Linux and ERP: A White Paper

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Peerstone
R E S E A R C H

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Executive Summary: taking the customer's point of view

The server operating system landscape for ERP users is changing. Since the late 1990s, customers of the big enterprise application suites from SAP, PeopleSoft or Oracle have had only two choices: either run on one of the vendor flavors of Unix, or go to the server version of Microsoft Windows.

But now these customers have another choice. A recent Peerstone survey of several hundred SAP, Peoplesoft and Oracle ERP customers shows that a small but growing minority intend to migrate their core business applications to Linux.

In other words, Linux is beginning to expand beyond its traditional role as an edge server into the core of the enterprise applications stack. Although Unix and Windows Server will retain their majority share through at least the middle term future, the evidence demonstrates conclusively that *from the customer point of view* the server OS choice for ERP is now a three way race.

The issue of whether or not Linux is ready to play alongside Unix and Windows Server in the enterprise application stack has ignited a sharp controversy in the vendor community. Users seeking clarity and guidance must sift through a dense thicket of conflicting claims and advice about Linux from leading players such as Microsoft, IBM, Sun, Oracle and others. Hardly a month goes by without some new benchmark or study purporting to show that Linux either is or is not ready for prime time. In this Peerstone white paper we temporarily put aside the competing vendor claims and take up the Linux question from the customer point of view.

Instead of asking which scalability benchmark, total cost of ownership comparison or study of security vulnerabilities sponsored by this or that vendor is most worthy of belief, we ask what actual ERP customers are doing today, and what they plan to do in the near future. We base our answers to these questions not on speculation or forecasts but on an extremely detailed survey of ERP customers we have been conducting for some time. We began this survey project in April 2004 and expect to continue it on a permanent ongoing basis. The results reported in this white paper are an early snapshot of the data available as of September 2004.

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[1] The research reported in this white paper was not commissioned or sponsored by any vendor. The questionnaire was developed solely by Peerstone and was designed to maintain a strict neutrality between the various operating systems and hardware architectures that make up the infrastructure options for modern ERP applications. Peerstone Research does not endorse or recommend any specific operating system or brand of server hardware.

What does an ERP server operating system do?

We begin by stating exactly what we mean by an ERP server operating system. Modern ERP applications are extremely complex multi-tier software packages that typically run on several physically and logically distinct server platforms. The focus of our survey is on customers using ERP, CRM and Supply Chain applications from the top three vendors of integrated enterprise application suites – SAP, PeopleSoft and Oracle. We refer to these vendors throughout this white paper as the ERP Big 3. All of these vendors now support all three of the primary server operating system choices considered in this white paper:

- Unix in its multiple hardware vendor varieties (chiefly Solaris, AIX and HP-UX)

- Microsoft Windows Server (including the current Windows Server 2003 and the older versions such as Windows NT)

- Linux (specifically the enterprise server versions from Red Hat or Novell SuSE which are supported by the Big 3 ERP vendors)

It is worth pointing out that the installed base of servers running Big 3 ERP applications is the largest single revenue prize in the enterprise IT industry today. We estimate the size of this installed base - including all tiers and instances of all SAP, PeopleSoft and Oracle installations worldwide – at roughly 700,000 to 800,000 server units. This physical hardware provides the infrastructure for over 100,000 distinct logical ERP application instances used by roughly 40,000 to 50,000 corporations, government agencies and other institutions.

What are all those servers doing? Well, a typical large ERP application suite may require dozens of individual server machines, each dedicated to a specific task:

- The most important component of the whole installation will be one or more high volume transaction database servers on the back end – one for ERP, one for CRM, one for Supply Chain, another for a Data Warehouse, etc. (Oracle pitches a single database architecture, but when volumes are high this requires a multi-server cluster architecture, which amounts to the same thing as far as the size of the server installed base is concerned).

