## Peerstone Enterprise Software Notes

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Companies mentioned in this report: RHAT, IBM, MSFT, SUNW, HPQ, DELL, NOVL, SCOX, SAP, ORCL, PSFT, SEBL, LWSN.

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# Linux Rising in the Enterprise Stack

### Peerstone Survey Flash Results

Historically Linux in the enterprise has been an operating system for edge and utility servers – web and e-mail servers, firewalls, small file servers, and the like. Now that is changing.

Early results from Peerstone's rolling 2004 Enterprise Apps survey suggest that 30% of companies running ERP and similar big ticket enterprise applications expect to run them on Linux within 5 years. That's up from about 5% doing so today. This translates into a compound annual growth rate of well over 40% per year through at least 2009. It appears that concerns about scalability and the threat of SCO lawsuits are not deterring users from looking at enterprise Linux.

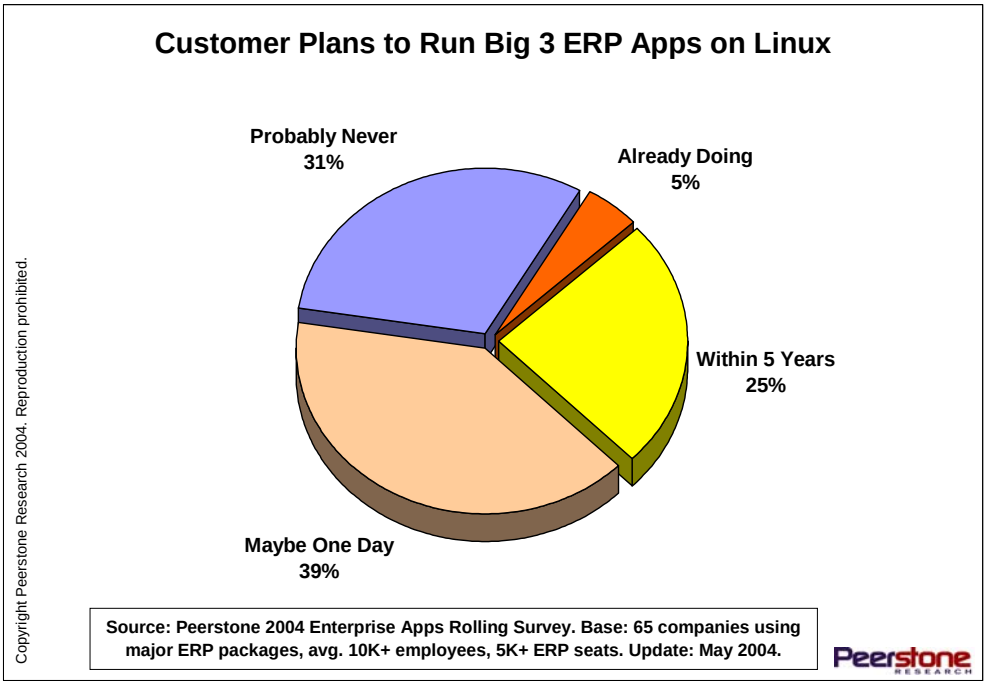
The implications of this finding for the enterprise server OS market are momentous:

- If Linux really does grow this fast in the core enterprise stack, the first and most obvious victims will be the system vendor Unixes (Solaris, HP-UX, AIX).
- Given its penchant for commodity hardware, enterprise Linux could also put a ceiling on the currently rapid growth of Microsoft Windows Server in the datacenter.
- Meanwhile, the ramp up in sales of support subscriptions for enterprise server editions of Linux will drive higher ASPs at Red Hat and Novell-Suse (or at least slow the decline in ASPs due to high volume growth in entry-level Linux).

The factors driving enterprise app users to consider Linux are a mix of objective cost calculation and subjective desire to escape lock-in from established system vendors. But the single biggest obstacle to the rise of Linux is not technical or legal. Rather, it is the difficulty in transferring to Linux the human skill base that user organization IT teams have built up around Microsoft Windows Server and vendor Unix.

