Red Hat
Enterprise Overview & Strategy
HEPiX

May 24, 2004

Red Hat

- Headquarters: Raleigh, NC

- Founded 1993

- Operating in 16 countries

- Cash: $930 million

- FY 04 revenue: $126.1 million

Agenda

- What is the state of Open Source today?

- What does Red Hat do?

- How does Red Hat make Linux predictable, deployable, and sustainable?

- What is the Red Hat product set?

- What is on Red Hat's roadmap?

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The state of open source today

- The open source model has proven itself
  - Delivering fully competitive operating system and application environments

- Customers are adopting open source solutions because they provide unbeatable price/performance, security, and vendor independence

- Open source is now in the mainstream
  - Suppliers – OEMs, ISVs, channels, technology integrators
  - Customers – government, corporate, academia, commerce, end users

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The value of Linux

- Higher performance for CPU-intensive applications

  - Fewer servers, licenses

  - Less administrative burden

- Leverage inexpensive commodity hardware

- Flexibility through open standards

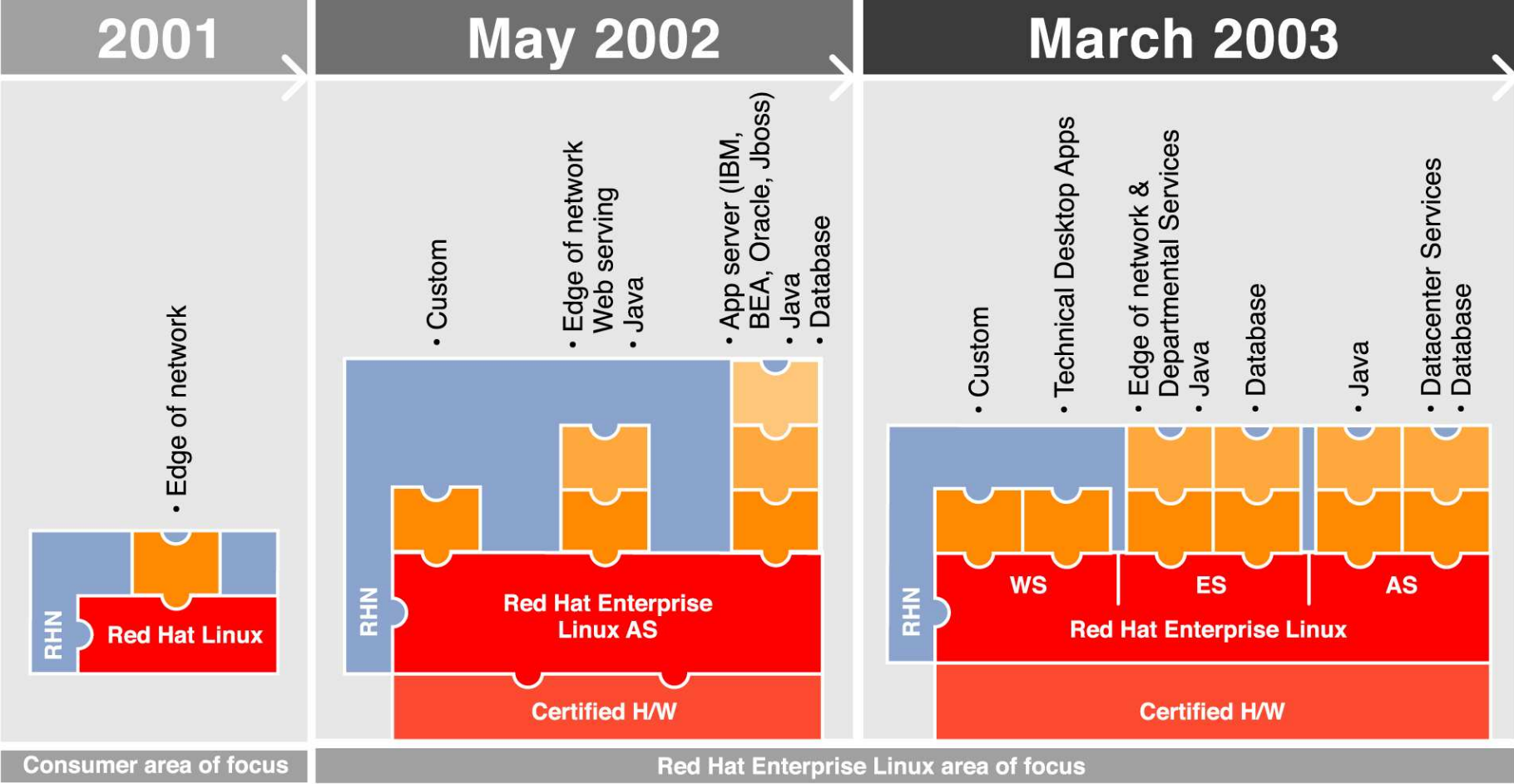- Security and management equivalent to Unix

