

Content extracted from Butler Group's Linux in the Enterprise Report

Linux in the Enterprise

A Viable Alternative for Server and Desktop
Operating Systems?

September 2004

SECTION 1: Management Summary

► 1.1 MANAGEMENT SUMMARY

KEY FINDINGS

- It's time to put both feet in the water – Linux is now a credible alternative for the core of the data centre, and will be for the client within two years.
- Freedom of choice – the most important attribute of Linux is the independence afforded from the hardware platform.
- Linux is a cost-effective UNIX replacement, and worthy competitor to Microsoft Windows Server in many areas.
- Linux on the client is gaining credence, with offerings available from Red Hat, IBM, Novell, and Sun.
- Ignore generalised Total Cost of Ownership (TCO) evaluations; the TCO of Linux varies dependent on an individual organisation's circumstances.
- The Linux ecosystem is developing quickly and is a major driver of the adoption of Linux, especially for the main enterprise distributions from Red Hat and Novell.
- The public sector is showing leadership in this area, and beginning to embrace Linux and Open Source in a major way.
- Open Source software tends not to be innovative, but does produce efficient, secure, and robust code.
- For many already using Windows, it remains the best strategic choice, as does proprietary UNIX at the very high end.

Introduction

IT management needs to take a long, hard look at their heterogeneous systems infrastructure, and put in place steps to reduce the escalating costs that are in part driven by the number of incumbent Operating Systems (OSs) in the environment. Very few IT managers ever go out to purchase an OS, but it is the provision or development of services to meet the business objectives and requirements that is the main driver. Above all else, what Linux provides is the opportunity to reduce the number of platforms supported, by removing the need for close coupling between the OS and specific hardware.

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It seems to many in the IT industry and outside that Linux has come from nowhere to capture a significant share of the enterprise server market. Those in the vendor community hotly dispute the actual figures, especially as the engagement model for Linux makes accurate numbers difficult to determine. However, what must be acknowledged is that Linux is definitely gaining traction in the enterprise, especially against UNIX derivatives. In little more than 15 years Linux has advanced from the garage into the core of the enterprise, has achieved credibility in the server environment, and is now even beginning to threaten Microsoft's iron grip on the client OS market. The Linux generation has begun and, make no mistake, the era of Open Source development, with Linux as a leading exponent, is a reality.

Let's be clear though; Linux, whilst offering an end to hardware vendor lock in, more control, and good resilience, is no universal remedy. There are the same issues as with the deployment and maintenance of other platforms, and Microsoft Windows continues to be an effective alternative. In the short term, adding Linux to the mix can increase skill requirements and complexity, making it imperative that management processes and administration tools are in place to allow the centralised control of the IT environment. But an organisation that commits itself to just two OSs, i.e. Windows and Linux, will over time reduce the skill sets required for management and administration.

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Business Issues

Everybody now accepts that Linux in the enterprise environment is not free. However, TCO is complex with many variables to consider, making direct comparison difficult as each organisation is different. Little attention should be paid to the generalised TCO studies generated by many in the industry around whether UNIX, Windows, or Linux is the most expensive to operate. IT management must retain its objectivity in selecting the most appropriate and cost effective OS for the selected services and applications. In the end, as with any IT deployment, it hinges on what the specific business and technical requirements are. What is significant is that Linux is now a valid option for enterprise use.

The on-going SCO litigation saga with regard to provenance of Linux code, involving many leading IT industry vendors, and some customers, looks set to continue for some time to come. This backdrop can be unsettling for those deciding whether to make Linux a strategic OS. However, this is not seen as a major threat and should not cloud the decision-making process, especially as many vendors will indemnify users against any unfavourable judgements.

The patent protection regulation changes proposed by the European Union (EU) have the potential to cause further difficulties for the Open Source community.

The patent protection regulation changes proposed by the European Union (EU) have the potential to cause further difficulties for the Open Source community, of which Linux is a part. If the proposal is accepted in its current form it will allow patents to cover code, data structures, and process descriptions. The danger is that Open Source projects will find patent licensing costs prohibitive, stifling code reuse and innovation, as well as commercial software vendors possibly using the regulations to close down Open Source projects. This should not detract from the fact that Linux has evolved into a dependable, enterprise-ready environment capable of meeting business and technical requirements.

The absence of accountability for Linux can be a worry for many organisations, with liability, and the provision of a warranty difficult to pin down to a developer. There is also a concern as to the future direction that the OS might take, as there is no guarantee that new kernel developments will cater for business needs. The establishment of enterprise-focused distributions and the availability of support from the Linux ecosystem, including the control and testing provided by the Open Source Development Lab (OSDL), should significantly diminish these concerns.

Technology Issues

Linux is very much a disruptive technology where migration should not be taken too lightly, especially the retraining needs and organisational changes required when moving from Windows to Linux. Another possible barrier to adoption is the total cost of acquisition, which should be given careful consideration, with the softer issues such as the cultural aspects and management support afforded particular attention.

Linux's ability to run on this industry standard hardware makes it a prime contender to replace proprietary UNIX solutions.

A number of significant technology trends within the IT industry have made Linux a leading contender for inclusion in an organisation's infrastructure. Intel-based architecture dominates the enterprise IT environment. With Moore's law continually advancing performance and the increasing use of blade technology, x86 hardware is a feasible option for all data processing requirements, even for large database and transactional applications. Linux's ability to run on this industry standard hardware makes it a prime contender to replace proprietary UNIX solutions.

This hardware independence is especially important as organisations start to move into the 64-bit world. It is by no means certain which processor will become the industry standard from Intel Xeon and Itanium, AMD Opteron, and IBM POWER. Being hardware agnostic gives the flexibility to utilise whichever system provides the best performance and value now and in the future. This portability at last presents the IT manager with the leverage to maximise the best price from hardware vendors.

Where Windows has a significant advantage is in the totality of software stack, developer tools, available functionality, and integration, especially in the desktop environment.

There is a continuing focus on doing more with less, consolidating servers to maximise utilisation along with a move to utility computing. Linux allows the number of OSs deployed in an organisation's infrastructure to be decreased, thus reducing the administration overhead of the IT environment. In addition, the connectivity features built into Linux allow integration with Microsoft, Novell, and other networks, which can help with the implementation of a consolidation strategy.

The latest 2.6 Linux kernel release, made available at the end of 2003, builds on the previous version with enhancements that include support for NUMA servers, hyperthreading, scalability improvements, security-related changes, and more legacy support. Novell plans to include the new kernel in its SUSE LINUX enterprise distribution about the time that this Report is published and Red Hat plans to do the same by early 2005.

