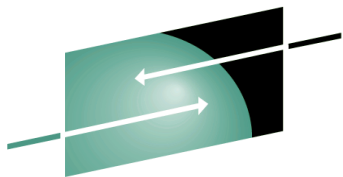


JES2 Job Related Exits

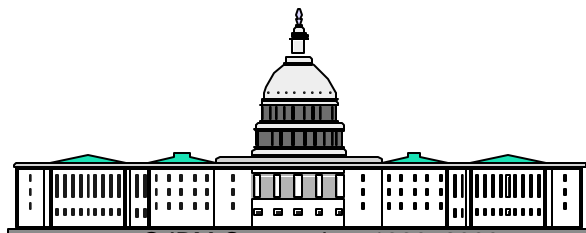
Session# 2662

SHARE 94 Technical Conference - Winter, 2000
John Hutchinson - hutchjm@us.ibm.com
IBM Washington Systems Center, Gaithersburg, Maryland
(original by Bernie Becker, 1990)



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Session Overview

■ **Phases of a Job** (& the exits it touches)

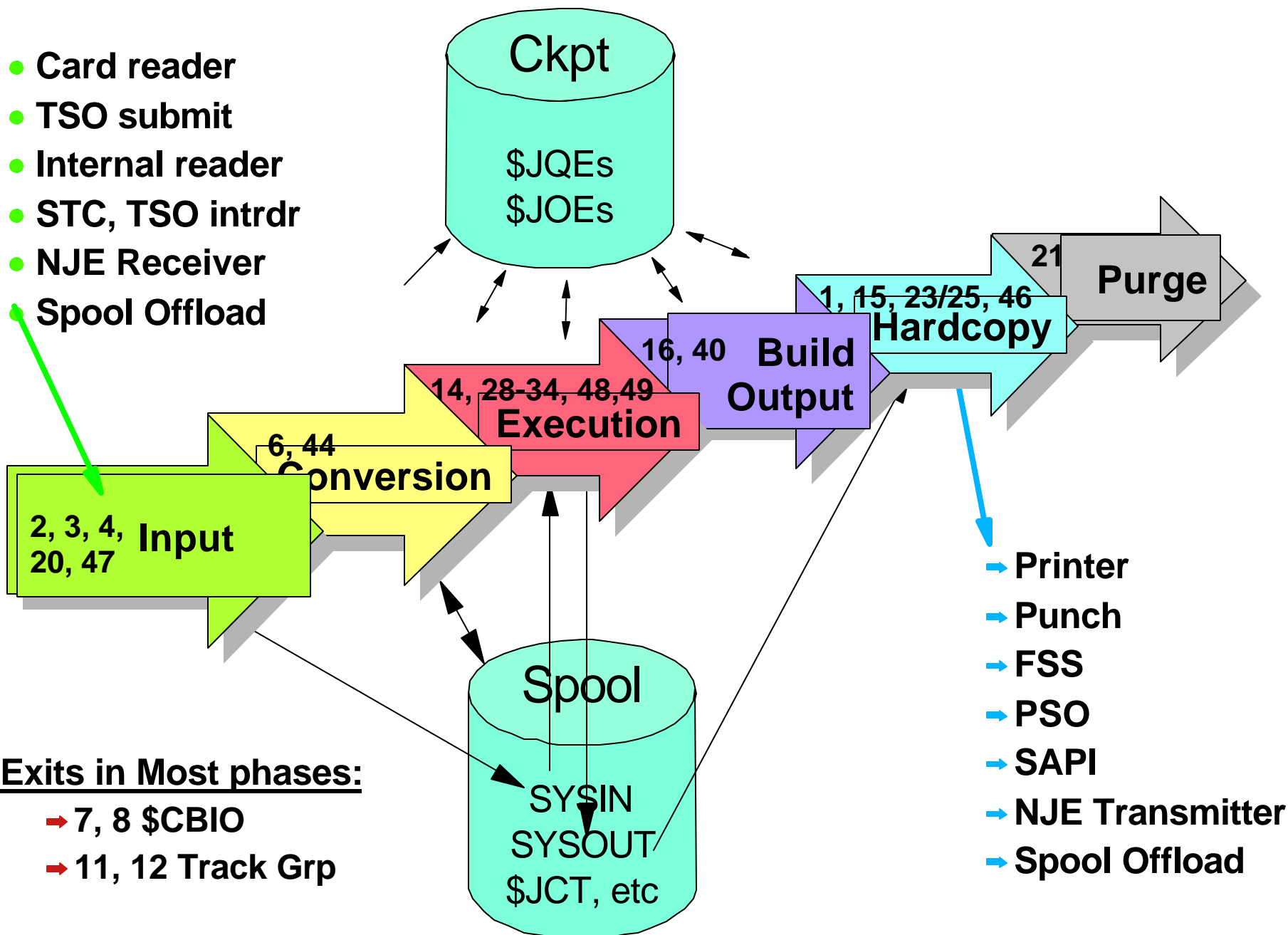
1. **Input** (2, 3, 4, 20, 47)
2. **Conversion** (6, 44)
3. **Execution** (32, 31, 30, 33, 34, 48, 28, 29)
4. **Output element building** (16, 40)
5. **Hardcopy** (1, 15, 46)
6. **Purge** (21)
 - + many phases (7, 8, 11, 12, 14, 36, 37, 49)

■ **References**

- Job-related Control Blocks
- Exits, exits, everywhere!
- Information Sources

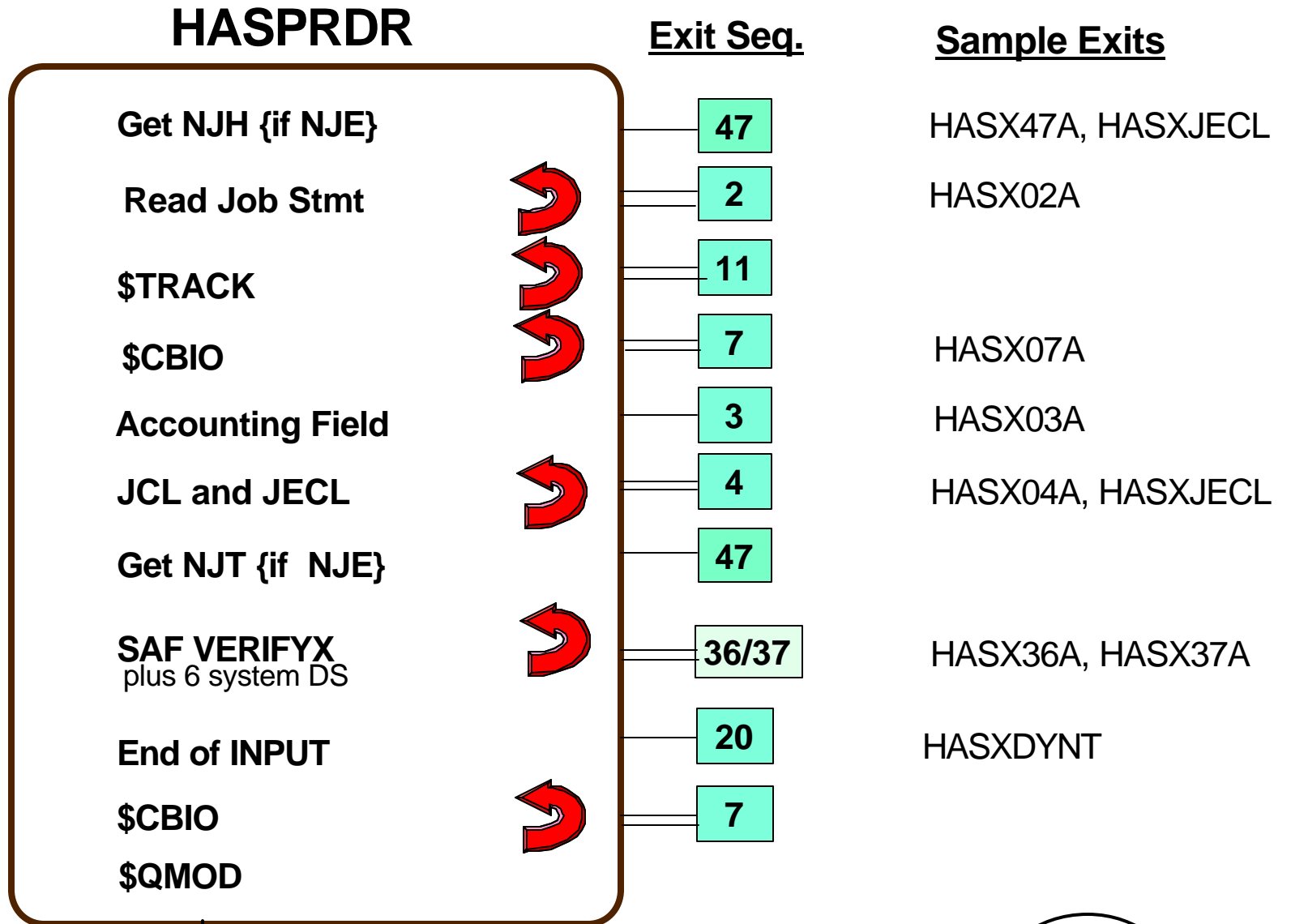
"Life of a Job" - JES2 Job Phases - the Big Picture