> Companies deploying Linux on Intel servers saw 504% ROI over three years.
>
> IDC, May 2003
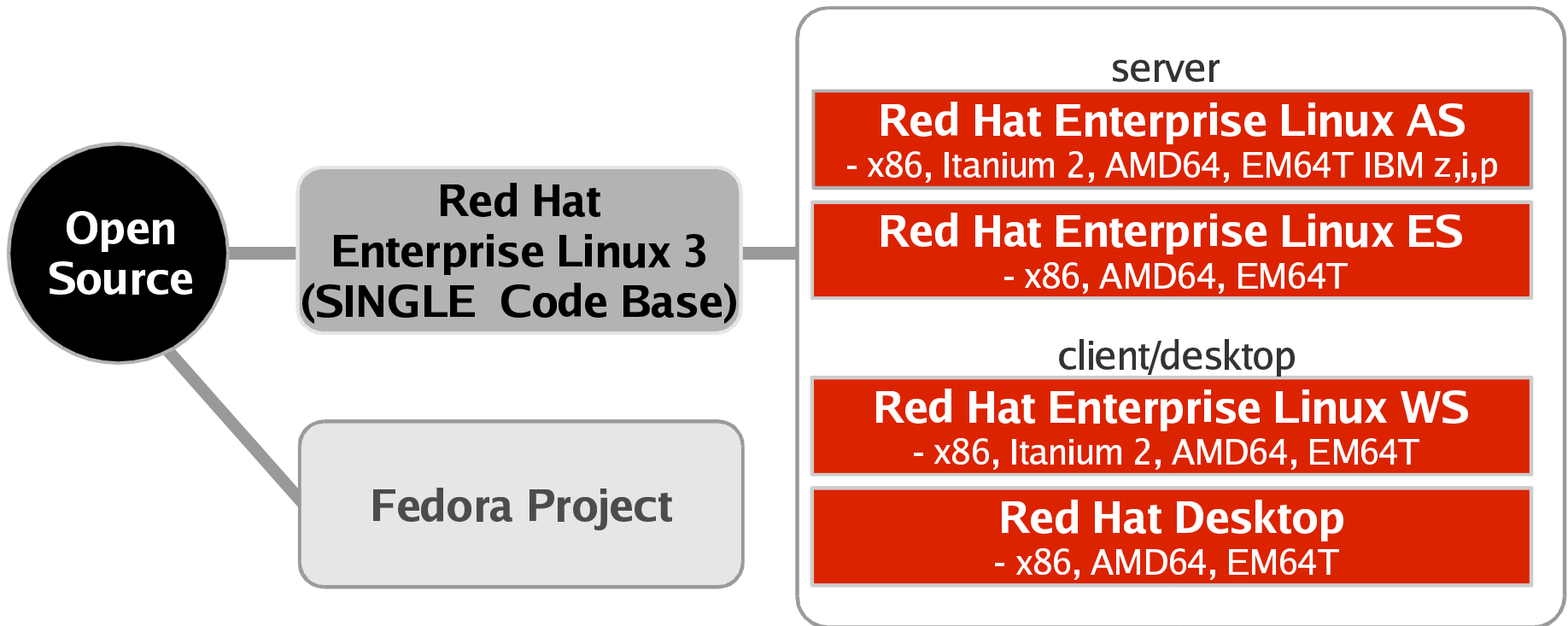
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What does Red Hat do?

