



Research Report

CIO Linux Outlook for 2010 and Beyond

Executive Summary

Over the past six weeks, *Clabby Analytics* has interviewed over two dozen information technology executives (including 5 CIOs/vice presidents, 5 Linux/Linux application vendors; a dozen IT managers; and several Linux administrators). The primary focus of these interviews was to gain some insight into where Linux is now within the enterprise — and where Linux is headed in the future. And what we found was:

- Linux has become a strategic operating environment for enterprises of all sizes. Every interviewee described plans for *growing* Linux use within their respective enterprises.
 - Linux was not the dominant operating environment in any of the data centers that were described, but it was clear that Linux was on a path to become a dominant operating environment within many of these data centers over time.
 - A few interviewees pointed out that Linux has the potential to become the “common-denominator” operating environment within their data centers because Linux can run on x86 servers, on midrange servers, and on mainframes. Also, they believe that having a common operating environment (and a common infrastructure across low-end, midrange, and high-end servers) will simplify information system operations.
- Many enterprises are actively consolidating their Linux servers.
 - Most of this activity consists of consolidating small x86 servers onto much large x86 multi-cores, and some x86 consolidation onto midrange servers.
- Linux consolidation appears to be a precursor to virtualization and provisioning (cloud) activities.
 - Many IT managers are consolidating their server environments first, and are planning to move aggressively into virtualization and provisioning after consolidation takes place.
 - This bodes extremely well for VMware with its suite of x86 virtualization infrastructure and management products; for open source KVM; as well as for IBM (if IBM can continue to get customers to adopt its new System z/zBX management/governance environment — an environment that does a particularly good job of managing Linux virtualization and provisioning across heterogeneous computing environments).
- Most of the near term Linux growth within these enterprises can be expected to come from the deployment of custom and packaged applications on Linux (particularly Oracle and SAP business applications). Red Hat and Novell Linux distributions dominated these enterprise deployments.

CIO Linux Outlook for 2010 and Beyond

- Several IT executives expect to expand their WebSphere Application Server infrastructure (Web services, SOA, etc.). None mentioned that they would expand their Oracle infrastructure environments — and none indicated any plans to adopt Oracle Enterprise Linux (OEL).
 - *Clabby Analytics* suspects, however, that a broader sample would probably show that some enterprises are planning to grow their Oracle infrastructure on Linux.
- Many reported that other Linux growth will come by eliminating Unix servers (particularly Sun servers), and migrating to Linux servers.
 - For those planning to move from Sun/Oracle Solaris to Linux, some planned to move their Solaris workloads to Linux on the mainframe, while others were considering x86 multi-cores as replacement servers.
- Linux-on-the-desktop growth appears static.
 - IT managers stated that the reason for little activity in this space can be attributed to: a) Windows desktops are often linked to Windows back-end servers — and introducing Linux into this scenario might create integration problems; and, b) buyers that really “dislike” Microsoft have already made the move to Linux-on-the-desktop.
 - A few interviewees did mention Ubuntu Linux gaining traction via the enterprise “backdoor” when used by developers in pre-production/testing.
 - *Clabby Analytics* believes that Linux-on-the-desktop efforts to date have largely focused on “office” applications such as email, editors, spreadsheets, etc. We, however, expect mobile computing applications that have linkage with desktops to drive future Linux-on-the-desktop growth. (This may be the topic of a future *Clabby Analytics* research report).

The remainder of this report takes a closer look at Linux in general: where it has been, where it is now, and where it appears to be going. The bottom line after conducting this research is this: Linux is enterprise ready and capable — and IT buyers are planning to significantly expand the use of business applications on Linux now, and for the foreseeable future.

Background

In January, 2003, when working with *Bloor Research*, we wrote a 92 page report entitled “Linux is Ready”. This report described Linux operating environment strengths and limitations in the areas of scalability, reliability, availability, security, flexibility, and manageability perspective. And this report found Linux to be a solid operating environment — ready for custom and independent software vendor (ISV) application development.

In 2005, on assignment with *Summit Strategies*, we wrote another report that found that Linux had become highly successful in the high-performance computing space (where it continues to be wildly successful today). At the time Linux was being used primarily as low cost/no cost operating environment for custom applications.

CIO Linux Outlook for 2010 and Beyond

In 2007, after attending a LinuxWorld event in Boston, we published yet another report that described how Linux was moving from the edge of the network into the office applications market. There were several office e-mail and database application software packages demonstrated at this conference — but very few “business applications” (financial, human resources, sales, manufacturing, etc.).

