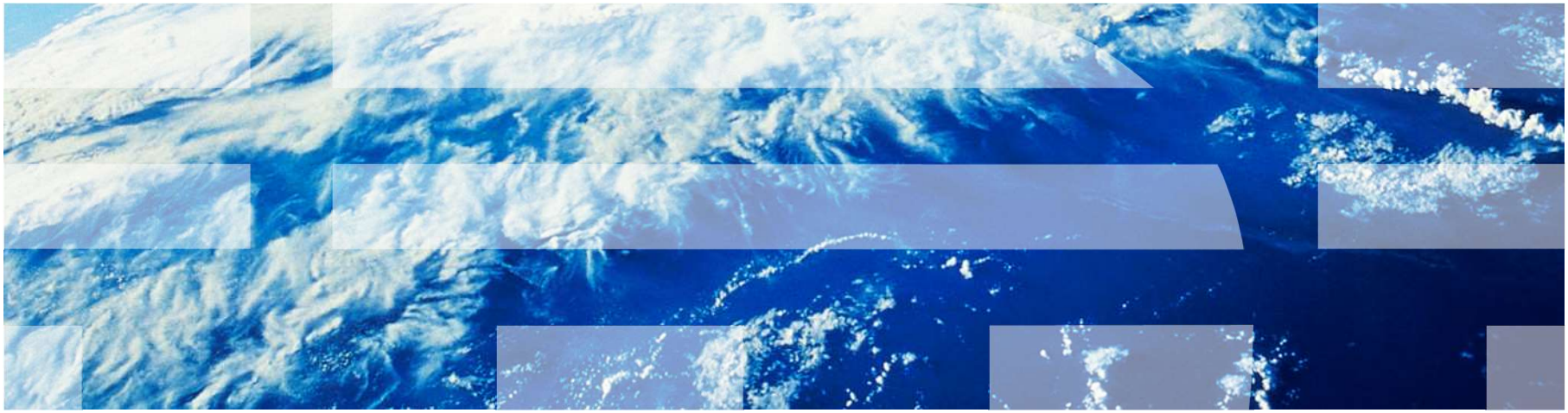
Günter Kook

22.-24. Mai 2019

IBM Z Workload Scheduler 9.5 Migration & Enhancements



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Agenda

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- **Installation / Migration**
- Actions / Alerting based on Deadline
- Smooth Job Submission
- Integration with IBM Common Data Provider (CDP)
- Miscellaneous
  - OPSTAT Returncode
  - Automatic Rebind for remote Jobs
  - NOP wait for time / resource
  - Batchloader preserve duration for existing operations
  - Enhancement BUILDSSX(REBUILD)

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Documentation

- General link to IWS documentation (all releases)

  https://www.ibm.com/support/knowledgecenter/en/SSRULV

- Link to online documentation

  https://www.ibm.com/support/knowledgecenter/SSRULV_9.5.0/com.ibm.tivoli.itws.doc_9.5/twa_landing.html

- Link to PDF-Files IBM Workload Scheduler, Version 9.5

  You can download the PDFs from:

  https://www.ibm.com/support/knowledgecenter/en/SSRULV_9.5.0/com.ibm.tivoli.itws.doc_9.5/pdfguides.html

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FMID for IWS Z 9.5

- **Program Number:** **5698-T08**
- **COMPID** **5697WSZ01**

UPGRADE	SUBSET (FMID)	Description
TWSZOS950	HWSZ950	Agent
	JWSZ952	Engine
	JWSZ953	E2E and Java Enabler
	JWSZ954	z/OS Connector Enabler
	JWSZ95A	Engine Korean
	JWSZ95B	Engine English
	JWSZ95C	Engine German
	JWSZ95D	Engine Japanese
	JWSZ95E	Engine Spanish

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Interoperability

- New suffix **N** to recognize the version:
  - EQQINIT**N**, EQQMINO**N**, EQQSSCM**N**
- The z/OS connector version must be the same as the DWC version.
- The DWC version must be equal or higher than IWS for z/OS version.

