Free and Open Source as Viewed by a Processor Developer

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Community Leader

200

"Relations with Intel have been "harder to gauge ... because they don't seem to understand how to interact with the free software community at all. They're obsessed with secrecy and non-disclosure. Their own chairman described Intel as `paranoid', which is reasonably true. They are very hard to work with." *LinuxUser Magazine*

2007

"Of the big vendors I deal with I would say Intel are probably the most co-operative today, they provide good documentation, errata information and also fund or write key drivers for their hardware such as the 3D support (done by Tungsten Graphics) and the wireless. That has really paid off and made their systems hardware of choice." *www.abclinuxu.cz*

Open Source Reality in the Market

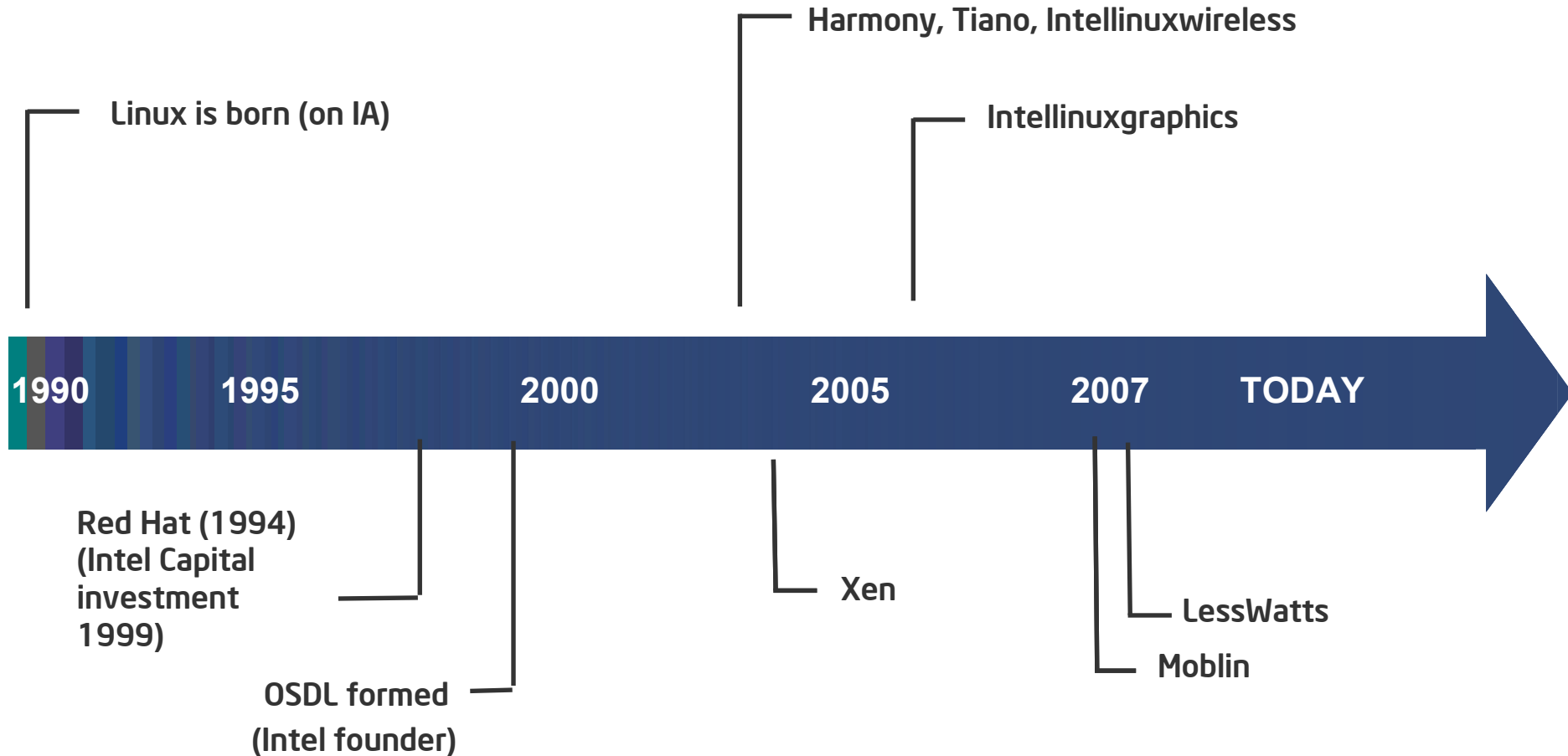## Significant Market Segment Share across the board

