*In*Sight

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Linux Is on the Move — Up!

The development of Linux is moving faster than any other commercial operating system (OS) to date — so fast, in fact, that it will leapfrog Windows to replace Unix on the high end within the next seven or eight years. That means Linux, z/OS, and Windows will be the primary server OSs before the end of the decade.

Replacing Unix on the High End

In seven to eight years there will be three primary commercial server operating systems: Linux, z/OS (the 64-bit version of OS/390), and Windows. Innovative application development will focus on these three operating systems — with most of the attention being directed to Linux and Windows. z/OS is included because it cannot be replaced; whereas Unix, like VMS, can be replaced — and will be by Linux.

Migration from Unix to Linux will make Unix a legacy server operating system. Windows is here to stay. Despite Microsoft's planning for Windows to replace Unix on the high end, there is evidence to support the notion that Linux will leapfrog Windows as the future Unix replacement. Microsoft's recent comments about open source — referring to open source software as viral software — can be traced to its fear that Linux is going to do just that.

So, what is this evidence? Through the efforts of thousands of individuals and many major organizations, Linux is being developed at a faster pace than any OS in history. This development is being carried out in a very organized manner via Linus Torvalds and his colleagues at large companies like Compaq, Dell, Fujitsu, HP, Hitachi, IBM, NEC, and SGI — and at many smaller companies like Caldera, MandrakeSoft, Red Hat, SuSE, TurboLinux, and VA Linux.

There are two major reasons for this fast pace. First, there are thousands of open source developers who routinely contribute to Linux development, and many Unix developers — both systems and applications developers — are looking for new interests. Second, technology developed for Unix is easily transferable to Linux. For example, cluster technology on Linux, either implemented by former Unix developers, or ported directly from

Unix, is already far ahead of that on Windows.

RISC Unix vendors, such as Compaq, HP, and IBM, are spending significant amounts of money to develop Linux/Unix affinity strategies. They want their Unix applications to run on Linux, and they want Linux applications to run on Unix. Linux/Unix affinity provides Unix with a larger pool of applications, making it likelier to survive and thrive in the high end, at the expense of Windows, until Linux is robust enough to move Unix aside.

None of the Unix vendors have actually gone public with a long-term strategy for replacing their Unix OSs with Linux. However, ongoing work by some of these vendors (and many other organizations) to add enterprise-level features to Linux and to significantly improve scalability strongly suggests that this replacement will occur before the end of the decade.

Recently, IBM, NEC, Fujitsu, and Hitachi formed an alliance to utilize those companies' resources to refine features needed to drive Linux further into the enterprise. Another goal of the alliance: speed up Linux development. The alliance will focus on usability and scalability for Linux. Linux is expected to scale to 16-way machines within 18 months and to 32-way shortly thereafter.

Given the aforementioned alliance, and the Open Source Development Laboratory (OSDL) in Portland, OR, that now has 19 members — another OSDL will open later this year in

Japan — it is clear that many organizations worldwide are striving to move Linux into the production mainstream. The OSDLs provide hardware and development tools that were previously unavailable to many Linux developers.

Users are becoming cognizant of the fact that use of Linux almost certainly means major decreases in system administration costs. As more and more people graduate from universities and enter the market with Linux backgrounds, a large pool of administrative staff will become available. In addition, the use of Linux means that less proprietary expertise is required for system administration.

Another reason that Linux will replace Unix is that Unix vendors want to dump the development costs of their Unix OSs — they practically give them away anyway. It appears that the largest vendors likely to replace Unix with Linux are Compaq, HP, and IBM. These three vendors have the most comprehensive Linux strategies and the best Linux/Unix affinity plans. Moreover, they are the only leading Unix vendors to port their Unix OSs to the Itanium architecture. (Compaq is currently porting Tru64 UNIX to Itanium.) Of these three vendors, Compaq will likely decrease support of its Unix first, because Compaq has a very small share of the Unix market when compared to HP, IBM, and Sun.

Finally, Linux is a welcome addition to Unix-based installations because Linux and Unix are very similar, and Linux expertise, in most cases, is already in place.