By 2009, Linux had arrived in the business applications market. We found many instances of Linux serving as the basis for enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM) applications. In fact, several Linux case studies still available on our site (www.clabbyanalytics.com — search for the Colacem and Baldor Electric case studies for more detail on Linux in the enterprise).

Our latest research (as published in this report) still finds Linux at the edge of the network. And Linux has become the dominant operating environment in the HPC space. Further, Linux is growing strongly in the business applications area, where SAP is reporting over 20% growth — even in this down economy. (The strong growth of Linux in the business applications space indicates that enterprises believe that Linux is reliable — and that it can be made highly-available and secure). Also worthy of note, we found a lot of Linux consolidation activity taking place — and we also found that IT executives are planning to virtualize and automatically provision their Linux environments (in fact, many have already started to do so). And we believe that these consolidation, virtualization, and provisioning activities — combined with efforts underway to standardize and expand Linux infrastructure — are setting the stage for enterprise-wide Linux cloud environments.

The Survey

Our survey consisted of three open-ended questions:

1. Why did you originally adopt Linux (for which applications)?
2. How are you using Linux now?
3. What are your future plans for Linux?

Our target interviewee was the chief information officer (CIO) — or anyone else whose role was to perform strategic information systems planning within an enterprise. But halfway through our interview sequence we decided that we should also talk to Linux and Linux application vendors in order to find out what they are seeing when they talk to their customers. So we expanded our interviewee base to include Red Hat and Novell executives (the two leading companies in enterprise Linux) — as well as to include three random Linux application vendors.

Some questions can be raised about the statistical significance of this survey due to its small sample size (a couple of dozen interviews — several by phone, but most conducted person-to-person). But Clabby Analytics believes that our findings are statistically significant and relevant because we kept hearing the same themes in interview after interview. And with most interviewees reporting the same observations, even though our interviews were conducted independently of one another, we believe that we have constructed an accurate snapshot of where Linux is heading over the next 3-5 years.

Additionally, we found other reports and articles that validate our findings (we located these reports after we conducted our surveys — so the conclusions reached in these reports did not influence our findings in anyway whatsoever). Some of these corroborating reports can be found at:

CIO Linux Outlook for 2010 and Beyond

- *The Opportunity for Linux in the New Economy* (available at http://www.linuxfoundation.org/sites/main/files/publications/Linux_in_New_Economy.pdf) supports our finding that Linux growth will be found in associated software (this report specifically points to growth in virtualization and cloud);
- *Expert Analysis of Spending in Today's Data Centers* (available at: http://viewer.media.bitpipe.com/1182112995_571/1260407795_245/DellsDCeGuide2.pdf) supports our Windows and virtualization findings — but does not support our Sun migration findings (note however, that this was published at the end of 2009 — the Sun migration trend has spiked significantly upward since then);
- *Linux Migration* (available at: <http://realtech.com/wInternational/sap-consulting/sap-technology/sap-on-linux-migrationW3DnavanchorW2621100414310023.php>) shows SAP growing at a 20% annual clip on Linux (supporting our finding of strong growth for business applications on Linux) — and supports our findings on Linux migration;

Key Findings: A Closer Look

Based upon our interviews, we have seven key findings:

1. Linux is becoming a strategic operating environment for enterprises of all sizes.
2. Several IT executives expect to expand their Linux infrastructure. Expect growth in virtualization/cloud activities, and in WebSphere Application Server infrastructure (to enable Web services, SOA, etc.).
3. Many enterprises are currently consolidating their Linux servers — and this may be a precursor to virtualization and provisioning (cloud) activities.
4. Most of the near term Linux growth within enterprises can be expected to come from the deployment of custom and packaged applications on Linux.
5. Many reported that other Linux growth will come by eliminating Unix servers (particularly Sun servers), and migrating to Linux servers.
6. Linux-on-the-desktop growth appears static.

Each of these points bears closer examination.

Linux as a Strategic Operating Environment

There is a belief in the IT marketplace that standardizing on fewer systems types and fewer software products reduces complexity and lowers operational costs. And several interviewees echoed this sentiment — indicating that they plan to install Linux across all tiers within their data centers over time.

This survey represents the first time that a majority of IT buyers told us that they consider Linux to be a strategic operating system. It shows us that IT buyers are no longer treating their operating environment choice as a foregone conclusion — they are actually building their data centers from the ground up by choosing Linux; then choosing a standardized infrastructure environment that will run across heterogeneous servers; and then making plans to tune those data centers by consolidating (to simplify management), virtualizing (to increase utilization rates), and automatically provisioning resources (again, to help lower operational costs).