- Card reader
- TSO submit
- Internal reader
- STC, TSO intrdr
- NJE Receiver
- Spool Offload



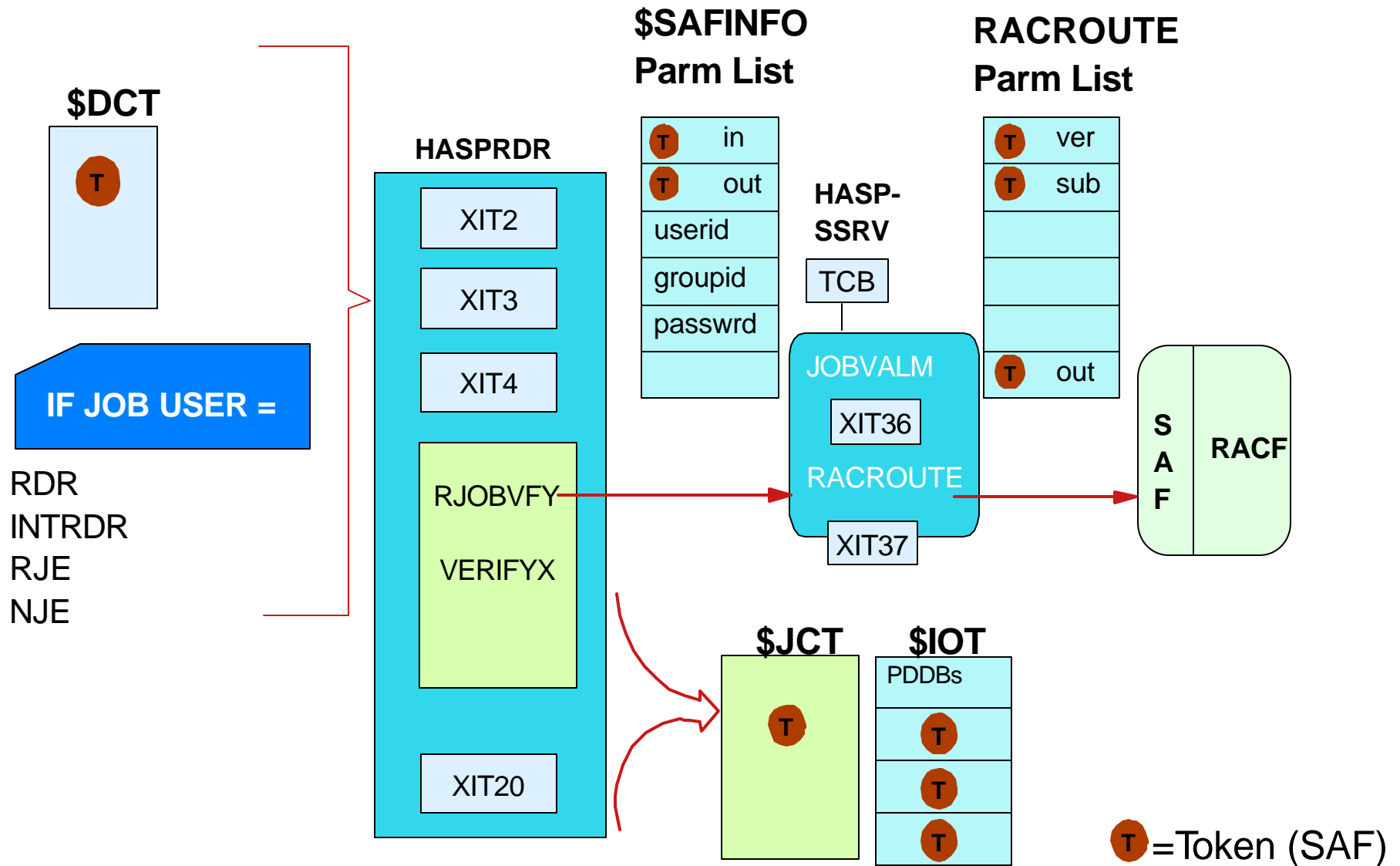
Exits in Most phases:

