The Center of Gravity for Linux

Bill Weinberg, OSDL

May 2005
Agenda

- About OSDL
- Linux in the Marketplace
- Linux Development Process
- OSDL, Your Organization, and You
OSDL Mission

To be the recognized center-of-gravity for the Linux industry; a central body dedicated to accelerating the use of Linux for enterprise computing.
Center of Gravity?

“IBM's endorsement of Linux has added credibility and an illusion of support and accountability, although the reality is there is no 'center of gravity,' or central body, investing in the health and growth of noncommercial software or innovating in critical areas like engineering, manageability, compatibility and security.”

Steve Ballmer, Microsoft – from June 4, 2003 Memo
OSDL Means Business
OSDL History

Founded 2000
- Seven global IT leaders came together to address shared challenges in the Linux industry

OSDL Today
- More than 75 members on 5 continents
- OSDL employs Linus Torvalds & kernel maintainer Andrew Morton
- Making Linux enterprise ready and accelerating its growth
OSDL Activities

- **Initiatives**
  - Carrier Grade Linux, Data Center Linux, Desk Top Linux
    - Track requirements, publish specifications, roadmaps
  - ISV Forum
- **Lab**
  - Performance and regression testing on Linux kernel, patches
  - Host initiative-related and member-specific projects
- **Engineering**
  - Dedicated resources for key technology projects
  - Fund core Linux kernel development and maintenance
- **Legal**
  - Legal Defense Fund
  - Patent and other IP-related activities
- **Marketing**
  - Promote Linux adoption through PR, evangelism; support Initiatives
  - Sponsor / host enterprise Linux events, fora, conferences
  - LUACs – Linux User Advisory Councils (on-going focus groups)
OSDL History - Highlights

- OSDL Founded, Labs in - Beaverton, OR USA - Yokohama, Japan
- Carrier Grade & Data Center Linux Working Groups
- Linus Torvalds & Andrew Morton join OSDL
- Desktop Linux Working Group
- Est. OSS IP Fund & FSFLC

2000
- Implementation of STP and PLM dev tools

2001
- OSDL Positioned as Center of Gravity for Linux Industry

2002
- Established Japan Working Group

2003
- Established Legal Defense Fund

2004
- Established OSDL Beijing

2005
- Enterprise Linux Summit

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OSDL Membership Growth through 2004 and 2005
(Actual and Projected)
OSDL Membership – May 2005
# OSDL Membership, Initiatives and the Linux S/W Stack

## End-Users
- DreamWorks
- Bank of America
- Goldman Sachs
- Google
- Credit Suisse
- First Boston
- Waccaver
- IBM

## Integration & Services
- LEVANTA
- Good-Day
- Co-Create
- Beijing Software Test Center
- EMX
- MICROCOST
- SPIKE
- HANSOFT

## TEMs, NEPs, Carriers & Device OEMs
- WYSE
- cyclades
- ZTE
- NTT
- PTELECOM
- SIEMENS

## Applications
- Adobe
- blackduck
- SCALIX
- CA
- COMVERSE

## Middleware
- TROLLTECH
- pixelworks
- OnStage
- adava
- Cassatt
- NetApp
- OpenCountry

## System S/W & OS Distros
- turbolinux
- Novell
- SuSE
- MIRACLE
- Red Flag Linux
- redhat
- Bull
- SYSTREX
- WIND RIVER
- IBM
- Sun
- Fujitsu
- Mitsubishi Electric
- MOTOROLA

## Systems and Silicon
- HP
- UNISYS
- Mitsubishi Electric
- AMD
- Intel
- Hitachi
- Toshiba
- NEC

## Desk Top

## Data Center

## Carrier Grade
What OSDL Provides the Linux Community

**Linux Developers**
- Enterprise-class data center test facility
- Development tools and performance test suite
- **Working Group Participation**

**IT Vendors**
- End-User Requirements
- Visibility to developer community
- **Working Group Participation**

**Customers**
- Vendor Interaction
- New development/research
- Influence Vendor Solutions
  - User Advisory Council
  - **Working Group Participation**

**Academia**
- Engage with Industry
- Collaborate with other academic institutions
- Gain insight into project and career opportunities

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OSDL Working Group Structure / Roles

Linux User Advisory Council
“Business” Working Group
- US, EMEA, Japan
- 2005 China, Brazil
- Global 2000 IT execs
- Global Issues
- Local Requirements
- Business Solutions

Steering Committee

Technical Sub-committee
- Specifications
- Proof of Concept
- Validation
- Spider Charts

Marketing Sub-committee
- Requirements
- Awareness
- Industry Events
- Spider Charts

Working Groups
OSDL Initiative Life Cycle Process

Open Source Community

Membership

Requirements

Specifications

Initiatives & Capabilities

Market of End Users

Distribution Suppliers

Independent Software Suppliers

H/W Platform Vendors

OSS Projects

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Scope of Enterprise Linux Adoption - Clients, Infrastructure, Data Center