Most IT executives indicated that the big driving forces for moving toward Linux are: a) to simplify systems management; and, b) to lower operational expenses (especially costs related to operating system licensing and related to human labor management costs).

CIO Linux Outlook for 2010 and Beyond

Based upon our experiences with Linux over the past decade, we suggest that as IT executives build their Linux deployment plans, they become aware of trends related to the management of Linux in *homogeneous* environments, as well as trends related to the management of Linux in *heterogeneous* environments. Here are our perspectives on both trends:

- The first thing to avoid when implementing a Linux strategy is the creation of management and infrastructure silos. We have seen many heterogeneous data centers where mainframes, midrange servers, and low-end servers are managed and virtualized differently. And this situation requires the enterprise to hire different people with different skill sets to manage each environment — and it also creates obstacles when it comes to sharing information (including data and management information) across these silos. The use of differing virtualization, provisioning, and management infrastructure across silos should be avoided at all costs.
 - For heterogeneous environments, a major shift is underway due to the introduction to a new approach by IBM to manage and govern heterogeneous systems. IBM's new zEnterprise/zBX environment creates a common management/governance environment that can help enterprises standardize heterogeneous systems infrastructure while establishing a common management scheme for a heterogeneous mainframe/blade environment. If this System z/zBX environment takes off, it will change the way that heterogeneous servers (and especially Linux-based mainframes, midrange, and low-end servers) can be managed.
- In our world travels, we see many data centers that have gone “homogeneous” (usually x86 servers running a common infrastructure and management environment) to lower costs. The downside of this approach is that x86 servers may not be the best server choice for a particular application — hence, that application will run less efficiently on an x86 server than on a RISC or mainframe architecture. If an organization is willing to accept that penalty, then making a homogeneous choice obviates several infrastructure/server management problems.

Linux Infrastructure Expansion

Many customers mentioned that they are expanding their Linux infrastructure. At the program-to-program level, IBM's WAS (WebSphere Application Server) environment was constantly mentioned as the basis for program-to-program communications and as the basis for XML data sharing. And several interviewees talked about virtualization efforts for their Linux environments — including building a common virtualization infrastructure and deploying common management products. Some executives also referred to these efforts as “cloud building”.

Linux Server Consolidation — Followed by Virtualization and Automatic Provisioning

For those who do not follow *Clabby Analytics* very closely, you should know that we do business all over the world, including places such as the Middle East, Eastern Europe, South America, India, China, and the South Pacific (as well as in the U.S. and Europe). So our perspective on the virtualization trend is a bit different than U.S./Europe-centric analyst organizations. What we have seen in our travels is that many IT managers are still in the

CIO Linux Outlook for 2010 and Beyond

process of consolidating their computer environments (because they want to get physical control of their systems before growing virtual/logical control).

Many of these IT managers are planning to adopt VMware as their standard for Linux infrastructure, virtualization, and management of x86-based servers. But a growing number of other IT managers are telling us that they are planning to adopt open source KVM (the Linux standard for virtualization). The move toward KVM, it appears, has two strong benefits for these IT managers: 1) licensing cost flexibility because the open source business model is based upon subscription use; and 2) cross-platform applicability (VMware only runs on x86 architecture).

Most Near-term Linux Growth Will Be In the Business Applications Space

SAP and Oracle are both growing strongly on Linux platforms. We see this growth coming from two sources:

1. The move from business applications on Unix to running those same applications on Linux; and,
2. The expansion of business applications on Linux. (Example: Baldor Electric recently presented its Linux expansion plan at a user group meeting in Boston — and this plan called for adding more and more business applications from SAP to its product portfolio. By doing this, Baldor leverages industry specific code produced by SAP — as well as the integration that SAP provides (helping keep its deployment/operations costs down).

Unix to Linux Migrations

Although Matt Stansbury's report (mentioned earlier: *Expert Analysis of Spending in Today's Data Center*) did not find major Unix to Linux migration taking place at the end of 2009, our survey indicated that many customers are in the process of moving off of Unix and over to Linux. Some fun facts regarding migration activities include the following:

- Over the past four years, IBM is reporting that over 2,700 customers have moved from other platforms to IBM servers and storage, with the majority of the migrations coming from Hewlett-Packard and Oracle/Sun.
- In Q1, 2010, IBM reported that 117 server or storage customers moved from Oracle/Sun iron to IBM platforms and storage — and that 95 moved from HP servers (total: 212 migrations from other platforms to IBM POWER, IBM z, or IBM x86-based servers).