- 7, 8 \$CBIO
- 11, 12 Track Grp

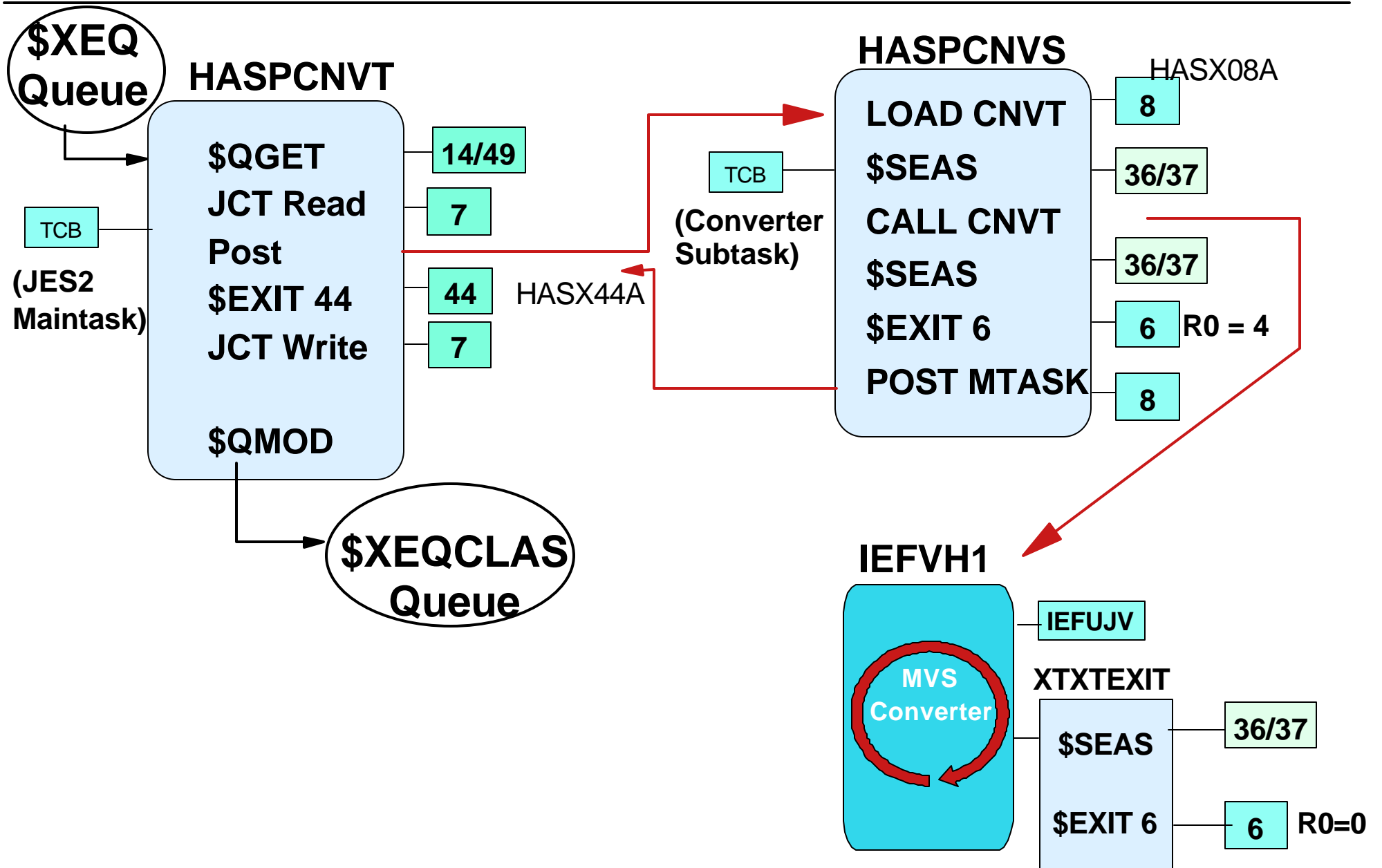


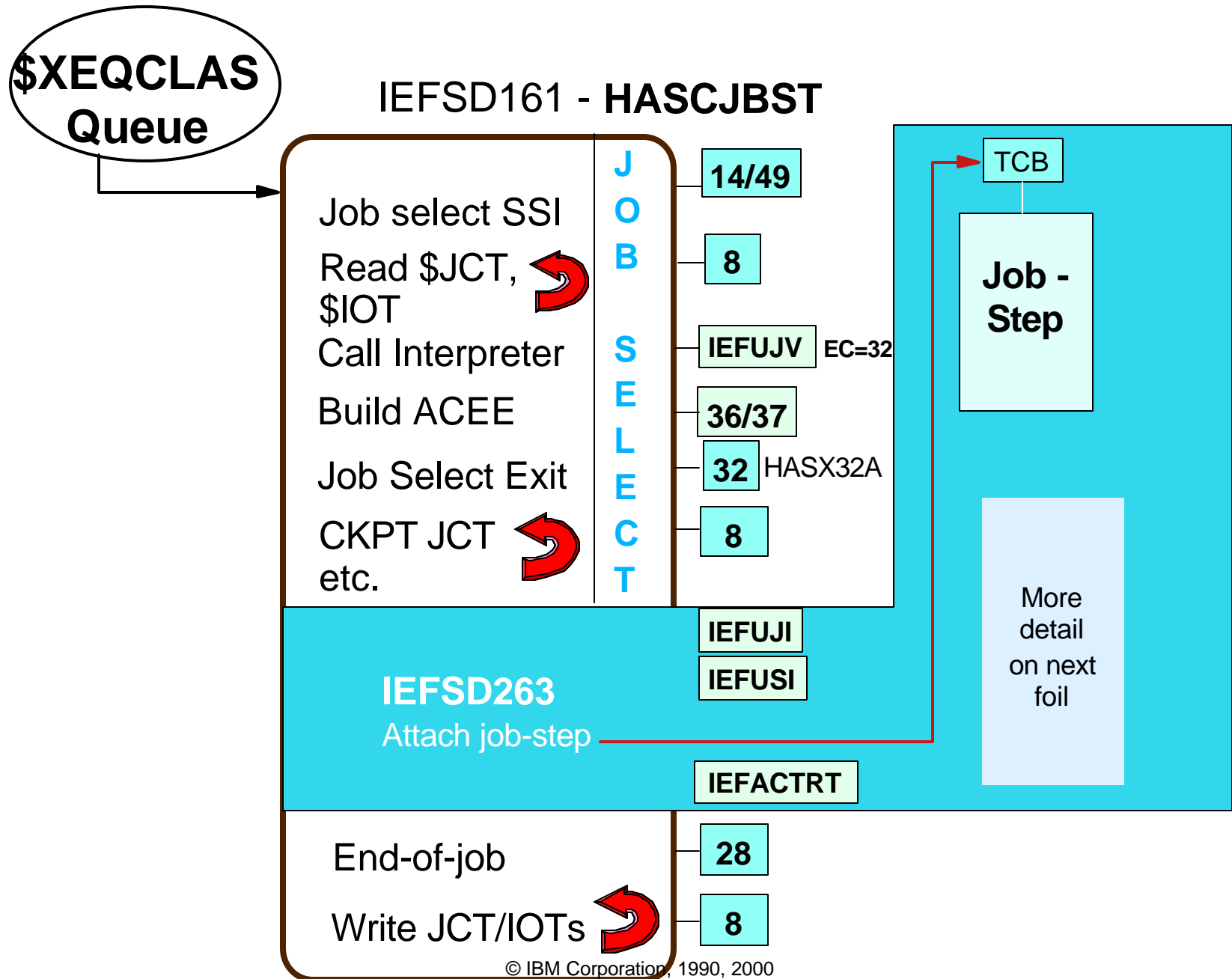
= Exit may be called multiple times

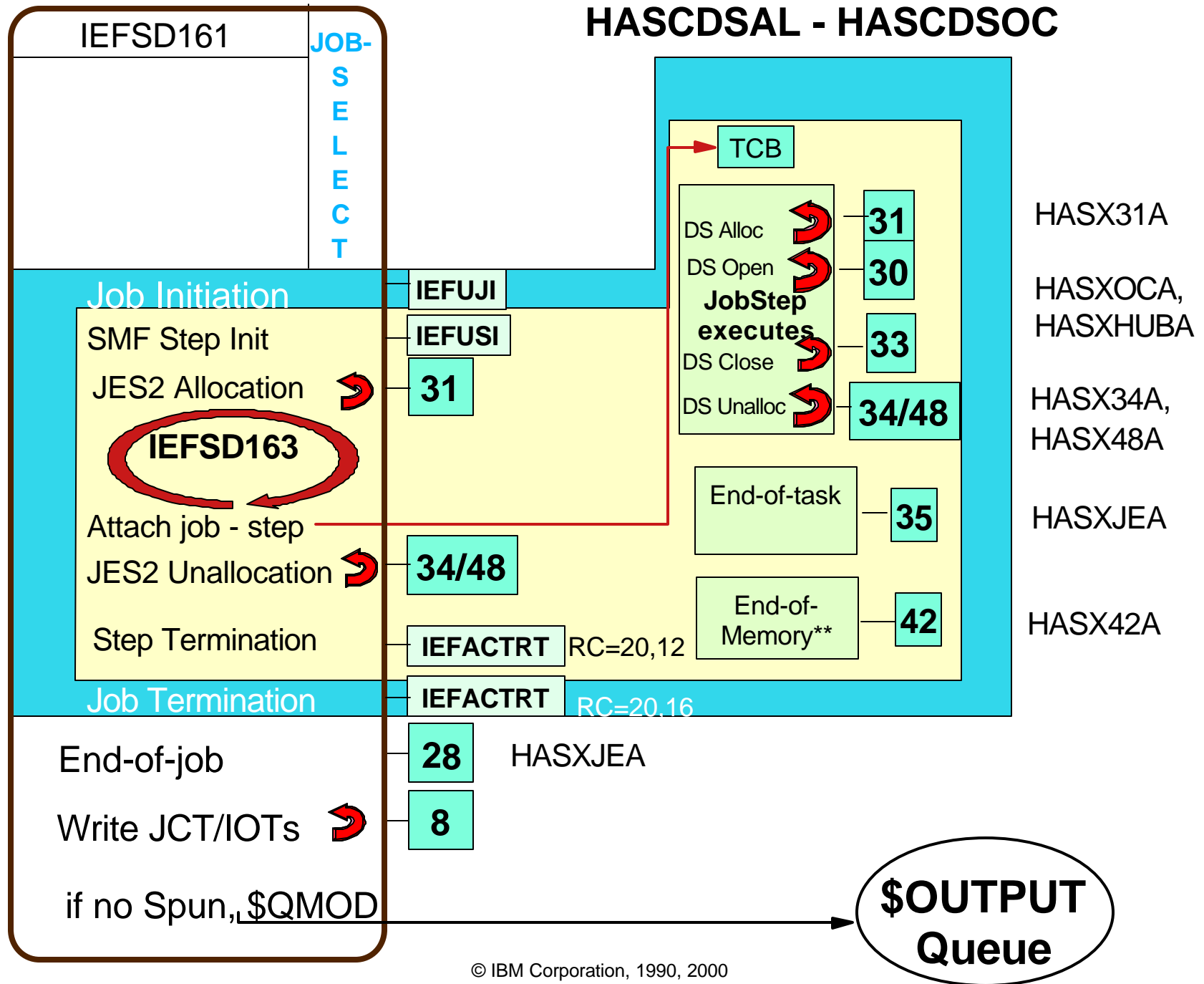


