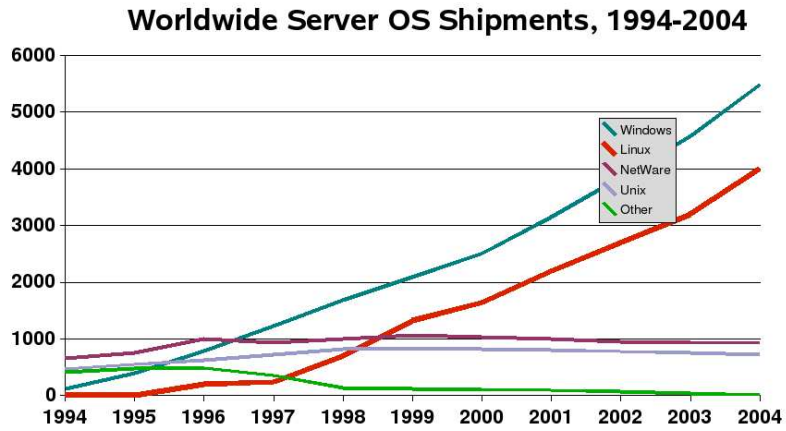
Migrating from Solaris/Unix to Red Hat Enterprise Linux

August 2004

By 2005 Only Two Operating Systems Will Matter

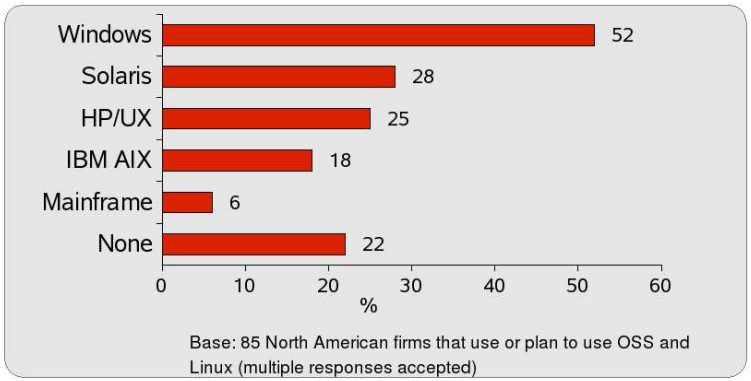


Source: IDC, 2003

Note: Only paid shipments are included

Every OS is losing to Linux

"Which operating systems are you replacing?"

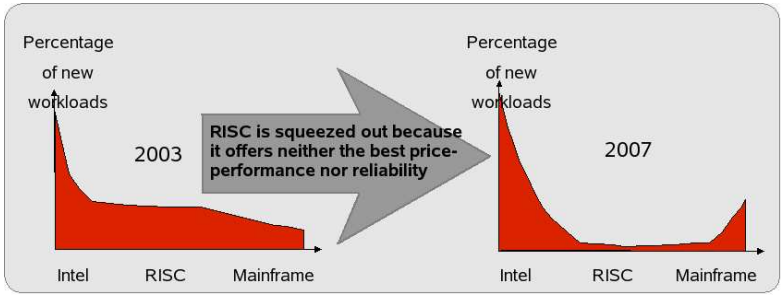


Base: 85 North American firms that use or plan to use OSS and Linux (multiple responses accepted)

Source: "Open Source Moves into the Mainstream", Forrester Research, March 2004

Why Linux is replacing Unix

- **Linux will hollow-out the Server Market:**



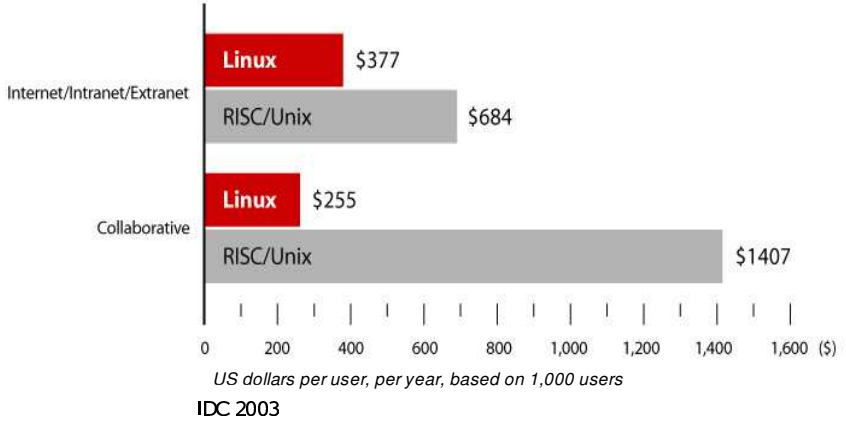
- Why do midrange RISC servers fade, while both Intel and mainframe-class thrive? Because:

