Open Source Development Labs
Accelerating Linux Adoption in the Enterprise and Beyond

OSDL Bill Weinberg

1. Introduction to OSDL

Open Source Development Lab is a non-profit organization with the mission of accelerating Linux adoption in the enterprise and beyond. Founded in 2000 by IT leaders Computer Associates, Fujitsu, Hitachi, IBM, Intel, and NEC, OSDL membership today comprises 75 companies in a dozen countries across the Americas, Asia, Europe and the Middle East. The "trade association" behind the Linux kernel, OSDL employs a staff of 45 including engineering, marketing, business development and administration - the most famous OSDL employees include Linux kernel developers and maintainers Linus Torvalds and Andrew Morton.

1.1 Diverse Membership

OSDL membership is impressively diverse, with representation from nearly every part of IT industry and Linux software/hardware ecosystem. While OSDL was founded by systems and silicon
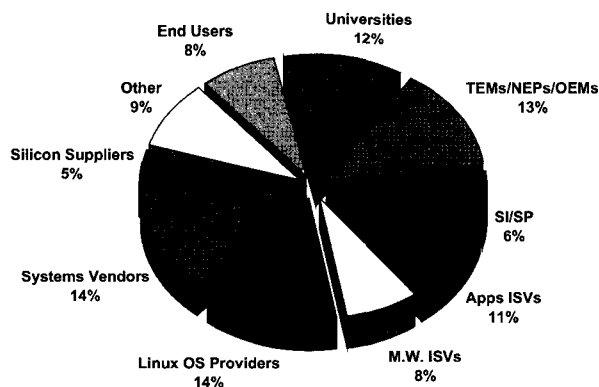

Figure 1 OSDL Membership Distribution
by Member Type

suppliers, participation has worked its way "upward" and "outward" to encompass Linux distribution suppliers, ISVs, integrators, equipment manufacturers, a range of commercial and academic end-users and recently other interested parties like government research institutes and venture capitalists.

Recently, new initiatives like Mobile Linux and legal activities around patents and intellectual property are driving new member acquisition.

1.2 Geographic Distribution

North America, while still the largest base for OSDL membership, now stands on a par with the international roster: North American membership continued to grow in 2005, followed by Asia, where it is interesting to note that membership expansion came from outside of OSDL's original base in Japan where the organization originally established a regional software testing lab.

2005 saw several new OSDL members coming from Korea, including the following companies and institutes:

- ETRI
- Hansoft
- Mizi
- KIPA

OSDL is investing resources in growing its member ranks in Korea, through direct contact and through participation in events like LinuxWorld Expo Korea in June 2006. Stay tuned for new developments!
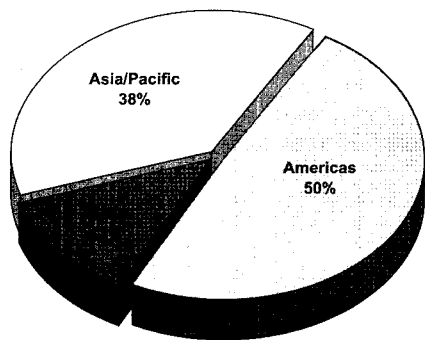
Figure 2 Geographic Distribution of OSDL Membership

2. OSDL Initiative Process

OSDL initiatives exist to serve industry, from enterprise IT to vertical market OEMs out to individual end-users. Since, unlike traditional proprietary software, Linux and open source have no single vendor that collects requirements and drives advances, OSDL initiatives act as clearing houses or even as "product management" for the Linux kernel. Very much unlike traditional product management, however, OSDL initiatives do not present customer requirements as mandates to "engineering", in this case, the community of developers. Rather, OSDL works with member companies with an interest in advancing the Linux kernel and OS (e.g., distribution suppliers, hardware vendors and ISVs) to spur development together with the open source community, by supporting and contributing to existing development projects, and by stating new ones.
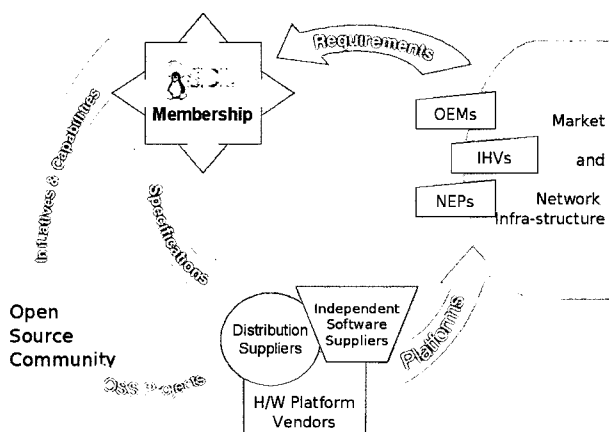