Linux is, of course, not the only alternative going forward. Microsoft Windows, whilst not being completely hardware agnostic, does run on industry standard x86-based hardware. The combination of Microsoft Windows XP and Microsoft Windows Server 2003 offers an IT platform which is compelling for the enterprise user, especially with the focus on improved security, reliability, availability, and scalability. Where Windows has a significant advantage is in the totality of software stack, developer tools, available functionality, and integration, especially in the desktop environment. A shortcoming is perceived as the on going licensing costs, an issue that ironically Microsoft itself brought to the fore.

There could now be the beginnings of a sea change on the desktop, with Linux client offerings available from Red Hat, IBM, Novell, and Sun. However, gaining credence will be no easy task, and all the solutions must deliver the equivalent convenience and integration of the incumbent Windows environment. A number of early adopter public sector organisations, such as Munich, City of Bergen, and Schwabisch Hall councils, are now deploying Linux and Open Source on the desktop. For the sceptical, download Knoppix 3.4 or SUSE Live 9.1 and boot from the CD to see how far the Linux desktop has come in recent times. The Open Source office tools, deployed on a Linux desktop will, however, be playing 'catch-up' with Microsoft Office for the foreseeable future. The only product that appears to have 'leapfrogged' the Microsoft stable to date is the Mozilla Browser.

Market Issues

An important reason why Linux has successfully evolved into an enterprise-ready OS is the creation of a mutually beneficial ecosystem. Over the past couple of years the Open Source community and the commercial sector have adapted to each other and this has allowed the commercialisation of Linux to go from strength to strength. The use of the Open Source software development model has proved very good at producing efficient and robust code, but possibly not the catalyst for innovative improvements that has been advocated by many in the Open Source community. The openness and flexibility surrounding Linux is particularly appealing to public sector organisations.

To be a credible offering in the enterprise space Linux must have Independent Software Vendors' (ISVs) support.

To be a credible offering in the enterprise space Linux must have Independent Software Vendors' (ISVs) support. While in the early days this was lacking this is no longer the case, especially as IBM has provided active assistance to ISVs to port their offerings. Linux is now a *Tier 1* OS for the majority of ISVs and hardware vendors. The main benefactors have been the Linux enterprise distributions from Red Hat and Novell, making them the leaders in the market. The availability of reference architectures from HP, Oracle, and others has further aided confidence in the Linux market.

The health of the Linux ecosystem very much depends on service providers to supply Linux support and other resources to users. IBM has played a leading role in growing the Linux market. Additionally, many ISVs, hardware vendors, and service providers donate software back to the Open Source community for inclusion in the Linux kernel. A worry is the fragmentation of Linux; however, the fact that no single vendor controls the kernel has thus far prevented this.

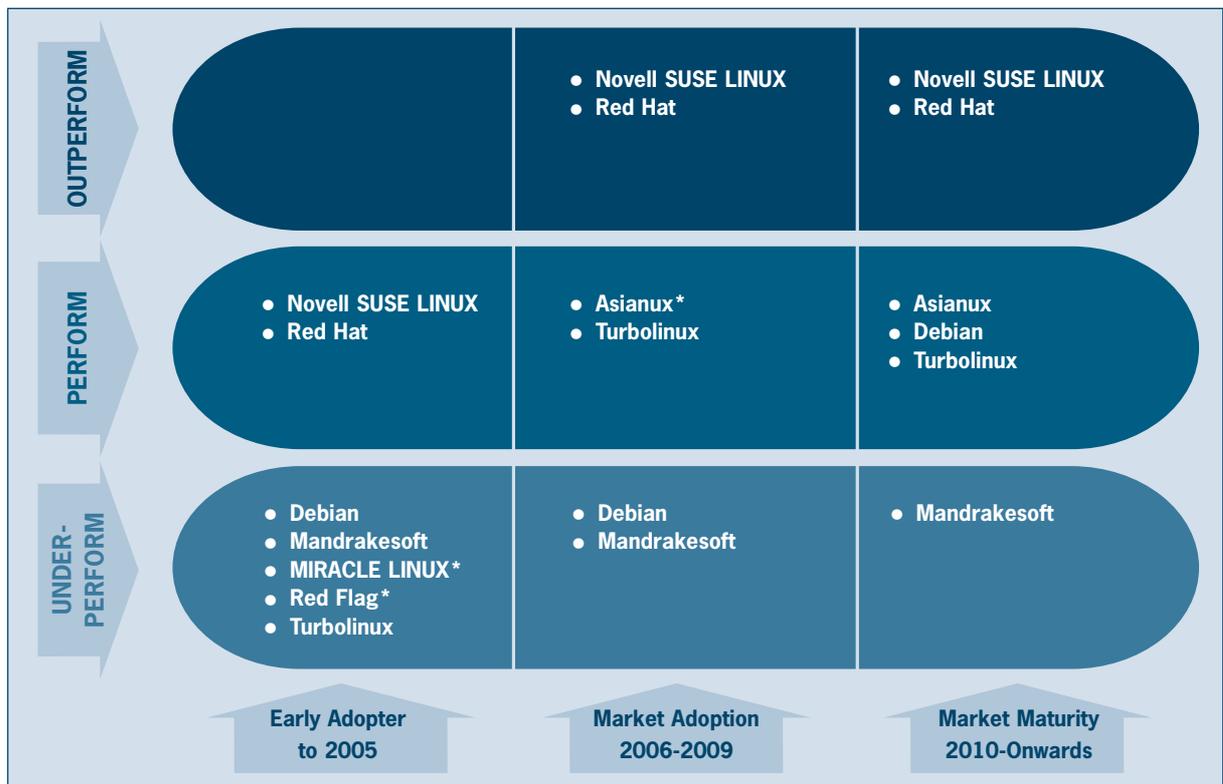
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There are significant trigger points on the horizon for many IT managers including the withdrawal of Windows NT support, hardware replacement, and the Windows Longhorn release. Linux offers an alternative and is worthy of consideration as and when decisions on future OS strategy become necessary.

