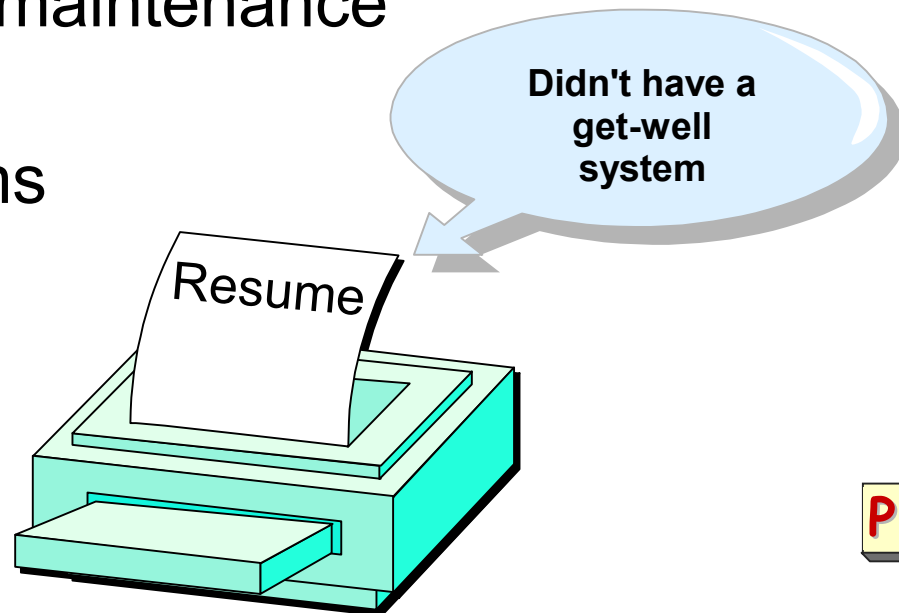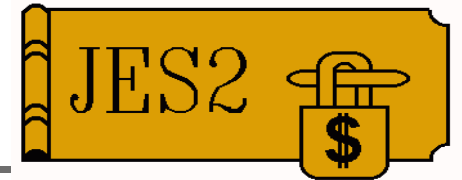- First-aid for your system

Plan ahead

Have a get-well system

- **Small separate system**
  - Access to production DASD and catalogs
  - But doesn't require any production DASD
  - Access to IBM link and FTP capability desirable
- **Use to**
  - Apply emergency maintenance
  - Fix JES2 proc
  - Fix DASD problems
  - etc.

Didn't have a get-well system

Resume

Plan Ahead

Run with both CKPT1 and CKPT2

- Don't let a glitch turn into cold start
- Insignificant performance impact
- Second checkpoint **not** RESERVED

Didn't run with both checkpoints

Resume

Plan Ahead

5
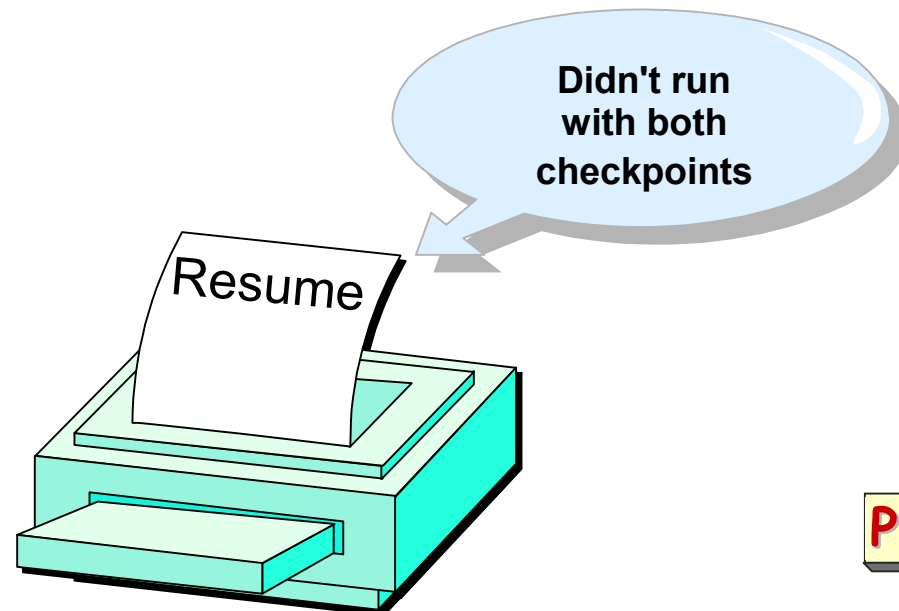
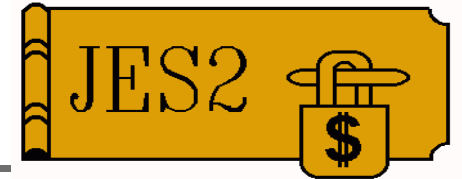# Allocate CKPT and SPOOL as unmovable