OSS DB		Tomcat

Linux

Java

17.5%   34%   34%   15%

JBoss   Apache
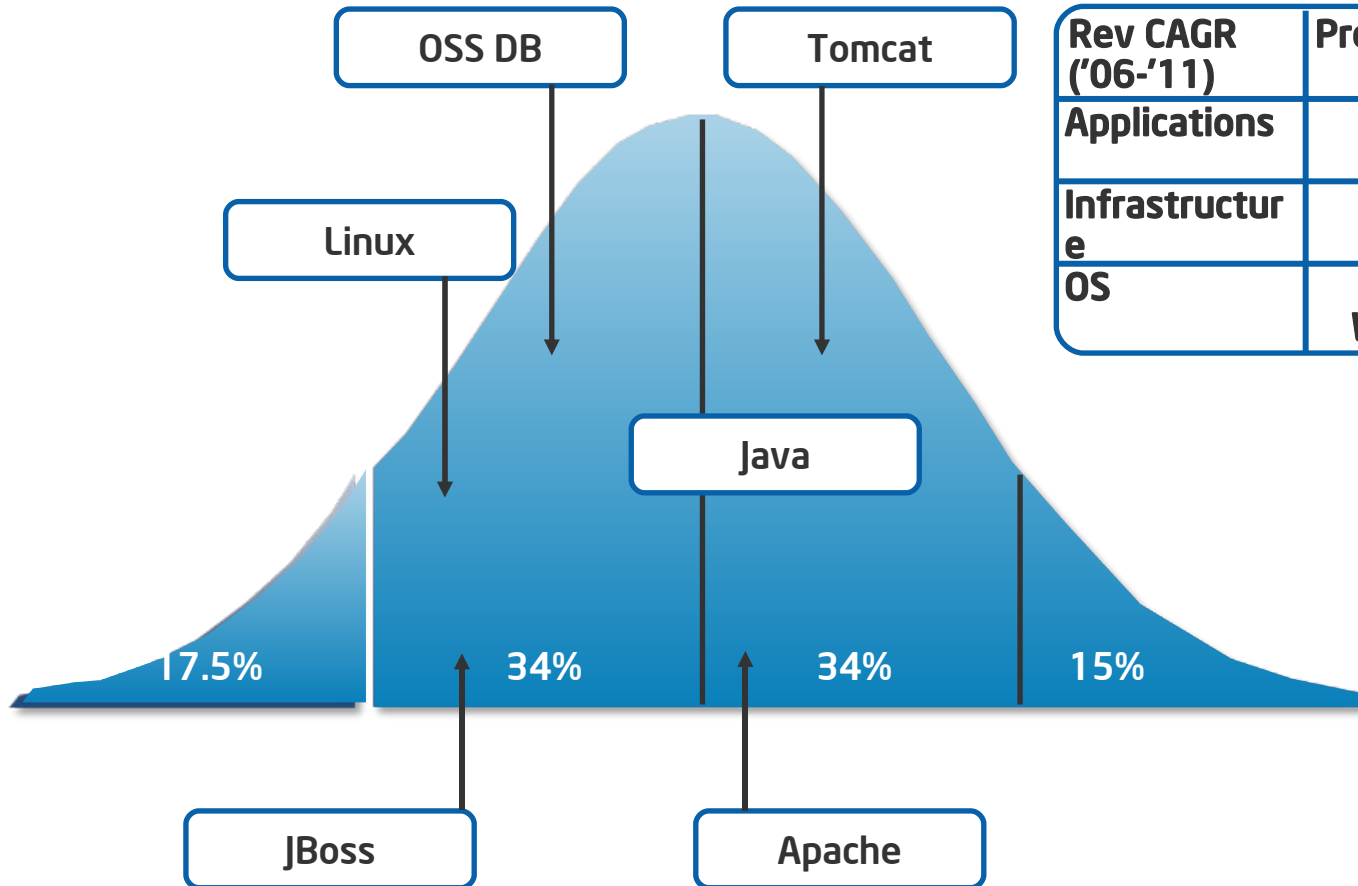
3x CAGR* to proprietary source