Butler Group Market Lifecycle Positions

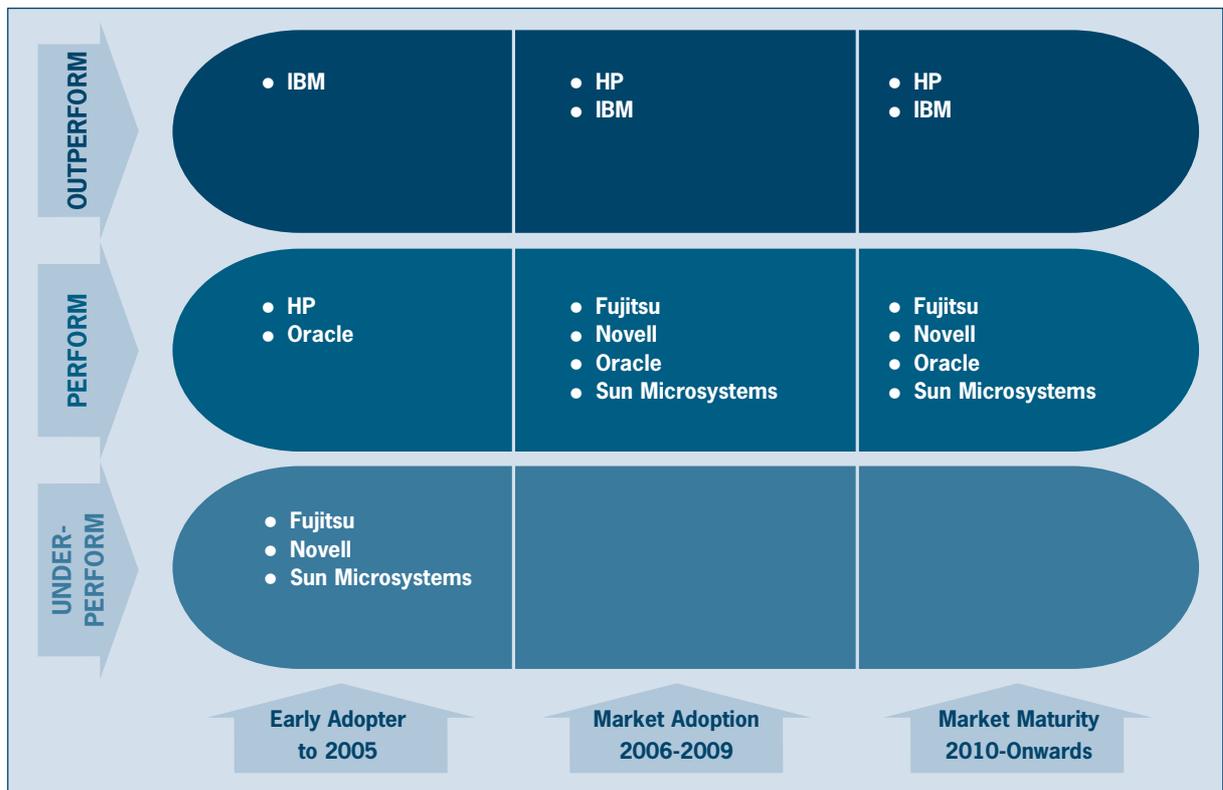
Butler Group's vendor ranking and assessment model groups suppliers into *Outperform*, *Perform*, and *Under-perform* categories, and shows the predicted progress through the three major market phases of Early Adoption, Market Adoption, and Market Maturity.

Linux Distributions



* Asianux is an enterprise distribution jointly produced by Red Flag and MIRACLE LINUX. This will rapidly become the dominant distribution in the Asia/Pacific region.

Linux Services



Solution Performance Table

Butler Group's summary of the analysis and market positioning of each vendor's current solution, taking into account all the research as well as how the vendor addresses the market.

Linux Distributions

Rating	Company/Solution	Butler Group Opinion
Perform	Novell SUSE LINUX Enterprise Server 8	European Linux technology leader now owned and supported by Novell. Excellent range of management tools and close relationship with IBM and HP. Will remain one of the top two distributions for the foreseeable future.
	Red Hat Red Hat Enterprise Linux and Red Hat Desktop v. 3	The first company to deliver enterprise-level technology and support for Linux. Recognised leader with key partnerships and full range of supporting services. Will be the other leading distribution.
Under-perform	Debian Debian GNU/Linux 3.0	Solid technology, but despite tie-up with HP it is lacking support and direction.
	Mandrakesoft Mandrakelinux	French-centric distribution, with good features, but little penetration outside France/southern Europe.
	MIRACLE LINUX and Red Flag Asianux 1.0	China's Red Flag and Japan's MIRACLE LINUX have recently aligned to create Asianux, a standard enterprise distribution for the Asia/Pacific region. Given the size of the potential market, this will be a major distribution in the future.
	Turbolinux Turbolinux Enterprise Server 8	Asia/Pacific distribution that is likely to suffer as Asianux (Red Flag, MIRACLE LINUX) gains predominance in the region.