Figure 3 OSDL Initiative Requirements Specification Life Cycle

It is important to understand that OSDL is not a standards body. The outcome of OSDL initiatives are gap analyses, requirements, specifications and implementations. While there may exist requirements *for* standards compliance or conformance, and while OSDL initiatives may *specify* existing standards (as Carrier Grade does with POSIX, LSB and SA-Forum), and while OSDL members may also *implement* standards-compliant code, OSDL does not *create* or *publish* standards itself.

3. OSDL Linux Platform Initiatives

OSDL is best known for the work of the lab and of its members in defining, promoting, and fostering implementation of Carrier Grade Linux. Today, the OSDL sponsors and engages in greatly expanded activities that include four Linux platform initiatives:

- Carrier Grade Linux – Core/edge carrier-class applications
- Data Center Linux – Corporate/enterprise applications
- Desktop Linux – Enterprise desktop platform and workloads
- Mobile Linux – Handheld / wireless mobile communications platform and applications

3.1 Carrier Grade Linux

Starting in 2000, Network Equipment Providers (NEPs) and Telecommunications Equipment Manufacturers (TEMs) began building on Linux for its reliability and robust architecture, but found they needed additional capabilities to implement the fault-resilience and availability needs of the carriers and operators they serve. In response, Carrier Grade Linux (CGL) was created as a specification for the functionality in Linux-based OS platforms to support "5 and 6 nines" availability requirements in voice and data networking.

CGL is not a "fork" to mainstream Linux. Rather, the initiative specifies the addition of capabilities that include:

- Availability – System monitoring, fail-over, clustering, etc.
- Serviceability – Diagnostics, logging, recovery, and crash analysis tools
- Standards-compliance – For example, LSB and POSIX.
- Performance – Real-time and throughput
- Hardware – Support for ATCA, etc.
- Security – Addressing the unique security requirements of TEMs and NEPs
- Clustering – Base clustering definition for availability and scalability

The Carrier Grade Linux initiative began its work in early 2002, and issued the CGL Version 1.0 Requirements Specification and Feature Road Map later that same year. In early 2003, the CGL Technical and Marketing committees released the version 2.1 specification.

In 2003 and 2005, multiple Linux-based platform suppliers in the enterprise and embedded markets ship commercial versions of Linux built from Open Source components that comply with the version 1.x CGL specification. Key NEPs and TEMs have also deployed systems based on 1.x-compliant CGL platform code. In 2005, additional companies announced availability of 2.1-compliant Linux platforms:

- AsianNux
- FSMLabs
- MontaVista Software
- Novell/SuSE
- Wind River

OSDL membership is also working to streamline and simplify the process of registration by supplying CGL platform teams with the methods and tools to demonstrate compliance to CGL specifications.

As OSDL's longest-running initiative, CGL did not rest upon its laurels in 2005. Membership continued investing in driving the CGL specification forward and in supporting adoption by a dynamic ecosystem.

- CGL membership approved and published the CGL version 3.1 specification,

- CGL membership issued a draft 3.2 specification, slated for final release in February of 2006
- Non-member companies have begun to self-register both commercial-off-the-shelf and internal Linux platforms against the CGL specification; the first such example in 2005 was FSM Labs Real-time Carrier Grade Linux, with more to follow in 2006 (including at least one in Korea)

3.2 Data Center Linux

Data Center deployment stands out as a high point of Linux adoption, with market share of 30% or more in 2005. The mission of the Data Center Linux (DCL) Working Group is *to provide a forum for industry leaders to accelerate business hardening and adoption of Linux in the data center*. This mission complements and extends the organic adoption that Linux has enjoyed to date.