- In addition, the ERP installation will have a number of middle tier servers (sometimes called application servers) running the various functional modules that make up a suite: Accounting, HR, Payroll, Procurement, Project Management, Budgeting, and so forth. These application modules contain the business logic that is applied to the data residing on the back end database server as well as the interface logic that determines how the transaction results will be displayed to end users. Depending on the

throughput required, these modules can all reside on a single server or be dispersed over several servers. The allocation of specific computing tasks to specific servers may or may not be dynamic, depending on the architecture.

- In front of this middle application tier will stand the network and user facing component of the ERP installation. The job of the front end is to pump out the thousands of HTML pages that provide the user interface for most modern ERP applications. For small customers with only a few dozen end-users this can done by a single machine. But for large customers who may have thousands of end-users simultaneously accessing the back end database and the intervening business logic, the front end more likely consists of a farm of web servers. These will often be smaller pizza-box servers installed in racks, or even so-called "blades" (which lack their own external network connection or power supply). They will be connected by load balancers and interface with firewalls.

- In addition to the three primary tiers just described, a typical ERP suite installation will also have separate servers running portal and integration broker software (as in SAP Netweaver) that combines data from different modules and back-end databases before serving it up to end users or to other applications. Other dedicated servers will manage business process workflow and specialized access by mobile devices such as laptops and PDAs (or even RFID chips in the warehouse). Still other servers will be used for development work.

- Finally, large multi-divisional organizations may have multiple instances of an ERP application installed, one for each major line of business or region. Each instance will have its own database, application and front end tiers, all running on multiple servers as described above. This architecture is especially common among multinational corporations that have different businesses or manufacturing operations spread across many different countries. Note that it is also technically possible for such customers to run all of their ERP applications from a single global instance. But this choice requires not only a very robust global network infrastructure, but also a very strong political consensus among the managers of the various business units whose applications will be centralized, which perhaps explains why the global single instance is still the minority choice among large multinational corporations.

Each of the servers described in the list above will have one or more processor chips and its own operating system instance. Although the majority of the ERP customers we surveyed use the same server operating system for both the back end database and the middle tier application servers, this practice is not universal. It is perfectly possible to have different application modules in the middle tier running side by

side on different operating systems, or to use a different system for the database tier than for the middle tier. For example, a few very large ERP users who have moved their middle tier servers to Intel hardware (running either Windows Server or Linux) prefer to keep their database on a high-end Unix machine with 64 bit addressing, because this allows an entire multi-gigabyte database to reside in main memory during high volume transaction processing. However, as we will see below, 64 bit database servers have now arrived in the Linux world as well.
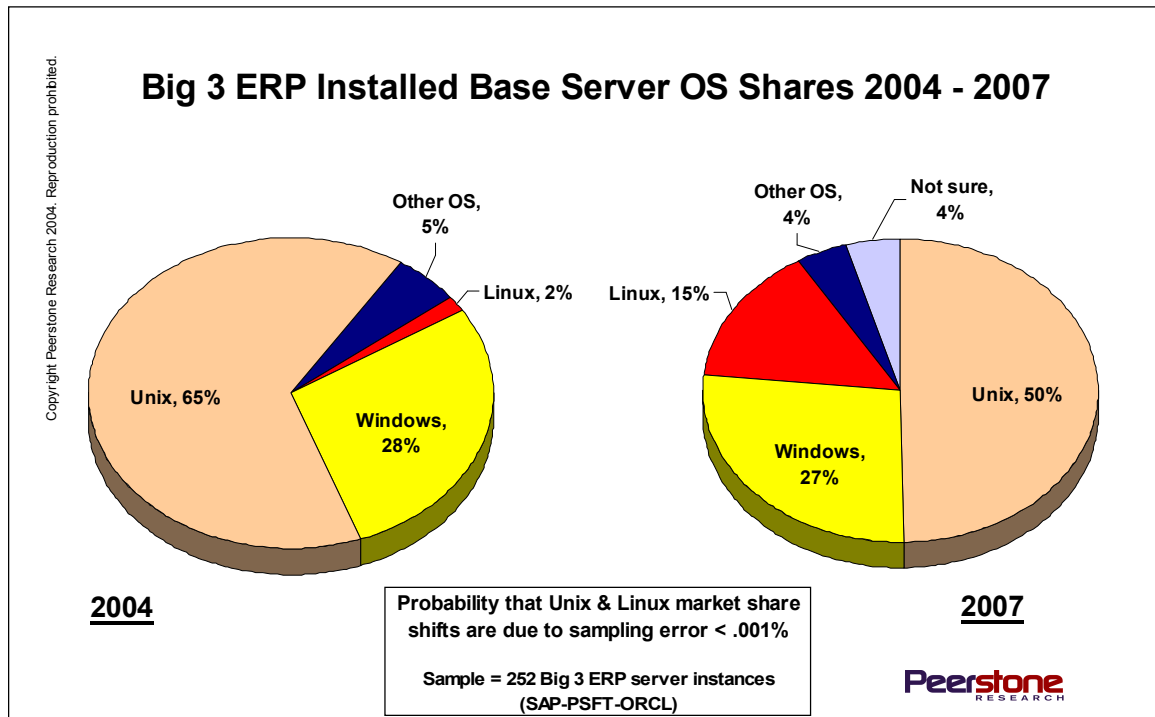
ERP server OS survey results