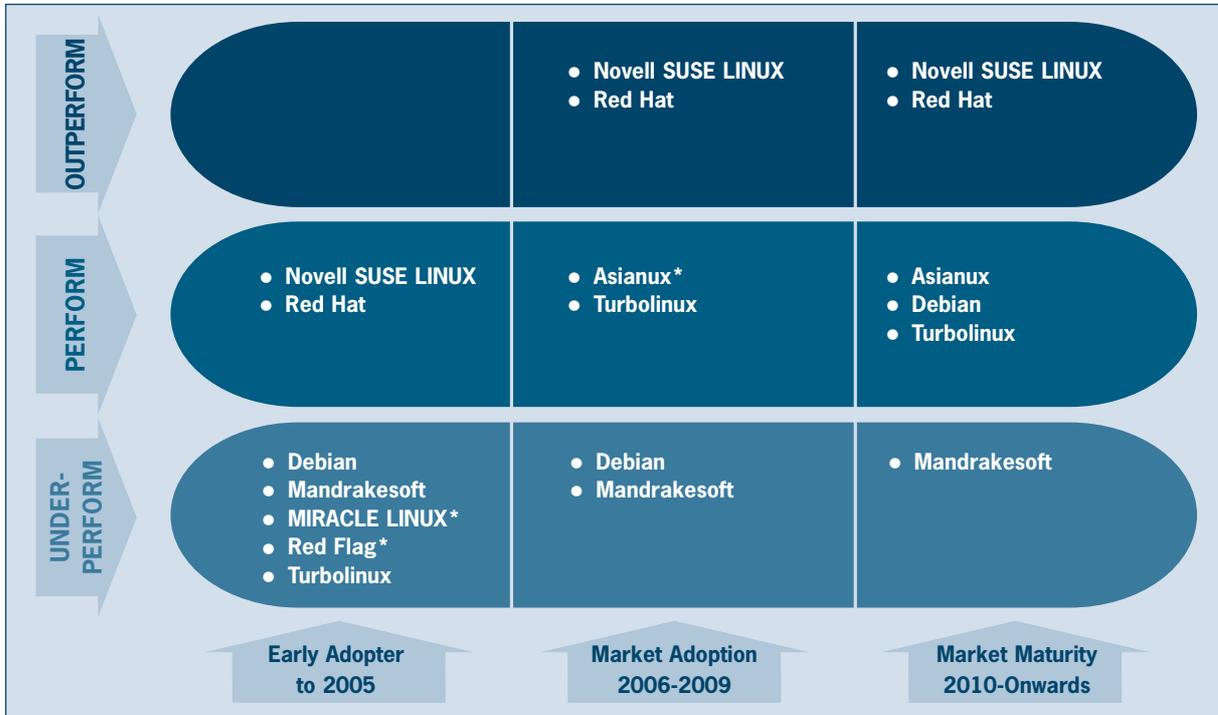
Linux Services

Rating	Company/Solution	Butler Group Opinion
Outperform	IBM Linux Products, Services, and Support	IBM has probably the biggest portfolio of Linux products and services, and can rightly be considered the godparent of Linux. With a major part of the company's business strategy based upon migration to, and deployment of, Linux, IBM must be regarded as the leader in Linux Services.
Perform	HP Linux Services and Support	HP is a strong advocate for Linux, but provides support and services in a manner that is hardware and software agnostic, focusing on organisations having the most appropriate solution to meet their business needs. Its indemnification programme is part of a strategy to give businesses confidence to migrate and deploy Linux at the enterprise level.
	Oracle Linux Products, Services, and Support	Oracle regards Linux as a strategic platform for its software and has aligned closely with SUSE and Red Hat in particular. Oracle is also the 58% shareholder in Japan's Miracle Linux distribution. The company will provide a single point of support for its products deployed on Linux, and up to third-level support even providing code-level fixes to the Linux kernel.
Under-perform	Fujitsu Linux Services	Fujitsu regards Linux as another 'flavour' of UNIX, and is in the initial stages of its Linux services programme. However as the world's fourth largest IT company, with significant presence in the Asia/Pacific region, and large public sector contracts in the UK, it is positioned to be a major player in Linux Services.
	Novell Linux Services	Following a busy 2003/2004 acquiring Ximian and SUSE LINUX, Novell is now clarifying its offerings to build on its global experience and presence. It promises to offer a comprehensive range of services and has the opportunity to integrate its legacy applications into an expanding application server platform.
	Sun Microsystems Linux Services	Sun Microsystems seems to be putting out confusing messages about its strategy, particularly shown in its recent attitude to Red Hat, and its announcement that it is considering the release of Solaris into the open source community. If the company invests wisely with a coherent strategy, it could be a big player in the Linux services market

SECTION 2: Tables

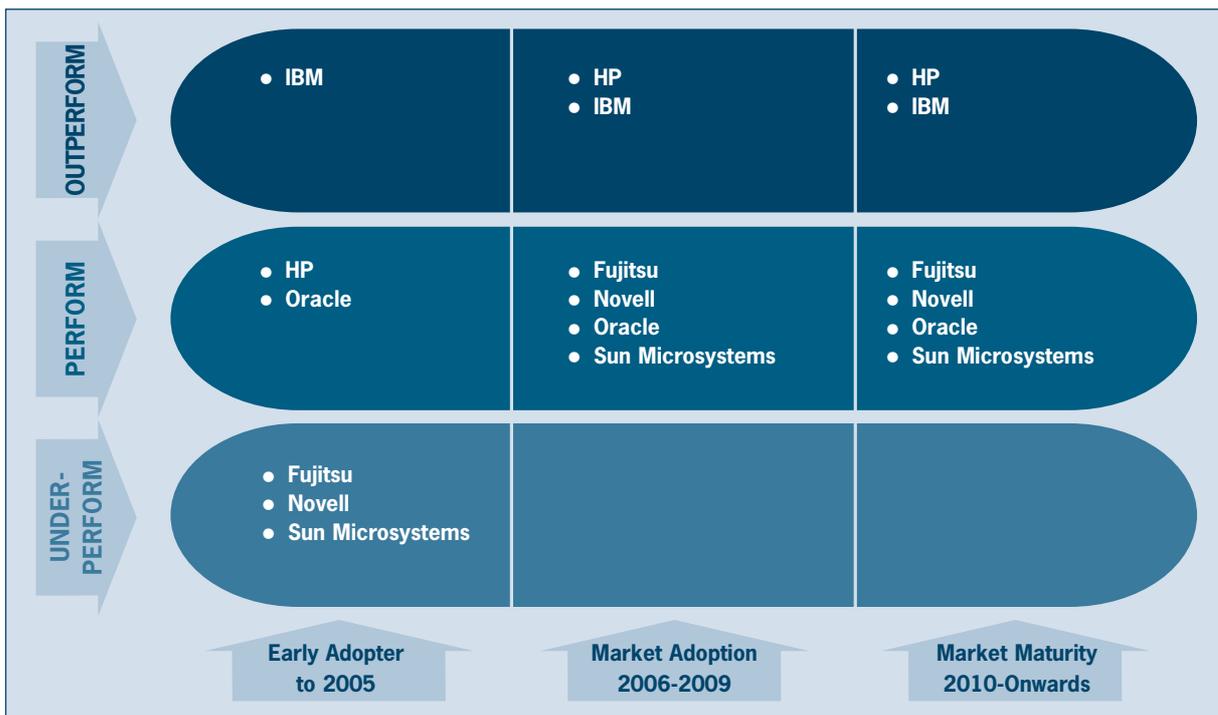
► 2.1 BUTLER GROUP LINUX IN THE ENTERPRISE MARKET LIFECYCLE POSITIONS

Linux Distributions



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Linux Services



About Butler Group Market Lifecycle Positions

The vertical “Performance” groups reflect the success of the vendors and the relevant products in a particular market. This is not a financial measure, but a measure of the success of the technology in taking market share. A financial measure would have to take into account financing, management skills, and economic conditions. Market performance, however, is more related to the marketing skills of the vendor, product positioning, timing, product excellence, and the success of the market.

The vertical axis is divided into three groups, with each making a specific statement about the vendor and its product. **Within each group, vendors are listed alphabetically, and the order and positioning of company names is not significant.**

- **Outperform:** The vendor has established a commanding market position with a solution that is widely accepted as best-of-breed.
- **Perform:** The vendor has good market positioning and is marketing the solution well. The solution also offers competitive functionality and performance.
- **Under-perform:** The vendor has poor positioning, has exercised poor timing, and is failing to market effectively. The product may also be deficient or outside mainstream trends.

The horizontal axis is similarly divided into three groups, with each depicting a phase in the market lifecycle.