1. Linux makes it possible to run any application on any server – servers will win based on their price and operating characteristics.
2. Intel's scale advantage guarantees that its processors will surpass RISC in price-performance.
3. Mainframe-class machines offer the highest grace under load and best business reliability.

Source: "The Linux Tipping Point", Forrester Research, March 2003

It Starts with Cost Savings

Linux saves enterprise customers **45%-80%** in TCO over RISC/UNIX



US dollars per user, per year, based on 1,000 users

IDC 2003

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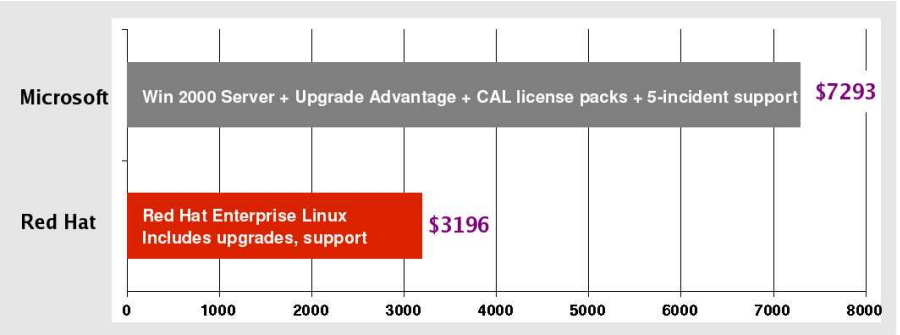
It's Not Just Cheaper Than Unix

Four-year OS platform/access licenses for collaboration solution



RHEL price includes:
- Upgrades to new versions
- Unlimited incident support services
- All updates/errata
- And is free from any CAL encumbrances

MSFT figure assumptions:
- Windows 2000 Server w/ 10 CALs
- Microsoft Upgrade Advantage 4 years @ 25%/year
- 20 additional 5-units Microsoft CAL packs
- 5 incident support pack

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Benefits of Unix to Linux Migration

- Portability - Linux runs on 8 different hardware platforms
- Performance – 2-3X raw speed for many applications
- Cost – 40-85% less expensive than proprietary applications
- Stability - on par with UNIX, made better through workload distribution
- Scalability – supported up to 16-way on Intel systems
- Simplicity
  - Skills transfer for existing UNIX admins
  - Ease of code migration
  - Native UNIX compatibility provides drop in migrations
  - Often less than 10% of the code changes
  - Tools and administration
  - Low cost of training and support

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Price/Performance Benefits

- Substantially faster clock speeds drive foundational performance benefits
- Less expensive industry standard hardware allows purchase of larger, more robust systems
- Red Hat on Intel is on par with I/O and network throughput for Solaris/Unix based systems
- Industry standard server configurations well suited to virtualization – leading to better workflow management and capacity utilization

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Platform Focus

- From – RISC UNIX
  - Solaris/SPARC the most common proprietary UNIX deployment
  - Intel economies of scale apply to other proprietary UNIX systems
  - Migrations from UNIX to Linux are generally easier than migrations from UNIX to Windows
- To – Linux on Industry Standard Servers
  - Intel IA-32 – most frequently selected platform today
  - AMD, Itanium, EM64T – rapidly gaining acceptance
  - Mainframe – interest is in taking advantage of available capacity
    - Rather than purchasing a new mainframe to deploy Linux

Migration Target Selection Factors

- Application Availability
  - Dependencies must be satisfied
- Business Drivers
  - Reliability, Availability, Security, Manageability
  - Competetive Leverage
- Cost
  - Savings on per-system cost
  - Savings on total number of systems
  - Total on admin/connectivity/managment costs
- Project Size
  - Cost savings are dependent on server counts
  - Larger projects allow maximum savings at minimal barrier