IWSz/TWSz	DWC - z/OS Connector	IWS zAgent	FTA
950	950	910, 920,930,940, 950	910,920,930,940,950
930	930, 940, 950	910, 920,930,940, 950	910,920,930,940,950
920	920, 930, 940, 950	910, 920,930,940, 950	910,920,930,940,950
(910)	910, 920, 930, 940, 950	910,920,930,940, 950	910,920,930,940,950

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Interoperability

- Parameter INIT USRLEV could be used for access with old PIF programs
  - USRLEV(11) Release 9.5 (Alert Actions) → Default !
  - USRLEV(10) SPE 930 PI62520 PI62521 (Application dependencies)
  - USRLEV(9) SPE 930 PI57310 (NOP, MH variable values)

- DB2 History function is not longer supported
  - Use DB2 Reporting function instead

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GA Apars / Prereqs

- The following Apars / PTF should be applied before using IWS Z 9.5

  APAR **PH08841**

  PTF UI61799 (HWSZ950), UI61800 (JWSZ952), UI61801 (JWSZ953), UI61802 (JWSZ95A), UI61803 (JWSZ95B), UI61803 (JWSZ95C), UI61804 (JWSZ95D), UI61805 (JWSZ95E)

- The following PTF's must be applied on old Release before migrating to IWS Z 9.5

  IWSz 9.3:
  – UI57072, UI57073 (proxy support SPE)
  – UI55004, UI55005, UI55006, UI55007, UI51764 (Appl. Deps)
  – UI56453, UI56454 (WLM submission SPE)
  – UI51772, UI51762 (Data space SPE)

  TWSz 9.2:
  – UI23820, UI23826, and related relevant NLS PTF UI23821,
  – UI23822, UI23823, UI23824 or UI23825

see also: **https://www-01.ibm.com/support/docview.wss?uid=ibm10879253**

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Changed skeletons (compared to IWS 9.3 with SPE's)

- None

Generated batch jobs must not be changed.

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New IWS Parameter

- BATCHOPT
  - SMOOTHSUBCONFLEVEL(n)
  - SMOOTHSUBDELAY(nnnn)

- JTOPTS
  - NOPWAIT (YES|NO)
  - NOTSTARTCOMP(YES|NO)
  - SMOOTHCRITNET(NO|YES)
  - SMOOTHSUBMISSION(YES|NO)
  - SMOOTHSUBRATE(average num of operations to submit|0)

- OPCOPTS
  - CDP(YES|NO)
  - CDPJOBSTATUS(CS|changed operation statuses|NO)
  - CDPDB(YES|NO)
  - CDPMCP(YES|NO)
  - CDPSWITCHLOGLIM(number of records|1000)
  - CDPPATH(path to CDP log files)

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Migration from old releases

- IWS Z 9.5.0 supports direct migration from TWSz 9.1 on, no intermediate migration necessary.

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Actions and alerting based on deadline

- Currently IWSz has the following automatic options if a deadline is missed:
  - Deadline WTO for running jobs (intended to stop running tasks)
  - Suppress if late with a controller wide option to complete or set the operation to error
  - (late operation message EQQE027/EQQE037I)

- With IWS Z there are new options on operation level available:
  - Deadline action if operation is not completed
  - Not Started action if operation is not started
  - Not Started alert if operation is not started

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Actions and alerting based on deadline

The new function is activated with parameter

JTOPTS NOTSTARTCOMP(YES|NO)

An alert is issued or an action is taken according to the value you set in the following fields at operation level:

- **Not started alert**
  If an operation has not started when the start day and time are reached, an alert message is issued in the EQQMLOG and system log.
- **Not started action**
  If an operation has not started when the start day and time are reached, an action is taken.
- **Deadline action**
  If an operation is still not completed when the deadline day and time are reached, an action is taken.