The baseline data point that every ERP user company needs to consider when making an operating system choice is what its peer user companies are doing now and what they plan to do in the future. In terms of our questionnaire, this boils down to two questions:

- What server operating systems are Big 3 ERP customers running on today?

- What operating systems do they expect to run on three years from now?

Chart 1 below shows our survey results for these two questions. Three striking conclusions emerge from this data.

Chart 1

Big 3 ERP Installed Base Server OS Shares 2004 - 2007

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2004
- Other OS, 5%
- Linux, 2%
- Unix, 65%
- Windows, 28%

2007
- Other OS, 4%
- Not sure, 4%
- Linux, 15%
- Unix, 50%
- Windows, 27%

Probability that Unix & Linux market share shifts are due to sampling error < .001%

Sample = 252 Big 3 ERP server instances (SAP-PSFT-ORCL)

(1) Unix still leads. The first fact that leaps out from this chart is that, contrary to what some breathless press releases or analyst reports may have suggested, Unix is still by a healthy margin the dominant server OS for Big 3 ERP customers and is virtually certain to remain so for at least the next few years. Our survey found that 65% of Big 3 ERP customers were running on Unix as of mid 2004. This fact is not surprising when you consider that all of the Big 3 vendors originally developed the client-server versions of their suites on Unix platforms in the early to mid 1990s. Indeed, Unix running on proprietary RISC hardware was for a long time the only reasonable choice for large ERP applications, while Windows NT (now Windows Server) on Intel only gradually emerged as a serious challenger to Unix in the second half of the 1990s. The continued dominance of Unix in today's ERP installed base is thus first and foremost a reflection of history.

History however is not always a good predictor of the future. Indeed, the ERP customers we surveyed forecast a sharp and fairly rapid decline in their use of Unix: only 50% of them still expect to be running their Big 3 applications on Unix by 2007. Unix vendors are perfectly entitled to interpret this situation as a "glass half full" rather than a "glass half empty". Some of them will argue forcefully that they are about to reverse the trend with aggressive new pricing models (Sun's new subscription pricing for Solaris 10 on servers with 4 or fewer CPU's is a prominent recent example). And it is certainly too early to predict with certainty that the decline of Unix will continue indefinitely. But if we take a customer data driven point of view rather than a vendor marketing perspective, it is simply impossible to deny that an increasing number of Unix users have been voting with their feet by choosing to migrate their applications to other operating systems.

