
Rule WLM371: Non-paging DASD I/O activity caused significant delays

Finding: Non-paging DASD I/O activity experienced by the service class caused significant delays to the service class.

This finding applies only to service classes with execution velocity goals, and then applies **only** if I/O using and I/O delay are **not** included in the execution velocity calculation.

Impact: This finding can have a LOW IMPACT, MEDIUM IMPACT, or HIGH IMPACT, depending upon the amount of non-paging DASD I/O activity and the delay to the service class caused by the non-paging DASD I/O activity.

Logic flow: The following rules cause this rule to be invoked:
Rule WLM103: Service Class did not achieve execution velocity goal

Discussion: When CPEXpert detects that a service class did not achieve its execution goal, CPEXpert analyzes the basic causes (see the discussion in the above predecessor rules). One of the possible causes of delay is that the service class was delayed because of non-paging DASD I/O activity.

The SRM collects I/O using and delay information beginning with OS/390 Release 3. Prior to OS/390 Release 3, any I/O delay is reflected in the UNKNOWN category of delay, and CPEXpert will analyze the I/O delay as discussed in Rule WLM350.

The non-paging DASD I/O using and delay information is reported in SMF Type 72 records for each service class period. CPEXpert analyzes the non-paging DASD I/O delay (field R723CIOD) for service classes missing their performance goal. CPEXpert produces Rule WLM371 when the percent delay caused by non-paging DASD I/O is greater than the **WLM SIG** guidance variable in USOURCE(WLMGUIDE), and an execution velocity goal has been specified..

From the perspective of Rule WLM371, I/O using and I/O delay are not considered in computing execution velocity. However, a significant I/O delay may be important from the overall performance of the service class. This is because service classes with an execution velocity goal often have significant I/O activity.

The following example illustrates the output from Rule WLM371:

RULE WLM371: NON-PAGING DASD I/O EXPERIENCED SIGNIFICANT DELAYS

BATCHHI: Non-paging DASD I/O operations experienced significant delay during the time that the BATCHHI service class was executing. The percentages are computed as a function of the EXECUTION samples on the local system (the percentages are adjusted to eliminate IDLE time, to reflect the effect when the service class was actually executing). Values greater than 100% for the PCT DELAY indicate that an average of more than one DASD I/O operation was delayed concurrently during the execution time.

MEASUREMENT INTERVAL	AVG DASD	PCT	---AVERAGE DASD I/O TIMES---				
	I/O RATE	DELAY	RESP	IOSQ	WAIT	DISC	CONN
21:00-21:15,19NOV1998	380	22.7	0.016	0.010	0.001	0.004	0.001
22:30-22:45,19NOV1998	686	30.6	0.015	0.007	0.001	0.005	0.001
22:45-23:00,19NOV1998	575	12.5	0.010	0.003	0.001	0.005	0.001

Suggestion: Please note that the non-paging DASD I/O activity did not directly cause the service class to miss its execution velocity goal, since non-paging DASD I/O activity was not a part of the execution velocity calculation. However, the non-paging DASD I/O time was significant, and could have caused overall performance to be degraded.

From a high-level view, there are four key measures of DASD performance: IOS Queue (IOSQ) time, pending (PEND) time, disconnect (DISC) time, and connect (CONN) time. The last three of these measures are reported in SMF Type 72 records (fields R723CIWT, R723CIDT, and R723CICT, respectively) for environments prior to OS/390 V2R4. IOSQ time is reported in SMF Type 72 (field R723CIOT) beginning with OS/390 V2R4.

Please refer to the suggestions associated with Rule WLM361 for a discussion of these measures and how to reduce delay in each category.