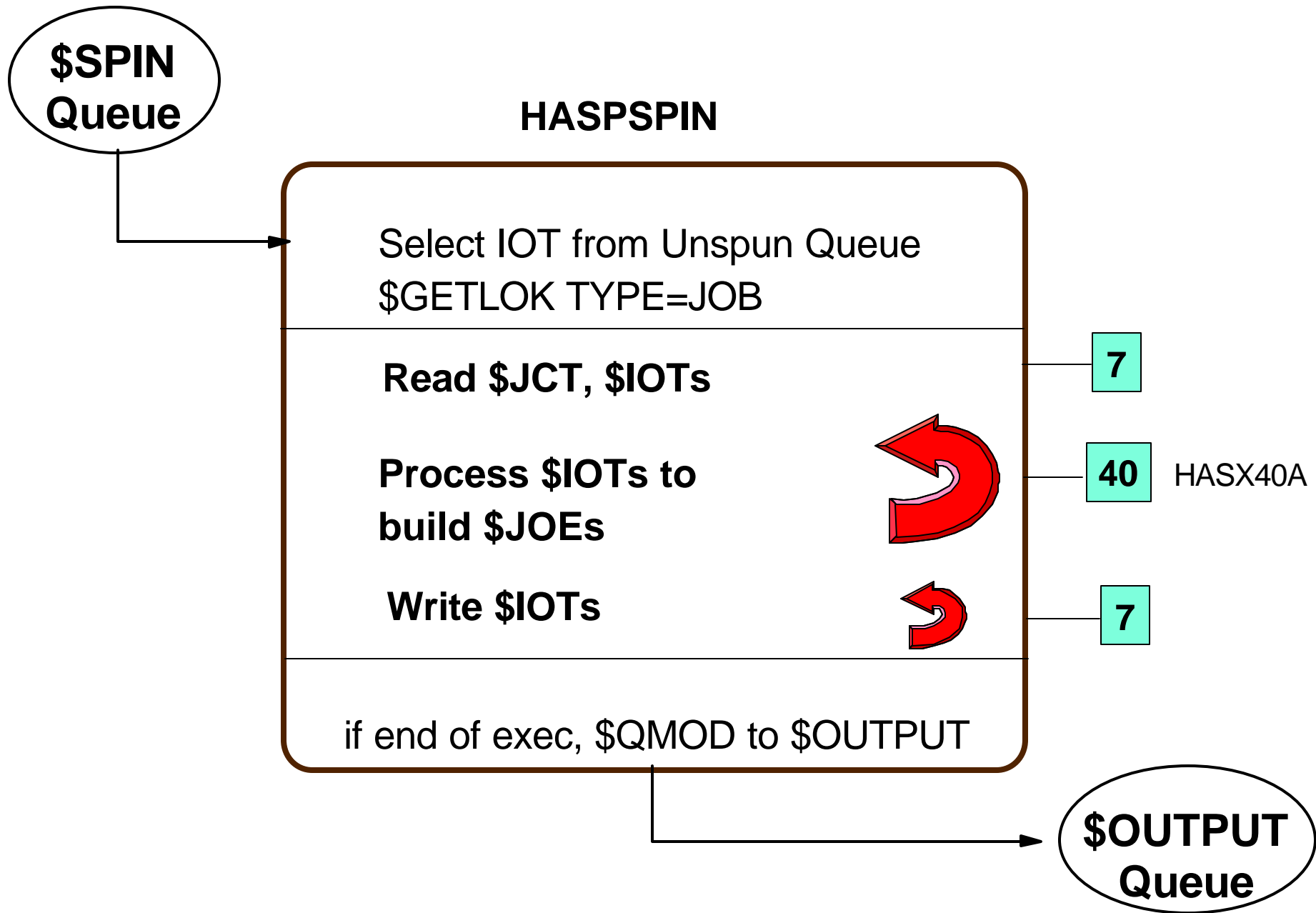


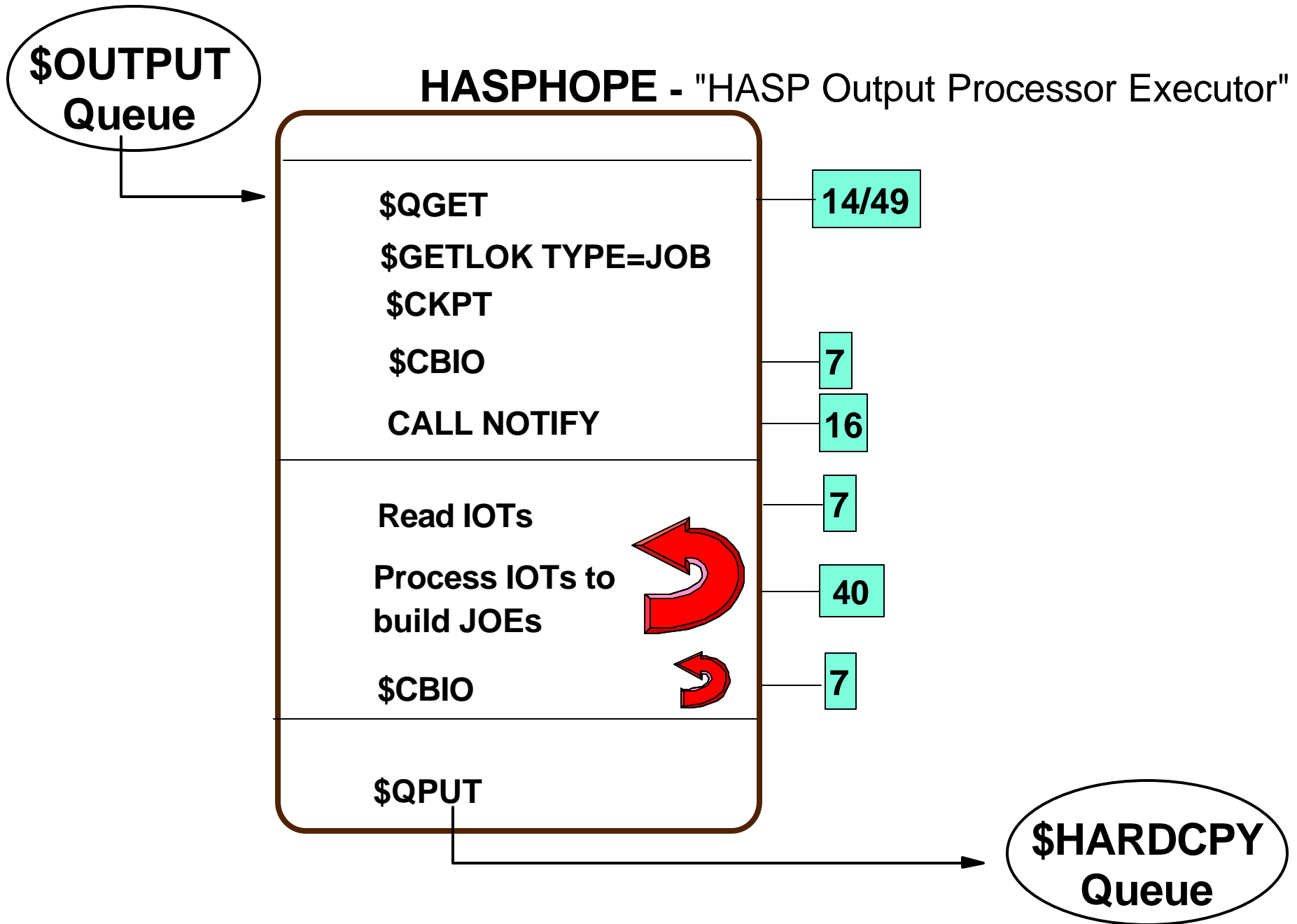
Conversion



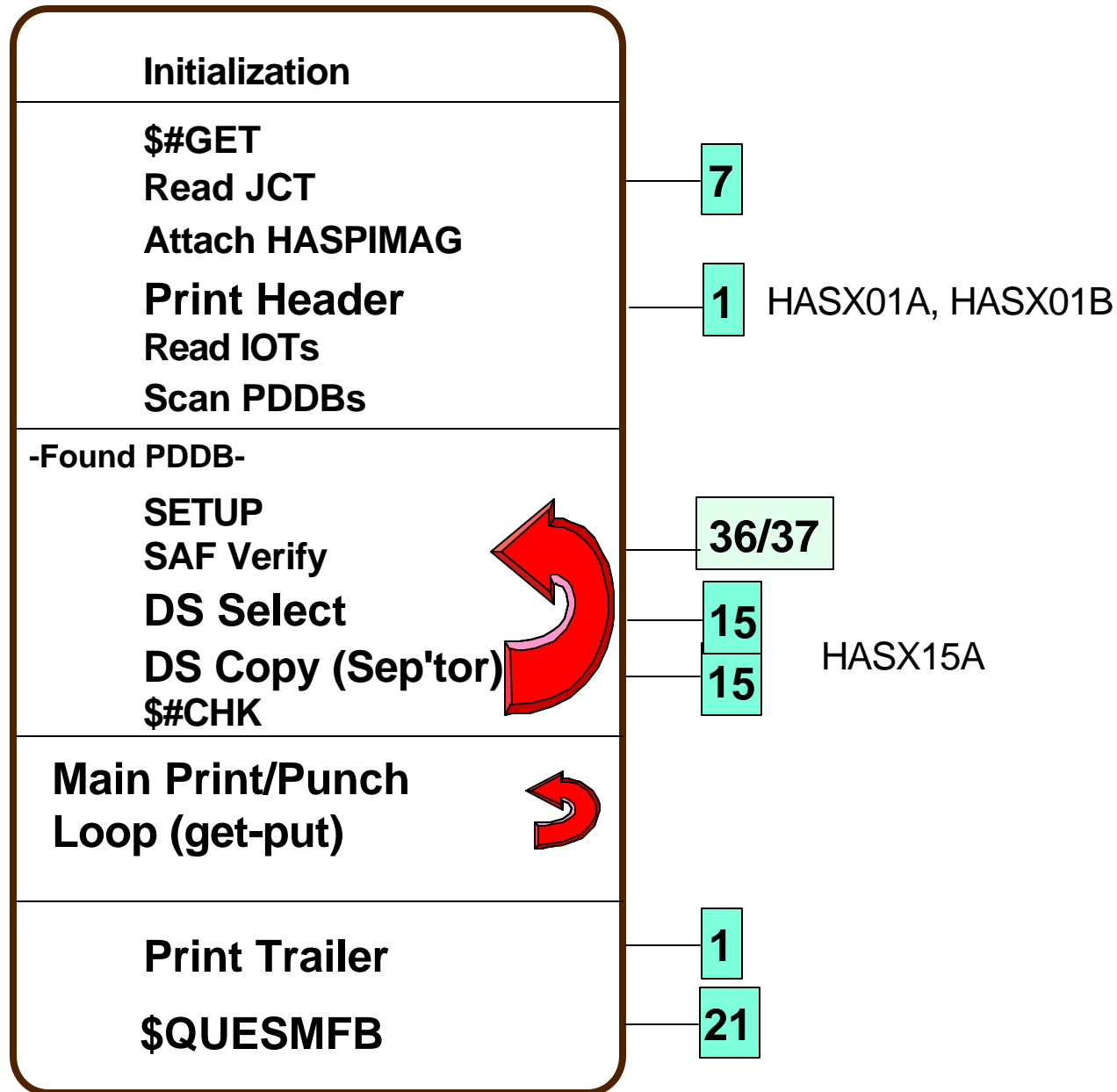








HASPPRPU



PSF Addr.
Space

TCB

HASPFSSM

FSMGETDS

Scan JIB queue
(look for eligible JIB)

\$CBIO (Read JCT)

Initialize JSPA

\$CBIO (read IOT)

\$CALL PRTAUTH (JNEWS)

More JSPA initl.