Thus, while the threat to Microsoft and vendor Unix is real, the rise of Linux is not a foregone conclusion. 70% of enterprise customers still don't expect to run mission critical apps on this OS any time soon, if ever. The next two years will be the critical turning point in this battle.

Figure 1




## Peerstone Survey Background

The data in figures 1 and 2 represent early flash results from Peerstone's 2004 Enterprise Applications rolling survey. The respondents are large and mid-size companies from a broad mix of verticals, mostly using SAP, PeopleSoft or Oracle ERP applications in multi-tier architectures.

The initial sample in these flash results consisted of 65 companies surveyed in the first two weeks of May. We expect the survey to reach 800 to 1000 organizations by the end of the year (vs. 800 covered in our 2003 survey). Enterprise applications covered in addition to the ERP Big 3 will include Siebel, Lawson, QAD, Microsoft Business Solutions, Manugistics, i2 and others. We will also measure the presence of the major business intelligence vendors in the ERP and packaged enterprise applications installed base.

The data presented here come from responses to one question in the infrastructure section of the Peerstone survey. Additional questions in this section measure server OS share in the ERP installed base for all major OS vendors (Microsoft, vendor Unix, etc) on both the application server middle tier and the back-end database tier, as well as market share of the major database and server hardware brands.

In addition to the infrastructure section covering the hardware and software stack underlying the major packaged applications, the

Peerstone survey contains a broad series of questions that measure key enterprise software trends including the following:

- Installed base, upgrade/migration and new buying plans for all major categories of enterprise applications. Categories covered include ERP Financials, MRP, Supply Chain Management, HRMS, eProcurement, Sales Force Automation, Call Center, Business Intelligence and Data Warehouses, Enterprise Application Integration, and custom development based on J2EE or Microsoft .NET.

- Number of current and planned users per application, along with growth and migration or version upgrade plans.

- Customer preferences and trade-offs regarding custom development (J2EE and .NET) vs. packaged apps. Also, preferences and plans for application hosting and business process outsourcing (BPO), as well as customer attitudes towards offshoring.

- Software project cost breakdowns by major line item (application and middleware software licenses, hardware, consulting, training and change management, maintenance).

- A-through-F letter grades given to major enterprise app vendors (SAP, PSFT, ORCL, SEBL) on seven key attributes by their current customers, and customer commentary on the pros & cons of each vendor vs. its direct competitors. Also: customer evaluations of the consulting firms used to implement their apps.

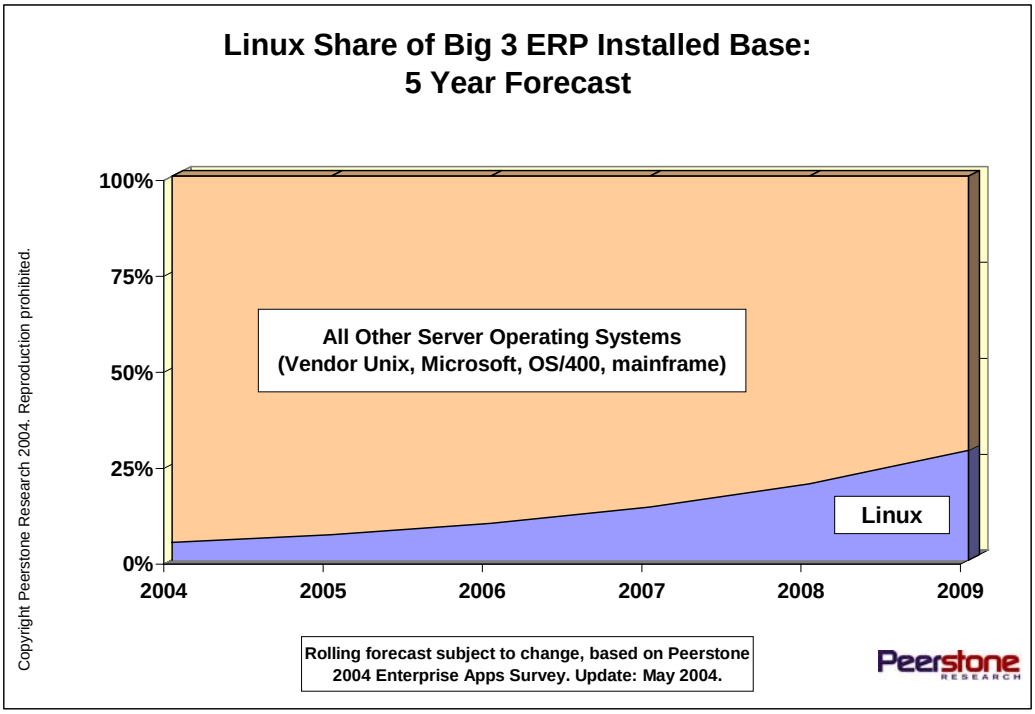
- Customer evaluations of the business benefits yielded by each major application type in six key areas (including hard dollar ROI, headcount reduction, top line growth, and competitive advantage).