While the Data Center Linux (DCL) initiative germinated together with CGL, it is only now bearing fruit of its own. While CGL targets core and edge networking applications, the DCL requirements specification aims to meet the needs of modern IT departments and the businesses they serve.

The goal of the CGL initiative is to define and instigate implementation of a Linux-based OS platform, middleware, and application stacks for business-critical deployment in financial services, healthcare, insurance, e-government, and other enterprise settings.

While CGL is extremely kernel-centric, DCL tends to focus on the application stack and enabling technologies like database security, and storage. Indeed, one of the key activities today of DCL initiative members is the study of how and why Independent Software Vendors (ISVs) host their applications on Linux – which distributions and versions, for what reason, and at what cost.

DCL initiative members are also collecting requirements from their own ranks, and from a

larger community of Linux end-users. With this knowledge in hand, the DCL initiative will shortly be ready to publish its own requirements, and work with the Open Source community to implement the particulars of a DCL specification. As with CGL, DCL seeks to eliminate or reduce existing barriers to Linux deployment, this time with emphasis on the data center, and to promote migration from proprietary legacy solutions.

In 2005, data center adoption continued to grow, with industry focus on financial services, insurance, retail, and medical segments, to name a few. OSDL DCL engaged in a range of activities to close gaps and further the incremental advance of data center adoption.

Storage/Networking – NFS 4.0 Testing

DCL focus on NFS centered on testing, not on development. By expanding the text matrix and formalizing testing efforts, DCL helped deliver higher quality and performance to NFS end-users, keeping Linux competitive with legacy / proprietary data center platforms. NFS 4.0 testing by DCL was also highlighted as the cover story of the May 2005 issue of *LinuxWorld Magazine*.

The NFS testing effort also represented steps forward in the community testing process, with improved visibility for on-going activities and testing quality, and in reducing duplication of effort. In particular, OSDL implemented

- Formal NFS 4.0 bug tracking
- Multi-platform cross compiling
- Test configurations specified by DCL storage SIG

as mechanisms to enhance NFS 4.0 code quality.

NFS 4.0 performance and interoperability tests, while interesting in themselves, are most useful in context. To allow publication of comparative results, OSDL legal counsel brokered agreements with Sun attorneys to allow posting of Solaris 10 test data alongside data for NFS 4.0 (normally prohibited by the Solaris license).

3.3 Desktop Linux - DTL

In the enterprise, desktop computing is still a stronghold of proprietary operating systems and applications, primarily of Microsoft Windows and Microsoft Office. While Linux has made tremendous gains on engineering workstations and hobbyist's desktops, its worldwide commercial market penetration stands around 3% (IDC). On the bright side, forecasts call for double-digit growth for at least the next four years.

After recognizing the scope of the task before it – the removal of the barriers to broad adoption of Linux on the desktop – OSDL membership narrowed its sights to only the enterprise desktop. This subset of the total desktop universe addresses the needs of corporate information workers, technical workstation users, and mono-purpose PC applications like Point-of-Sale devices.

This more modest scope not only aspires to a more attainable goal, but also recapitulates the original progression of the dominant proprietary desktop, Microsoft Windows. Windows (and its predecessor DOS) made their debut in corporate and technical settings. Only after gaining currency in the office did they make their way into homes and schools.

The OSDL DTL initiative finished 2005 with a huge amount of press coverage and interest in desktop Linux thanks to a Desktop Linux Survey and the Linux Desktop Architects Meeting:

Desktop Linux Survey

In October 2005 DTL launched a month-long online survey that received over 3300 responses. The goal of the survey was to determine the key issues driving Linux progress on the desktop as well as the major barriers to Linux desktop adoption.

Key Findings:

Top reasons for deploying Linux on the desktop
- Employees requesting Linux (user demand)
- My competitors have successfully deployed Linux
- TCO (Total Cost of Ownership)

Applications critical to Linux deployment

- Email / messaging
- Office Productivity Tools (examples: Text Documents, Spreadsheets, Presentations, Databases
- Browser

Top inhibitors to Linux desktop adoption

- Application support
- Peripheral support
- End user training

DTL plans to leverage the survey results to show ISVs and the market as a whole that Linux on the desktop is getting close to reaching the tipping point of mass adoption.

