

WLM Sysplex Workload Distribution

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When WLM is called by DNS or sysplex distributor for advice on where to route work in a sysplex, WLM returns a list of eligible servers with a weight assigned to each server. Work is then routed to the server proportionally to its weight so that the higher weight servers receive more work. For example, if four servers A, B, C, and D are returned by WLM with weights of 2, 2, 4, and 8 respectively, DNS will route one-eighth of the requests to each of servers A and B, one-fourth of the requests to server C, and one-half the requests to server D.

The weights are calculated as follows. WLM first assigns a weight to each system, with a higher weight to systems with the most available capacity. The weights are proportional to the amount of available capacity on each system. Then WLM divides the weight for a system equally among the registered servers on that system. In the case of DNS, there can be multiple servers registered with WLM per system image. For sysplex distributor, however, the WLM server registration is done by the TCP/IP stack so there is only one server per system image. This means the server weight always equals the system weight for sysplex distributor. If all systems are running at or near 100% utilization, then higher weights are given to the systems running less important work. The objective is to send work where there is available capacity or, if there is no available capacity, where the least important work will be displaced. Servers on systems that are in a serious storage shortage (SQA, fixed frame, auxiliary storage) are not recommended unless all systems are in a shortage.

Calculation of Server Weights

The basis for WLM's weight calculation is a CPU capacity table for each goal mode system in the sysplex. More than half of the systems in the sysplex need to be in goal mode for WLM to calculate weights. Otherwise, all weights are set equal to one. The table has one row for each level of work in the system:

- Level 0 is used for service consumed by the system
- Levels 1-5 are the externally defined importance levels
- Level 6 is used for Discretionary work
- Level 7 is unused service (equivalent number of service units)

Each row contains the following fields:

- Number of service units consumed in 3 minutes at the given importance level and below.
 - Percentage of total capacity consumed in 3 minutes at given importance level and below.
- (For example, Level 4 in the table has the service units consumed by importance 4, importance 5, and discretionary work plus unused capacity.)

1. WLM scans the rows in the table in reverse starting with Level 7 until it finds a level where one or more systems have at least 5% cumulative service units of capacity. WLM then uses this table level for all goal mode systems to assign relative weights.

2. A system weight is calculated for each system in the sysplex using the SU value in the selected row in the table.

$$\text{System weight} = \frac{\text{SUs for this system at selected level} * 64}{\text{total SUs for all systems at selected level}}$$

3. Finally, a server weight is calculated:

$$\text{Server weight} = \frac{\text{system weight}}{\text{\# of servers on system}}$$

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If the number of servers is greater than the system weight, one server is selected and its weight is set to one.

Example: In this example, there are three goal-mode systems in the sysplex, all running at 100% CPU utilization. Let's say each system has two DNS servers running for a particular application. To assign weights to the three systems, WLM scans the CPU consumption table from the bottom up, looking for a level where at least one system has 5% or greater cumulative CPU consumption. In this case, Level 5 row is used because System A exceeds the 5% minimum (and so does System B). Level 5 is then used to calculate the weight for all systems including System C. So in this case the system weights are determined by the amount of importance 5 and discretionary work each system is running. Because there are two servers on each system, the server weight is the system weight divided by 2.

System A weight = 200 * 64 / 640 = 20 Server weight = 20 / 2 = 10
 System B weight = 400 * 64 / 640 = 40 Server weight = 40 / 2 = 20
 System C weight = 40 * 64 / 640 = 4 Server weight = 4 / 2 = 2

CPU consumption table

Level	System A		System B		System C	
	SUs	%	SUs	%	SUs	%
0	2000	100	2000	100	2000	100
1	1800	90	1900	95	1840	92
2	1600	80	1500	75	1600	80
3	1100	55	1500	75	800	40
4	400	20	1200	60	800	40
5	200	10	400	20	40	2
6	80	4	20	1	0	0
7	0	0	0	0	0	0

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