- Don't let DASD defrag utilities move checkpoint and SPOOL data sets
- **$K24** (sometimes **$K23**) if checkpoint is moved

Use symbolics in JES2 PROC

- Use symbolics in **PROCxx** concatenations
- Use symbolics in **HASPPARM** concatenation
- Use symbolics for everything!
- Use **HASIPROC** in **SHASSAMP** as a model
- **Tip:** Keep a hardcopy by the console
- **Tip:** Test JES2 PROC changes by starting a second copy of your production JES2 ... it won't get too far

Don't run out of BERTs

- Jobs will hang until BERTs are available
- Don't take JES2 down or you might have to **cold start**
- **OW44400** - **BERTWARN=0** after **$ACTIVATE**
- **OW41547** - HASPHOPE not assembled
- **OW35410** - JES2 restart problems (OPEN)
- **Warning:** BERTNUM=2000 hardcoded in **SERVERPAC** prior to 4Q98

```
$T CKPTSPACE,BERTNUM=n,BERTWARN=80
```

Why IPL when you can hot start?

- **Separate JES2 startup automation from IPL**
- **Need automation to**
  - Start NJE/RJE
  - Start JES mode printers

Be able to manually start JES2

- Be able to specify any JES2 start option
  - **CKPT1**
  - **CKPT2**
  - **RECONFIG**
  - **CONSOLE**
  - etc.
- Be able to respond to any startup message
- Don't put a **$S** in your init parms
  - Example: Purge a job before it can take JES2 down
- **ZAPJOB** (new in release 10) doesn't help if you can't manually start JES2
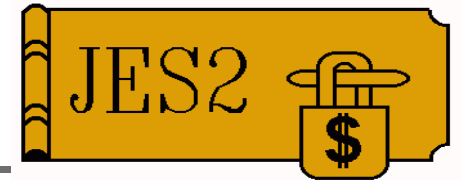
Keep JES2 parms in sync with checkpoint

- Some mismatches cause **HASP496** message
- **JOBCLASS** info rebuilt from init parm data if BERT errors for $CATs
- Ensure **all** members are in sync
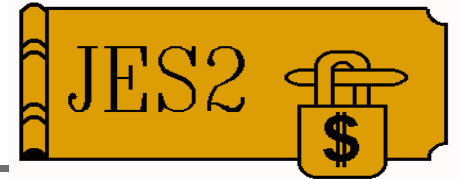- Be ready for an unscheduled cold start

Use reasonable WARN thresholds

- Don't use WARN=0 (no warning)
- Don't specify over 90%

Install JES2 IPCS

- System programmer action required
- See *JES2 Migration Notebook* for instructions
- See *JES2 Diagnosis* for verification procedure
- Have an IPCS setup for every combination of MVS and JES2 releases in production
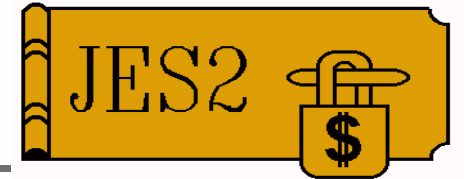- Apply **OW33073** - JES2 IPCS enhancements

