

z/OS Basics: JES2/JES3 JCL/JECL Differences

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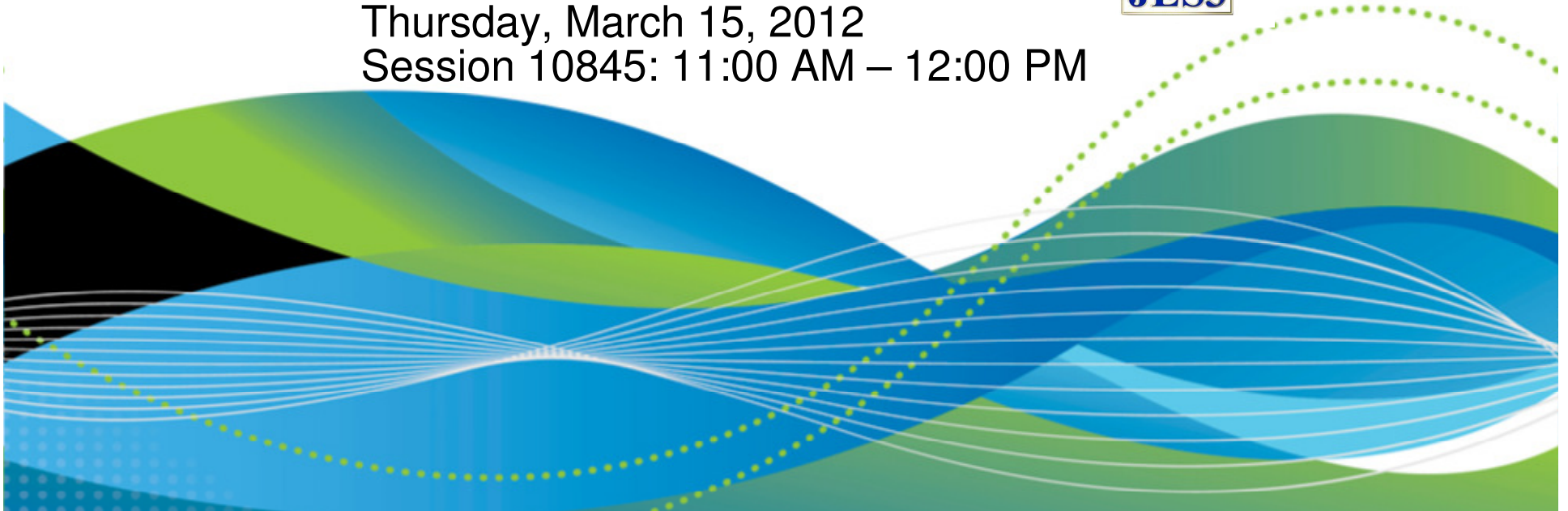


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A VERY brief history of JCL/JECL (with a bit of poetic license)

- In the beginning, there was JCL
 - It described the basics of a job and it was good
- But then came the JESes, JES2 and JES3
 - They wanted their own specifications in JCL but were not type 1
 - So each created their own JCL statement prefixes
 - `/*` for JES3
 - `/*` for JES2 that was converted to `/*` before converter saw it
 - Each created their own solutions to their problems, and all was good
- But then, the customers wanted something that worked for ALL JESes
 - The OUTPUT card was born, keywords were added
 - The world was better, BUT not all differences were addressed....

Objectives:

- Examine the main JCL/JECL of JES2 and JES3
 - Job level statements
 - NJE routing statements
 - SYSOUT property statements
- Understand how each JES accomplishes similar functions
- Relate the JECL statements to JES independent JCL statements
- Highlight the JES Unique aspects of the statements
- End goal is to help understand how to write JES independent JCL where possible
 - JECL is bad
 - Except when there is no other choice (the JECL made me do it)