- **Early Adopter:** Represents the early phases of the market when a new technology or standard, often promoted by new entrants, is finding adoption with innovative companies.
- **Market Adoption:** The phase when the majority of technology adoption takes place, which typically lasts for between three and four years.
- **Market Maturity:** After the market adoption phase, the maturity phase represents a time when the market can be reshaped by vendor acquisitions, new products, and concerted efforts to make an impact in the market. Some of the vendors may have been acquired by this stage, and clear leaders will have emerged.

Linux Distributions – Early Adopter to 2005

Novell SUSE LINUX – Having been recently acquired by its parent company, Novell, SUSE LINUX now has the back up of a global organisation for support and marketing, and is able to provide the complete ecosystem. Butler Group believes that this will aid its acceptance in a wider geography than its home territory of Germany and Western Europe. SUSE LINUX is able to simultaneously release its software on all platforms, which provides it with a competitive edge.

Red Hat – Red Hat is a leading Linux distributor, and was first to market with the offering of the levels of support and training that had previously only been expected of proprietary Operating Systems (OSs). It is endorsed by giants in the IT industry through partnerships, and offers a wide choice of services suppliers. With the addition of Red Hat Desktop v.3 to its Enterprise family of products, it provides a consistent platform across architectures.

Debian – The Debian Project is a non-commercial operation and has a relatively low profile. Organisations that use Debian need more in-house skills than those needed to deploy other major distributions. Debian is developing UserLinux, aimed at building a free, enterprise-stable Linux distribution that will include certifications, service, and support options. HP has undertaken a significant level of investment in Debian, but the fruits of this have yet to be seen.

Mandrakesoft – Mandrakesoft entered protection from bankruptcy in January 2003, and emerged from this status in March 2004. It is strong in its French home market, which has a history of focusing on ‘home-grown’ offerings, and is concentrating on development of new and updated products.

MIRACLE LINUX – Is strong in its native Japanese market and is fully tested and supported by Oracle9i, and also includes clustering and a Journaling File System. Oracle owns 58.5% of the company and NEC 14%. It has recently joined with Red Flag to create Asianux, which is positioned to be the standard distribution for enterprise servers.

Red Flag – Was co-founded by Software Research Institute of the Chinese Academy of Sciences and NewMargin Venture Capital in June 2000. The company joined with MIRACLE LINUX CORPORATION to announce in March 2004 the completion of the beta version of Asianux 1.0, the only standardised Linux operating environment developed specially for businesses in Asia. The sheer size of the emerging Chinese market ensures by volume alone that this will be a major distribution.

Turbolinux – Founded in 1992, Turbolinux is a Linux software company that is strong in Japan and is committed to providing the latest in Linux-based solutions. It is backed by some of the leading companies in the high technology world.

Market Adoption 2006-2009

As one of the two key distributions in the Americas and Western Europe, Red Hat with its strong development team will be at the top of any shortlist, along with Novell SUSE LINUX. With Novell's marketing strength and its broad geographical coverage, the SUSE LINUX distribution will be able to break out from its Western Europe base. Together with Novell services and support, it will provide a strong and attractive offering.

From its roots in Miracle Linux and Red Flag, Asianux should become the dominant distribution in the Japanese and exploding Chinese markets, and building on its strong foundations, Turbolinux will also have a significant share in those markets.

Although Debian has wide appeal amongst the Open Source community, and forms the core of a number of other distributions, we do not see Debian achieving mass enterprise popularity. We believe that Mandrakesoft will remain particularly strong in the French market, but will not achieve the global exposure necessary to take a significant world market share.

Maturity 2010-Onwards

In the longer term, we expect that Red Hat and Novell SUSE LINUX will continue to take the lion's share of the distribution market. With the ever-growing Chinese market, we expect Turbolinux to still be supported and have a significant base, although Asianux will be the predominant distribution in the Asia/Pacific region. It is possible that Debian will have an appropriate partnership in place to build on its potential by this timescale. We do not anticipate that Mandrakesoft will find it possible to break out from its French background.

Linux Services – Early Adopter to 2005

IBM – IBM has probably the most comprehensive range of products and support for Linux. This is reinforced by its Global Services organisation. For organisations moving to Linux at the enterprise level, using IBM will minimise risks, perceived and real, although as always with IBM there will be a cost.

HP – HP's hardware and software agnostic approach, the indemnification programme, and its internal commitment to Linux internally offers those migrating to or deploying Linux a level of confidence. As a global company, with significant support services arm, HP will be potential partner for larger organisations.

Oracle – The 'Unbreakable Linux' offering and the single company for support across the software stack, is very attractive, particularly for Oracle's extensive customer base, especially those migrating from Microsoft Windows NT4 platforms.

Fujitsu – Fujitsu regards Linux as another ‘flavour’ of UNIX, and is in the initial stages of its Linux services programme, but as the world’s fourth largest IT company, with significant presence in the Asia/Pacific region, and large public sector contracts in the UK, it is positioned to be a major player in Linux Services.

Novell – After making sensible acquisitions in Ximian and SUSE LINUX, the company will be getting its offerings in place to attack the global market, leveraging its legacy applications, experience and presence.

Sun Microsystems – Its strategy seems to be confused as instanced by its recent attack on its business partner, Red Hat, and its announcement that it is considering the release of Solaris into the Open Source community.

Market Adoption 2006-2009

We believe that HP will join IBM as a dominant player in the Linux services market in the medium term. By offering a complete ecosystem, and integrating its legacy applications, Novell should appeal to the wider Linux market providing the same risk averse argument as HP and IBM. Fujitsu will continue to provide comprehensive support for its customer base that has migrated to, or deployed, Linux. With Oracle’s strong commitment to Linux and its reference architecture for customers wishing to migrate to Linux, the company will retain a considerable share of the market. We believe that Sun Microsystems will have sorted out a coherent strategy by this stage, providing it with the opportunity to be a significant player in the Linux services market.

Maturity 2010-Onwards

We do not believe that it will be possible for a new entrant to make an impression in this market and that HP and IBM will continue to be dominant. Novell will continue to have a considerable share in the market, assisted by its ownership of one of the two major Linux distributions. Similarly, Fujitsu and Oracle, building on their strong customer bases will continue to have a share, and provided that Sun Microsystems succeeds in getting its strategy clarified, it could also have a significant share in the Linux services market, longer term.