- Makes Linux predictable, deployable, and sustainable

- From an engineering standpoint:
  - Works with the community, partners, and customers
  - Develops/incorporates new features
  - Integrates open source packages, new features, drivers, bug fixes, & security updates
  - Tests, certifies, productizes, and supports the result

- From a business standpoint:
  - Engineers and sustains the platform
  - Provides services—training, consulting, support
  - *But* leverages the open source development model

Open Source Architecture

2001

- Edge of network

RHN
Red Hat Linux

Consumer area of focus

May 2002

- Custom
- Edge of network Web serving
- Java
- App server (IBM, BEA, Oracle, Jboss)
- Java
- Database

RHN
Red Hat Enterprise Linux AS
Certified H/W

March 2003

- Custom
- Technical Desktop Apps
- Edge of network & Departmental Services
- Java
- Database
- Java
- Datacenter Services
- Database

RHN
WS | ES | AS
Red Hat Enterprise Linux
Certified H/W

Red Hat Enterprise Linux area of focus

RHN=Red Hat Network

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Red Hat OS products and projects

Open Source

Red Hat Enterprise Linux 3 (SINGLE Code Base)

Fedora Project

server

Red Hat Enterprise Linux AS
- x86, Itanium 2, AMD64, EM64T IBM z,i,p

Red Hat Enterprise Linux ES
- x86, AMD64, EM64T

client/desktop

Red Hat Enterprise Linux WS
- x86, Itanium 2, AMD64, EM64T

Red Hat Desktop
- x86, AMD64, EM64T

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Enterprise Linux & The Fedora Project

- Red Hat Enterprise Linux

  - *Who should use it?*
    Business, government, or other users looking for a stable, supported, and certified Linux

  - Benefits:
    Stable, reliable, broadly supported. Easy to deploy and manage. Many certified applications available. Industry-leading combination of server performance/scalability and desktop features.

- Fedora project

  - *Who should use it?*
    Developer or highly technical enthusiast using Linux in non-critical computing environments

  - Benefits:
    Bleeding-edge technology released early and often

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Enterprise Linux/Fedora Comparison

	Red Hat Enterprise Linux	Fedora Project
Release frequency	12-18 months	4-6 months
Product lifetime	5 years from release	2-3 months (after next release)
ISV certification	More than 400 supported applications	None
API/Interfaces	Standardized	Not standardized
Support duration	5+ years	none
Support level	Production/developer	none
Support availability	24x7 or 12x5	none
Response	1 hour for Priority 1	none

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Red Hat Enterprise Linux 3

- The Red Hat Enterprise Linux 3 product family shipped October 2003
- Supports eight architectures
  - x86 (IA-32)
  - Itanium 2 (IA-64)
  - AMD64, EM64T *
  - IBM iSeries, pSeries
  - IBM zSeries
  - IBM s390
- A single source code base is used for all architectures
  - Greatly improves code stability and maintainability
  - Five new architectures
 - Eliminates feature skew; simplifies ISV application support

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Enterprise Linux 3 feature summary

- Focus on performance, stability, availability, application development, and standards support.

  - Kernel based on 2.4.21 with numerous 2.6 features
  - Better support for large SMP, memory, and I/O configurations
  - Forward compatibility between version 2.1 and version 3
  - Greatly improved desktop environment
  - 4GB-4GB Kernel/User Memory Split
  - Enhanced standards support
  - Enhanced security features
  - Native Posix Threading Library
  - GCC 3.2 tool chain environment
  - Logical Volume Manager
  - Diskless system support

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Enterprise Linux product comparison

	RHEL AS	RHEL ES	RHEL WS	Red Hat Desktop
	"Advanced Server"	*"Entry/Mid Server"*	*"Workstation/HPC"*	*"Desktop"*
Target Hardware	>2 CPUs >8GB memory (x86)	1-2 CPUs; up to 8GB	1-2 CPUs	1 CPU; up to 4 GB
Target Market	Large servers (e.g. database and enterprise applications)	SOHO & departmental servers (e.g. small-medium web, file, and print configs)	Technical workstations (e.g. CAD/CAM, S/W devel); HPC compute nodes	Corporate office productivity (e.g. Document creation, email, Web, IM)