Typical Migration Targets

- Custom Applications
- Java Application Servers
- Infrastructure
- Web Servers
- Messaging Servers
- Database
- Ported 3rd Party Applications

Targets: Infrastructure

- File Server
  - NFS, Samba
- LDAP, eDirectory
- Backup (Veritas)
- Print Server
  - Samba, lpd
- DNS Server (bind)
- Security (Iptables, Kerberos, ssl, vpn)
- Build Server (Gcc, make, CVS)
- Custom Utility Server

Web Servers

- HTTP Servers
  - Apache, Iplanet, Zeus
- Web Caching (squid)
- Content Engine
- Server-side Applications
  - CGI, PHP, Perl, Shells

Application Servers

- JSP Servlet Engines (Tomcat)
- J2EE Application Servers
  - WebSphere, WebLogic, OAS, JBoss
- JDKs/SDKs
  - IBM, Sun, BEA, Blackdown

Targets: Messaging

- Custom Messaging Systems
- Tibco RV
- Financial/Market Data Feeds
- Reuters RMDS
- Mail Routing
- Lotus, Sendmail, Binari
- Instant Messaging

Targets: C/C++ Applications

- C Development Environment
- Gcc, gdb, make, gprof, CVS, Rational
- C Runtime Environment
- glibc
- 3rd Party APIs and Libraries
- Analysis
- Core/Kernel Dump facilities
- High Availability
- Red Hat Cluster Manager

C/C++ Performance on Linux

- Integer Mathematics
  - Spec99 shows parity with Solaris on a MHz basis
- Floating Point Mathematics
  - SpecFP shows a 75% parity with Solaris on a MHz basis
- GCC 2.96 vs GCC 3.1
  - Spec numbers show a 10-20% performance gain with 3.1
- Compiler optimization can have a significant impact ... but performance is very frequently most dependent on application details rather than GCC optimizations
- P4 optimizations may increase performance by 20% or more

Targets: Database

- RDBMS
- Oracle, DB2, Sybase, Informix, PostgreSQL, MySQL
- DB Application Servers
- Oracle

Growing ISV Support

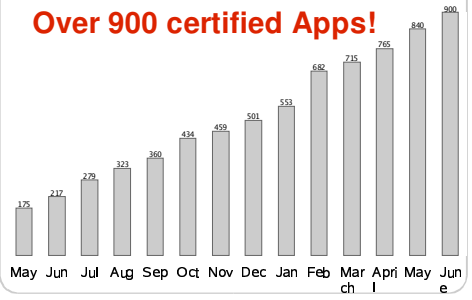
- **Red Hat Enterprise Linux is quickly becoming the Linux standard for enterprise infrastructure, business application, and tools vendors**

Support of the Market Leaders

ORACLE SAP VERITAS documentum bea PeopleSoft bmcsoftware Borland SYBASE EMC² IBM REUTERS

Red Hat Certified & Red Hat Ready Apps

Over 900 certified Apps!



Case Study: Wall Street Bank

- Before
  - Sun 420R/280R 2 CPU Systems- 36 Systems/yr avg. $23,000
  - WebSphere on Solaris
- After
  - IA-32, 2 CPU Systems- 12 Systems/yr avg. $5,000
  - WebSphere on Linux
  - Bottom Line
  - 3x performance meant 1/3 systems required at ¼ price
  - $10,000/CPU charge for WebSphere cut by 1/3
  - $150,000/yr admin cost per 30 systems cut significantly
  - 5 year savings of over $5M
- Red Hat services to support a migration and deployment of this type
  - Training : on-site RHCE classes
  - Red Hat Network : Satellite and Proxy
  - Red Hat Linux Advanced Server : Premium Subscription
  - Professional Services : On-Site Technical Account Manager

Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Clearly identify the goal : a one-size fits all foundation or a very-highly tuned, application-specific configuration
- Have a detailed understanding of the envionment and framework into which the systems using the build must be incorporated. This includes:
- Authentication / security configuration
- Network configuration
- Existing monitoring and management solutions
- Storage and backup tools and processes

Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Gather the software requirements for this environment. This includes required RPMS found in AS, 3rd party dependencies, and in-house developed software
- Package in RPM format as many applications and utilties as possible
- Gather operating system and application tuning and optimization parameters
- Gather pre- and post-install configuration parameters

Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Setup RHN Satellite Server
- Define Channels and Groups
- Populate Channels
- Generate activation keys
- Determine Kickstart infrastructure
- Setup Kickstart Server
- Generate KS script

RPM (Red Hat Package Manager)

- All software in Red Hat Linux is packaged in RPM format
- Organizes software into packages
- Enables ease of software installation, upgrades, and removal
- Tracks dependencies and conflicts
- Foundation for the Red Hat installer (anaconda) and Red Hat Network
- Binary (RPM) and source (SRPM)
- Software may be broken down into multiple packages
- Packages contain files and triggers
- RPM database located on system stores metadata
- Used for verification, integrity checks

Anaconda

- Installer for Red Hat Linux
- Used for both manual and automated (Kickstart) installs
- Uses RPM for software installation
- Customizable
- Add/delete/modify package groups
- Add/delete/update packages

Kickstart

- Automated install using a script file
  - Similar in concept to Jumpstart (Solaris) and Ignite-UX (HP-UX)
- Based on anaconda and RPM
  - Not an image copy like Ghost, Drive Image, etc.
  - Same script usable on different types of hardware
- Configuration
  - Authentication / Security
  - Partitioning
  - Package Selection
  - Pre/post-install Configuration

Kickstart

- Common methods
- PXE / NFS
- Floppy / NFS
- CD-ROM
- Advantages :
  - Enables standardization
  - Provides automation
  - Enables rapid provisioning / reprovisioning

Sample Kickstart Script

```
# Kickstart file automatically generated by anaconda.

install
lang en_US
langsupport --default en_US en_US
keyboard us
mouse genericps/2 --device psaux --emulthree
skipx
network --device eth0 --bootproto dhcp
rootpw --iscrypted $1$Y9öØaÆäü$0XDfKraLA.M7HLDjOthlg1
firewall --disabled
authconfig --enableshadow --enablemd5
timezone America/New_York
bootloader
```

Generating a Kickstart Script

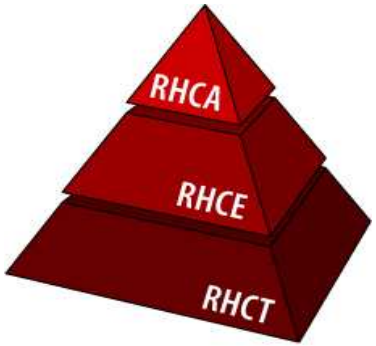
- A Kickstart script is a text file
- /root/anaconda-ks.cfg
- ksconfig
- One method:
- Do a manual install, according to desired configuration
- Take the resulting anaconda-ks.cfg script and fine-tune

Installation Process Using PXE

1. Client system setup
   a. Hard drive clean
   b. BIOS set to boot from hard drive, then PXE boot
2. Client boots – PXE client contacts DHCP server
3. DHCP server indicates use of PXE server
4. PXE server indicates configuration to be used or presents menu
5. Pxelinux bootstrap tftp'd to client
6. System boots as normal, using Kickstart script indicated by PXE configuration or DHCP configuration
7. System installs and registers with Red Hat Network Satellite
8. System reboots automatically, boots from hard drive

Accelerated Skills Transfer

- **Architect – RHCA**
  - Master-level technical leadership for Linux and open source architecture
  - Design, plan, deploy and manage Linux systems across the enterprise from datacenter to desktop
- **Engineer – RHCE**
  - Set up and configure Linux servers, network services, network security, diagnostics, troubleshooting
  - The standard Linux certification
- **Technician – RHCT**
  - Install and configure new Linux systems, host security, attach to corporate network
  - Entry-level Linux certification



Linux Migration Assessment

What is it?

- Red Hat's flagship consulting engagement to prepare a company for a successful migration to Linux
- Red Hat reviews a customer's technical infrastructure and spending plan
  - Provides analysis of software availability, performance, and cost savings by application domain
  - Shows how money will be saved and what the best migration plan is **"if you flip the switch, this is what you need to focus on ..."**
  - Analysis is customer specific (quantitative and qualitative), not just a simple aggregate of industry benchmarks

Why is the assessment so critical?

- Ensures a successful migration to RHEL
- Speeds up implementation
- Decreases risk – customer gets it right the first time