Client Devices

Access
- Edge Devices
  - Proxy/caching
  - VPN
  - RAS
  - Firewall
  - Wireless edge
  - All-in-one
  - VoIP gateway
  - GPRS gateway

Corporate Network
- Infrastructure Server
  - Directory
  - Security
  - Load balancing
  - File/Print
  - Web
  - Mail
  - NAS
  - Soft switch
  - Telco features

Business Application Server
  - E R P
  - S C M
  - C R M
  - M R O
  - S F A
  - H R
  - I V R

Enterprise Data Store
- Data/Content Server
  - Databases
  - Multimedia
  - Documents
  - New Objects
  - HPC

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Linux Market Share in Enterprise and Embedded

Sources: IDC, VDC
Linux Revenues to Top $35 Billion in 3 Years

Revenue in Millions US$

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<th>PCs</th>
<th>Packaged Software</th>
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IDC

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Linux Development Process

- Development process overview
  - Key Contributors
  - Changes from 2.4.x to 2.6.x
- Maintainers and their roles
- Merging your code into mainline
  - Advantages
  - Disadvantages
  - Acceptance criteria
Top Eight Kernel Contributors

- Patch Submission from 2.5.4 through 2.6.10
- Measured by Organization / Domain

- Others 70.8%
  - OSDL 12.5%
  - SuSE 4.4%
  - IBM 3.4%
  - Red Hat 3.2%
  - HP 2.1%
  - Transmeta 1.8%
  - Intel 1.7%
  - NEC 0.2%
Development Process Overview

- Requirements analysis
  - Community leaves to others (e.g., OSDL)
    - Linux implements POSIX APIs, IETF RFCs, etc
    - Requirements presumed to be well understood
    - Most discussion concerns implementation

- Coding
  - Large multiperson kernel projects uncommon
  - Exceptions
    - SCTP, IPV6, Crypto, SELinux, LVM2
Development Process Overview (cont)

- **Review process**
  - Strong review process
    - Via email on relevant mailing lists
  - Many people follow commits list to see tree changes

- **Testing**
  - User & developer base:
    - “Release early, release often”
  - Formal QA by distributors, IBM, OSDL
  - Feedback
    - Via distributor bugzilla, kernel bugzilla, email lists
Maintainers and Their Roles

- **Top-level maintainers**
  - torvalds, akpm, marcelo

- **Responsibilities**
  - Control public trees
  - Tie-breakers when there is controversy
  - Delegate, especially outside area of personal knowledge
  - Strong trust system
    - Prefer code from known contributors
Kernel Development Process Schematic
No longer parallel trees
- 2.4 (stable) vs. 2.5 (experimental)

Today
- Andrew integrates
- Linux releases
- Marcelo maintains legacy 2.4 tree
Patch Submission Flow

- -mm kernel aggregates ~30 sub-trees for external testing
- Patches not originating from subsystem maintainer trees merged directly from -mm kernel into kernel.org kernel
- After test and review in -mm kernels, patches merged from subsystem maintainer tree into kernel.org tree
Maintainers and Their Roles (cont)

- **Subsystem maintainers**
  - net, scsi, USB, net drivers, IDE, block layer, file systems, video, 1394, et cetera
  - Usually run own kernel trees
  - Regularly merge into mainline (at own intervals)

- **Subsystem team**
  - Individuals feed patches to subsystem maintainer

- **Reality Check**
  - It's not as neat as this scheme appears on paper
  - There are many exceptions, usually for the better
Merging Code into Mainline – Benefits

- Not maintaining your own patchset
- Other people find and report (or even fix) your bugs
- Kernel-wide code sweeps fix code rather than breaking it
- More testers
- Increased likelihood that others will add features
- Quashes competitive efforts
Merging Code into Mainline: Disadvantages

- Need to adapt code to kernel coding styles and conventions
- Compatibility wrapper layers are discouraged
- Design changes may be required
- More features may be requested
- People may say rude things about it
Merging into Mainline: Acceptance Criteria

- Code merged into the mainline kernel carries a permanent cost
  - Kernel-wide codesweeps become harder
  - People do not know how to regression-test subsystems after the sweep
Merging into Mainline: Acceptance Criteria

- Distribution Suppliers (RH, SuSE . . .)
  - Are they shipping a feature?
  - Is the feature in their product roadmap?