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Actions and alerting based on deadline

The following actions could be specified:

- **‘ ’ (blank)** No action is taken.
- **A** Only an alert message is issued.
- **C** The operation is set to Complete, if its status allows it.
  Otherwise it is NOPed.
- **E** The operation is set to Error with ODEA, if its status allows it.
  Otherwise it is ignored.
- **N** Operation and all its internal successors are NOPed, if their status allows NOPing.
  Otherwise it is ignored.

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Definition in AD database

```
---------------------------- TIME SPECIFICATIONS ------------ Row 1 to 1 of 1
Command ===>

Enter/Change data below:

Application time specifications:
 Input arrival time          :      06.00
 Default deadline day/time   : 00   18.00
 Default duration            :      00.01.00

Operation time specifications:   CPU1 011
 Input arrival               :   DAY   __    TIME   _____
 Default Operation deadline  :   DAY   00    TIME   16.00   ACTION  C
 Not started alert           :   DAY   00    TIME   14.00
 Not started action          :   DAY   00    TIME   15.00   ACTION  E
Enter/Change data in the rows, and/or enter any of the following
row commands related to variable values:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
Row  Ext./Appl.  Duration  Deadline      NOP  MH  Crt  Not started  Not started
cmd  Run Cycle   HH.MM.SS  DD HH.MM Act          ind  alert        action
                                                      DD HH.MM     DD HH.MM Act
'''' MONTH____   ________  __ _____ _    _   _   _    00 13.00     __ _____ _
******************************* Bottom of data ********************************
```


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Actions and alerting based on deadline

The request for a status change (complete or set to error) is handled based on the actual status of the operation:

- Status **S,*,R,A,E** (no uncompleted predecessor):
  - Status change is done

- Status **W** (uncompleted predecessor):
  - Operation will be NOPed and completed when it becomes ready (if operation can be noped)

- **Caution:** For operations with status **S** the status of the operation is changed, but the corresponding job will still be executing on the system.

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Workload optimization with smoothing job submission

- Currently IWSz submits all jobs that are ready to run as soon as possible .
- This might lead to a delay of critical jobs because non-critical jobs are also submitted.
- This might lead to an overload of the system when starting the batch window.

- With the new feature it is possible to allow non-critical jobs (which are not defined on the critical path) to be delayed from starting at the beginning of the batch window.
- The number of jobs that could be started within a minute could be restricted.
- As a consequence, critical jobs are prioritized and the non-critical batch is delayed.
- This might also lead to a reduction of the average CPU consumption on the system.
- The feature is activated using new IWS parameters.

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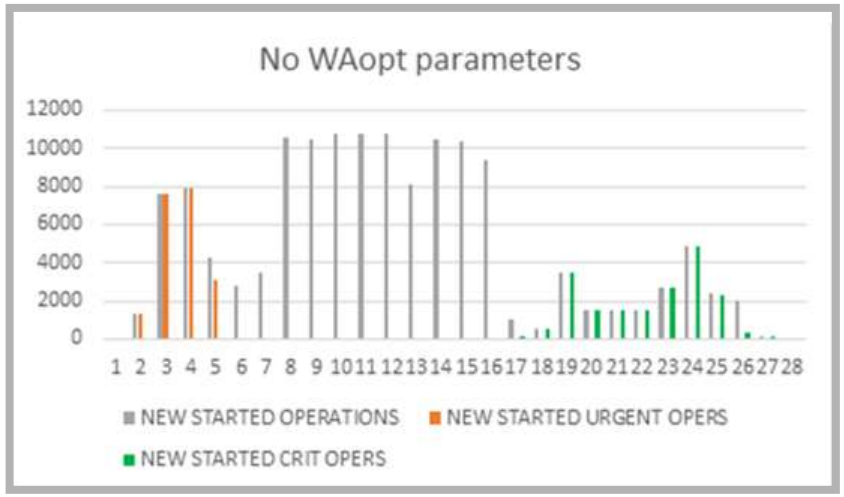
Example (from the lab)