Note: Neither JES has significantly updated JECL in Decades

// JOB

JES2 /*JOBPARM

JES3 /*MAIN

/*JOBPARM v. /*MAIN v. //JOB JOB Level Parameters

- In the days before SJF (Scheduler JCL Facility)
 - Adding JCL keywords was expensive → never done
 - JES (remember field developed) wanted to provide function
 - Rather than wait for OS guys (Poughkeepsie), JES did their own thing
- JOBPARM and MAIN provided job level defaults
 - Everything from trivial (lines per page printed) to major (where job can run)
- Then came SJF to the rescue
 - Extendable way to define JCL with tables and common parsing
 - New keywords or JCL statements are now easy
 - SJF deals with parsing and validation
 - JES does the real work behind most keywords
- Keywords eventually start appearing on JCL cards

//*MAIN v. /*JOBPARM v. // JOB Parameters compared

//*MAIN	/*JOBPARM	// JOB	Usage notes
ACMAIN=	None	None	Archaic (system name for notify processing)
BYTES=	BYTES=	BYTES=	//*MAIN has warning frequency. /*JOBPARM does not have action.
CARDS=	CARDS=	CARDS=	//*MAIN has warning frequency. /*JOBPARM does not have action.
CLASS=	None	CLASS=	JES3 supports 8 characters for //*MAIN CLASS=
None	COPIES=	None	Replicates non-held, non-spin SYSOUT
DEADLINE=	None	None	JES3 Deadline Scheduling
EXPDTCHK=	None	None	JES3 tape expiration checking
FAILURE=	RESTART=	None	Must use FAILURE=RESTART if // JOB RESTART= is used. Subtle differences.
FETCH=	None	None	JES3 tape fetch message options
None	FORMS=	None	Equivalent to FORMS on JES3 default //*FORMAT
HOLD=	None	TYPRUN=	TYPRUN=HOLD.

//*MAIN v. /*JOBPARM v. // JOB Parameters compared (continued)

//*MAIN	/*JOBPARM	// JOB	Usage notes
IORATE=	None	None	Archaic (used by selection processing)
JOURNAL=	None	None	JES3 job level control of journaling
None	LINECT=	None	JES2 lines per page count
LINES=	LINES=	LINES=	//*MAIN has warning frequency. /*JOBPARM does not have action.
LREGION=	None	None	Archaic (used by selection processing) – In K bytes
None	NOLOG	None	JES2 suppress job log
ORG=	None	None	JES3 default routing (similar to //OUTPUT DEST)
PAGES=	PAGES=	PAGES=	//*MAIN has warning frequency. /*JOBPARM does not have action.
PROC=	PROCLIB=	None	Ooops
RINGCHK=	None	None	Archaic (tapes had rings?)
None	ROOM=	None	Archaic (JES2 job default ROOM for SYSOUT)
SETUP=	None	None	JES3 setup capability.

//*MAIN v. // JOB Parameters compared (continued)

//*MAIN	/*JOBPARM	// JOB	Usage notes
SPART=	None	None	JES3 SPOOL partition
SYSTEM=	SYSAFF=	None	Ooops
THWSSEP=	None	None	JES3 high water setup processing
None	TIME=	None	Archaic (JES2 wall clock time execution limit)
TRKGRPS=	None	None	Archaic (JES3 track groups for job)
TYPE=	None	None	Archaic (Type of operating system. VS2 or ?)
UPDATE=	None	None	JES3 scheduling function
USER=	None	USER=	<i>These are not the same! //*MAIN user Archaic</i>

Ooops?

- PROC/PROCLIB has no true JCL equivalent
 - Can use JCLLIB to specify specific PROC data sets for a job
 - No easy way to select system level default
- SYSAFF/SYSTEM also has no true JCL equivalent
 - Scheduling environment is the recommended solution (SCHENV=)
 - System decides where to run job based on where resources are
 - Deals with most if not all application level affinity questions
 - Especially since system names can change
 - Define a resource and a scheduling environment for each system
 - SCHENV=SY1 would then execute job on system SY1
 - Unfortunately does not control conversion processing
 - For the 1% where that matters

```
// JOB USER= v.  
//*MAIN USER=
```

- // JOB USER=*userid* identifies to the system the person submitting the job.
- //*MAIN USER=*userid* identifies the job with the specified TSO/E user.
 - TSO/E *userid* can issue the TSO/E OUTPUT command to access sysout data sets from the job.
 - TSO/E *userid* can inquire about the status of the job or to cancel the job.
 - Requires use of user exits IATUX29, IATUX30 and disabling security authorization checking using JESSPOOL and JESJOBS classes!
 - i.e. This predates existing security checking!