\$CALL FINDP (PDDB)

\$CALL PRTAUTH

\$CALL DSOPEN (OPEN)

\$CALL SWBRD (Read SWB)

GET (Initiate DS Input)

\$CALL FINDP

(NEXT PDDB)

\$RETURN (to FSS)



8

25

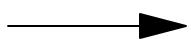
8

36/37

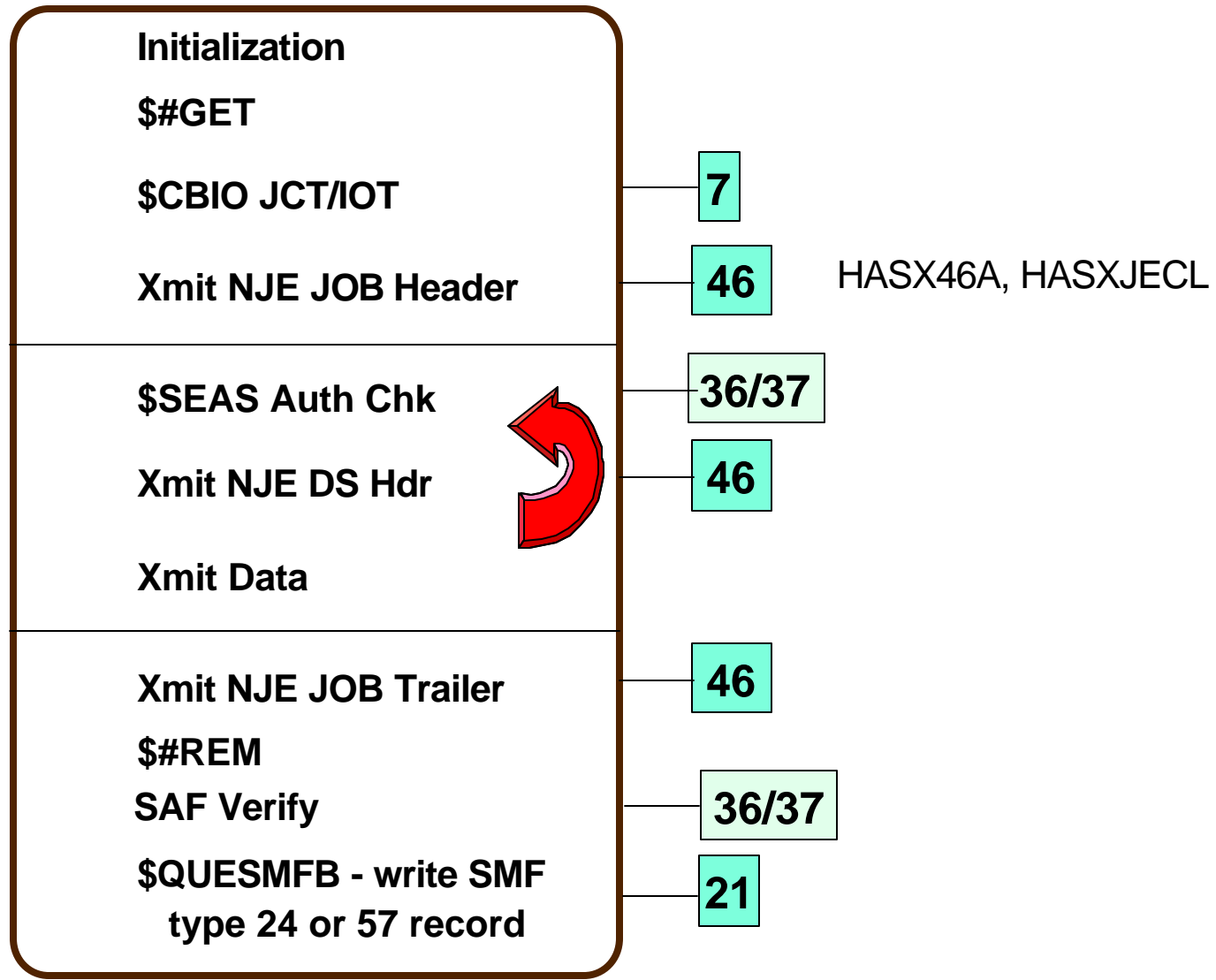
23

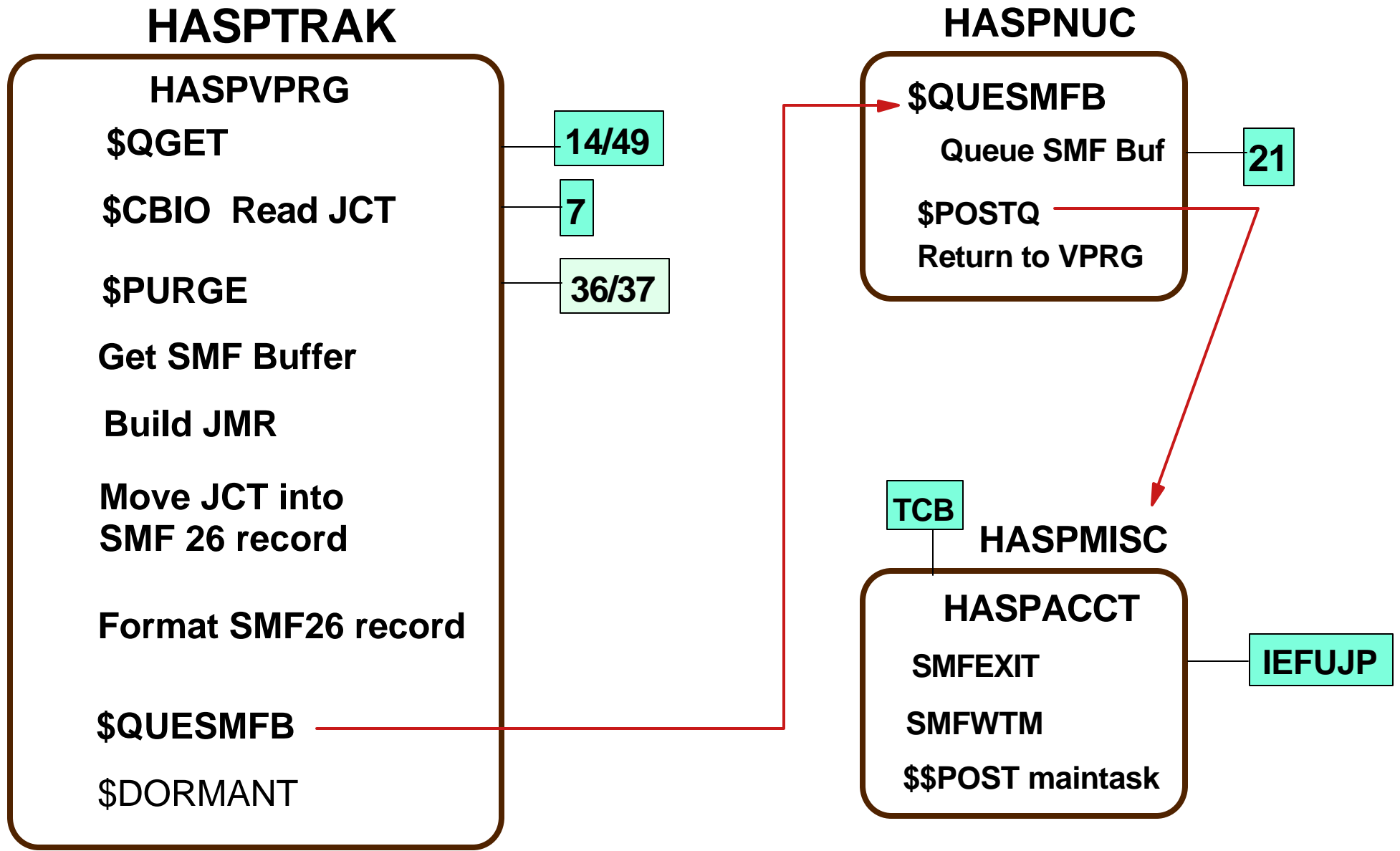
HASX23A

36/37



HASPNST





Caution!