Rev CAGR ('06-'11)	Proprietary	Open Source
Applications	8%	43%
Infrastructure	7.2%	24.3%
OS	8.6% Windows	26.4% Linux

Sources: Various – IDC , NetCraft, BZ Research, Evans, ABI Research, IOUG,

*CAGR = Compound Aggregate Growth Rate

A View from the outside: Intel & Open Source

Harmony, Tiano, Intellinuxwireless

Intellinuxgraphics

Linux is born (on IA)

1990   **1995**   **2000**   **2005**   **2007**   **TODAY**

Red Hat (1994)
(Intel Capital
investment
1999)

Xen

LessWatts

Moblin

OSDL formed
(Intel founder)

The stubborn component: BIOS

- Rationale: BIOS was unchanged for 20+ years

- Initially launched as the tiano project partnering with CollabNet to establish Extensible Framework Interface (EFI) Development Kit

- Key learning: Intel helped to establish Unified EFI as the industry standard for BIOS

- Open Source can drive industry change

Industry Impact: BIOS Transition

Pre-2000 — All Platforms BIOS were proprietary

2000 — Intel invented the Extensible Firmware Interface (EFI) and provided sample implementation under free BSD terms
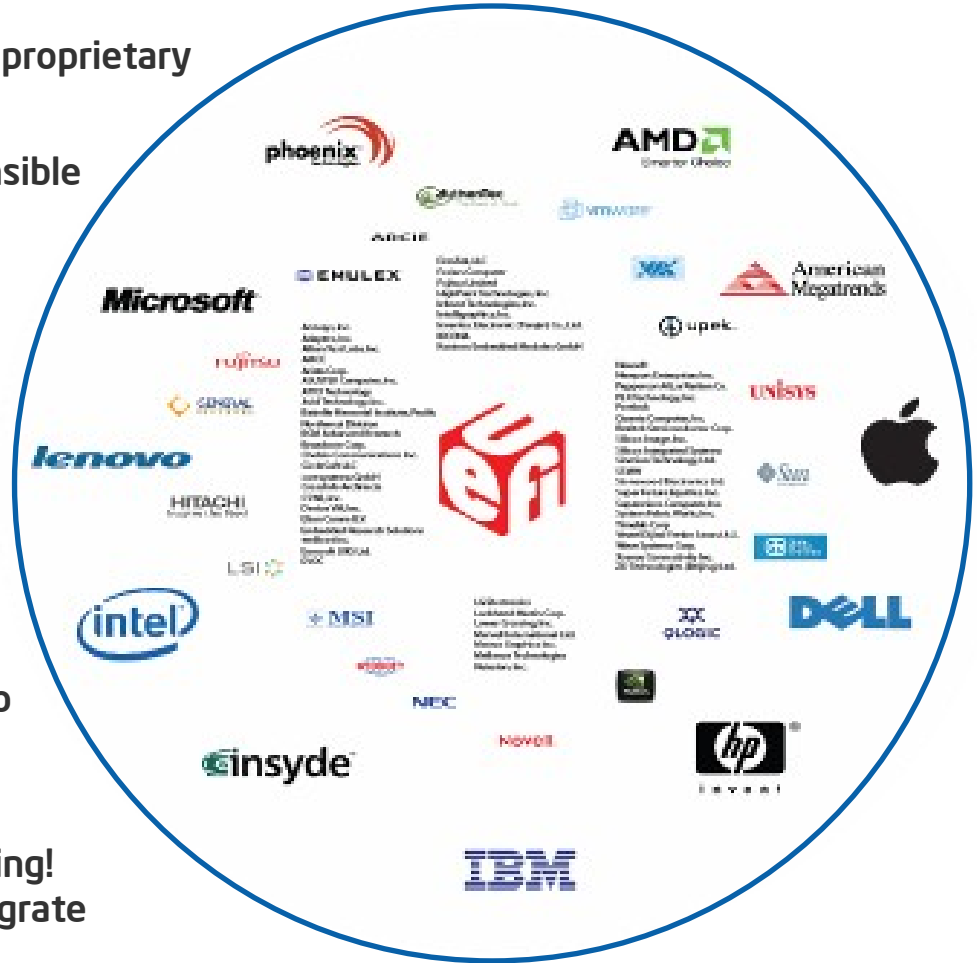
2004 — **tianocore.org**, open source EFI community launched