Linux Desktop Architects Meeting

OSDL hosted the Linux Desktop Architects meeting in Beaverton, Oregon. More than 40 different projects were represented, including Freedesktop.org, GNOME, KDE, Mozilla and Ubuntu. The group focused on the technical and ecosystem issues most critical to the evolution of Linux on the desktop.

From the Architects meeting emerged the "Portland Project", today working toward a desktop integration interface. The objective of Portland is to simplify ISV work to retarget and run their applications on multiple Linux desktop environments.

3.4 Mobile Linux

In October 2005, OSDL launched its fourth and latest working group, the Mobile Linux Initiative (MLI). MLI already includes members spanning the mobile telephony ecosystem — chipset manufacturers, Linux distribution and platform suppliers, ISVs, handset manufacturers, integrators, and mobile/wireless carriers.
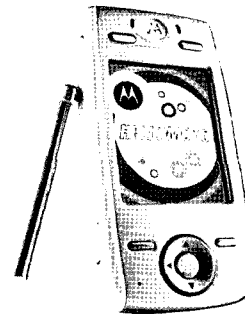
Dubbed "Carrier Grade Linux for handsets" by several OSDL members, MLI will strive to address platform challenges "from the kernel up" to accelerate Linux adoption on mobile phones and other converged voice and data devices.

MLI Mission:

To accelerate Linux adoption in the mobile space

- Identify and address technical and non-technical industry requirements
- Create and foster implementations in open source
- Advocate/explain industry needs to the kernel/open source community
- Promote mobile Linux (including education of Carriers about benefits of open source)
- Clarify legal and regulatory issues surrounding mobile phones as they relates to Linux and open source
- Enable and foster pre-platform developer ecosystem

Addressing Key Gaps

On the technical front, MLI membership has identified a list of key gaps to address:

- Development Tools
- I/O and Networking
- Memory Management
- Multimedia
- Performance
- Power Management
- Security
- Storage

MLI membership is keenly aware that breaking down barriers to mobile Linux adoption extends beyond the technical domain. To that end, MLI

has identified non-technical gaps to address, including

- Legal Concerns of using Linux on cell phones
- Silicon Provider Alignment - orchestrating the OSS work of semiconductor suppliers to avoid fragmentation
- Mainstreaming - migrating mobile enabling capabilities into the main Linux kernel tree

MLI intends to focus on solution creation, not merely publish APIs and new standards that can end up as unfunded mandates. To that end, MLI members are today marshalling resources to create implementations to meet handset OEM, carrier and operator needs, to foster the advancement of existing open source projects, and to open existing internal technologies for the benefit of the MLI audience and the community in general.

3.5 OSDL Technical Initiatives - History and Comparison

OSDL continues to evolve the mission and value of its technical and other initiatives. It is interesting to compare the history, focus and approach of today's four technical/platform initiatives:

For example, while CGL effectively "broke ground" to build new capabilities to meet carrier-class applications requirements, DCL tracks a marketplace where Linux has grown organically and where most gaps impact specific types of workloads, not the platform itself. Whereas DCL and DTL focus on enterprise IT, CGL and MLI target embedded communications applications.

4. OSDL Legal Initiatives

OSDL significantly stepped up its legal support of Linux and open source software in 2005. Open source software has become mainstream, and with that evolution comes a demand for legal support that meets the level of activity and complexities in this dynamic market.

4.1 Linux Legal Defense Fund

OSDL has always believed that customers deploy Linux solutions in good faith based on its technical merits and lower cost of ownership. Litigious threats within the Linux industry call for leadership on behalf of the rights of Linux end users. OSDL is responding to that call.

The OSDL Linux Legal Defense Fund was created to defray legal expenses of Linux end users who may become involved in litigation with The SCO Group on issues that affect the Linux community and industry. The fund also covers the legal expenses of Linus Torvalds, Andrew Morton and OSDL in connection with the pending SCO litigation.