  Example analysis:
  ```
  *** WARNING:  Work on one or more SPOOL volumes is not
       selectable ($SPLEXST¬=$SPLSLCT in checkpointed HCT)
  ```
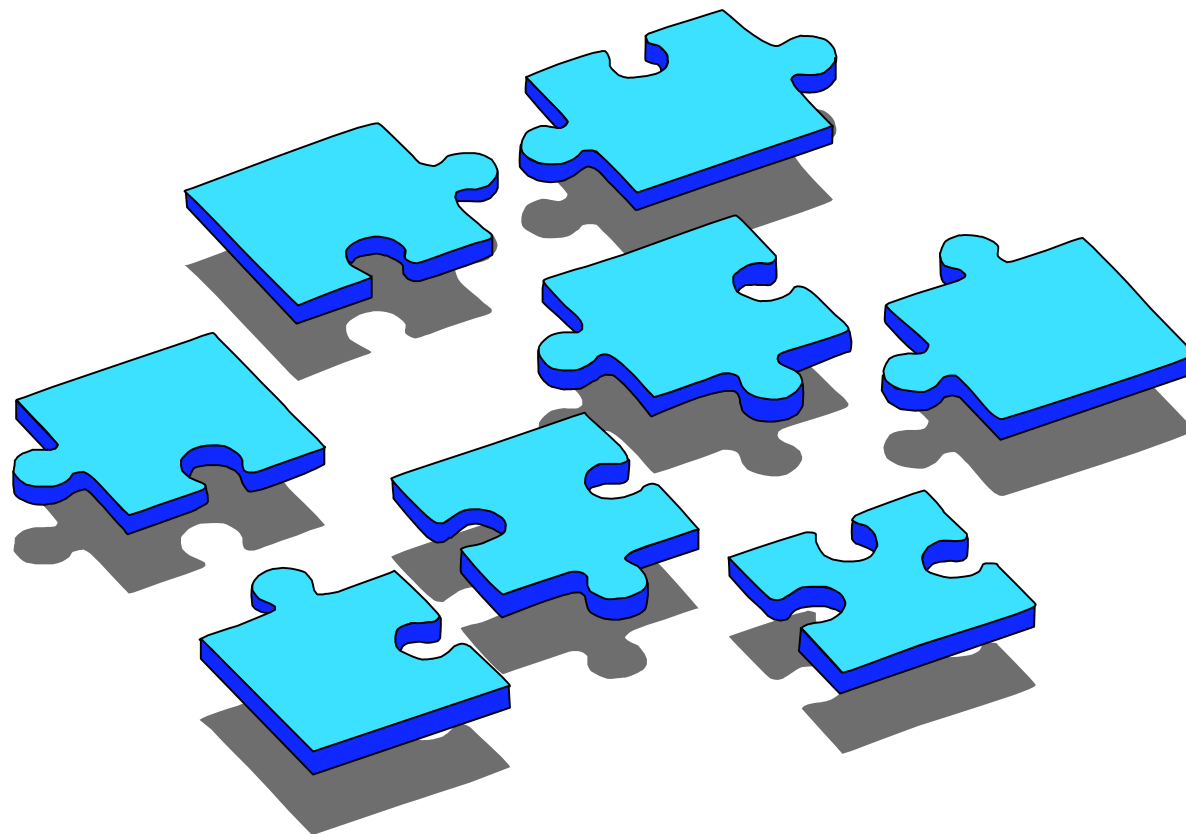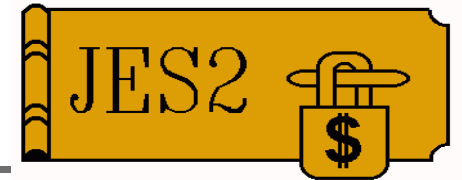
Rethink your migration testing policy

- Over reliance on in-house testing
- Some customers freeze all changes on a new release for weeks before migrating
- Potentially applicable **HIPERs** not applied
- Symptoms show up within hours of migration
- **Get very current on a new release before migrating**

Solving everyday problems

Why won't this job print?