- Kernel.org View of Distribution Suppliers
  - Main consumers of the public kernel tree
  - Merging features on suppliers’ road maps is an important service from public kernel tree developers
  - Not all vendor-shipped features make it to kernel.org
  - Merging vendor-shipped features helps avoid kernel forking
Merging into Mainline: Acceptance Criteria

- Ultimately top-level maintainers make trade-off
  - Cost vs. benefit
  - Driven by expected number of end-users of the feature
Conclusion – Key Take-Away

- Leverage existing Community mechanisms
  - Mailing lists, etc.
- Learn to follow community practices
  - Small incremental releases / patches
  - Email and posting etiquette
  - Coding style
- Understand mainline merging before you jump in
- Get to know your sub-system maintainer(s)
Background Slides
Hints and Tips from Andrew Morton
Merging into Mainline: Tips and Hints #1

- Kernel developers are always right
  - Except for when they are wrong
  - Don't be afraid to push back
- Be responsive to suggestions
- Be incremental
  - Release early, often and small
- 50,000-line code drops difficult to merge/digest
- Top-level maintainers delegate
- Identify your subsystem maintainer up-front
  - Develop dialog ASAP
Merging into Mainline: Tips and Hints #2

- Join the mailing lists,
  - Learn the culture and practices
- Plan on merging just a small core (early), incrementally build on it
- Send patches (not URLs) to mailing lists
  - always cc LKML
- If a patches is too big to send, it’s just plain TOO BIG
- Allocate several weeks for getting code into a mergeable state
Merging into Mainline: Tips and Hints #3

- Make regression and stress-test user space tools available
  - Make them super-simple to run!
  - People will regression-test your code for you
  - Your test tools may be integrated into higher-level regression suites
Merging into Mainline:
Tips and Hints #4

- In a corporate environment, task an individual with being the “community contact person”
  - Follow the mailing lists
  - Watch out for issues which affect your team
  - Develop rapport with the kernel developers
    - Hence, resources to leverage
Merging into Mainline: Tips and Hints #5

- Email etiquette
  - don't top-post
  - edit away irrelevancies
  - Add <80 col line breaks
  - make sure your mailer honours References:, etc.

- Read
  - Documentation/CodingStyle
  - Documentation/SubmittingDrivers, SubmittingPatches
OSDL Participation in Community Development

- **File System & I/O Scheduler Test**
  - Judith Lebzelter, Mark Wong
  - Mary Meredith

- **Async Disk I/O**
  - Daniel McNeil
  - Judith Lebzelter

- **Clustering**
  - Mark Haverkamp
  - Daniel McNeil

- **Fast Reboot**

- **Multipath I/O**

- **Database Test**
  - Mark Wong

- **Test Development Framework STP/PLM**
  - Bryce Harrington, Judith Lebzelter

- **Stability / Maintenance**
  - Leanne Ogasawara, Judith Lebzelter

- **Security**
  - Chris Wright

- **Network Performance**
  - Steve Hemmenger

- **Persistent Device Naming**
  - Mark Haverkamp, Mary Meredith
  - Leann Ogasawara

- **Logical Volume Management**
  - Mark Wong

- **Tinderbox project compiles**
  - Bryce Harrington

- **OSDL Kernel Conduit**
  - Leann Ogasawara

Andrew Morton

Linus Torvalds
OSDL Member Participation in Development
(Carrier Grade Linux Only in this Slide)
Linux Development Timeline

Major Upgrades

First public posting of Linux kernel
8/91

1.2 kernel
3/95

2.2 kernel
1/99

2.6 kernel
12/03

0.98 kernel
9/91

1.0 kernel
3/94

2.0 kernel
6/96

2.4 kernel
1/01

Last three major releases at
~ 2.5 year intervals
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Linux End-User Adoption Curve

Where is your organization today?

Where would you like it to be?
Challenges for End-User Linux Adoption

- Strategic to Core Business
  - Capability / appropriateness for Business-critical Applications
  - Long-term Viability / Support
- Participating in OSS Development
  - Working with the OSS Community
- Developing Applications on Linux
  - Tracking kernel/OS Evolution / Roadmap
  - Changes in APIs between Minor / Major Releases
  - Validating applications on M/W, Kernel, Distributions
- Using Linux as Platform
  - Incremental IT Costs (and Savings)
  - ISV Applications Available / Validated
- Studying Adoption
  - Acquiring / Developing Expertise
  - TCO vs. Legacy Platform
  - Legal / Licensing Concerns
  - Application Migration

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Key Question: How to get/hold attention of Distribution Supplier?

Competition Among End-Users for Distro Road-map
What Can You Do?

- Use Open Source!
- Test OSS code
- Submit bug reports and feature requests
- Work on OSS project(s)
- Join OSDL as a lab affiliate

- Encourage your organization to use OSS
- Encourage your organization to join OSDL
How OSDL Participation Benefit Members

BakBone

*Participating in OSDL's Data Center Linux working group enables us to contribute to the robustness of data protection on Linux and accelerate the adoption of Linux storage solutions in the enterprise*

-- Keith Rickard, president & CEO

Group Bull

*Bull has been an active contributor to . . . Open Source projects and views its OSDL membership as an important way to amplify our investments and bring our expertise in mainframe-class features to the development of Linux*

-- Carl Morelli, director, Interoperability Software Engineering

Unilever

*OSDL gives us a unique venue where we can work directly with the world's major IT vendors and with the open source development community on an equal basis*

-- Colin Hope-Murray, CTO global IT infrastructure

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Q & A and Wrap-Up

- http://www.osdl.org
- Center of Information
- bill@osdl.org