4.2 Patent Commons

The most significant legal program of the year

	Carrier Grade Linux	Data Center Linux	Desktop Linux	Mobile Linux
Founded	2002	2002	2004	2005
Market Focus	Communications Infrastructure	Enterprise Servers	Enterprise Desktop	Handheld/Wireless
Market Types	Vertical	Horizontal w/Key Verticals	Horizontal w/Key Geos. (BRICK)	Vertical
Technical Focus	Linux Kernel, Middleware	Application Workloads	Linux Kernel, Desktop Framework, Applications	Linux Kernel, M/W, Applications, Service Delivery
Members	23	24	19	13
Gap Analysis	Yes	Yes	Yes	Yes
Requirements	Yes	Yes	Some	Yes
Specifications	Yes - Version 3.2	No	No	In Progress

Figure 4 Comparing OSDL Platform Initiatives

came to fruition in August when the Patent Commons Project was announced at LinuxWorld San Francisco. With a very deliberate eye on finding ways to reduce the risk of patent infringements for open source developers, OSDL designed and launched its Patent Commons Project to provide a central location where software patents and patent pledges could be housed for the benefit of the open source development community and industry. By November, the Patent Commons website was live and had catalogued all pledges to date in searchable databases freely available to developers, users and vendors. The website continues to mature as a central resource on patents as they apply to software.

4.3 Sponsoring the Software Freedom Law Center

In February, OSDL and its members kicked off a busy year by raising more than $4 million to help establish the Software Freedom Law Center, the pro-bono law resrouce headed by Columbia Law School Professor and leading IP attorney on Free and Open Source (FOSS) attorney, Eben Moglen. Since the SFLC opened its doors in February 2005, it has signed a number of open source projects as new clients, added staff, and at year end was preparing to support its client, the Free Software Foundation, in the revising of the General Public License version 3 (GPLv3).

4.4 LinuxMark Institute

OSDL helped to reorganize the LMI into an independent organization with a focus on protecting Linus Torvalds' global Linux-brand trademark rights. OSDL spearheaded efforts to revise and find support for LMI's sub-licensing program through which authorization to use the Linux trademark is given to Linux distributors and service providers. OSDL remains dedicated to reinforcing the strength of the Linux trademark and holds a seat on the LMI board of directors.

4.5 Licensing Work

OSDL engaged with the Open Source Initiative (OSI) throughout 2005 to address the issue of license proliferation. Together with other industry leaders and OSI staff, OSDL has collaborated with OSI to prioritize existing open source licenses with the goal of reducing the number of licenses used by new projects. This effort continues and will remain a focus in 2006 as participants vet the prioritized license recommendations.

5. OSDL Engineering

OSDL invests significant resources in supporting direct development and maintenance of the Linux kernel and key related open source projects. OSDL technical impact begins with providing a home for Linux kernel maintainers Linux Torvalds and Andrew Morton, and extends to direct development on projects like NFS, Samba, OpenAIS, the Open POSIX Test Suite and the Linux Test Project.

The impact of OSDL Engineering in 2005 was varied and far-reaching. OSDL technical teams, lead by engineering director Tom Hanrahan, supported community efforts focused on device drivers and database benchmarking and a range of community and infrastructure projects. The following outline provides a taste of the important work being performed by OSDL engineering:

Device Drivers
- Launched Open Driver information portal at http://developer.osdl.org/dev/opendrivers/ to provide resources for developing and merging open source drivers in the main kernel tree.
- Provides a repository for training material developed by kernel engineers.
- Hosted Open Driver forum

Database
- Continuing support of open database workloads
- Tested releases from the PostgreSQL community to assure performance integrity

Networking
- Acted as maintainer of iproute2 utilities, key to IT administrators needing to network

large numbers of systems through simple configuration and management utilities

- Acted as maintainer of bridging code following ANSI/IEEE standards to facilitate network interconnection
- Launched Linux-net information portal at http://linux-net.osdl.org to provide documentation and other resources for networking application developers

Storage

- Tested, enhanced and QA'd Linux capability to identify large numbers of LUNs (device Logical Unit Numbers) - up to 16,000 LUNs