- Job status
- Job held
- SPOOL volume not available
- No output group (maybe an archiver got it)
- Output on another device
- Device status
- Work selection mismatch
- **OUTDISP=HOLD** or **LEAVE**
- **HOLD=SYSTEM** or **OPER**
- Printer not eligible per RACF (**HASP186**)
- System draining (**$P** or **$PJES2**)
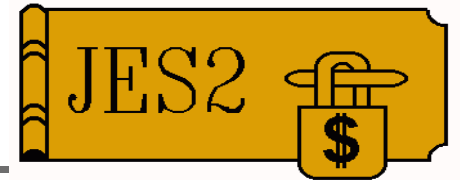
Why won't this job print? *(continued)*

- Helpful commands
  - **$D*job*,LONG**
  - **$DO*job***
  - **$DPRTn**
  - **$DSPOOL**
  - **$S**

Why won't this job execute?

- Job awaiting execution and not BERT locked?
- Job held
- Duplicate job name
- Affinity to systems where the job can't run
- Scheduling environment not available
- SPOOL volumes not available
- **$PXEQ** in effect (**$DMEMBER**, also **HASP222**)
- System draining (**$P** or **$PJES2**)
- Exit 14 or 49
- Independent mode (job/member must match)

Why won't this job execute? *(continued)*

- **JOBCLASS(*x*)**
  - **QHELD=YES**
  - **XEQCOUNT=MAX=**limit exceeded
  - **MODE=JES** and an initiator is not available
  - **MODE=WLM** and WLM not in **GOAL** mode

Why won't this job execute? *(continued)*
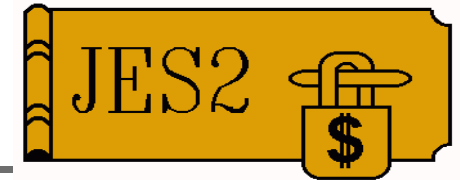
- **Display commands**
  - **$D*job*,DELAY**
  - **$D*job*,LONG**
  - **$DJOBCLASS(*x*)**
  - **$DMEMBER**
  - **$DI** Watch out for **INELIGIBLE_CLASS=(*x-rsn*,...)**
  - **$DSPOOL**
 - **$S**
  - **D WLM,...**
  - **$DPERFDATA(SAMPDATA)**

Why won't this job execute? *(continued)*

- Delays reported by **$D*job*,DELAY**
  - **HOLD** - job held via $HJ, $HA, TYPERUN=HOLD, duplicate job name, or JOBCLASS QHOLD=YES
  - **SYSAFF** - member job has SYSAFF to not available
  - **SCHENV** - scheduling environment not available
  - **MEMBER_STATUS** - SCHENV + SYSAFF + BOSS + $P + $PXEQ
  - **LIMIT** - JOBCLASS limit prevents job from starting
  - **LOCKED** - BERT lock is held somewhere
  - **BUSY_ON_DEVICE** - job is busy on a device
  - **SPOOLS_NOT_AVAILABLE**
  - **YES** - any of the above - filter only
 - **NO** - none of the above - filter only

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Why won't this job execute? *(continued)*
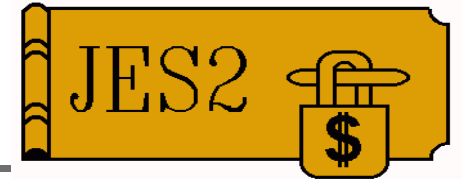
- Delays **NOT** reported by **$D*job*,DELAY**
  - No WLM initiators to select service class
    - Eventually, service class will no longer be meeting its goals and WLM may decide to start another init
  - Jobs are in **MODE=WLM** job classes but WLM is not in GOAL mode
  - Job class intended to be WLM but inadvertently set to **MODE=JES**
  - No JES2 initiators in job class on any system job can run on
 - All initiators are currently busy