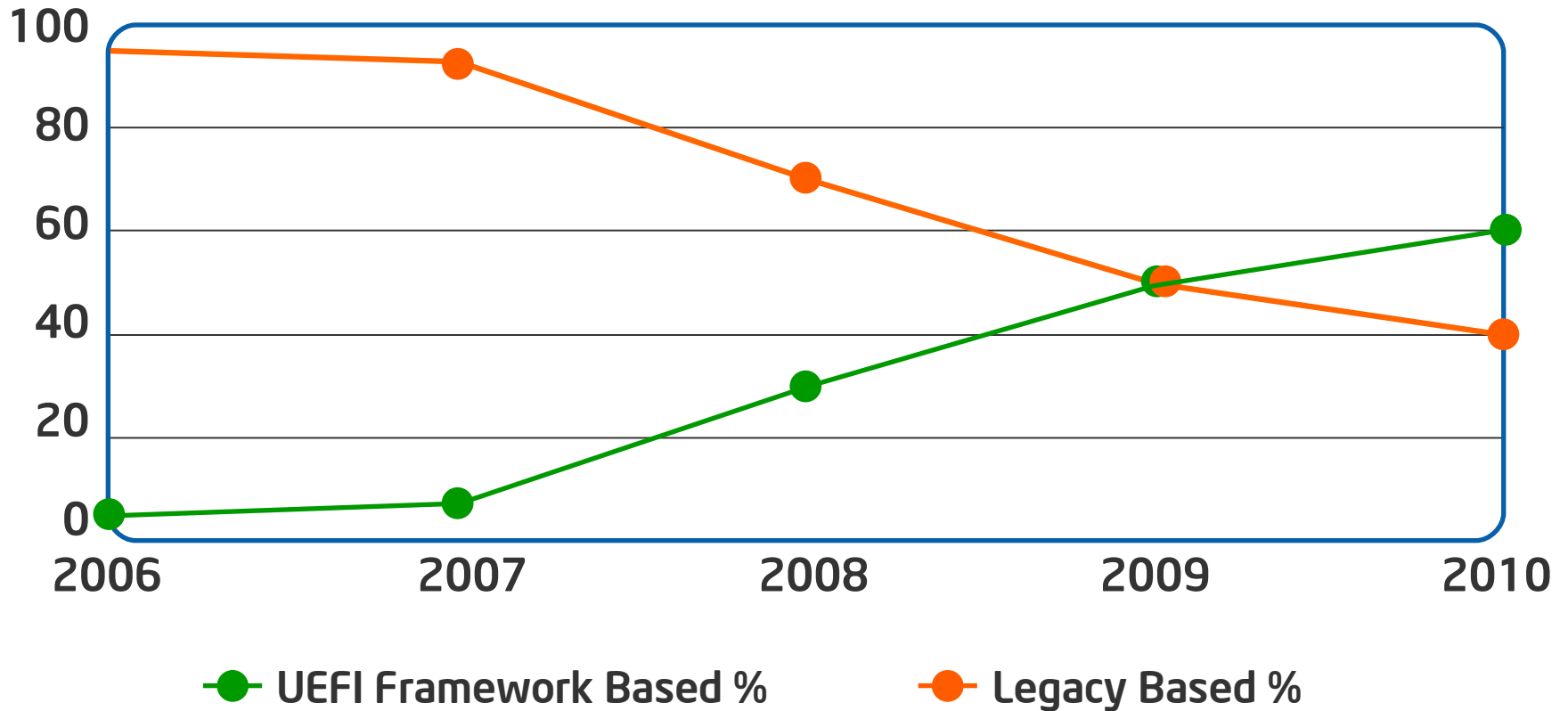**2005** — **Unified EFI (UEFI)** Industry forum, with 15 members, was formed to standardize EFI