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RHN Architecture Options
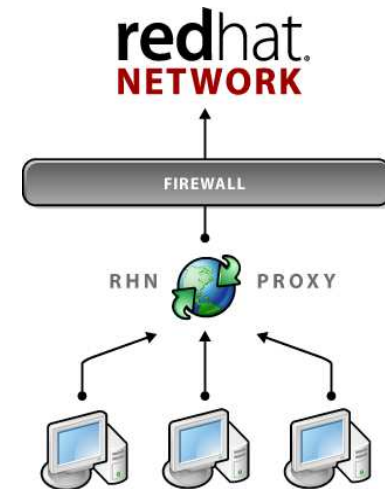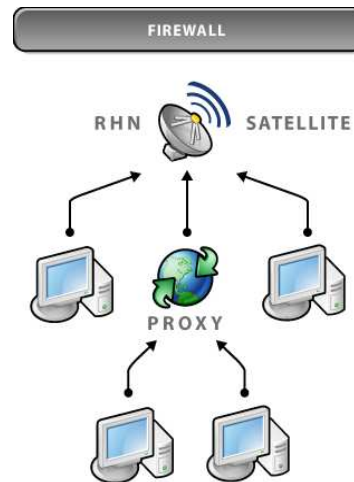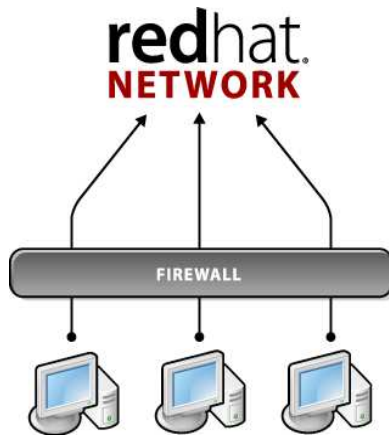
Hosted Model

Default Architectural Option...

Features
- Simple web UI
- Introductory API layer
- Hosted database repository

Satellite Server*

On-Premise Installation...

Features
- Local database repository
- Channel/Errata cloning & mgmt
- Channel permissions
- Off-network capability
- Bare-metal PXE Provisioning**
- Integrated network install tree**
- Configuration mgmt profiles**

Proxy Server*

Scalability...

Features
- Works with hosted or Satellite
- Local package caching
- Single port access

* Requires Management Module   ** Requires Provisioning Module

Red Hat Cluster Suite

- Two clustering capabilities:
  - Cluster Manager: high availability for unmodified applications
    - Suitable for database web/file/print/mail servers
  - IP Load Balancing
    - Suitable for high-performance network configurations
- Can be used together in a 3-tier environment
  - IP load balancing for front-end
  - Apache for mid-tier web serving
  - Cluster Manager for backend database and file serving
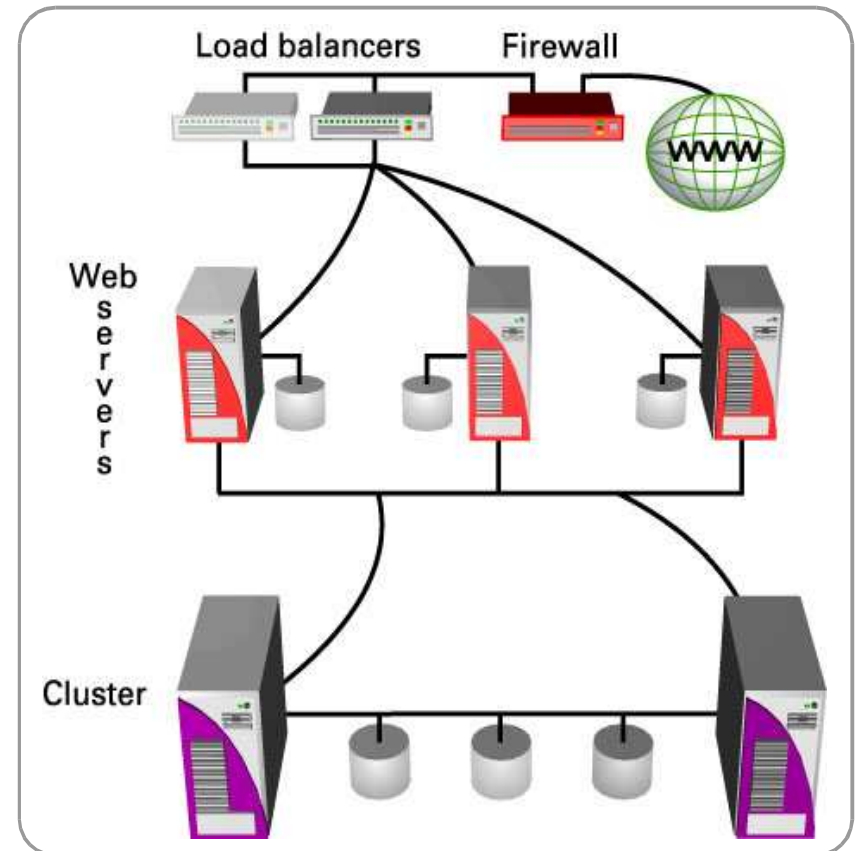
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Red Hat Enterprise Linux v.4