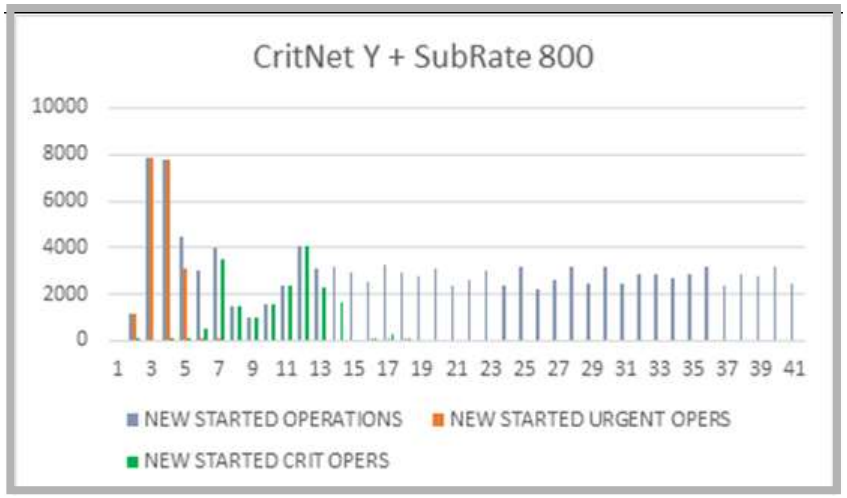
RECCPCOMPL(N)
no WAopt Parameters

Plan Execution Time	Average CPU During Plan Execution	Total CPU
1:42:19	17,02%	8981

RECCPCOMPL(N)
SMOOTHSUBMISSION(Y)
SMOOTHCRITNET(Y)
SMOOTHSUBRATE(800)

Plan Execution Time	Average CPU During Plan Execution	Total CPU
3:09:43	8.00%	8463





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Smooth job submission - Parameter

JTOPTS SMOOTHSUBMISSION(YES|NO)

- Activates the Smooth Submission feature.
- By setting this parameter to YES, the submission of operations that are urgent (with priority 9) or belong to a critical path is prioritized.
- If SMOOTHSUBCONFLEVEL and SMOOTHSUBDELAY parameters in the “BATCHOPT” are specified, the controller adds a random delay in submitting not urgent and not critical operations.
- The default is NO.

JTOPTS SMOOTHCRITNET(NO|YES)

- YES to prioritize the submission of the operations belonging to the whole critical network (not only operations on the actual critical patch).
- The default value is NO.

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Smooth job submission - Parameter

BATCHOPTS SMOOTHSUBDELAY(*nnnn*)

- This value is stored by the DP batch in the current-plan header to make it available to the controller. Based on this setting, the controller adds a random delay to the submission of operations that are neither urgent nor belonging to a critical path.
- It is expressed in seconds, in a range between 0 and 9999 (about 2 hours and 46 minute). The default is 0, meaning that no delay is added.
- A value greater than 0 means that the controller adds a random delay in submitting operations that are neither urgent nor belonging to a critical path, in a range between 1 second and this value. Latest start time is never exceeded, regardless of the value that you specify for this parameter.

BATCHOPTS SMOOTHSUBCONFLEVEL(*n*)

- The multiplying factor to be applied to sigma (variance of latest start time). It is used to prevent that the delay added by SMOOTHSUBDELAY causes that an operation is submitted too close to its latest start time
- It can be an integer from 0 to 5. The value 0 means that the variance is not considered, therefore the operation submission might reach its latest start time.

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Smooth job submission - Parameter

JTOPTS SMOOTHSUBRATE(*average num of operations to submit***|0)**

- The average number of operations to be submitted, in 1 minute, on computer automatic workstations, with the exception of the operations that are urgent (with priority 9) and operations running on E2E workstations.
- With SMOOTHSUBMISSION(NO) all operations will be restricted
- With SMOOTHSUBMISSION(YES) the following operations will be excluded from the submission rate restrictions:
  - Operations belonging to a critical path.
  - Operations eligible for WLM assistance.
- With additionally SMOOTHCRITNET(YES) set the following operations will be excluded from the submission rate restrictions:
  - Operations belonging to a critical network.
  - Operations eligible for WLM assistance.