// XMIT

JES2 /*XMIT & /*ROUTE

JES3 /*ROUTE

// XMIT v.

/*XMIT or /*ROUTE XEQ or /*ROUTE XEQ

- All are used to transmit an input stream to a network node.
 - May be a job input stream which is then executed on the destination node.
 - May be other job definition statements recognized by the destination node.
- Differences exist with regard to which records from an input stream are transmitted.

// XMIT (JCL like statement)

- Transmit a job input stream, or other job definition statements.
- Transmits all records following the XMIT JCL statement to:
 - Two character delimiter specified by DLM= parameter.
 - /* if DLM= not specified.
 - End of input stream.
- What follows the XMIT JCL depends on where the data is going
 - MVS system would expect a JOB card
 - VM system would expect VMBATCH control statements
 - Other operating system would have other expectations
- /*EOF and /*DEL are processed by the internal reader.
 - Occurrence after the XMIT JCL statement may result in errors.
 - Cannot be transmitted in JES2.
 - Can be transmitted in JES3 when SUBCHARS= is used to define a substitute for /* on the input of /*EOF and /*DEL.

/*XMIT

- Transmit a job input stream or other job definition statements.
- Transmits all records following the /*XMIT JCL statement to:
 - Two character delimiter specified by DLM= parameter.
 - /* if DLM= not specified.
 - End of input stream.
- What following the /*XMIT JECL is same as //XMIT.
- /*EOF and /*DEL are processed by the internal reader.
 - Occurrence after the /*XMIT JCL statement may result in errors.
 - Cannot be transmitted using /*XMIT.

/*ROUTE XEQ and /*XEQ

- Transmit the entire job input stream to execute at the destination.
- Transmits all records in the job.
 - /*ROUTE XEQ follows the JOB JCL statement.
- The preceding JOB JCL statement is transmitted with the job.
 - Must be valid on the sending and receiving system
- /*EOF and /*DEL are processed by the internal reader.
 - Cannot be transmitted using /*ROUTE XEQ.

//*ROUTE XEQ

- Transmit a job input stream to be executed at the destination.
- Transmits all records following the **//*ROUTE XEQ** to:
 - A second JOB JCL statement following the **//*ROUTE XEQ**.
 - End of input stream including **/*EOF**.
 - No other delimiters can be specified.
- A JOB JCL statement must follow the **//*ROUTE XEQ**.
 - NJB should be used in place of JOB to avoid the job being submitted at the submitting node if **//*ROUTE XEQ** is in error.
 - NJB required in place of JOB for TSO/E submits.
 - NJB restored to JOB before transmit.
- **/*EOF** and **/*DEL** are processed by the internal reader.
 - Cannot be transmitted using **//*ROUTE XEQ**.

// OUTPUT

JES2 /*OUTPUT et al
JES3 /*FORMAT

Output characteristics

- JES2 output data set characteristics are based upon:
 - OUTCLASS(v) initialization statements (define SYSOUT classes)
 - // OUTPUT JCL statements
 - // DD JCL statement
 - /*OUTPUT JES2 control statement
 - /*ROUTE PRINT or PUNCH for DEST
 - /*JOBPARM for job level defaults of FORMS, LINECT, ROOM
- JES3 output data set characteristics are based upon:
 - JES3 defaults and OUTSERV initialization statement
 - SYSOUT initialization statements (define SYSOUT classes)
 - // OUTPUT JCL statements
 - // DD JCL statement
 - /*FORMAT JES3 control statement