2008 — 127 members and growing! MNCs committed to integrate

UEFI Firmware Based Deployments....
...will cross 50% of worldwide IA units by 2010

Legend: UEFI Framework Based %, Legacy Based %

Source: Various – IDC Sep'07 worldwide vendor market share; Intel customer platform adoption projection

Leading with Open Source: Virtualization

- Potential disruptive technology but slow and targeted adoption

- Research project with other vendors and the University of Cambridge in 2003

- Key learning: XEN helped to catalyze Intel feature adoption by vendors with virtualization products

Industry Impact: Virtualization

2004 ▶ Intel introduced VT
...Intel contributed
to Open Source

2008 ▶ Large ecosystem around VT
contributing to Xen,UML,KVM
Benchmark standards
(vConsolidate..), New usage
models emerging (Fault
tolerence..), New VT features
(Flex migration...)

Community   Vendors

Customers

Leap ahead™
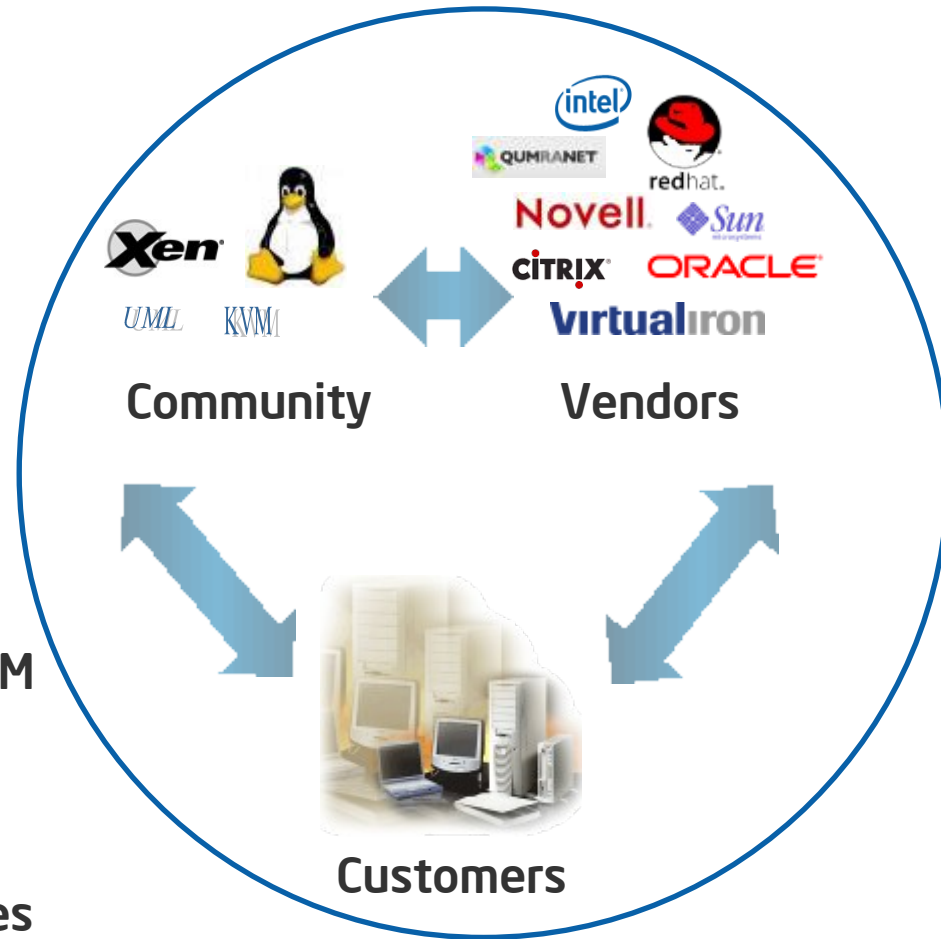
Virtualization Software Ecosystem
Many products based on OSS