Our survey shows that approximately one in five current Unix ERP customers plans to abandon this OS in the next three years. This is of course not a completely new trend. Users have been migrating away from Unix in a slow but steady trickle since the late 1990s. Until now their primary destination has been Windows NT or Windows Server. As is widely understood in the market, the main reason for migration has not been dissatisfaction with Unix or a particularly strong preference for Microsoft operating systems, but rather the desire to move from expensive RISC platforms to cheaper Intel-based server hardware (and now AMD-based as well).

(2) Windows high water mark. A second striking fact in chart 1 is that Windows Server currently occupies a very strong number two slot in the ERP installed base, with 28% of users running on one version or another of the Microsoft server OS. Undeniably, Microsoft has done a good job of closing the scalability gap between Windows and Unix and has lined up strong support from virtually all of the major enterprise application vendors. There is also a strong Windows Server ecosystem that provides an ample supply of skilled and affordable Windows staff and consulting partners. All of these factors have made Windows Server an

attractive destination for many ERP customers. But the fundamental fact remains that operating system migration is a tedious and often painful low-level procedure which the vast majority of customers strongly prefer to avoid if at all possible. They only undertake it when the benefits are compelling. In practice, the fundamental driver for migration from Unix to Windows has been and continues to be hardware platform cost, not operating system features or performance.

In contrast to Unix, our survey respondents say their aggregate usage of Windows Server will not change much in the next three years, declining a statistically insignificant 1% to 27% by 2007. A few current Microsoft customers will abandon this OS, mostly for Linux, but they will be replaced by a roughly equal number of new converts from Unix (see chart 3 below).

Although this might seem like an adequate performance for Microsoft, it will in fact represent a sharp departure from the dominant trend of the past decade in the ERP market. This period was one of spectacular and uninterrupted growth for Windows Server in the enterprise applications stack. But if our respondents carry out the OS migration plans indicated in this survey, this growth phase will now come to a halt. Based on this evidence, Peerstone believes that Microsoft's current share of the ERP installed base of just under 30% will remain its historic high water mark.

(3) Linux rising. The third striking conclusion suggested by the survey data is that our respondents plan to increase the use of Linux in their ERP stack dramatically over the next three years. Linux will rise from a modest 2% sliver of the Big 3 ERP installed base in mid 2004 to a very substantial 15% by 2007. Put differently, while by our estimate somewhat fewer than 1,000 companies and government agencies in the world now run their Big 3 ERP applications on Linux, this number will approach 8,000 customer organizations by the end of 2007. In other words, given that the number of true green field installations of large ERP suites is now quite low compared to the number of existing enterprise users who upgrade or expand their applications (or swap out software from competing ERP vendors), we can expect to see several thousand Big 3 customers per year converting to Linux over the next few years.
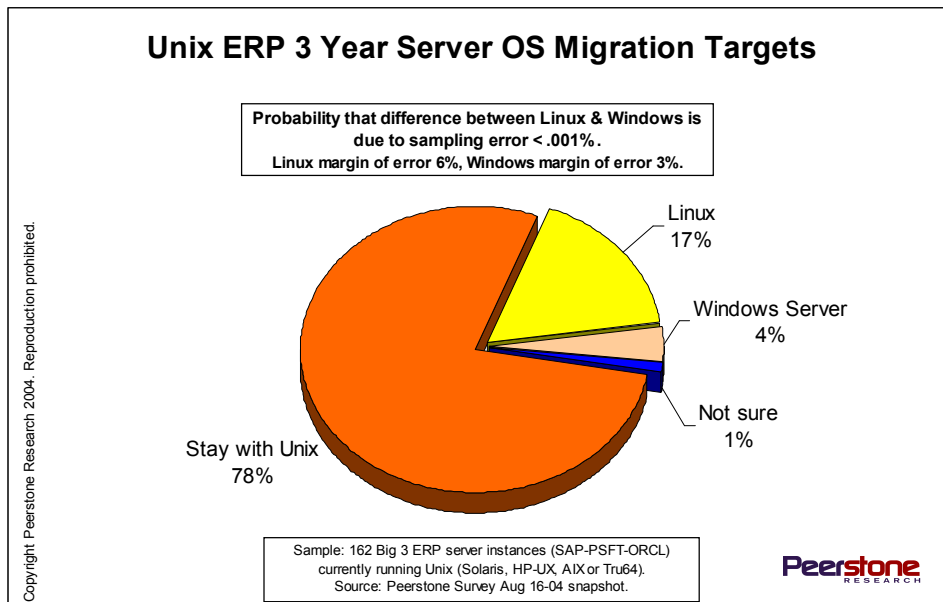
Although future events may modulate the growth of Linux in the ERP stack up or down, it is now clear that the open source operating system has begun a decisive transition. Linux is expanding from its traditional role as an "edge server" used at the frontier of the corporate network for such tasks as serving web pages, running firewalls, or managing single purpose appliances and the like to an operating system that can run the core business applications at the heart of the corporate data center.

