Choosing an LSPR workload mix for use in a capacity planning methodology

The LSPR provides the capacity ratios among processors for six IBM workloads named: TSO, IMS, CICS/DB2, CB84, CBW2, and FPC1. These workloads are intended to define the envelope (or range) of the expected capacity difference between two processors. As part of a capacity planning exercise for a particular production workload, the intent should be to estimate where in the envelope the workload will fall.

The default LSPR MIX capacity ratio is made up of the harmonic mean from weighting four workloads, TSO, IMS, CICS/DB2 and CB84, in equal 25% proportions. This has been chosen to provide continuity with previous LSPR MIX numbers and is often used for capacity planning. However, this mix does not necessarily correctly place a particular production workload within the capacity envelope. A more accurate use of the LSPR for capacity planning involves "tailoring" a mix to match a production workload.

When is tailoring the mix most necessary?
The answer is when the LSPR capacity ratios for a particular upgrade path indicate a wide variation among the workloads. An important example of this is upgrades from G4 to G5 and G6 processors (especially upgrades from the higher-Nway G4s). Workloads that did not stress the memory-subsystem (that is, the caches and memory buses) of the G4 tend to run better on the G4 than workloads that are more stressful on this part of the hardware. Thus, when moving from G4 to G5 or G6 processors (which have very robust caches and buses), a large variation in workload performance can be seen in the LSPR capacity ratios. It is very important to use a tailored mix in this situation. When there is only a small variation in workload capacity ratios (such as upgrades from G5 to G6), it is much less important to tailor a mix.

Tailoring a mix
For workloads that have been reasonably stable over a period of time, and whose actual capacity ratios have been carefully tracked across previous upgrades (and compared to the LSPR workload capacity ratios), the appropriate mix of LSPR workloads may have already been proven to yield accurate estimates (although this must be reexamined in light of the new LSPR workloads). Note this tracking must have been based on detailed before/after analysis - do not be lulled into a false sense of security by comments such as "We got what we expected" or "We're happy because it's better than expected" - the latter should actually be a warning sign that the proper mix had not yet been identified. For workloads with less history, or less scrutiny of past upgrade performance, the following guidelines are provided.

Online to "other" ratio
The first step is to split the production workload into two major categories: online and "other." The online component is defined as the portion of the workload involved in transaction processing where the end user typically is sitting waiting for a response. Examples would include TSO, IMS and CICS workloads. Note that some parts of workloads with these labels are actually more batch-like and should not be included in the online component. For example,

IMS BMPs and DB2 complex queries are typically batch or batch-like and thus should not be included as online work. The "other" component basically is a catchall for everything else. Batch, system, started tasks, and monitors are examples for this component, but actually, it is simply everything that is not classified as online. At the end of this step, an online-to-other ratio will have been identified, such as 60% online and 40% other.

Tailoring the online component

Once the online component of a production workload has been identified, a mix of the three LSPR online workloads, TSO, IMS and CICS/DB2 must be chosen. A simple "middle of the envelope" mix of equal portions of each workload will provide a reasonable estimate. As an example, if the online component is 60%, one could simply divide this percentage equally among the workloads yielding 20% of each of TSO, IMS and CICS/DB2. It would also be reasonable to adjust the mix in proportion to the type of online workload (such as 10% TSO, 25% IMS and 25% CICS/DB2, still summing to 60%), although it is difficult to match a production workload to a specific LSPR workload (despite having the same "name", the workloads may actually be quite different).

Tailoring the other component

For the "other" component, a mix of the two commercial batch workloads, CB84 and CBW2, should be chosen. As with the online mix, choosing equal portions of each will provide a simple and reasonable "middle of the envelope" mix. For example, if the other component is 40%, one could split this equally at 20% of each of CB84 and CBW2. Note, however, that the characteristics of CB84 and CBW2 are significantly different, thus, there is more reason to often deviate from using an equal mix of each. CB84 may be qualitatively characterized as many short batch jobs, while CBW2 has much longer and heavier CPU-consuming jobs. Thus, if the production batch may be characterized as leaning toward one or the other type (that is, short-light-CPU versus long-heavy-CPU), a higher proportion of that batch workload may be used in the mix. Even if the batch tends to be short-light-CPU, another indication of a more CBW2-like workload is a low DASD IO content for the overall system. If the total system DASD IO per MSU (that is, the total DASD IO rate divided by the used MSUs of the system) is less than 30, this indicates the need to increase the proportion of CBW2 in relation to CB84. In either case, one could end up choosing all CBW2 (or CB84) to represent the "other" component.

Final comments

Tailoring a mix of LSPR workloads to match a production workload is not a purely scientific exercise, applying some judgment is unavoidable. The intent is to provide a reasonable capacity estimate for an upgrade path. The best indicator of an accurate mix is a carefully analyzed track record of past upgrades. For those who want to be conservative in their estimates, several tailored mixes may be tried (particularly varying the mixture of CB84 and CBW2) and the mix producing the more conservative estimate may be chosen.