- Valid range is from 1 to 99999.
  The default value is 0, meaning that this parameter is not set.

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Controller MODIFY commands

- **DSPSMOOTHSUB**
  Displays all the values that are set for the smooth submission feature in the JTOPTS and BATCHOPT statements.
- **SETSMOOTHCRITNET=ON**
  Sets the SMOOTHCRITNET parameter to YES, to prioritize the submission of operations belonging to the whole critical network.
- **SETSMOOTHCRITNET=OFF**
  Sets the SMOOTHCRITNET parameter to NO.
- **SETSMOOTHRATE=*nnnn***
  Changes the value for the SMOOTHSUBRATE parameter in the JTOPTS statement. Valid values are in the range from 0 to 99999. 0 means that the SMOOTHSUBRATE parameter is not set.
- **SETSMOOTHSUB=ON**
  Activates the smooth submission feature. To make it effective, run either a daily planning EXTEND or REPLAN.
- **SETSMOOTHSUB=OFF**
  Deactivates the smooth submission feature. To make it effective, run either a daily planning EXTEND or REPLAN.

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CDP Integration

- Centralized AUDIT Info and Messages covering EQQMLOG, changes in IWSz database and IWSz current plan
- Used as input for CDP (Common Data Provider) for deeper analysis
- But also:
  Centralized information of all controller activities for own reporting without CDP

- Data is written into two alternate files in USS
- Message EQQZ299I when file is switched
- Readable text format that can be accessed without using EQQAUDIT program
- Messages could be added specifying CDP=YES (similar to WTO=YES)
- Included data could be customized by parameter

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CDP Parameter in OPCOPTS

- **CDP(YES|NO)**
  YES to enable the logging of data in the EQQCDP1 and EQQCDP2 log files, which are read by IBM Common Data Provider for z Systems (CDP), if you configure it to integrate with IBM Z Workload Scheduler.
- **CDPPATH(***path to CDP log files***)**
  The complete path to the EQQCDP1 and EQQCDP2 log files (up to 40 alphanumeric characters). It must be existent in the HFS file system.
- **CDPSWITCHLOGLIM(***number of records***|1000)**
  Specifies how many records must be written in the CDP log before the CDP log switching function is started. The CDP log switching function stops the running CDP log file and starts the alternate CDP log file. The alternate CDP log file records upcoming messages until the CDPSWITCHLOGLIM value is reached again, and the process is repeated.

  Allowed values are from 1 to 999 999 999. The default is 1000 records.

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CDP Parameter in OPCOPTS

- **CDPDB(YES|NO)**
  YES to log the events related to actions performed in the controller database.
  This is the default.
- **CDPMCP(YES|NO)**
  YES to log the events related to MCP actions.
  This is the default.
- **CDPJOBSTATUS(CS|***changed operation statuses***|NO)**
  Indicates the changed statuses of an operation that are to be logged. Specify the statuses as a string, for example AIR*. Valid values are:
  – **A** Ready. No predecessors defined.
  – **C** Complete.
  – **E** Operation ended in error.
  – **I** Interrupted operation.
  – **R** Ready. All predecessors are complete.
  – **S** Started.
  – **X** Suppressed by condition.
  – ***** Ready. At least one predecessor was non-reporting. All predecessors are complete.
  By default, only the statuses changed to C and S are logged.
  To disable the logging of operations changed status, set this parameter to NO.