Linux on the Desktop

Interviews reported little progress in the Linux on the desktop market space. In general, they believed that:

1. Microsoft is firmly entrenched;
2. Those who can realized a big payback by moving to Linux on the desktop have already done so (colleges, universities, geographies where Microsoft has little penetration); and,
3. It would cost more to migrate to and support Linux on the desktop than the effort is worth.

As we surveyed IT executives for this research report, we did not pursue Linux mobile strategies in any depth. But we observe that Linux is already popular as a mobile operating environment — and we suspect that mobile applications based on Linux will be closely linked to Linux-based applications running on the desktop over time. This may be the subject of a future research report to be published by Clabby Analytics over time.

The Great Unknowns

At the conclusion of this survey we looked at our interviews and corresponding data and were most intrigued by two comments that we heard consistently from our interviewees. First, most of their Linux is being deployed on x86 architecture; and, second, Linux can become the lowest-common-denominator for a heterogeneous enterprise.

What we are seeing worldwide is that Linux and x86 is almost synonymous — there is a strong preference to deploy Linux on x86 (and now, with the new x86 multi-cores available, there is a strong preference to consolidate Linux on scale-up x86 multi-cores). We are seeing little pick-up of Linux on traditional midrange servers (some on IBM Power Systems — but almost none on UltraSPARC- or Itanium-based servers). And, we are seeing some Linux server consolidation being brought to mainframes (mainframes and associated blades can now support up to 100,000 Linux images — making the mainframe the most scalable Linux consolidation server in the industry).

It will be of great interest to us to watch Linux server adoption patterns over the next few years, especially because:

1. x86 multi-cores are working their way into the traditional server midrange;
2. Linux is becoming a “glue” operating environment across the high-end, midrange, and low-end;
3. Mainframes now offer tremendous cost savings for Linux consolidation as compared with consolidation on x86 architecture; and because,
4. We think there may be a Unix-to-Linux migration trend developing on IBM Power Systems as certain industries (such as the banking and financial industries) move off of Unix on Sun and HP servers to Linux POWER-based systems.
 - (Note: *Clabby Analytics* has seen only a few examples of Unix migration to Linux on midrange systems — most notably the HPC Linux reference of Rice University at <http://www.youtube.com/watch?v=kNEpOPQxslQ>. Expect us to report more on this potential trend as more information becomes available in 2011).
 - Enterprises that are making this move put a heavy premium on manageability — so moving to Linux on POWER indicates that IT decision makers are convinced that Linux has similar depth in management when compared to Unix.

CIO Linux Outlook for 2010 and Beyond

Summary Observations

According to a large survey conducted by Tech Target, Linux growth was flat in 2009. But, according to another survey by IDC (described earlier: *The Opportunity for Linux in the New Economy*), Linux is expected to grow at a 23.6% rate (CAGR) between 2008 and 2013. Our point: surveys on the same topic can show different results.

In the case of this survey, we were gratified to find several other reports and articles that supported our research findings (these reports/articles are described on page 4). Although our survey was comparatively smaller, we found the several of the same trends that other, much large surveys found.

Our key findings are that:

1. Linux has become a strategic operating environment for enterprises of all sizes.
2. Several IT executives are expanding their Linux infrastructure.
3. Many enterprises are currently consolidating their Linux servers — and a big move to Linux virtualization and clouds will come next.
4. Many reported that other Linux growth will come by eliminating Unix servers (particularly Sun servers), and migrating to Linux servers.
5. Linux-on-the-desktop growth appears static (but this may change as Linux-based mobile computing grows and is then linked to Linux on the desktop). And,
6. Most of the near term Linux growth within enterprises can be expected to come from the deployment of custom and packaged applications on Linux.

At the conclusion of our survey, we examined our data — and, of course, new questions have arisen. We want to know why our interviewees did not indicate they were moving toward Linux-based business analytics. We want to explore mobile Linux in greater depth. We want to know if enterprises will adopt IBM's new System z/zBX hybrid mainframe/blade environment — and use Linux as a glue element to get their heterogeneous systems to work together. We want to know if the market will start to move more aggressively toward Linux in the midrange to run Linux applications on servers that can be optimized to best serve those applications.

In other words, we know that we'll have to do this again next year to track these and other evolving Linux market trends as Linux use grows within the enterprise...

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