JES2 /*OUTPUT and // OUTPUT

- No generic /*OUTPUT concept
- Specific: /*OUTPUT **code** parameters
- DD statement points to ONE /*OUTPUT card
 - SYSOUT=(*class,writer,code*)
- Default: //name OUTPUT with DEFAULT=YES
- Direct: //name OUTPUT
- Parameters from /*OUTPUT and // OUTPUT never mixed.
 - When DD specifies OUTPUT= value
or
job has DEFAULT=YES OUTPUT JCL statements
 - Then SYSOUT **code** value is treated as a form name
 - Same as when no /*OUTPUT card *code* matches the value

JES3 **//*FORMAT** and **// OUTPUT**

- Non-specific (default): **//*FORMAT DDNAME=*null***,
- Specific: **//*FORMAT DDNAME=*ddname***

- Default: **//*name* OUTPUT** with **DEFAULT=YES**
- Direct: **//*name* OUTPUT**

- Parameters from **//*FORMAT** and **// OUTPUT** statements are never mixed.

Non-specific **//*FORMAT** statements

- Non-specific **//*FORMAT** parameters apply to all DDs in a job:
 - When a default **// OUTPUT** does not exist in the job.
 - When a direct **// OUTPUT** does not apply to the DD.
 - Merged when a specific **//*FORMAT** applies to the DD.
- Non-specific **//*FORMAT** parameters apply to system-managed data sets.
 - Except when **// OUTPUT JESDS=** is specified for the data set.
- Multiple non-specific **//*FORMAT** statements are merged for a single default set of parameters.

Specific **//*FORMAT** statements

- Specific **//*FORMAT** statement identifies the DD statement(s) to which it applies with **DDNAME=*name***.
 - Easier to apply the parameters to DDs defined across the job, in a step, or in a procedure.
 - Can also specify system-managed data sets.
- Multiple **SYSOUT** copies are produced when multiple specific **//*FORMAT** statements apply to a DD.
 - One for each **//*FORMAT**.

How JES3 applies **//*FORMAT** parameters

- Start with JES3 defaults.
 - JES3 defaults can be altered by OUTSERV initialization statement.
- Apply **//*FORMAT DDNAME=*null***, statement parameters.
- Apply SYSOUT class parameters using the first of:
 - 1) SYSOUT class from **// DD SYSOUT =** parameter.
 - 2) SYSOUT class from **// JOB MSGCLASS=** parameter.
 - 3) Default SYSOUT class.
- Apply DD statement specific parameters.
- Apply specific **//*FORMAT** statement parameters.
 - Specific **//*FORMAT** statement where DDNAME= identifies a DD.
 - Note that this overrides DD statement specific parameters.

Other JES2 SYSOUT Property Sources

- /*JOBPARM FORMS=, LINECT=, and ROOM= defaults at job level
 - Applies to all SYSOUT as 1st default
 - Even if // OUTPUT or /*OUTPUT cards are present
 - Unless they specify FORMS, LINECT or ROOM
- /*ROUTE PRINT and PUNCH default SYSOUT route codes
 - Applies at the job level to all output
 - Even if //OUTPUT or /*OUTPUT cards are present
 - Unless they specify DEST

Other JES2 SYSOUT Property Sources

- OUTDISP defaults from OUTCLASS(x) parameter setting
 - Applies to both normal and abnormal disposition
 - Overridden by a // OUTPUT JCL card and DD HOLD=YES/NO
- OUTPUT=DUMMY on OUTCLASS(x) takes ultimate preference
 - No output is produced

Default // OUTPUT statements

- Default // OUTPUT parameters apply to all DDs in a job:
 - When a direct // OUTPUT does not apply to the DD.
 - Default and direct // OUTPUT parameters are not merged.
 - When a specific /*FORMAT does not apply to the DD.
- Default // OUTPUT cards cause all /*OUTPUT cards to be ignored
- Multiple SYSOUT copies are produced when multiple default // OUTPUT statements apply.
 - One for each default // OUTPUT.
- // OUTPUT parameters apply to system-managed data sets when JESDS= is specified.