- Continue driving the Open Source Architecture
  - Scalable, universal Open Source OS distribution
  - Open Source Layered Products (App Server, Developer Suite)
  - Management Infrastructure (Red Hat Network)
- Maintain 7 architectures, 10 languages from RHEL 3
- OS Release Themes:
  - Linux 2.6 kernel base
  - Improved Desktop Capabilities
  - Virtualization & Storage Management
  - Class-based Resource Management
  - Security (SELinux, Auditing)
  - Distributed Management and Provisioning (via RHN)
  - Carrier Grade / Telco Environment support
  - Performance and Scalability

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Futures – 2.6 kernel

- Upstream open source version available December 2003.
- New capabilities:
  - Native Posix Threading Library (NPTL)
  - Kernel IPSec
  - Asynchronous I/O
  - O(1) scheduler
  - Oprofile
  - VM improvements (Rmap VM and HugeTLBFS)
  - Improved networking: IPV6
  - Access Control Lists (ACLs)
  - I/O optimizations: Block I/O (BIO) layer and new I/O elevators
  - Interactive scheduler response tuning
- Most of these capabilities have been backported to Red Hat Enterprise Linux 3

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Futures – 2.6 kernel

- Stabilization, driver support, and application support still in progress
- Initial introduction in Fedora Core 2 (May 2004)
- Available in Red Hat Enterprise Linux 4

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Futures – SELinux

- NSA project that implements Mandatory Access Control (MAC) in Linux
- Security policy dictates what can and can't take place on the system
- Benefits:
  - Flexible policy model allows for different security policies for different needs
  - Flaw containment: isolates effects of application security flaws, viruses, etc.
  - Takes security decisions out of the hands of the user
  - Provides foundation for higher security levels such as Multi-Level Security (MLS)