Pre-2000

2008

Traditional Software Enabling @Intel

Enabling Engagement → Chasm → Mutually Beneficial Biz Value

Desired State
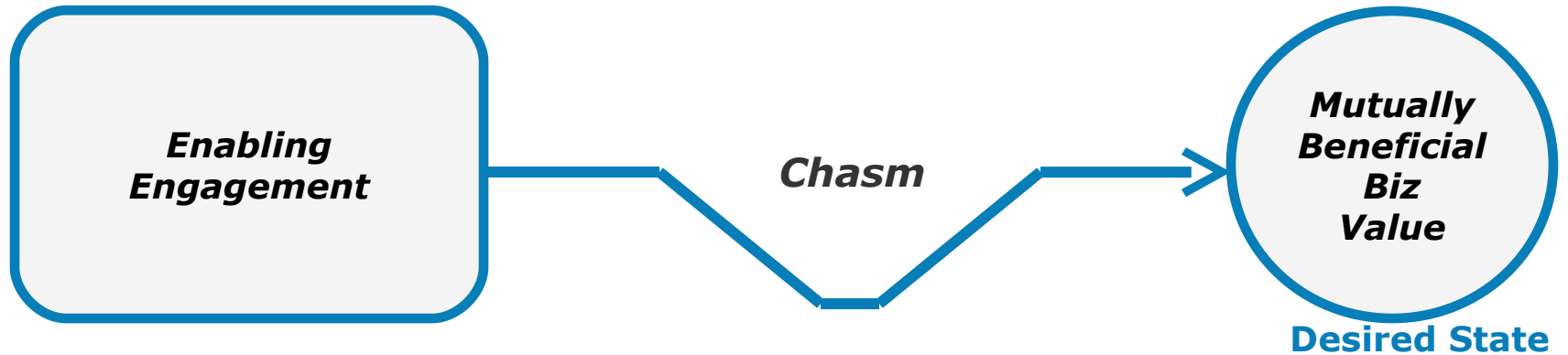
Simplified Linux Family Tree

- Community Distribution
- Product
- Consortium
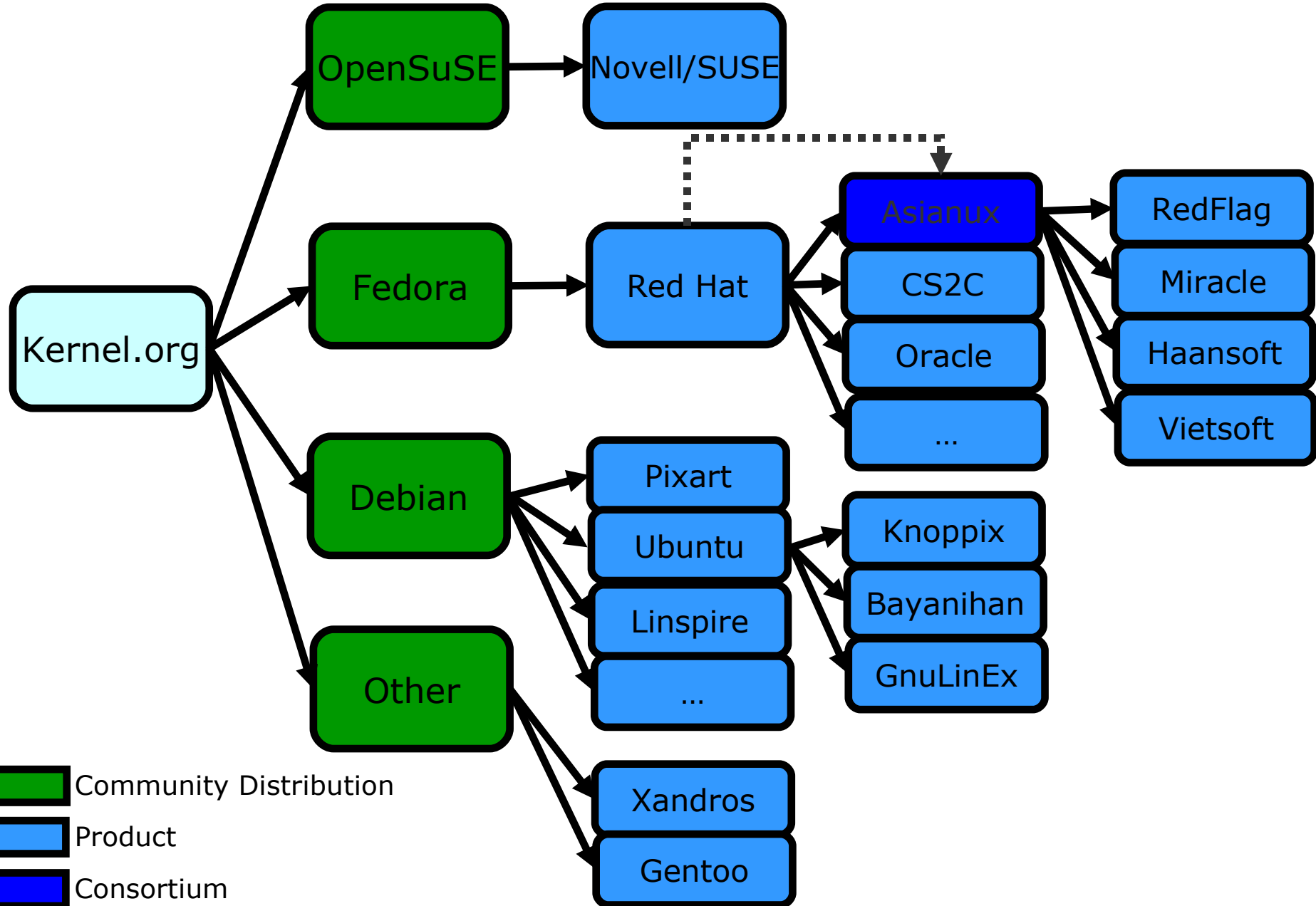
Vertical Industry: Carrier Grade Linux