IBM: Linux Products, Services, and Support

IBM Linux Products, Services, and Support

Abstract

IBM probably has the widest range of products and services associated with Linux than any other vendor. There are over 10,000 Linux engagements for IBM around the world, including many in central and local government. The strength of IBM's approach is having a 'whole company' perspective with strategic leads for Linux in each geographical region, to ensure that customers have a complete package of products and services. Case studies and reference deployments have demonstrable Returns On Investment (ROI), and IBM sees the pressures for better management, consolidation, and technology refresh, as key drivers for organisations adopting or migrating to Linux. As the 'godparent' of Linux, IBM's commitment to the continuing development as a business platform and making it 'mainstream' cannot be doubted. IBM will continue to be seen as an evangelist and leader in the Linux arena.

KEY FINDINGS

- | | |
|---|---|
| ✓ Linux support on all hardware platforms. | ✓ Full support, services, and consulting available. |
| ✓ Tight integration of all IBM offerings with Linux operating system. | ✓ High-end reference sites are normally using Linux as a partition on an IBM zSeries. |
| i IBM is a strong supporter of the two major Linux distributions. | ✗ Obvious bias towards IBM hardware and software. |

Key: ✓ Product Strength ✗ Product Weakness i Point of Information

LOOK AHEAD

Apart from the platform's creator Linus Torvalds, IBM as a company is probably the biggest Linux evangelist. Linux is core to the company's business strategy for hardware, software, and services, and Linux is fundamental to the concept of on-demand computing.

► FUNCTIONALITY

IBM has a whole company philosophy behind the adoption and migration to Linux, with its whole software stack being ported to run on either Red Hat or SUSE platforms, and all IBM hardware already enabled to run Linux, and Linux-based applications.

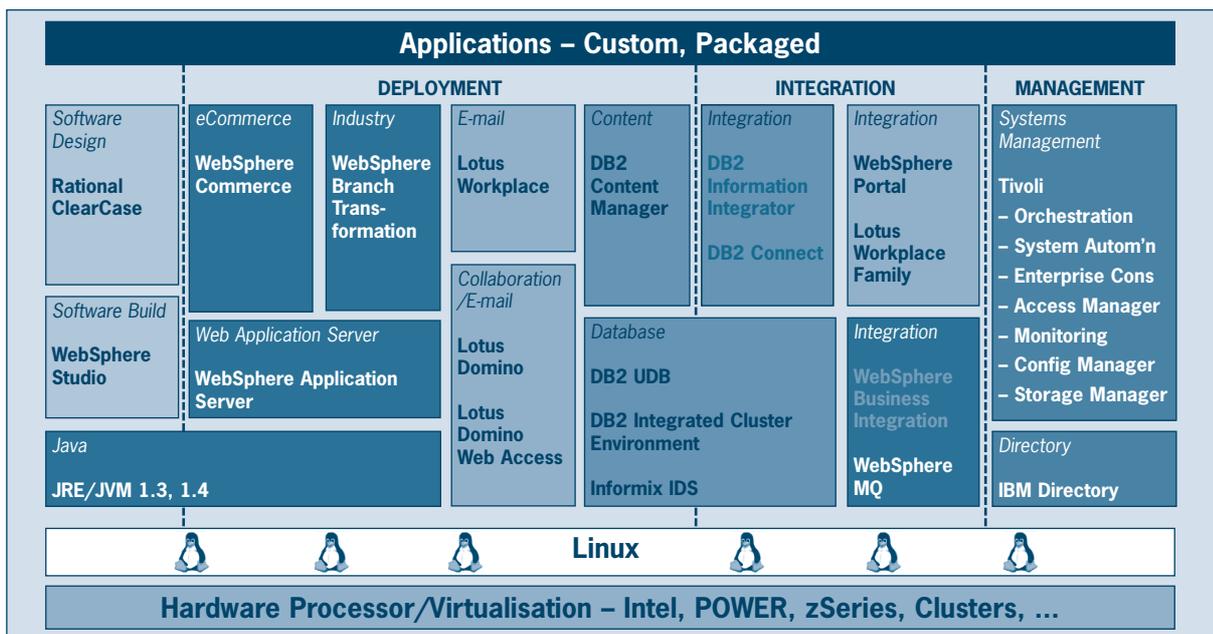


Figure 1: IBM Software Stack on Linux

IBM probably offers the widest range of products and services associated with Linux. In addition, all its hardware platforms support Linux. The company has been committed to Linux since 1997 and reportedly invested over US\$1 billion in Linux, and related products and services in 2001, including ensuring that every key IBM hardware and software product was enabled for Linux.

The company reports that it has over 8,500 staff worldwide working on Linux development, research, services, and sales. Internally, IBM is currently running Linux on over 1,000 servers, including those supporting its Web site, ibm.com.

Over 275 software products from DB2, WebSphere, Lotus, Rational, and Tivoli lines are currently available on Linux and 17% of IBM mainframe sales in 2003 were reportedly to handle Linux workloads. IBM estimates that 65% of its zSeries/S390 customers are in some stage of implementing or evaluating Linux.

In excess of 80 solutions have been announced by Solution Providers for Linux on IBM iSeries servers, and there are now more than 50,000 developers actively creating Linux-based applications that can run on the IBM xSeries Intel-based platform. In total the developers have created more than 6,500 Linux-based applications for IBM software.

Interestingly IBM reports that only one third of the new Linux-based applications are being created by Independent Software Vendors (ISVs), the majority are being developed by businesses in-house, a statistic that IBM believes is a major mark of adoption.

IBM believes the basis for the business adoption of Linux has been two-fold:

1. The Business drivers:

- Cost.
- Reliability.
- Security.
- Flexibility.
- Requirement for On Demand capacity and services.

2. The Technology Enablers:

- Open Standards.
- Linux maturity.
- Hardware standards.
- Middleware standards.
- Support and services.

Together these have created the environment for the development of applications and solutions. IBM believes that the availability of the Linux 2.6 kernel, with its support for 16-way processing and 64 bit processors, makes Linux highly suitable to displace lower-end proprietary UNIX platforms. The Globus toolkit for Linux allows Linux servers to be utilised as a Grid, a key concept within IBM's vision for On Demand computing.

IBM regards Linux as a reliable, secure, operating system, which offers heterogeneous hardware support. It believes the use of Open Standards on the Linux platform, should deliver flexibility and avoid 'lock-in', enable easier integration, and encourage the portability of applications. The use of Linux also enables the protection of exiting IT investments, for example, by connecting legacy applications to new Open Source applications such as Apache and SAMBA.

*IBM regards Linux as a reliable, secure,
operating system, which offers heterogeneous
hardware support.*

Linux and the Open Source movement are, IBM believes, now central to the IT industry and to IBM's e-business On Demand strategy. For its part IBM has created a Linux Technology Center, made up of more than 600 engineers, and programmers worldwide who work full-time on Linux, and other open source projects as part of the open source community.