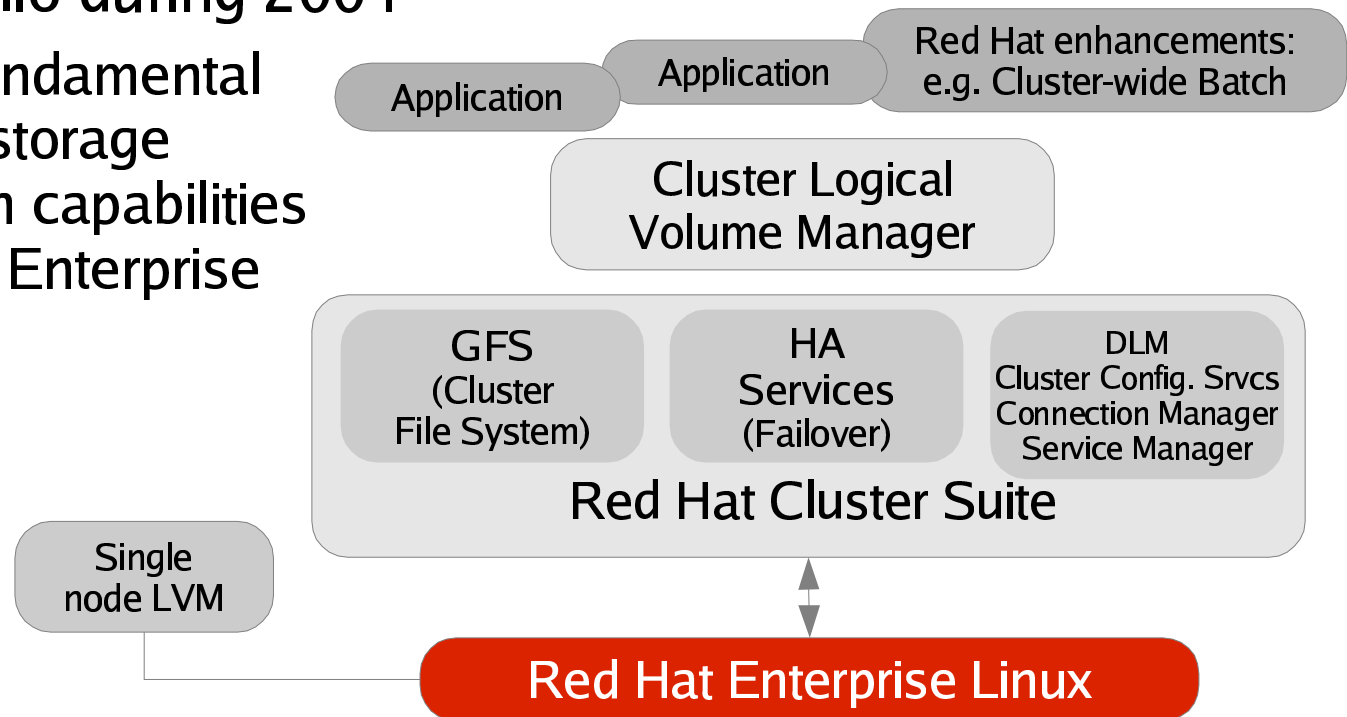redhat.

Futures – Red Hat & SELinux

- Goal: Enable higher levels of security for all systems, not just for specialized military and intelligence deployments
- Initial introduction in Fedora Core 2 (May 2004)
- Available in Red Hat Enterprise Linux 4
- SELinux will be integrated into the OS; no separate "trusted" version
  - Traditional "trusted" approaches have been marginalized
  - Goal is to redefine paradigm of operating system security
  - Flexible model provides benefits to all users, regardless of security requirements

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Futures – SELinux Example: BIND

- Uses standard BIND
  - Chroot jail not necessary
- Example Policy (named_t domain):
  - Bind to port 53 on external network interface
  - Read /etc/named.conf
  - Read and write dynamic zone files in /var/named/*
  - Execute BIND and system libraries
  - Everything else denied
- If BIND is compromised, damage is confined:
  - Only dynamic zone files may be modified
  - New binaries cannot be installed
  - Existing system files cannot be altered or removed
  - Access to internal network interface is denied
  - Other applications on the same system are unaffected

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Virtualization Technologies

- Red Hat acquired Sistina Software in 2003
  - Leading provider of clustering and storage management software
- Sistina technology will be incorporated into Red Hat's core product portfolio during 2004
  - Providing fundamental server and storage virtualization capabilities for Red Hat Enterprise Linux

Application

Application

Red Hat enhancements:
e.g. Cluster-wide Batch

Cluster Logical
Volume Manager

GFS
(Cluster
File System)

HA
Services
(Failover)