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Example CDP data

```
05/21 14.19.25.TWSC.EQQHT25E THE HTTP SERVER FAILED TO BIND ON PORT 30511. ERROR
05/21 14.19.41.TWSC.EQQHT15E THE HTTP CLIENT FAILED TO PROCESS A REQUEST FOR DES
05/21 14.19.41.TWSC.EQQHT43I CLIENT FAILED TO OPEN. ERROR 1137 WHILE OPENING CON
05/21 14.19.41.TWSC.EQQHT43I PORT='2212'): 'EDC8137I STREAMS ioctl() timeout.'
05/21 15.34.14.TWSC.EQQ8004I AD INSERTING BY DSKOOK - APPLICATION: TEST#SMOOTH#0
05/21 15.43.18.TWSC.EQQ8004I AD INSERTING BY DSKOOK - APPLICATION: TEST#SMOOTH#C
05/21 15.44.41.TWSC.EQQ8006I OPERATION 010 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.41.TWSC.EQQ8006I OPERATION 020 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.41.TWSC.EQQ8006I OPERATION 030 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.41.TWSC.EQQ8000I OCCURRENCE TEST#SPE93#NOP WITH IA DATE 19/05/17 AND
05/21 15.44.42.TWSC.EQQ8006I OPERATION 010 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.42.TWSC.EQQ8006I OPERATION 020 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.42.TWSC.EQQ8006I OPERATION 030 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.42.TWSC.EQQ8000I OCCURRENCE TEST#SPE93#NOP WITH IA DATE 19/05/20 AND
05/21 15.44.42.TWSC.EQQ8006I OPERATION 010 IN OCCURRENCE TEST#SPE93#NOP WITH IA
05/21 15.44.42.TWSC.EQQ8006I OPERATION 020 IN OCCURRENCE TEST#SPE93#NOP WITH IA
```


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OPSTAT Completion Code

- OPSTAT command could set a completion code if operation is set to complete

```
>>—OPSTAT—┬──────────────────────────────────────────────┬──────────────────>
          └ADID—(——application description ID——)—┘

>—┬──────────────────────────────────────┬──────────────────────────────────>
  └CLASS—(——printer sysout class——)—┘

>—┬──────────────────────────────────────────────────────┬──────────────────>
  └COMPLCODE—(——completed operation return code——)—┘

>—┬──────────────────────────┬─┬──────────────────────────────────────────┬──>
  └DURATION—(——hhmm——)—┘ └ERRORCODE—(——operation error code——)—┘
```

- This could be used with conditional dependencies to check a special condition based on the returned completion code

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Automatic Rebind for remote Jobs (Cross-Dependencies)

- When a remote job dependency (remote job info or workstation) is modified in the current plan, the bind information is not updated till the execution of BND command

- The Automatic rebind assure the execution of needed Bind action (no possibility to miss it as when manual action is required)

- It is executed once the commit is done (PF3 - END) from all the interfaces: operation pannel (5.3), application pannel (5.2) and batch interface (PIF)

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NOP waits for time / resources

- **JTOPTS**

  NOPWAIT (YES|<u>NO</u>)

- Specify **YES** if an NOPED operation must be set to complete only after special resource and time restrictions have been respected
- Specify **NO** (default) if the operation is NOPed immediately.

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Batchloader preserve duration for existing operations

- When using batch loader, the duration for productive jobs within the application description was set to the specified value.
- If you had established a correct duration with ‘smoothing factor' and ‘limit feedback' it will be lost by the next replacement via batch loader.
- There’s a new PIF-Parameter to use the already defined duration in the AD database:

  ADOPOLDDUR =Y

- Batch loader will use this new parameter, so if you do not specify the duration in the batch loader statements, EQQYLTOP will use the already defined duration for the operation.

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Enhancement BUILDSSX(REBUILD)

- The parameter BUILDSSX(REBUILD) is used to prevent the need for an IPL when a migration to a new release is done, or a PTF is applied which requires that the subsystem be rebuild.
- If the parameter is left in place when it is no longer needed, and a tracker is restarted, all the tracking records in the ECSA storage are lost which can cause severe problems.
- Now, when old and new FMID are the same, the event queue is maintained and no events are lost.

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Thank You

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