Linux is replacing Windows as the Unix migration target

Where are the new Linux ERP users coming from? Mostly they are coming from Unix. As chart 2 below shows, about four out of every five Big 3 ERP customers who plan to migrate away from Unix in the next three years will go to Linux. Slightly less than one in four of these users will go to Windows Server. As we noted above, this represents a dramatic shift away from the server OS migration pattern that has prevailed since the late 1990s, where Unix ERP users who wanted to move to cheaper Intel hardware found that their only operating system choice was Windows.

These are statistically robust results with an extremely small probability of sampling error. Of course there can be no hard and fast guarantee that these users will actually do what they say. A survey can only measure the current state of opinion, not future fact. But the numerous spontaneous pro-Linux comments provided by these respondents to our questionnaire suggest that for the present at least the interest in the Big 3 customer base for Linux is very real. We will review the reasons these customers cite for going to Linux in the next section.

Chart 2

Unix ERP 3 Year Server OS Migration Targets

Probability that difference between Linux & Windows is due to sampling error < .001%. Linux margin of error 6%, Windows margin of error 3%.

Linux 17%
Windows Server 4%
Not sure 1%
Stay with Unix 78%

Sample: 162 Big 3 ERP server instances (SAP-PSFT-ORCL) currently running Unix (Solaris, HP-UX, AIX or Tru64). Source: Peerstone Survey Aug 16-04 snapshot.

Why ERP users are choosing Linux

What reasons do our survey respondents who are planning to migrate to LInux give for their choice? A close look at the spontaneous verbatim responses to our questionnaire reveals a surprisingly broad range of arguments for and against Linux, where no single factor garners an overwhelming share. Nevertheless, certain clear patterns behind the

move to Linux do emerge, which can be boiled to down to four factors. The ERP partisans of LInux believe that the open source OS:

(1) Has achieved rough technological parity with Unix and Windows Server (or comes close enough that the remaining gap no longer matters);

(2) Runs on cheaper hardware than Unix, and costs less to buy than Windows Server;

(3) Is more secure than Windows Server;

(4) Enjoys the active technical support and strategic commitment of such major vendors as IBM, Hewlett-Packard and Oracle.

Obviously some of these points are contested by the vendors of competing operating systems, such as Sun and Microsoft. Both of them would probably want to deny that Linux has achieved technological parity with their own offerings. We don't propose to debate the pros and cons of this issue here. We simply note that as of mid 2004 a significant minority of ERP customers (including both Fortune 500 class companies as well as mid-market firms) has decided that, naysayers notwithstanding, Linux has enough scalability and performance for them.

The fact is that Linux functionality is a moving target. New Linux benchmarks sponsored by the hardware and database vendors appear frequently. The leading Linux distributors (Red Hat and Novell SuSE) are progressively rolling the new features of the recently released Linux 2.6 kernel into their distributions, and these will unquestionably enhance Linux scalability and performance. For the first time it is now possible to run the 64 bit versions of Oracle or IBM DB2 on Linux using 64 bit hardware from Intel or AMD. While it is probably true that the hardware vendor versions of Unix retain performance advantages over Linux in certain circumstances, Linux is undeniably closing the gap. Furthermore, since knowledge of the fundamental scientific principles underlying modern operating system technology as well as the development skills needed to implement these principles in production quality code are very widespread in the world software community, there is good reason to believe that whatever gap still exists will continue to shrink for the foreseeable future.