High CPU in JES2
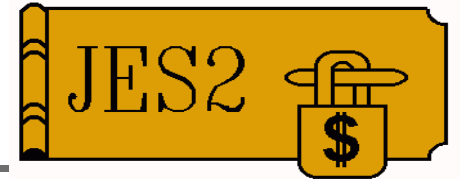
- **PERFDATA** (undocumented) collects JES2 main-task data
- In a period when JES2 CPU is high
  - **$TPERFDATA(*),RESET** and **D A,JES2**
  - Wait 10 or 20 minutes
  - **D A,JES2** and **$DPERFDATA**
    - ► Use **$DPERFDATA,L=Z** prior to release 7
- Don't be alarmed by CPU% numbers, the PCE types add up to 100%
- Use **D A,JES2** to get CPU and elapsed time for the address space

High CPU in JES2 *(continued)*
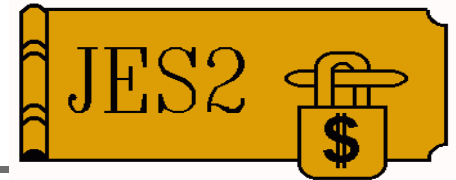
- ## Example PERFDATA for a specific PCE type

```
$DPERFDATA(PCESTAT),PCENAME=STAC
$HASP660 $DPERFDATA(PCESTAT),PCENA
$HASP660 PCE PERFORMANCE STATISTICS - INTERVAL=2:07:19.379957,
$HASP660 CPU=30:05.945181,
$HASP660 PCENAME=STAC,TIME=51:41.505259,CPU=22:54.777037,CPU%=
$HASP660 76.12,QSUSE_TIME=50:24.967096,IOCOUNT=29,CKPT_COUNT=
$HASP660 601,
$HASP660   WAIT=IO,MOD=HASPNUC,SEQ=17000000
$HASP660    COUNT=29,AVGWAIT=0.018144,
$HASP660      POST=IO,COUNT=29,AVGWAIT=0.018144,
$HASP660   WAIT=CKPT,MOD=HASPNUC,SEQ=28410000
$HASP660    COUNT=1686,AVGWAIT=0.069127,CMOD=HASPSTAC,CSEQ=
$HASP660 13100000,
$HASP660      POST=RESOURCE,COUNT=1686,AVGWAIT=0.069127,
$HASP660   WAIT=POST,XECB,MOD=HASPNUC,SEQ=97330800
$HASP660    COUNT=29,AVGWAIT=0.007361,
$HASP660      POST=XECB,COUNT=29,AVGWAIT=0.007361,
$HASP660   WAIT=STAC,INHIBIT=NO,MOD=HASPSTAC,SEQ=09900000
$HASP660    COUNT=11226361,AVGWAIT=0.006517,
$HASP660      POST=RESOURCE,COUNT=11226361,AVGWAIT=0.006517
```
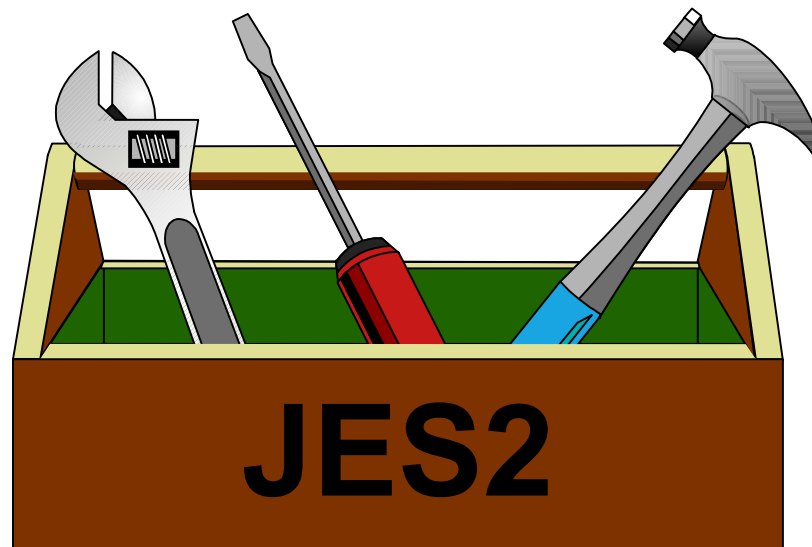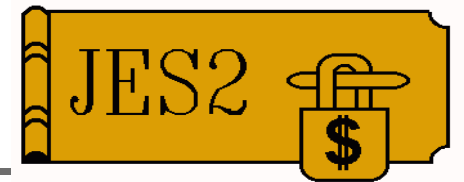
High CPU in JES2 *(continued)*
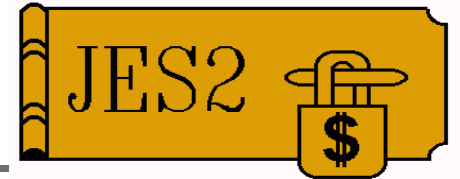
- **PERFDATA analysis result**
  - The **STAC** PCE processes **CANCEL** and **STATUS** SSI requests queued from other address spaces
  - Application(s) made **11,226,361 requests** in a little over 2 hours
  - **1,485 requests per second**
  - JES2 is a victim
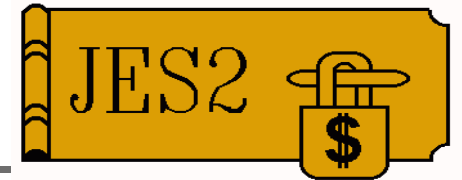 - Look for applications that make SSI requests for function codes 2 (**CANCEL**) or 3 (**STATUS**)