Defining exits and writing installation exit routines is intended to be accomplished by experienced system programmers; the reader is assumed to have knowledge of JES2.

If you want to customize JES2, IBM recommends that you use JES2 installation exits to accomplish this task. IBM does not recommend or support alteration of JES2 source code.

SC28-1793 "OS/390 JES2 Installation Exits" - Chapter 1

Job-related Control Blocks

■ Checkpointed Control Blocks

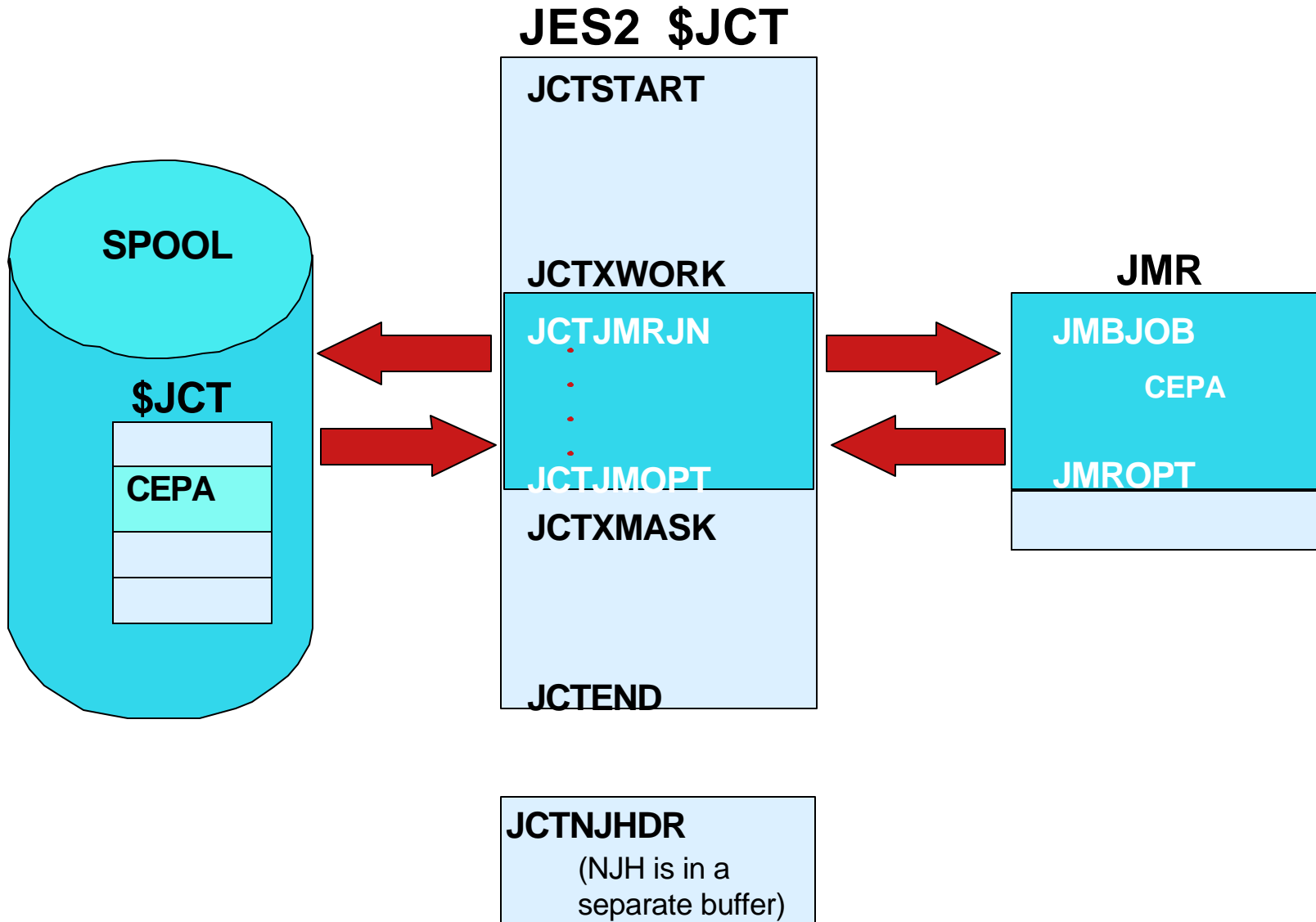
- ▶ \$JQE - Job Queue Elements - access w/\$DOGJQE
- ▶ \$JOE - Job Output Elements - access w/\$#GET, \$#....
- ▶ \$BERTTAB & Dynamic User Extended Table Pair (see OW32032, JES2 Macros (Appx. B), & "JES2 Short Subjects", #S2658, 8/98)

■ Spool Resident Control Blocks

- ▶ \$JCT - Job Control Table (Addr.usually passed in \$XPL)
- ▶ \$PDDB - Peripheral Data Definition Block (1/Data Set)
- ▶ \$IOT - I/O Table (contains PDDBs for a Job)
- ▶ NJE Job & Data Set hdrs (only created if transmitted)
- ▶ \$SJB - Subsystem Job Block (used to find \$JCT, etc.) during execution by SSI routines

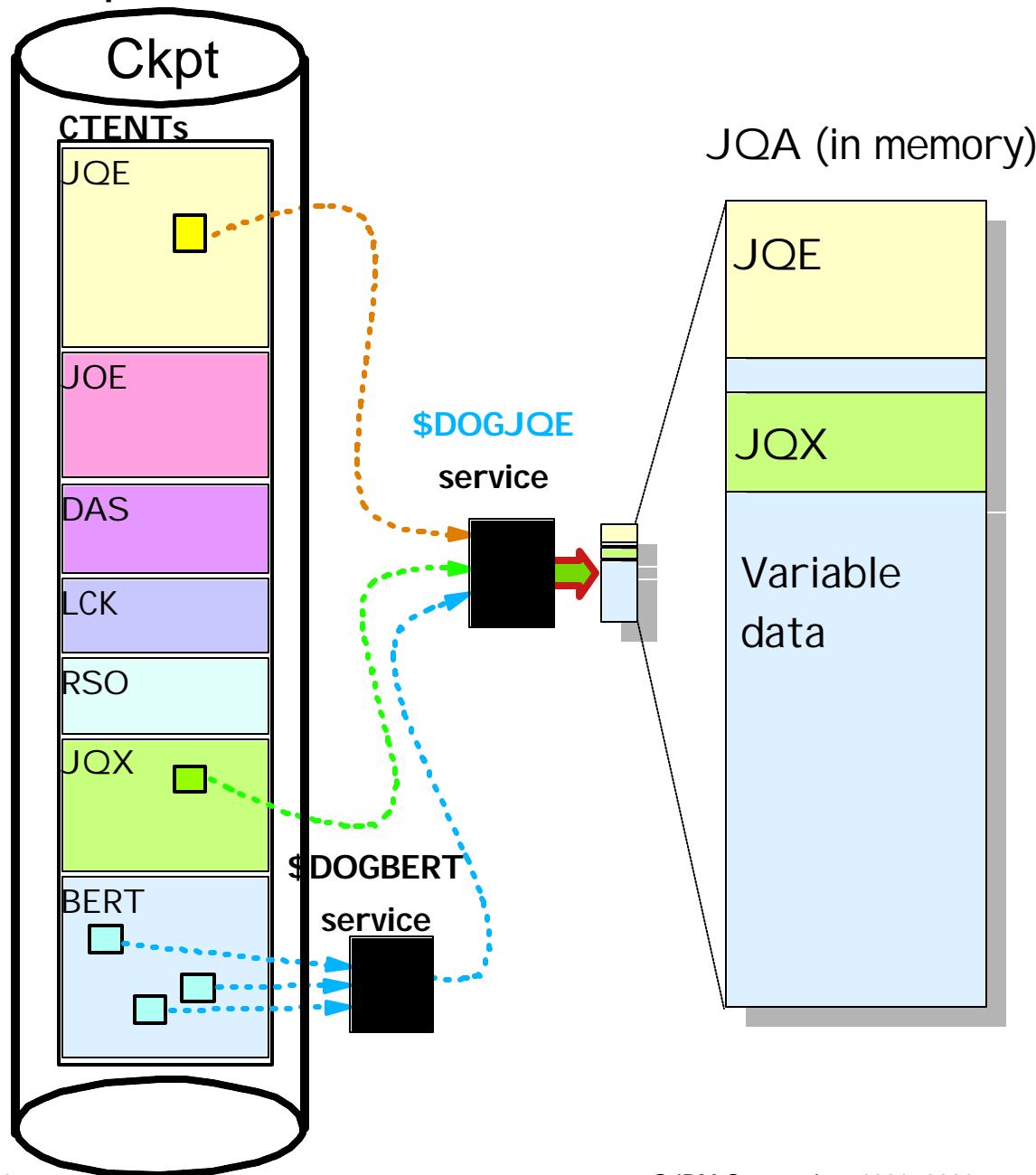
■ Other (non-JES) job-related control blocks