- Vertically integrated, proprietary industry over invested during the Dot com era

- OSDL founded while Intel contributed to kernel and CGL specifications

- Key learning: Helped Intel Architecture break into the telecommunication industry

Itanium lessons & the Linux Community

- In the late 90's 'Merced' solidified numerous operating system porting commitments

- Intel worked with many Operating System Vendors & indirectly contributed to the Linux kernel

- Key learning: Linux/Itanium helped Intel gain access to the RISC market

Working directly with the Linux Kernel Community

- Initially Linux contributions were made via proxy

- Challenges:
  - Intel not visible as a community member

  - Long, difficult internal negotiation on open source drivers

- Key learning: can accelerate technology adoption by direct participation with the community

Influencing Java was...Challenging

- Numerous industry requests for Sun to open source Java

- Launched Harmony project at Apache with industry players, including IBM

- Key learning: encouraged Sun to release an OpenJDK

Intel segments & platforms

Enterprise	Embedded	Mobile	Home

Enterprise
- Servers
- Biz Client
- Virtualization
- Emerging Market

Embedded
- Auto

Mobile
- Mobile Internet Devices
- Notebooks
- netbooks

Home
- Consumer Electronics
- nettops

(intel) Leap ahead™

Community Projects Intel is Involved in

Power Savings
http://www.lesswatts.org
Mobility
http://www.moblin.org/
Graphics
http://intellinuxgraphics.org
Performance
http://kernel-perf.sourceforge.net
Operating Systems
Linux kernel: http://kernel.org
OpenSolaris: http:/opensolaris.org

Virtualization
Xen: http://xen.xensource.com
UML: http://user-mode-linux.sourceforge.net
KVM: http://sourceforge.net/projects/kvm
Development Tools
Intel® TBB:http://threadingbuildingblocks.org
Eclipse: http://www.eclipse.org
GCC: http://gcc.gnu.org
Java: http://harmony.apache.org