Hints, tips, tools, etc.

JES2

Specify enough buffers, etc.

- **JES2 is good about not backing storage when it's not in use**
- **Usually take defaults except as noted below**
- **BUFDEF EXTBUF=LIMIT=** usually take default, but not less than 1000
- **CONDEF BUFNUM=**
  - At least 1000
  - **BUFNUM=9999,BUFWARN=50** is better
- **INTRDR RDINUM=** at least 100
  - Warm start (usually an IPL) to increase
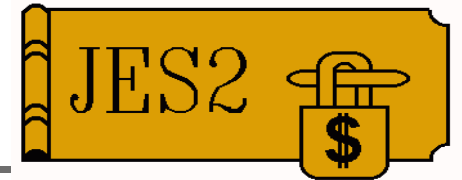- **SMFDEF BUFNUM**= see book, but at least 100

CKPT reconfiguration secrets
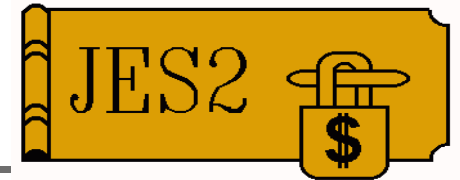
- Don't reply **TERM** in a reconfiguration for a checkpoint error. You'll have to IPL and you might have to **cold start**

- The key to understanding initialization dialogs
  - By default, JES2 tries to find the checkpoints it used when it was last active. You tell JES2 where to start and JES2 looks for a consistent set of checkpoints
  - An **explicit** specification of **RECONFIG** on an **All-Member Warm Start** lets you tell JES2 that you know better and to use the configuration you say to use (Specify the **READFROM** checkpoint)

See session 2664, *JES2 Checkpoint Reconfiguration Dialog*

DEBUG, a neglected test tool

- **DEBUG CKPT=YES,VERSION=YES**
  - Test with it at least some of the time
  - Less of a performance pig after SP5.2.0
  - Catches hard to diagnose bugs that hit intermittently
- **DEBUG STORAGE=YES**
  - Detects use of storage beyond end of **$GETWORK** areas (**$GW3**)
  - Use it in production
    - ‣ 6 to 11 additional instructions per **$RETWORK**
- **DEBUG SYMREC=YES**
  - Issues **HASP805** when an interesting symptom record is written