We will be releasing additional survey findings to Peerstone subscribers in the coming weeks and months.

## 5 Year Enterprise Linux Growth Forecast

Figure 2 below shows our initial forecast for Linux growth in the Big 3 ERP installed base (SAP, ORCL, PSFT) over the next five years. Since this forecast is an extrapolation from the early stages of a rolling survey, it is likely to shift over the next few months. Nevertheless, using survey results from May 2004, our model predicts that Linux will grow from about 5% of the Big 3 installed base today to roughly 29% by 2009, which is equivalent to a 45% compound annual growth rate, substantially higher than current forecasts for virtually any other segment of the enterprise software market.

Figure 2




## Distinguishing the Three Server Tiers in ERP Architecture

This forecast doesn't necessarily mean that every customer using Linux for a big enterprise app runs 100% of the app on Linux. Keep in mind that a typical Big 3 ERP instance has at least three distinct logical server tiers, each of which can use a different operating system and can contain more than one physical server requiring a distinct OS license or support contract:

- **Web Tier**: The front-end web server tier, consisting of basic HTML page servers. Required for all applications that use a browser client, such as PeopleSoft 8, Oracle 11i (most modules), MySAP or Siebel 7. Linux typically starts its journey in the ERP stack on this tier, which in some ways is just another "edge server" role. But the web tier is also mission critical, because if your page server isn't pumping out application screens to your user population, your whole application is effectively out of service.

- **Application Server Tier**: The middle tier where most of the core business logic of an ERP package or module resides. In small installations the middle tier and the web front-end can run on the same physical server. But in larger installation both tiers typically run on farms of servers linked by load balancers that distribute incoming transaction requests evenly among the available pool of

machines. Since the application server software layers of most major enterprise apps are still largely proprietary, the vendor has to make a specific effort to port its application to Linux (hence MySAP, Oracle 11i and PeopleSoft 8 all run on Linux, but the current versions of Siebel and Lawson do not).

- **Back-end Database Tier**: Typically the last tier to be penetrated by Linux, because of the scalability, stability and throughput required in high volume transaction environments. But the spread of database clustering technology (e.g. Oracle RAC) now makes it possible to run an ERP transaction database or ERP-based data warehouse on a rack full of low-cost server blades, which are well suited to Linux. In fact, Oracle is now in the process of shifting the database back-end of its own internal ERP installation from Solaris on SPARC to Linux on Dell two processor Xeon blades.

Measuring the market share of the various server operating systems on the distinct tiers of the enterprise application architecture is not a simple matter. Peerstone is currently gathering data on the server OS and hardware brands running the application and database tiers in the major app vendor installed bases, which we will publish in due course.