DLM
Cluster Config. Srvcs
Connection Manager
Service Manager

Red Hat Cluster Suite

Single
node LVM
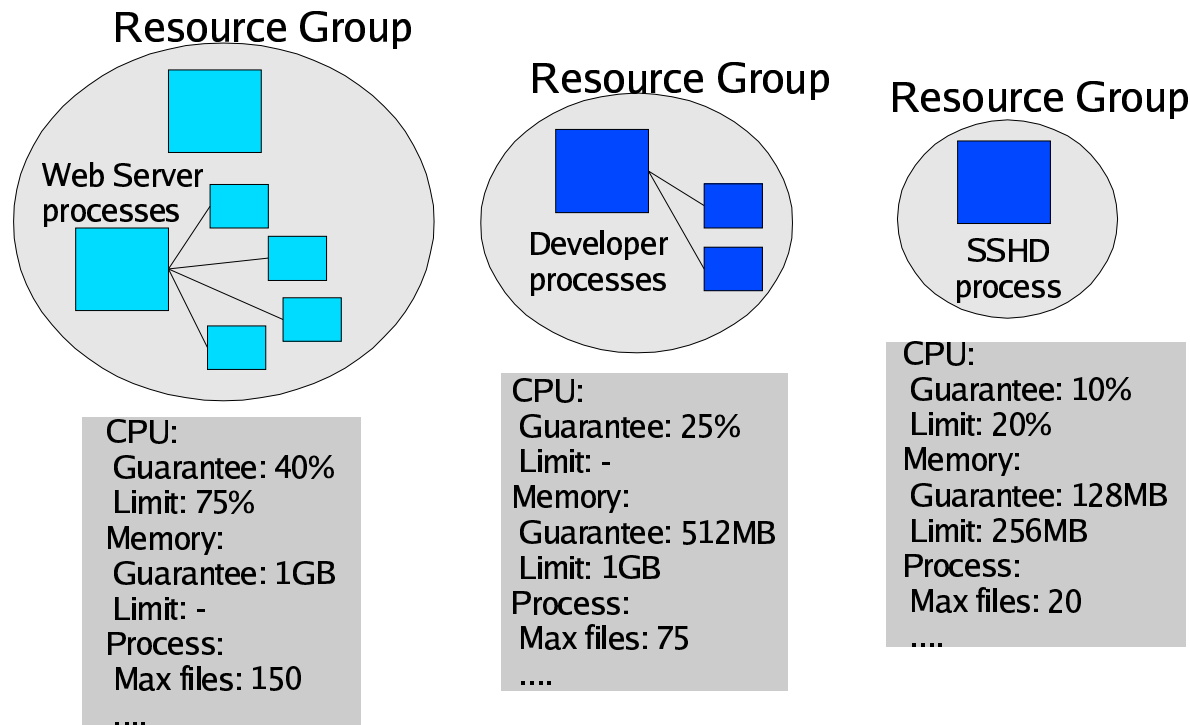
Red Hat Enterprise Linux

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Server and Storage Virtualization

- Sistina integration will complete with the delivery of Red Hat Enterprise Linux 4
- Currently Linux is limited to a few hundred physical devices per server and 2 Terabytes for the maximum file system and device size. These limitations effectively go away in RHEL 4.
- GFS will be provided as a feature of Red Hat Cluster Suite
- New technologies will be provided:
  - Cluster Logical Volume Manager (CLVM)
    - Extension of non-cluster LVM that is included in Red Hat Enterprise Linux core products
  - Distributed Lock Manager
    - Builds on existing lock management capabilities in GFS
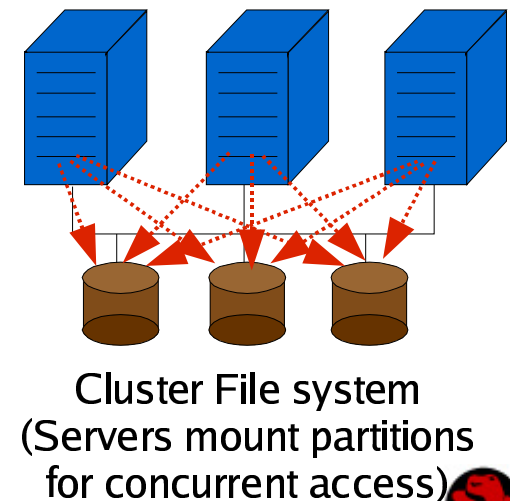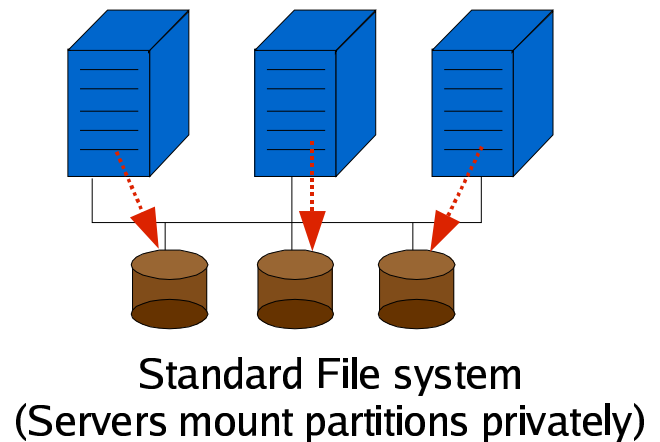   - Currently based on a client-server model