Don't use DEBUG=NO
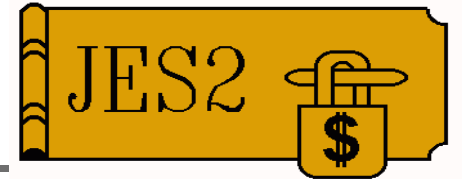
- Default for most **DEBUG** options is **NO**
- **BERT=YES** is the exception
- *First Failure Data Capture* for correctable BERT errors (**$BR3**)
- Don't say **DEBUG=NO** in your init parms
- Switch to **BERT=NO** if too many **$BR3** errors

Look in EREP after JES2 testing

- Search detail software records for **SC1BH**

- Some records report specific errors caused by exits

- Look at the *JES2 Diagnosis* book to determine whether a record is interesting
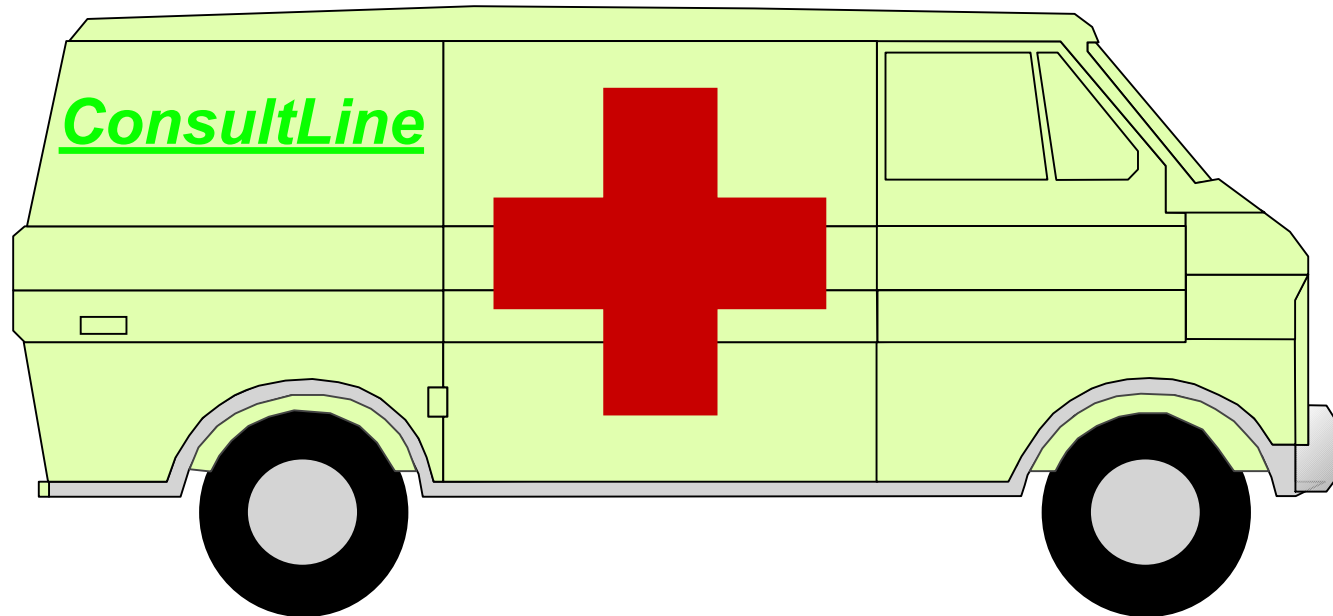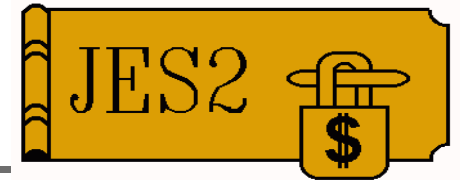
Specify a large enough JES2 REGION

- JES2 storage increases after JES2 initialization
- Specify at least **REGION=200M**
- **0M** is better
  - But, have enough auxiliary storage
  - Defect in JES2 or an exit can use up entire region
  - **WAIT03E** if page data sets too small
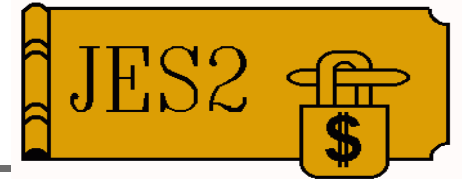 - Have seen **WAIT03E** caused by IEFUJV exit