Signs of Maturity
Although it took Unix the better part of a decade to sort itself out in the market, Linux will reach maturity much more quickly. Signs of its impending maturity include:

- Packaging — a common kernel version, installation, and administrative suite.

- Stability — high operating system meantime between failure (MTBF) is imperative in delivering mission-critical enterprise computing.

- Scalability — Linux today is best suited for four or fewer processors (with 16-way scaling about 18 months away).

- Security — battening down the security hatches so that enterprise business can be conducted securely is a mandate.

- ISV support — ISVs, e.g., Oracle, SAP, SAS, and many others, have ported their applications to Linux. ISV support must continue to grow, and it must be fostered by Linux platform suppliers; otherwise, Linux will be doomed to niche OS status in the enterprise.

Standard Linux Distribution Needed
Just adding technology to Linux to drive it forward is, by itself, not a sufficient activity. For Linux to continue to move upward and to increase its appeal to businesses on a large scale, the OS will have to be more appealing to ISVs, which want a standard Linux distribution — and quickly.

In late June 2001, the Free Standards Group (FSG) released Linux Standard Base (LSB) 1.0. LSB 1.0 is the first attempt at defining the features of a standard Linux distribution. The advent of LSB 1.0 does not suggest that there should be only one distribution. Instead, it provides a unifying layer that all distributors can adhere to.

Itanium: Important to Linux
Itanium is important to Linux because affinity between Linux and Unix — application programming interface (API) and application binary interface (ABI) compatibility for applications that run on Linux and Unix — is a reality. This Linux/Unix affinity provides a migration path from Unix to Linux.

Itanium is also important to Linux because it levels the playing field and allows Linux to compete with 64-bit Windows and Unix. Over time, proprietary hardware vendors will no longer be able to lock in customers who need 64-bit computing. Users will demand Linux because they will have a large choice of hardware platforms on which to run their businesses.

Linux: Not Just About Infrastructure
So far, Linux on the server side has received the most attention from enterprises. However, the importance of Linux as an embedded OS is gaining in significance very rapidly. Today, only Wind River's proprietary VxWorks operating system exceeds Linux in use as an embedded OS.

Another area in which Linux is creating a significant presence is in

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high-performance computing (HPC). Some HPC insiders — e.g., Cray, Linux NetworX, Myricom, and Scyld — believe that Linux has a good chance to dominate the HPC market within the next two to three years.

Users are citing price/performance improvements of 5 times to as high as 40 times. Vendors such as Compaq, Cray, HP, IBM, and SGI, and smaller vendors like API Networks, Linux NetworX, and Scyld, to name a few, are reaping the dividends of Linux in HPC.

Aberdeen Conclusions

Enterprise application developers migrate to the OSs of innovation. For the remainder of this decade, that will mean Linux as well as Windows. Several of the large systems vendors have adopted, or are adopting, Linux as their software development platform. And many software development organizations are following suit.

Today, for an OS such as Linux to gain approval as a tier 1 operating system it must be able to run mission-critical transaction-processing applications, applications from name brand ISVs including database ISVs, and host development tools. Systems manage-ment software must also be available.

As Linux moves into the enterprise and continues its upward assault to replace

Unix, the Unix vendors will have to adopt new business models. Models based on the pre-supposition that vendors can lock in customers with their proprietary OSs will no longer be suitable. Linux and Itanium will level the playing field.

The Unix vendor that may be most adversely affected by the increasing popularity of Linux is Sun. Currently, Sun has only a skeletal Linux strategy; a port of Linux to Sparc exists, but there is no strategy to commercialize it. Sun's Linux strategy primarily rests with Cobalt Networks, and it has no plans to enter the Linux server sweepstakes like Compaq, HP, and IBM have with Intel-based servers — the dominant platform for Linux.

Now that the dot.com boom is over, Sun will need to think about OS development costs: Solaris costs a fair amount to support and to continue to develop. Though Sun has been aiming Solaris at Windows NT/2000, Sun will fail to deter Microsoft with its current strategy.

Linux is a better defense against Windows server OSs with more applications and developers. Though that does not guarantee that Sun will move over to Linux in a significant way, during the next two to three years Sun will have to develop a strategy that will allow better access to Linux.

— Bill Claybrook