Direct // OUTPUT statements

- The DD statement directly identifies the // OUTPUT statement(s) to be applied with OUTPUT=.
 - Each DD needs to specify OUTPUT=.
 - Harder to specify for DDs in a procedure.
 - Can also specify the default // OUTPUT
- // OUTPUT JESDS= used to apply parameters to system-managed data sets.
 - Can be used on default and direct // OUTPUT statements.
- Multiple SYSOUT copies are produced when multiple // OUTPUT statements are specified in a DD.
 - One for each // OUTPUT.

How JES2 applies OUTPUT Characteristics

- Determine SYSOUT class parameters using the first of:
 - 1) SYSOUT class from // DD SYSOUT = parameter.
 - 2) SYSOUT class from // OUTPUT CLASS= parameter (SYSOUT=(,)).
 - 3) SYSOUT class from // JOB MSGCLASS= parameter.
 - 4) Default MSGCLASS from device
- Apply general defaults from
 - JOBPARM, ROUTE, and OUTCLASS(x)
- Apply values from // OUTPUT or /*OUTPUT (never both)
 - Specific or default // OUTPUT cards (never both)
- Apply values from the DD statement
 - DD statement keywords override all other sources

How JES3 applies // OUTPUT parameters

- Start with JES3 defaults.
 - JES3 defaults can be altered by OUTSERV initialization statement.
- Apply SYSOUT class parameters using the first of:
 - 1) SYSOUT class from // DD SYSOUT = parameter.
 - 2) SYSOUT class from // OUTPUT CLASS= parameter.
 - 3) SYSOUT class from // JOB MSGCLASS= parameter.
 - 4) Default SYSOUT class.
- Apply // OUTPUT statement parameters.
 - Either DEFAULT=YES statement or DD OUTPUT= statement.
- Apply DD statement specific parameters.
 - Note that this overrides // OUTPUT statement parameters.

Using both **//*FORMAT** and **// OUTPUT**

- Parameters from **//*FORMAT** and **// OUTPUT** statements are never mixed.
- When default **// OUTPUT** and non-specific **//*FORMAT** both apply to a data set, only one copy of the data set is created using the default **// OUTPUT** parameters.
- Multiple **SYSOUT** copies are produced when specific **//*FORMAT** and direct **// OUTPUT** statements apply to a **DD**.
 - One for each **//*FORMAT** and one for each **// OUTPUT**.

/*FORMAT v. // OUTPUT

Forcing the JES3 initialization default

- Can specify that the JES3 initialization default for a parameter be used.

```
/*FORMAT parameter=STANDARD, CARRIAGE=6, FCB=6  
// OUTPUT parameter=STD
```
- Only in JES3 for selected parameters
 - Using STD in JES2 may be an error or a valid parameter value.

/**FORMAT v. /*OUTPUT v. // OUTPUT Parameters compared

/**FORMAT	/*OUTPUT	// OUTPUT	Usage notes
CARRIAGE=	None	None	JES3 only 3211 carriage tape name – archaic
CHARS=	CHARS=	CHARS=	STANDARD/STD in JES3 only.
CHNSIZE=	None	None	JES3 SNA RJP transmission record count
None	CKPTLNS=	CKPTLINE=	CKPT interval in lines
None	CKPTPGS=	CKPTPAGE=	CKPT interval in pages
COMPACT=	COMPACT=	COMPACT=	Compact table name
CONTROL=	None	CONTROL=	Different JES2/JES3 defaults.
COPIES=	COPIES=	COPIES=	Copies 1-255. JES3 supports 0 (do not print)
DEST=	DEST=	DEST=	JES3 values not supported by both. Limited JES2/JES3 common values.
EXTWTR=	None	WRITER=	<i>These are not the same!</i>
FCB=	FCB=	FCB=	6/STD for JES3 initialization default.
FLASH=	FLASH=	FLASH=	STANDARD/STD for JES3 initialization default.
None	FLASHC=	FLASH=	Second keyword on FLASH= - archaic

/*FORMAT v. /*OUTPUT v. // OUTPUT Parameters compared (continued)