## Drivers of Enterprise Linux Growth

There are two main factors behind the current expansion of Linux from the utility edge server role to core enterprise applications in the data-center:

- Many (though not all) enterprise app customers believe that Linux will have substantially lower total cost of ownership (TCO) than the alternatives, not only because it has no upfront license fees, but also because its vendor independent status lets users migrate to the cheapest hardware platform of the moment and reduces the bargaining power of server operating system vendors in general (whether Linux or non-Linux).

- Although the existing SAP, Oracle and PeopleSoft ports to Linux were based on the 2.4 kernel which has been in the market for several years, the 2.6 kernel released in December 2003 offers new features with significant performance benefits for enterprise applications that are now being folded into the Red Hat and Suse (Novell) enterprise Linux distributions.

True TCO for a server operating system is extremely difficult to measure, because it isn't exclusively determined by the inherent technical attributes of the product such as performance, stability, scalability, security or underlying server hardware options. TCO is also a function of the following three "cultural" factors:

- the organizational environment in which the operating system is deployed, in particular the skill base and experience of the IT team that manages the enterprise application stack;
- the OS choices made by other parts of the organization (which will determine economies of scale and scope);
- the overall mindset of management -- a tough minded management team may obtain better TCO from a technically inferior product than a lax team from a product that is more cost-effective on paper.

An organization that has made a heavy human and psychological investment in Windows Server or a specific vendor Unix (e.g. Solaris, etc) will be reluctant to switch to Linux merely because the open source OS is a little cheaper – unless, that is, the organization is already deeply dissatisfied with its current provider.

Nevertheless, a substantial minority of our survey respondents now believes that the cost advantage of Linux is not merely modest but is in fact quite large. Again, this belief is fueled not only by directly measurable facts such as the cost of software licenses or annual maintenance subscriptions, but by the perception that the Unix system vendors (Sun, HP, IBM) and Microsoft exploit proprietary technology lock-in to charge premium prices for what users consider to be commodity products (basic server operating systems and hardware). It is the users' desire to escape the perceived evils of vendor lock-in that drives them to consider Linux.

Given this somewhat subjective alchemy of corporate IT purchase decision making, the actual technical features and performance of Linux, to the extent that they are credible, are at best enablers of migration rather than the fundamental cause. That said, there is little doubt that the enterprise Linux feature set is drawing closer to functional parity with the vendor Unixes such as Solaris and with Microsoft Windows Server. The recently released 2.6 Linux kernel contains several key features that promise to have a direct impact on enterprise application performance:

- Larger system memory and better support for 64 bit processors, which will boost Linux penetration on the back-end database tier (since large ERP customers like to keep as much of the database in memory as possible to reduce transaction times).
- Support for more disk storage, which will also make Linux more attractive on the database server.
- Improved multithreading (the ability to run multiple tasks efficiently in the same operating system process), which should yield better performance for complex J2EE code running on middle tier application servers.

- Support for a larger number of processors in SMP (symmetric multiprocessing) machines. In theory the 2.6 kernel boosts the maximum number of processors that can run on a single server under Linux from 8 to 32 on 32 bit machines) or all the way to 64 on 64 bit hardware (such as Intel's Itanium). But it is worth noting that in practice most large ERP users who have moved to Linux so far are avoiding pricey high-end SMP hardware, choosing instead to run their apps on racks full of two-processor blades built with inexpensive 32 bit Intel or AMD chips.

## Obstacles to Enterprise Linux Growth

Although our survey findings suggest rapid expansion of Linux in the enterprise application stack, we should remember that this is from a very low base. The fact remains that the vast majority of ERP users we surveyed – about 70% in the initial sample data released in this note – have no plans to use Linux in the foreseeable future. And nearly one out of three say they will probably never use Linux to run their mission critical apps (see figure 1 above).