IBM is committed to using Linux inside IBM with in excess of 3,500 of its servers capable of running Linux. Mission critical applications that run Linux include the IBM Web site (ibm.com), support of IBM's US\$2.5 billion 300mm chip manufacturing facility, and applications that support more than 300,000 IBM employees worldwide.

In addition, IBM has been hosting Web sites for many of its customers on Linux, including Wimbledon, the US Open, the French Open, and other sporting events.

IBM has opened a variety of Linux-based centres around the world that are intended to help customers, Business Partners, and developers migrate to Linux. Linux Centers of Competence around the world, including Wall Street, New York, US, South Bank, London, and the Government Solutions Center in Washington, DC, US, give developers a place to test new Linux-based applications and solutions.

IBM Global Services (IGS)

To support its customers, IBM has an extensive services capability to add value at all stages of a Linux project lifecycle. This is underpinned by a comprehensive portfolio of services offerings, ranging from the initial workshops to quantify the business benefits from adopting Linux to a comprehensive post delivery support capability. This portfolio is shown in Figure 2.

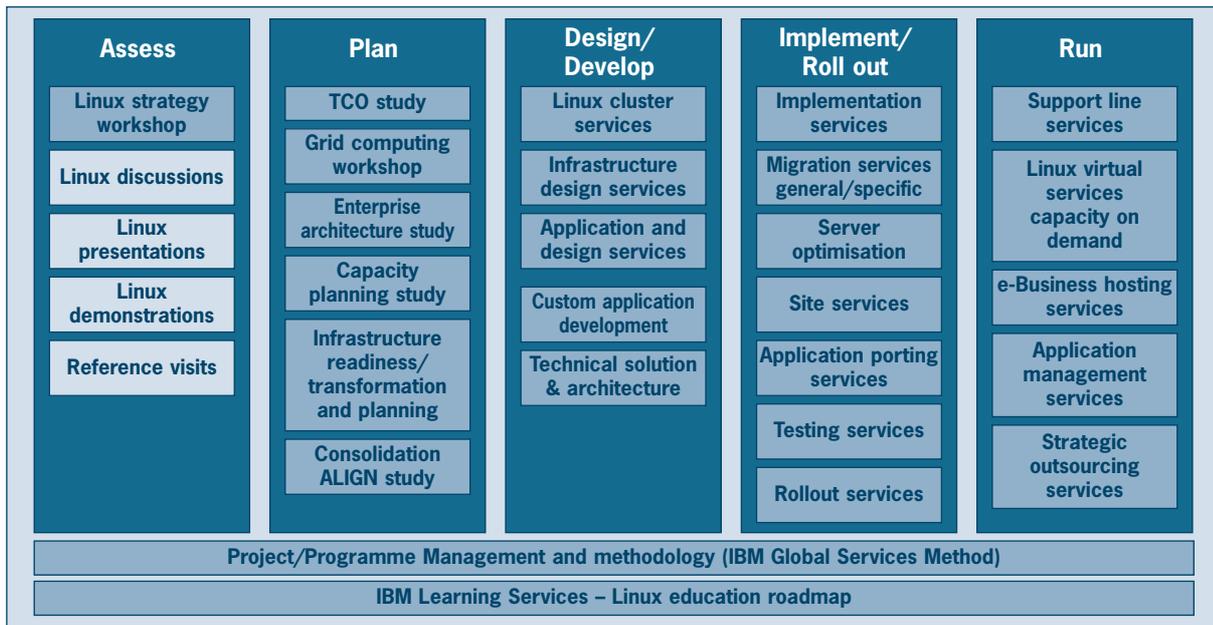


Figure 2: IBM's Linux Services Portfolio

IGS assigns consultants with deep industry aligned skills in the early project phases to ensure that the recommended solutions add sustainable business benefit. These solutions are then designed, integrated, and supported by practitioners with deep technology skills.

Although most early customer projects undertaken by IGS related to server side Linux solutions, IBM has recently launched portfolio extensions to cover the client side solutions, and has had significant customer success in this area including projects with Banca Popolare di Milano (Italy) and Schwaebische Hall (Germany).

► DEPLOYMENT

Red Hat and SUSE distributions of Linux can be deployed on the complete range of IBM hardware, from xSeries (x86-based) desktops, notebooks, and servers, through iSeries, and pSeries servers, to zSeries mainframes. IBM states that the platform used would be the one that best fits the customer's business needs. For example High performance Applications would be run on Linux clusters, those require high Input/Output (I/O) on zSeries/iSeries, or high availability xSeries/pSeries clusters. Linux is also actively supported by IBM's Global Services division (IGS). IBM, and its partners, can offer a complete range of services for implementing Linux, from the Linux-based centres to project management, bespoke training and development, and ongoing support.

Because of the range of IBM hardware and software, IBM could be for many organisations a single source of Linux hardware, software, consultancy, and support.

The large scale reference sites, for example, Austrian OMV's SAP R/3 deployment, and the UK's Waitrose's customer service solutions, are using Linux as partitions on a zSeries mainframe. This offers those companies the extensive range of management and support tools that have been developed over a long period to use and support the Linux-based applications most effectively.

Deployment Examples

West Yorkshire Police has used the Linux platform and a range of IBM software to create a consistent national system for police video identity parades. The solution known as Video Identity Parade Electronically Recorded (VIPER) contains a database of more than 10,000 images.

The IBM Linux infrastructure includes: IBM General Parallel File System (GPFS), IBM TotalStorage™ FASt500 Storage Servers, IBM SAN and LTO Ultrium Tape Library, and Tivoli® Storage Manager. The solution was designed, implemented, and supported by IBM TotalStorage Solutions Center, and IBM Business Partner, Sagitta.

The system allows identity parades to be assembled within two hours rather than weeks and the cost of each parade, reducing the cost of each parade from UK£720 – UK£1,200, to UK£150. Total benefits are expected to be UK£6.6 million savings in year one. The solution is based on 1.4TB of storage space built around industry-standard hardware configured as a Linux cluster, using IBM GPFS for rapid access to individual image files. The use of a Linux foundation was seen as essential to enable the sharing of bandwidth needed for dealing with large video files. It also fitted with West Yorkshire Police's existing Linux infrastructure, reducing the management overhead and Total Cost of Ownership (TCO).

The National VIPER Bureau now conducts an average of 82 parades a day, with 61 individual ID suites on-line across 15 police forces, and an additional 20 ID suites becoming operational.