The belief among our respondents that Linux has fewer security vulnerabilities than Windows Server is also significant, although we note that there is no obvious technical reason why there should be a fundamental difference between the two operating systems, at least not over the long term. The security issues that have persistently dogged Windows appear in part to be a sociological phenomenon, driven by widespread anti-Microsoft sentiments in the hacker sub-culture – sentiments that unfortunately motivate a criminal minority to put their animus into practice. Microsoft very rightly argues that security is

everyone's concern, and then goes on to suggest that as Linux market share grows it too is likely to be struck by hacker attacks. We find evidence that some ERP users subscribe to this view, which is certainly a plausible one. But we are not sure that the prediction of rising Linux insecurity will pan out. If it is true that the recurring virus and back-door attacks on Windows code are motivated primarily by anti-Microsoft resentment, then it may not follow than Linux will be subject to a similar wave of attacks, precisely because the angry rogue hackers who attack Microsoft may be more likely to harbor pro-Linux convictions. Clearly the jury will be out on this issue for some time.

The final point above about the commitment to Linux of the major infrastructure and application vendors is not open to doubt. The release of versions from SAP, Oracle and PeopleSoft that run on Linux was obviously a prerequisite for the take-off of this market. But our survey data also show that on the infrastructure side the engagement of IBM and Oracle in particular in the Linux camp is having a profound impact on customer attitudes. Many CIO's have become quite jaded about the benchmark battles and warring vendor claims over Linux cost of ownership, security or intellectual property litigation. As a result, many of them are beginning to tune out the day-to-day competitive chatter from Linux detractors and focus instead on what the lead application and infrastructure vendors present in their own IT portfolios are saying. If your primary IT vendors are SAP and IBM, then the fact that both of them are strong supporters of Linux probably means the objections of Sun or Microsoft will not carry much weight with you. If on the other hand your company has a stronger relationship with Sun or Microsoft, then you will be culturally and politically predisposed to let these vendors guide you away from Linux.

What are the obstacles to Linux on ERP?

The reasons most often cited by our respondents for not considering Linux for their ERP stack are the following:

- Linux sometimes has a higher total cost of ownership (TCO) than one would expect for a nominally free operating system, due to the high cost and relative scarcity of experienced Linux system administrators. This is an extremely important factor, and it is the most common reason our ERP survey respondents spontaneously mention for not moving to Linux.

- Linux requires a quite different corporate culture and employee skill base than Windows. Companies that have already migrated from Unix to Windows are for the most part satisfied with their new platform and don't want to change. On the other hand, companies that are still using Unix but plan to migrate to cheaper hardware are finding that Linux is an easier fit for their existing skill base than Windows.

- Fear, uncertainty and doubt caused by SCO's legal assault on Linux intellectual property continue to trouble some. Somewhat surprisingly, though, this issue is spontaneously mentioned by fewer than one in six of our survey respondents, so barring major new negative developments in the SCO trial it is unlikely to slow the trend towards Linux migration significantly.

- Some concerns about Linux scalability remain, particularly for large back end transactional databases. A handful of ERP customers in our survey expressed doubt about Linux on this score. However, as noted above, the release of 64 bit versions of the major database packages on Linux will probably probably put this issue to rest over the next year or so. In addition, none of our survey respondents who have already made the transition to Linux report any scalability problems.