User comments about Linux in the first few dozen questionnaires of our survey (gathered in early May) mention the following reasons for their reluctance or refusal to consider Linux in the enterprise stack:

- Difficulty of transferring IT staff skill sets heavily invested in vendor Unix or Microsoft Windows Server to Linux;
- Perceived lack of scalability as compared to vendor Unixes such as Solaris;
- Doubts about availability and quality of Linux support comparable to that provided by the major system vendors for their own brands of Unix;
- Lack of standard third party administration tools;
- Fear of the legal issues raised by the notorious SCO lawsuits.

We will review these enterprise app user objections to Linux at a later date when we have a larger survey sample to work with. However, it is worth noting that fear of the SCO lawsuits was only cited by a handful of our survey respondents, and does not appear at this point to be a significant obstacle to Linux expansion.

## Implications for Red Hat and Novell (Suse)

The implications of our survey findings for RHAT and NOVL are obviously extremely bullish in the medium term. The main effect of the spread of Linux in the core enterprise application stack is likely to be an increase in the average price (ASP) of the annual support subscriptions that provide the primary Linux revenue stream for the RHAT and NOVL.

RHAT's ASP for enterprise Linux has recently been trending downward, dropping from $525 in the November 2003 quarter to $455 in the February 2004 quarter. This decline reflects a sharp rise in volume driven by Red Hat's workstation (WS) and edge server (ES) editions of Linux, whose list prices for a standard one year support contract are $299 and $799 respectively (before hefty volume discounts).

But Red Hat's enterprise application edition of Linux (AS), which is designed for big footprint apps running on high-end hardware configurations, lists for $1499 per year for a standard support contract (12 x 5) or $2499 for a premium contract (24 x 7). Prices are higher still for 64 bit hardware. Today sales of subscriptions to the AS edition are still an insignificant share of Red Hat's revenue stream, as confirmed by the fact that management declines to report them separately. But based on our survey results we expect this share to rise rapidly over the next four to six quarters.

A similar analysis applies to Novell, which completed its acquisition of Suse Linux in early 2004. Historically Suse has been the only major rival to Red Hat in the enterprise segment of the market, and has enjoyed strong market penetration in Europe. In fact, we estimate that Suse currently leads Red Hat in the number of big enterprise app installations, chiefly because of strong support for Suse from SAP in its large German home market.

The only caveat about datacenter Linux growth for RHAT and NOVL is that the management teams for both vendors appear to be focused on the high-volume, low-ASP end of the enterprise Linux market right now. Over time the lack of management focus on the needs of mission critical app customers could become a significant weakness for RHAT and NOVL when engaged in tough competitive bids against Sun or Microsoft. The latter two vendors field much larger and much deeper pre-sales tech support teams and have a lot more at stake in this battle.

On the other hand, the missing focus at RHAT or NOVL is currently compensated for by the highly visible enterprise Linux marketing efforts of system vendors IBM, HP and Dell, as well as those of the app vendors themselves (particularly Oracle and SAP). Most enterprise customers planning to run a major ERP app on Linux will look first to their hardware system vendor and their application vendor for encouragement and support.

## Implications for Vendor Unix[1]

As we said above, vendor Unix is the most likely victim of Linux expansion in the datacenter, because an IT team experienced at managing Unix can transfer its skills to Linux much more easily than a team trained on Microsoft Windows Server.

However attractive Linux's pricing model and hardware independence may seem, companies that have been using vendor Unixes such as Solaris, HP-UX or AIX for years do not simply migrate to Linux and commodity Intel hardware at the drop of a hat. Only certain moments in the server infrastructure lifecycle lend themselves to migration. User comments in our questionnaires show that the most critical such moment is the replacement of server hardware whose capacity has been exceeded by growth in application transaction volumes or number of users.