The next development will be to link the video technology of VIPER with other identification systems, such as facial/iris recognition and digital fingerprints.

The City of Bergen is Norway's second largest city, with a population of 237, 430, and is centrally located by the North Sea. As part of its strategic direction to migrate to Linux as the standard operating platform for servers, the City has decided to deploy Novell SUSE LINUX Enterprise Server (SLES) 9 on a number of HP Servers, and IBM Blades, to replace the proprietary UNIX, and Microsoft Windows servers for the administrative and educational networks respectively.

In selecting Linux as a strategic platform the City was seeking to attain a business model that did not tie it to a single vendor's solution architecture. By migrating to Linux the City believes it has a business model that is open, and democratic, and one that will ensure a greater degree of freedom of choice for the future, more efficient operation, and major cost savings that will benefit its citizens.

The first project is to migrate the city's 20-30 existing Oracle database servers running on HP-UX and MS Windows 2000, to ten HP Integrity Itanium 64-bit servers. These will support a range of the City's operational business applications, including core health and welfare services, and will be accessed by 15,000 employees.

The second project in the strategy will involve the migration, and consolidation of 100 Microsoft NT Windows application servers, currently based in individual schools that support the City's educational network, to a centralised IBM eServer BladeCenter with 20 blade servers.

The migration is being managed within existing staff costs, and the City believes that the on-going support element of the TCO of the HP servers will be lower than that for an equivalent solution based upon Microsoft Windows Servers, as problem solving in Linux is generally less complex. As part of the business case for the use of Linux, the city has calculated that the costs of the servers for the educational network would be only 60% of those for an equivalent installation using servers running Microsoft Windows 2000.

► PRODUCT STRATEGY

IBM is seen by many as the godparent of the Linux market, encouraging as it did the development of two 'business-class' distributions in the shape of Red Hat Enterprise Linux, and SUSE (now part of Novell) Linux Enterprise Server, with the disciplined release cycles, support, and training that business customers expect. Undoubtedly the penetration and profile of Linux and Open Source software in general, would not be as high, and the development so fast, without the company's support, including the partnership with the likes of HP and CA in the Open Source Development Labs (OSDL). The creator, and notably trademark owner, of Linux, Linus Torvalds, is employed at OSDL.

Linux is now at the centre of IBM's product offerings, not only does it fit with the computing on demand paradigm; it also plays to the issues of reduction in the TCO through the consolidation of infrastructure and skills. The support for greater numbers of processors in the 2.6 kernel will enable IBM to offer greater flexibility and power in the On Demand model.

Linux is now at the centre of IBM's product offerings, not only does it fit with the computing on demand paradigm; it also plays to the issues of reduction in the TCO through the consolidation of infrastructure and skills.

IBM sees banking, government, and retail as the key markets for Linux adoption, with other industries, particularly in the Small to Medium-sized Business (SMB) arena, being drawn by specific IBM Industry Solutions, and the creation of Linux versions of existing enterprise applications by ISVs.

Geographically IBM has seen Europe and the US as being the early adopters, but has identified China, India, Russia, and Brazil as being markets where Linux adoption could be very rapid.

IBM regards Linux as the ideal operating system for thin-client and pervasive computing devices, but recognises that 64-bit support and performance will be required to gain further traction to displace proprietary UNIX servers.

In 2004 IBM will be pushing Linux through solutions under the "Linux optimised IBM solutions" tag.

- It has already implemented horizontal clustering to create very large DB2 databases with DB2 ICE, and has demonstrated technology previews of 64-bit DB2 on Linux on its POWER processors (iSeries and pSeries servers).
- Java 2 Enterprise Edition (J2EE) Application servers will be migrated to WebSphere on Linux from UNIX.
- E-mail Servers will be migrated to Lotus Domino for Linux on zSeries and xSeries.

► COMPANY PROFILE

International Business Machines (IBM) is one of the world's largest technology companies, with operations in 164 countries. The company was incorporated in the State of New York on 15 June 1911, as the Computing – Tabulating – Recording Co. (C-T-R), a consolidation of the Computing Scale Co. of America, The Tabulating Machine Co., and The International Time Recording Co. of New York. In 1924, C-T-R adopted the name International Business Machines. The corporate headquarters are in Armonk, New York, US.

IBM makes a broad range of computers, including PCs, mainframes, network servers, peripherals, and produces a comprehensive range of software. It has a consultancy services arm. Nearly 60% of the company's sales are to non-US customers. IBM continues to focus on the Internet and e-business.

The company has over 300,000 employees worldwide. IBM common stock is listed on the New York Stock Exchange (NYSE: IBM), on other exchanges in the United States, and around the world.

Financial results for the last three years (ending 31 December) are shown in the table below:

	2003 (US\$ millions)	2002 (US\$ millions)	2001 (US\$ millions)
Revenues	89,131	81,186	83,067
Increase/Decrease on previous year	9.79%	-2.30%	-2.40%
Net Income	7613	5,334	8,146
Increase/Decrease on previous year	42.73%	-34.50%	3.50%

In 2003, Global Services accounted for 48% of revenue, Hardware contributed 32%, and Software represented 16%, with the balance coming from other activities. IBM is a big company, with a wide product portfolio, but it is reported that in 2003 Linux related sales and services delivered US\$2 billion in revenues.

IBM customers that have deployed solutions on a Linux platform include:

- Charles Schwab.
- Dundee City Council.
- Italian Foreign Ministry.
- Lawson Products Inc.
- Northern Territory Schools in Australia.
- Princetown University.
- Swisscom.
- West Yorkshire Police.

IBM claims over 10,000 Linux customer engagements worldwide, and some 275 of these are now referenceable accounts.

► SUMMARY

Whilst Linus was the father of Linux, IBM is undoubtedly the godparent and has made a major corporate commitment to the platform. IBM has numerous business and technology partnerships that help support its operations, and has invested heavily in the Linux arena with these partnerships. In addition to all IBM hardware supporting Linux, and all software being migrated to the platform, with its Global Services, outsourcing, and consultancy arm IBM can probably offer the widest range of products and services of any company in the Linux arena.

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This Report reveals:

- Why Linux can now be regarded as a robust and viable option for the enterprise.
- The strengths and weaknesses of the Open Source development approach.
- How industry support has helped Linux evolve into an enterprise-class operating system.
- The differences between Linux distributions, and which one is right for the enterprise.
- What the differences are between the leading Linux service providers.
- The criteria for migrating to Linux and the deployment issues to consider.
- Whether a Linux strategy should be extended to the desktop.

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Analysis without compromise

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