Network and Wireless
http://intellinuxwireless.org
http://e1000.sourceforge.net
Manageability
http://www.openwsman.org
http://www.openamt.org
Firmware and Platform Integration
http://www.linuxfirmwarekit.org
http://www.tianocore.org

http://www.intel.com/opensource

Intel's Moblin Project Vision

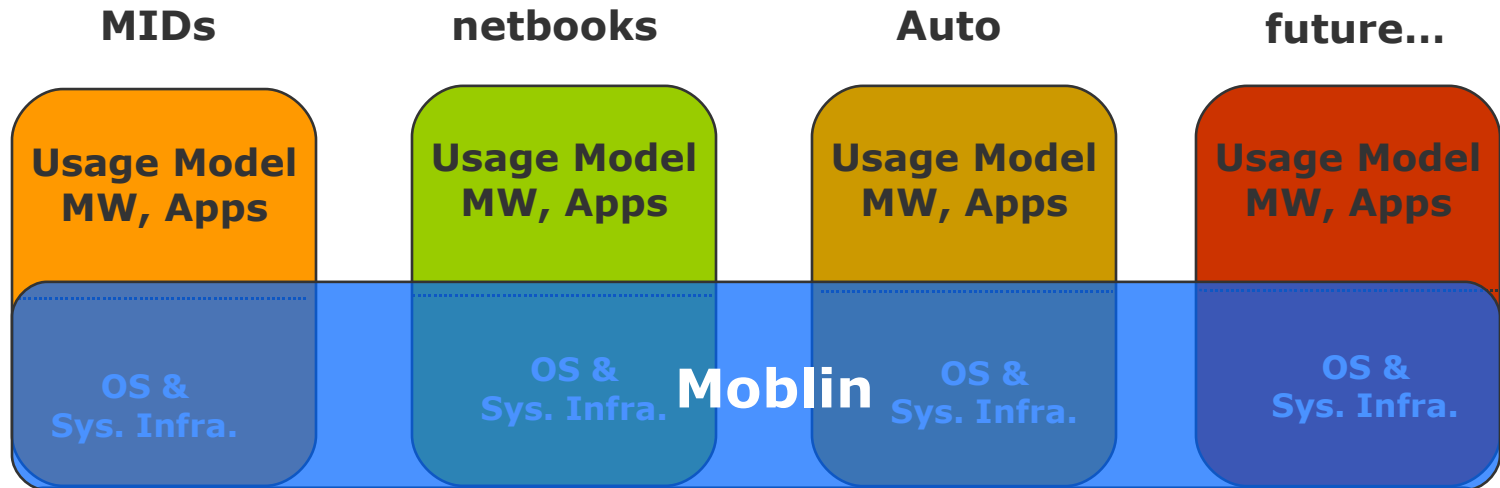| MIDs	netbooks	Auto	future...
Usage Model MW, Apps	**Usage Model MW, Apps**	**Usage Model MW, Apps**	**Usage Model MW, Apps**
OS & Sys. Infra.	OS & Sys. Infra.	OS & Sys. Infra.	OS & Sys. Infra.

Moblin

Platforms based on Intel® Atom™ processors

Moblin = Optimized Linux Software Platform for Atom based clients

Moblin Role in the Ecosystem

Community

Moblin.org

Moblin based Apps

+

Devices

- **Standardized Linux Core Stack**
- **Optimized Power, Performance & footprint**
- **Choice of OSVs**
- **Integrated Multi-Media Codecs, Browser Plug-ins**
- **Application Compatibility**

Moblin Software Development Kit

Core Development Tools

- Image Creator
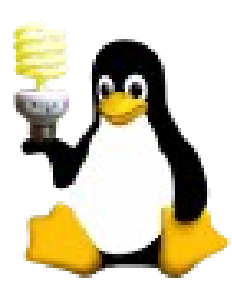- PowerTop
- GNU Toolchain

Intel® Software Development Products

- Intel® C++ Compiler for Linux*
- Intel® IPP Libraries
- Intel® VTune™ Analyzer
- JTAG Debugger/Apps Debugger

Sample Apps and Documentation

- Open source sample apps
- Application design, development, and optimization guides
- Moblin porting guides (Windows*, Java*)

Visit http://moblin.org/downloads.php to download

LessWatts.org
Power savings through software

"Intel Open Source project to make
        Linux greener"

Ziff Davis, Sept 2007

**LessWatts Technologies
Available in Community
Distributions**

**On Track for Integration
into Enterprise Linux
Distributions**

Summary

- Open Source Software is relevant to Intel's key business growth areas and initiatives

- Intel differentiates via establishing leadership through communities

- And, then drive choice of solutions to market through the value chain