/*FORMAT	/*OUTPUT	// OUTPUT	Usage notes
FORMS=	FORMS=	FORMS=	STANDARD/STD for JES3 initialization default. (1)
None	INDEX=	INDEX=	3211 left margin
None	LINDEX=	LINDEX=	3211 right margin
None	LINECT=	LINECT=	JES2 lines per page
MODIFY=	MODIFY=	MODIFY=	
None	MODTRC=	MODIFY=	Second parameter on MODIFY=. Archaic.
OVFL=	None	OVFL=	JES3 only.
PRTY=	None	PRTY=	Different JES2/JES3 defaults.
STACKER=	BURST=	BURST=	STACKER=Y / BURST=S (separate sheets) STACKER=N / BURST=C (continuous fanfold) STACKER=STANDARD but no BURST=STD
THRESHLD=	None	THRESHLD=	JES3 only.
TRAIN=	UCS=	UCS=	TRAIN=STANDARD but no UCS=STD

1. Form-name is 1 to 8 characters, but only 1 to 4 characters when specified using // DD SYSOUT= parameter.

```
// OUTPUT WRITER= v.  
//*FORMAT EXTWTR=
```

- // OUTPUT WRITER=*name* identifies an external writer to process the SYSOUT data set.
 - JES3 SYSOUT placed on Q=HOLD for WRITER=*name* if not destined for a known node (held for WRITER=*name*).
 - JES3 SYSOUT placed on appropriate Q for a destination node, then placed on Q=HOLD for WRITER=*name* at the destination node.
- //*FORMAT EXTWTR=*name* identifies an external writer at a destination node that is to process the sysout data set.
 - JES3 SYSOUT placed on Q=WTR if not destined for a known node (not held for EXTWTR=*name*).
 - JES3 SYSOUT placed on appropriate Q for a known node, then placed on Q=HOLD for EXTWTR=*name* at the destination node.

JES3 SYSOUT HOLD differences

- JES3 Q=HOLD (hold queue) contains:
 - Data sets for external writers.
 - Data sets for a SYSOUT class with HOLD=TSO.
 - Available for TSO/E OUTPUT command.
- // DD HOLD=YES for JES3 is not the same as for JES2.
 - Sets JES3 hold status of USER with data set on Q=WTR.
 - JES2 data set on Q=HOLD and available for TSO/E OUTPUT.
- /*FORMAT parameters are not applied to JES3 data sets initially put on Q=HOLD.
 - Applied when released (data set moved to Q=WTR).

Other JCL/JECL

Other JECL

JES2	JES3	Comment
/*\$XXXXX	/**XXXXX	Issue a JES operator command
	/*DATASET /*ENDDATASET	Define data set to process
	/*PROCESS /*ENDPROCESS	Process phases for a job
	/*NET	JES3 dependent job control
/*NETACCT	/*NETACCT	Network accounting info (same in name only)
/*NOTIFY		Archaic. Use JOB card NOTIFY=
/*MESSAGE	/*OPERATOR	Issue message to the operator
	/**PAUSE	Pause input device waiting for a start
/*PRIORITY		JES2 priority of the job
/*SETUP		JES2 issue setup message to operator
/*SIGNON /*SIGNOFF	/*SIGNON /*SIGNOFF	RJE/RJP sign on and off

JCL Differences

Statement	Comment
// DD COPIES=	JES2 is 1-255, JES3 0-255 (0 implies does not print) Group value JES2 1-255, JES3 1-254
// DD HOLD=	See hold discussion earlier
// DD SEGMENT=	JES2 only
// JOB accounting	JES2 has a default parser, JES3 does not
// JOB CLASS=	JES2 has only 1 character class, JES3 supports up to 8 using /* MAIN card
// JOB NOTIFY=	JES2 supports node.userid, JES3 support only userid
// JOB TYPRUN=	JES3 does not support JCLHOLD and COPY. /*MAIN HOLD=YES is same as TYPRUN=HOLD. EXEC PGM=JCLTEST is almost TYPRUN=SCAN except the interpreter is run

JCL Differences

Statement	Comment
// (null JCL card)	JES3 stops input processing for the job, JES2 ignores the // card. Can place JES2 JECL after a // and JES2 will honor it.
// OUTPUT	Various keywords supported by only one JES

Questions?

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