- Some senior non-IT executives worry about the propriety of using "free" software to run their business. A few of the IT executives we interviewed mentioned that their non-IT business colleagues feel sheepish about using software that seems to carry a "not for profit" label. Aside from the fact that the Red Hat and Novell SuSE distributions of Linux are certainly not charitable endeavors, this is essentially a sociological rather than a technology issue. Peerstone calls this the "golf buddy" factor. We believe that in the long run non-IT executives worried about what their peers will think will align their view of what is socially acceptable with the recommendations of the very reputable companies that serve as their primary IT suppliers (e.g. SAP, IBM, HP, Oracle, etc).

Of all of the above factors, we find from our survey results that only the first three are really significant barriers to Linux growth. We believe that both the Linux labor cost and the SCO litigation issues are likely to resolve themselves favorably over the next 18 to 24 months. For the labor market in particular, it seems highly likely that the natural desire of IT workers to shift to those areas of the market where demand is strongest will act to increase the supply and affordability of good Linux systems administrators. The labor market after all is a very dynamic place, and IT professionals are under a lot of pressure these days to adjust to customer demand. Although we cannot forecast what will ultimately happen in the SCO trial, we note that concern about this issue appears to be fading among ERP customers, efforts by Microsoft and SCO to fan the flames notwithstanding. If we are correct in our view that these obstacles to Linux will diminish in importance, the result could very well be a pronounced acceleration in Linux adoption sometime between late 2005 and mid 2006.

Is Microsoft in denial about Linux?

Are Microsoft executives in denial about the progression of Linux in the core enterprise stack? While they are acutely aware of the menace Linux represents, it seems they are not prepared to acknowledge that any fundamental change in strategy may be necessary. They are still working on the assumption that basic blocking and tackling will carry the day. Microsoft has a unique marketing culture propelled by an unequalled concentration of very smart, hard working people who are used to grinding out victory after victory. This is how they unseated Novell Netware in the 1990s from a position of incredible dominance in the LAN server market and installed Windows NT in its place. For the past decade they have been vigorously applying the same method to Unix in the enterprise, and until now they have known nothing but sustained success, although Unix – unlike Netware – is still a formidable opponent. So it is hardly surprising that Microsoft executives now have trouble switching perspectives and admitting that they themselves may have become the legacy system that is being challenged by a relentless newcomer with an alien culture and technology.

Chart 3
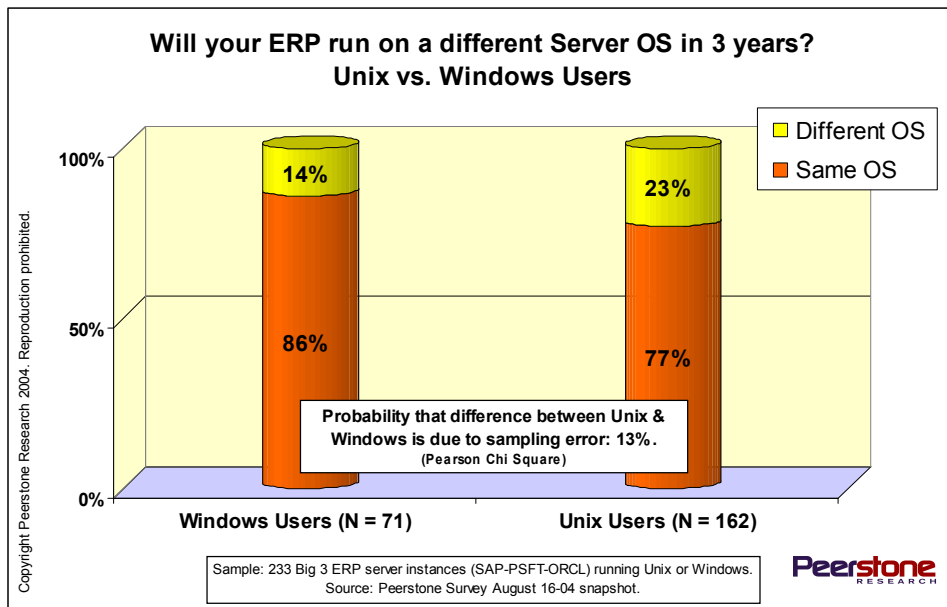
Microsoft's basic stance appears to be that surging customer interest in Linux is all a misunderstanding. In particular, Microsoft says that customers underestimate:

- both the TCO and the TCA (total cost of acquisition) of Linux compared to Windows Server

- the extent of the security risks that Linux is likely to face in the future

Our survey shows that while many ERP customers report higher Linux TCO due to higher labor costs, they do not say that Windows Server's cost of acquisition is lower than – or even comparable to – that of Linux. Perhaps these customers are simply misinformed, as Microsoft suggests. But if so, it will take a tremendous amount of blocking and tackling on Microsoft's part to change their minds. At the same time, the cost of Linux acquisition and ownership will be a moving target, due to competition and labor market changes. Bottom line: we think that, barring a radical shift in business model, Microsoft will find it extremely tough to make its case against Linux based on price.

There are three distinct segments of the ERP customer base in which the Linux vs. Windows Server battle will unfold over the next few years:

- First, the Unix leavers. They are already leaning to Linux rather than Windows, and as Linux labor costs come down the Unix skills bias in favor of Linux will probably make it impossible for Microsoft to recapture its lost ground here. In losing the Unix migration market Microsoft will lose the biggest historical source of Windows Server growth in the enterprise applications stack.

- Second, new enterprise application installations. Here we believe Windows Server will continue to hold its own, but Linux competition will pressure its pricing model and its margins, putting a ceiling both on growth and profitability.

- Finally, the existing Windows installed base itself. As chart 3 shows, relatively few Windows ERP users are planning to abandon Microsoft today. These users are generally satisifed with Windows, they already have the benefit of running on cheaper Intel or AMD hardware, and it is much easier for them to do nothing rather than migrate. Whether this changes in the future may depend on whether or not Microsoft tries to maintain a price premium for Windows Server compared to the enterprise Linux distributions.

In some ways Windows Server is in the same position today as Solaris was two years ago. Linux was looming on the horizon, but Sun executives weren't ready to concede that it could ever rock their universe. Now Sun has announced that it will open source Solaris and is adopting a pricing scheme that closely resembles Red Hat's subscription model. Although we doubt that Microsoft will be pushed to the point of contemplating open source for Windows Server, we think that an alignment on the Linux pricing model is inevitable within the next two to three years.

The future of the ERP server OS market

It is important not to read too much or too little into these Peerstone survey findings. On the one hand, Linux will unquestionably be the fastest growing server OS in the enterprise applications market for the foreseeable future. Its Big 3 ERP installed base will essentially double every year through at least 2007. Its growth rate will probably cool off somewhat after 2007, but will certainly remain very high in absolute terms. During the same time period Unix will continue to decline and Windows Server will stagnate. In this sense therefore our survey results can be read as a triumph for Linux. On the other hand, however, these same results show that even after three years of spectacular growth – in fact literally exponential growth – Linux will still be a distant third in the ERP customer base, far behind Windows and Unix. The conclusion ERP customers should draw from our research is not that any one server OS is going to sweep all competitors from its path, but rather that the ERP server OS market is moving towards a permanent state of diversity where Unix, Windows Server and Linux will all have substantial user bases.

If we look beyond the three year period which our survey has defined as the "foreseeable future" and consider what the ERP server OS landscape will look like in 5 to 7 years, we believe this market will evolve to a situation of rough parity between the three operating systems. In other words, Unix, Windows and Linux will end up with roughly a third each of the enterprise applications installed base. This is extremely good news for enterprise IT user companies. As the differences in underlying technology and performance between the major operating systems grow smaller, the vendors will have to compete more aggressively and more creatively to win business. The cost of acquiring and running an enterprise class server operating system – whether it be Unix, Windows Server or Linux – will continue to decline, while the vendors (and distributors) will redouble their efforts to enhance these systems with value added features and functions.

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