First-aid for your system

ConsultLine

$S can cure the common cold

- **REQ** option forced for some initialization errors
- Operator didn't enter **$S** after **HASP400**
- Operator accidentally entered **$P**
- **$PJES2** entered prematurely
  - Next **$PJES2** doesn't work
  - Enter **$S** before retrying **$PJES2**
- Missing or lost POST defect
  - Job, device, etc. appears hung
  - More likely noticed on a lightly loaded JES
  - **$S** forces POST and activity takes off

Accidentally deleted SPOOL volume
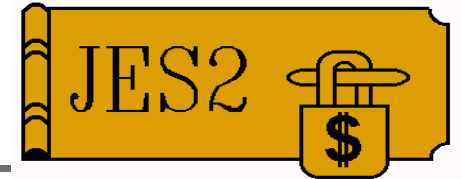
- ## Don't take any members down

- ## $DSPOOL(SPOOL1),UNITDATA

```
$HASP893 VOLUME(SPOOL1)  UNITDATA=(EXTENT=00,TRKRANGE=(002D,
$HASP893                         826D),RECMAX=12,TRKPERCYL=15)
$HASP646 48.1904 PERCENT SPOOL UTILIZATION
```
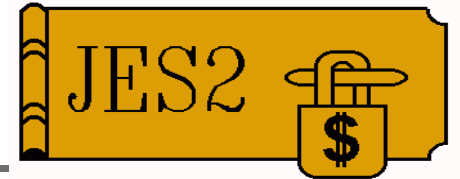
  - ▸ Start track X'**002D**' = **45**

  - ▸ Last track   X'**826D**' = **33,389**

  - ▸ Extent size = **33,389** - **45** + 1 = **33,345**

  - ▸ If the JES isn't up, get info from AMASPZAP dump of ckpt from get-well system

- ## Must reallocate in exactly the same spot

```
//STEP1     EXEC PGM=IEFBR14
//DD1       DD   DSN=SYS1.HASPACE,DISP=(,KEEP),UNIT=3390,
//               VOL=SER=SPOOL1,SPACE=(ABSTR,(33345,45))
```

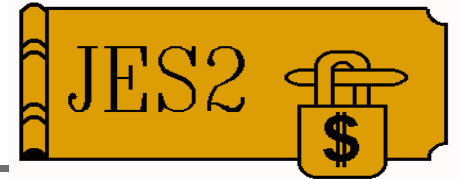- ## Forget it if RACF says *erase-on-scratch*

Consoles not processing commands

- Most MVS commands don't respond
- Related to WTO buffer shortage?

  `IEA404A SEVERE WTO BUFFER SHORTAGE - 100% FULL`

- Likely JES2 involvement?

  `IEE767A SEVERE BUFFER SHORTAGE FOR SYSTEM LOG - 100% FULL`

- JES2 hung terminating or (re)starting?
- Issue **K M,LOGLIM=0**, possibly many times
  - For example, if **K M,REF** shows LOGLIM=001000, you will have to issue the command over 40 times
  - **IEE767A** disappears and reappears
  - **TIP:** Specify **INIT LOGLIM(50000)** in **CONSOLxx**
- When **IEE767A** is gone and **D C,B** shows no backlog, get JES2 restarted in a hurry

Started JES2 with wrong checkpoint

- Can only happen on All-Member Warm Start
- Both good and bad CKPTs use same SPOOL
- Thousands of errors while starting
- Few if any jobs left after start completed
- If CKPT you should have used is still available
  - Take JES2 down very quickly
  - SPOOL damage mostly limited to track groups used by jobs created **after** starting with the wrong CKPT (for example, track groups used for latest SYSLOG)
  - Re-IPL and start with the correct checkpoint
  - Expect some CBIMPL4 and other errors for a while
- Less likely in Rel 10 and after OW43697

Questions ?