- ▶ JMR - Job Management Record (IEFJMR) - used by SMF exits
- ▶ JSAB - Job Scheduler Address space control Block (IAZXJSAB)



Job Queue Elements

Checkpoint saved on DASD or CF across JES2 restarts



- In OS/390 JES2 V2R4, Many new job attributes are required in the checkpoint
 - Service Class
 - Scheduling environment
 - etc.
- Job data is now found in multiple CTENTs
 - JOE (traditional JOE data)
 - JQX (parallel to JQEs)
 - BERT (Variable data in 64-byte blocks)
- Use **\$DOGJQE** service to collect all data into single control block (JQA = "Artificial JOE") and make any updates.
- See APAR [OW32032](#) for adding user defined fields to the checkpointed control blocks dynamically. ("JES2 Macros", Appendix A.)

JES2 Exits

- ▶ 0 - Pre-Initialization *
- ▶ 1 - Print/Punch Separator *
- ▶ 2 - JOB Card Scan *
- ▶ 3 - JOB Card Accounting Field *
- ▶ 4 - JCL & JECL Scan *
- ▶ 5 - Command Pre-Processor *
- ▶ 6 - Converter/Interpreter Text *
- ▶ 7 - Control Block Read/Write (JES2 AS)*
- ▶ 8 - Control Block Read/Write (User AS)*
- ▶ 9 - Job Output Excession *
- ▶ 10 - \$WTO Screen *
- ▶ 11 - \$TRACK (JES2 Spool Allocation)
- ▶ 12 - \$STRAK (User Spool Allocation)
- ▶ 13 - TSO/E Netmail Notification *
- ▶ 14 - \$QGET - Job Queue Work Select
- ▶ 15 - Output Data Set (Copy) Select *
- ▶ 16 - Notify
- ▶ 17 - BSC RJE Signon/Signoff **
- ▶ 18 - SNA RJE Logon / Logoff **
- ▶ 19 - Initialization Statement
- ▶ 20 - End of Job Input
- ▶ 21 - SMF Record
- ▶ 22 - Cancel/Status
- ▶ 23 - FSS Job Separator Page *
- ▶ 24 - Post Initialization *
- ▶ 25 - JCT Read (FSS)
- ▶ 26 - JES2 Termination
- ▶ 27 - PCEDYN (PCE Attach/Detach) *
- ▶ 28 - Job Termination
- ▶ 29 - End-of-Memory *
- ▶ 30 - Dataset Open/Restart
- ▶ 31 - Dataset Allocate *
- ▶ 32 - Job Select *
- ▶ 33 - Dataset Close
- ▶ 34 - Dataset Unallocate (Early) *
- ▶ 35 - End-of-Task
- ▶ 36 - Pre-SAF *
- ▶ 37 - Post-SAF *
- ▶ 38 - TSO Receive Disp. *
- ▶ 39 - SYSOUT Receive Disp. *
- ▶ 40 - JOE Chars Modify *
- ▶ 41 - Output Grouping *
- ▶ 42 - Notify Message *
- ▶ 43 - APPC TP Select/Terminate *
- ▶ 44 - Converter Main Task *
- ▶ 45 - SJF Service *
- ▶ 46 - NJE Header Transmit *
- ▶ 47 - NJE Header Receive *
- ▶ 48 - Dataset Unallocate (Late) *
- ▶ 49 - Job Queue Select ("Q-Got")

* Sample exit in SHASSAMP

Sample exit in "JES2 Exits", Appx. B

Other Job-related Exits

SMF Exits

- Job Validation Exit (Converter/Interpreter): IEFUJV
- Job Initiation Exit: IEFUJI *
- Step Initiation: IEFUSI *
- Time Limit Exit: IEFUTL
- JES2 SYSOUT Limit Exit: IEFUSO
- SMF Record Exit: IEFU83/84/85
- Termination Exit: IEFACTRT *
- JES2 Job Purge Exit: IEFUJP

TSO/E Exits

- Logon and Logoff Processing: IJKEFLD
- SUBMIT Command: IKJEFF10
- OUTPUT, STATUS, and CANCEL Commands: IKJEFF53*
- TRANSMIT and RECEIVE Commands: INMXZxx / INMRZxx

PSF Exits

- Separator-Page Exits: APSUX01*, APSUX02*, and APSUX03*
- Logical-Record Processing Exit: APSUX04*
- SMF Type 6 Record Exit: APSUX05*
- PSF Message Exit: APSUX06*
- Resource-Management Exit: APSUX07*

Other JES2 Exit Facilities

- \$TRACE(13)
 - ▶ Use to understand exit flow and debug exits
 - ▶ Use in conjunction with other IDs (1, 2, 11, 12, etc.)
- Job Exit Mask
 - ▶ Use to suppress unnecessary calls by subsequent exits
- Install via SMP/E
 - ▶ Use ++USERMOD
 - ▶ See session 2886
- Read "JES2 Exits" SC28-1793 Chapters 1 & 2 before attempting to write or install JES2 exits!
 - ▶ Environments (JES2, User, Subtask, FSS, ,,,)
 - ▶ Linkage, Programming Considerations, Macros, etc.
 - ✦ Appendix C: "Job-Related Exit Scenarios"

Information Sources

- **JES2 Exits, SC28-1793**
- JES2 Macros, SC28-1795
- JES2 Migration Notebook, GC28-1797
- JES2 Sample Exits, JES2.SHASSAMP
- JES2 Source Code, JES2.SHASSRC & SHASMAC

- MVS Installation Exits, SC28-1753
- PSF for OS/390 Customization, S544-5622
- Sample Exits, SYS1.SAMPLIB

- CBT Tape - JES2 Exits - <http://www.cbttape.org>

- RedBooks & Orange Books (obsolete)
 - JES2 Job Related Exits, LG66-3242
 - MVS/ESA JES2 Exit Coding, GG24-4127