Testing

- Established common application test framework, today used by OSDL US and Japan and also by independent Beijing Software Test Center
- Initiated cross-industry discussions with other companies and end-users to develop a common shared open source test harness
- Launched NFS Version 4 test information web site at http://developer.osdl.org/dev/nfsv4/
- Initiated NFS Version 4 testing
  - Tested 40 different NFS 4 releases on a wide variety of host platforms
  - Enabled an NFS v4 testing community to organize testing efforts and share test results
  - Hosted and jointly administered bug tracking NFS v4 defects
- Hot-Plug CPU and Memory testing
  - automated testing at OSDL to help the Hot Plug community as they developed their code and merged it with the Kernel

Infrastructure & Community Projects

- OpenAIS Support
  - Contributed extensively to OpenAIS clusters project, adding event service functionality based on SA Forum APIs
- Launch logistics for OSDL legal web sites:
  - OSDL Patent Commons Site at http://www.patentcommons.org/

- OSDL Prior Art site at http://developer.osdl.org/dev/priorart/
- Supported relocation of master kernel.org server from California to Oregon
- Hosted on-going ISV Forum
- Created new Special Interest Groups (SIGs)
  - Clusters SIG
  - Security SIG

6. OSDL Community Sponsorship

OSDL recently established two key mechanisms to bridge between the Linux industry and the open source community, and to help fund on-going open source development to fill gaps catalogued by OSDL initiative efforts:

6.1 Technical Advisory Board

OSDL Technical Advisory Board (TAB) is comprised of leading Linux and open source software developers who advise OSDL on technical requirements and issues important to the greater development community. TAB members are elected by Linux Kernel Summit attendees each July in Ottawa, Canada. Board members serve two years, with half of the 10-member board up for election each year.

The TAB includes expertise in areas as diverse as file systems, device drivers, security and various other kernel subsystems. Inaugural members of the TAB include James Bottomley (Steeleye), Randy Dunlap (Oracle), Chris Lameter (SGI), Ted T'so (IBM), Chris Wright (Red Hat), Wim Coekaerts (Oracle), Greg Kroah-Hartman (Novell/SuSE), Matt Mackall (CELF), and Arjan van de Ven (Intel).

6.2 OSDL Fellowship Fund

In 2005, OSDL established the OSDL Fellowship Fund to provide financial support to software developers working on Linux and open source community projects. Under the auspices of this fund, OSDL works with users, vendors and developers to identify where and how additional work or resources could accelerate development efforts and spur the adoption of

Linux and open source software.

The OSDL board of directors, with input from the Technical Advisory Board, evaluates applications for fellowship funding and determine allocation priorities and levels of financial commitment.

7. OSDL - Dedicated to Accelerating Adoption of Linux and Open Source

OSDL remains resolute in its mission to provide value to the Linux industry through engineering, legal and marketing activities that increase technical capability, confidence in the adoption of Linux and open source technologies, and awareness of advances in Linux and open source software.

2006 holds great promise not just for OSDL but for the open source community at large. IDC predicts that Linux growth will outpace all other operating systems through 2009. To help sustain this growth, to contribute directly to it and to benefit more from it, OSDL invites companies, educational and research institutions and end-users in Korea, across Asia and around the world to join the OSDL family and to support our efforts to promote Linux adoption – in the server room, on the desktop, in infrastructure and in the palm of your hand.

Why Join OSDL?

- OSDL employs Linus Torvalds and Andrew Morton, supporting vendor-neutral development and testing of the Linux kernel.
- OSDL is the steward of the Open Source Patent Commons, ensuring that software patents don't threaten developers or stifle innovation.
- OSDL members accelerate their Linux development efforts by working together with othermembers and with the Open Source community to address development and deployment challenges.
- OSDL sponsors Linux User Advisory Councils (LUACs) where end-users meet to provide input and guidance to the development process.
- OSDL provides a trusted viewpoint on Linux issues to business and technology press.

Bill Weinberg

He brings over 18 years embedded and open systems experience to his role as Senior Technology Analyst at the Open Source Development Labs. Previously, Bill helped found MontaVista Software, establishing Linux as a favored platform for next-generation intelligent devices. Bill is a frequent speaker and prolific writer on open source and device software, including at LinuxWorld Korea in June 2005.
Bill participates in OSDL initiatives for meeting developer and end-user requirements for Carrier-Grade, Data Center, and Desktop Linux, and has been a driving force behind OSDL's newest effort, the Mobile Linux Initiative.