A typical server hardware configuration in an ERP or other large enterprise app installation rarely has a useful life span of more than four or five years. Since the last major wave of new server hardware purchasing was in 2000, a large number of vendor Unix hardware shops will be asking themselves in the next 12 to 18 months whether the cost savings of Linux platforms are enough to justify the effort of migration.

We see this server lifecycle transition point as a major risk to the vendor Unixes in the datacenter segment of the market, especially to Solaris. It seems that Sun agrees with this analysis, in view of the aggressive volume discount promotion it launched in April on the x86 version of Solaris (for Intel and AMD 32 bit processors):

- This promotion offers customers a Solaris standard support contract for $500 per x86 server per year, but requires a minimum commitment of 100 servers (premium support costs more).
- With a 2,000 server commitment the price per x86 box drops to $400. (This volume level appears to be aimed at large scale third party hosters rather than single-customer datacenters.)

Given its steep volume requirements, even the lower level of this offer is not aimed at the typical Sun enterprise app shop. Even a blade configuration running multiple small servers on all three tiers of a large single-customer SAP installation is unlikely to require more than 100 x86 servers. But large customers who run every application in their enterprise portfolio on Solaris and who have extremely high transaction volumes probably do meet this threshold criterion. Hence the promotion

[1] We are currently gathering data on server OS installed base and trends in the enterprise app stack by individual system vendor (Sun, HP, IBM & Microsoft) cross tabbed with each major app vendor (SAP, ORCL, PSFT, SEBL, etc), and we will release this vendor market share data detail in subsequent research notes.

is cleverly engineered to make Sun's largest customers such as investment banks hesitate before abandoning Solaris for Linux.

But clearly Sun still hopes to keep the core of its customers' enterprise application stacks – in particular the back-end database tiers – running not only on Solaris but on SPARC hardware. This is where customer desire to escape vendor lock-in and premium pricing is strongest, and where Linux constitutes the greatest future danger to Sun. We don't see how the Solaris x86 volume discount by itself can make the idea of migrating the database tier away from pricey high-end SPARC hardware less attractive to typical ERP users. Moving these customers to x86 Solaris is better for Sun than losing them completely, but this still represents a completely different business model with margins that will be under constant competitive pressure.

The implications of our Linux findings for HP-UX and AIX, although also negative, raise somewhat different strategic issues for HP and IBM, which we will address in a subsequent note.

## Implications for Microsoft

Windows Server has a significantly larger share of the enterprise app stack market today than Linux (we will release our Microsoft server OS market share findings in a subsequent research note). It is also much less vulnerable to Linux migration than vendor Unix, both because it already runs on commodity Intel or AMD hardware and because its associated skills transfer far less readily to Linux. Initial user comments in our survey on Linux vs. Windows Server total cost of ownership show that opinion on this issue is divided: some see an advantage for Linux, others do not.

Two early conclusions that we can draw from our survey results to date about the impact of Linux on Windows Server are as follows:

- **The good news**: the Microsoft approach of a single-vendor middleware stack (server operating system + database + integration and development tools) is very attractive to a certain segment of enterprise app customers. This group tends to shrug off arguments about Linux TCO or vendor independence as irrelevant.

- **The bad news**: given that Microsoft has attacked the enterprise app stack market from the low end up (i.e. mid-size ERP shops running Intel hardware, as opposed to high-end customers running vendor Unix on proprietary hardware), the arrival of enteprise Linux in exactly the same market segment makes it more difficult for Microsoft to raise license prices, which in turn makes it more difficult for Microsoft to implement its strategy of

moving its single-vendor stack up market to attack the vendor Unixes and the Oracle or IBM databases that run on them.

Enterprise Linux is not quite the mortal threat to Windows Server than it is to vendor Unix, but it unquestionably puts a ceiling on Microsoft's ability to expand in the datacenter. So far the SCO legal gambit has failed to put a serious dent in enterprise app user willingness to consider Linux. This means that Microsoft is going to have to come up with some serious strategic innovations to meet its ambitious sales goals in this market.

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