Commentary

The Unix Consolidation Landscape

Some server consolidation techniques do not depend on the platform with which they are used. Others depend directly on the platform and its capability. Consolidation capabilities for Unix environments continue to advance.

When one looks at server consolidation, it is important to understand the platforms that are being consolidated (Unix, Windows or mainframe). The techniques used, benefits achieved and challenges faced associated with logical and physical consolidation (see "Recognizing the Three Types of Server Consolidation") are generally the same no matter what platforms are involved. However, in the rationalization of servers, many differences depend on the platform involved.

Partitioning

Partitioning in the Unix environment has continued to improve but remains limited when used to achieve consolidation benefits. Most partitioning is hardware partitioning or limited logical or software partitioning. None of the current partitioning capabilities in the Unix environment allow the sharing of resources, which is a key to consolidation savings.

Hardware partitioning provides for environmental savings, such as floor space and power savings. It also provides the ability for reconfiguration. Reconfiguration can help some environments where workloads have major differences in capacity needs at differing times, such as daily shifts, weekends or seasons of the year. If there are workloads that peak at differing times, then the ability to reconfigure systems would remove the need to buy capacity for each and every peak period.

One problem with using the reconfiguration capability of hardware partitioning is that the granularity of hardware partitioning is usually large (that is, four processors and memory). Sun Microsystems and Fujitsu offer dynamic hardware partitioning only, although Fujitsu can go down to a two-processor granularity with Extended Partitioning (XPAR), which can subdivide a system board. Hewlett-Packard (HP) supplements its hardware partitioning (nPars) with a very basic software-partitioning capability (vPars) that allows the granularity to go to a single CPU and provides some dynamic reconfiguration among vPars within an nPar. This helps compensate for the lack of dynamic reconfiguration using nPar alone. IBM's logical partition (LPAR) support for the AIX environment now supports dynamic reconfiguration (using AIX 5.2) down to a single processor, single input/output (I/O) path and to 256MB of memory. IBM has plans to update its AIX LPAR capability when it introduces its new Power chip in 2004.
At that time, it hopes to be the first Unix vendor to offer partitioning that allows resource sharing and subprocessor granularity.

Currently, no software partitioning allows resource sharing (such as z/VM on the mainframe or VMware on Intel) for the Unix environment. An interesting future capability will be the use of VMware ESX on a Superdome, when it supports Itanium processors, to support HP-UX as a guest operating environment (0.7 probability).

**Workload Management Capabilities**

Sun was the first to provide a workload management capability for Unix other than round-robin scheduling. It provided the Solaris Resource Manager (SRM), which was a package purchased from Aurema. It provided some basic “fair share” scheduling. Aurema has updated its original Sharell package and is now offering a workload management solution called Active Resource Management Technology (ARMTech). The Compaq (HP) True64 and Fujitsu Primepower Solaris systems are supported by the ARMTech package. Even though ARMTech supports Solaris 8 and Solaris 9 on a Fujitsu Primepower, Sun has chosen to update its SRM workload management software itself and has embarked on a solution it calls Containers. At this time, only the infrastructure and CPU controls are available. The Container architecture not only offers workload management controls but also will help to provide better separation among applications running under the same copy of Solaris 9. It should be noted that Container is a workload management technique and not a new partitioning capability.

IBM has a basic fair share scheduler that is included as part of AIX and is not a separately priced product. HP has moved into the lead in the Unix arena with the beginnings of a "goal mode" architecture for its workload management capability for HP-UX. At this time, it only supports the control of CPU capacity to help a workload to achieve its goals, and it will need to add things such as I/O priority and memory occupancy to fully implement goal mode.

Unix operating systems, unlike Windows, provide a more stable environment for running applications side-by-side, because they do not face problems such as Dynamic Link Library interaction incompatibilities. However, there are still areas that need improvement to provide better separation to prevent one application from interfering with another application.

**ISV Support Issues**

As workloads are consolidated on a single system, the ability and desire of independent software vendors (ISVs) to support their software in a consolidated environment will have an impact on consolidation efforts. Although certification of a product for a system environment is more of an issue in the Windows environment, there are still problems in a Unix environment. Usually, support for a partitioned environment is not a major problem, but support for software packages running side-by-side in the same single system image can present some problems, especially for those software packages designed to work with all of a system's resources. As the Unix operating-system vendors add more workload management controls and capabilities into their operating systems, ISVs must redesign their packages to relinquish direct control of resources and use standard system interfaces. This will move the control up above the individual application and enable the system to control the total system more effectively.

**Software Pricing**

As more applications have moved toward Web access rather than direct connection, software license models have migrated from a named-user model to per-processor or system capacity models. This
presents no problem in a single-application-per-server environment or where only the same software is consolidated onto larger servers. A problem does arise when diverse software stacks are consolidated onto large servers and the licensing model is a capacity-based model. The Unix world is trying to adjust to this but faces the potential for increases in software costs. Also, new tools must be developed to help assure software vendors that any subcapacity model they try to provide will not be circumvented.

Availability

As more workloads are being put on consolidated systems, concerns are being raised about the availability characteristics of Unix systems. Many enterprises are concerned with the "all your eggs in one basket" condition. Hardware partitioning provides good isolation in most cases, but workload management rationalization will be more prone to losing all applications in case of a system failure. In the case of business-critical applications, high-availability clustering should be examined. As dynamic reconfiguration and capacity-on-demand solutions mature, the need for dedicated backup systems will cease.

Bottom Line: Consolidation capabilities for Unix environments continue to be enhanced. The lack of partitioning capabilities that allow resource sharing continues to be a hindrance. Workload management rationalization has advanced far enough that, with careful planning, some workloads can run together. The ability to run general-purpose, diverse workloads in a consolidated single system image as a normal practice in the Unix environment is still several years away.