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Resource Management

- Red Hat Enterprise Linux will provide Resource Management capabilities
  - Provides process group definition and resource utilization control
  - Permits applications to execute with a pre-defined Quality of Service

Resource Group

Web Server processes

CPU:
 Guarantee: 40%
 Limit: 75%
Memory:
 Guarantee: 1GB
 Limit: -
Process:
 Max files: 150
 ....

Resource Group

Developer processes

CPU:
 Guarantee: 25%
 Limit: -
Memory:
 Guarantee: 512MB
 Limit: 1GB
Process:
 Max files: 75
 ....

Resource Group

SSHD process

CPU:
 Guarantee: 10%
 Limit: 20%
Memory:
 Guarantee: 128MB
 Limit: 256MB
Process:
 Max files: 20
 ....

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Red Hat/Sistina GFS

- Sistina's Global File System is the first virtualization technology to be delivered under the Open Source Architecture
- Delivery planned Q2-Q3, initially as a separate product
  - Full integration in 2005
- Provides a concurrent access, shared or served storage, cluster file system
- Exceptional performance & scalability
- Red Hat is currently converting code license to GPL for delivery to the community during 2004

Standard File system
(Servers mount partitions privately)

Cluster File system
(Servers mount partitions
for concurrent access)

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Red Hat/Sistina GFS

- Features:
  - Fully POSIX compliant
  - Multi-node journaling, with recovery by remaining nodes after failure
  - I/O multi-pathing
- Usually configured with fully shared storage
  - E.G. Fibre Channel
- Optionally, using GNBD (Global Network Block Device) is is possible to deploy GFS without fully-connected shared storage
  - Reduces cost of deployment
    - Suitable for heavily networked environments such as HPC
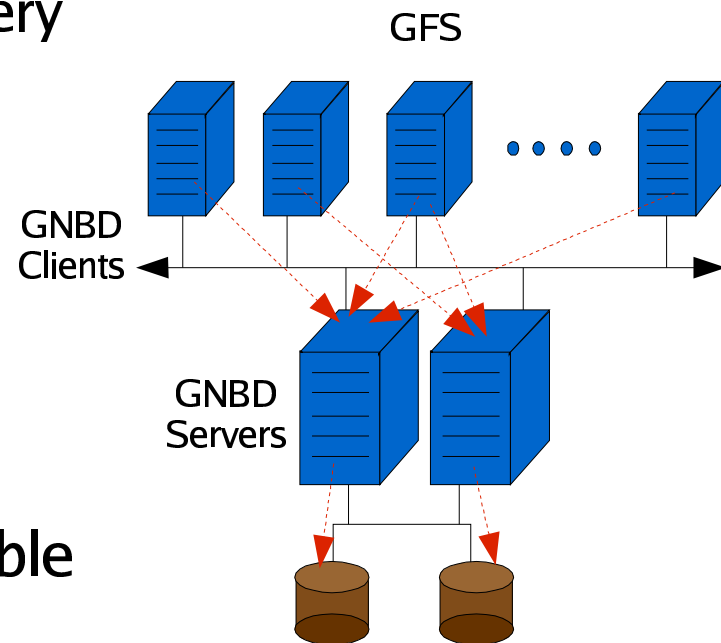
Additional information

- Other support options:
  - Technical Account Manager
  - On-site consulting

- Contact Information:
  - Nathan Jones, Sales Director
  - njones@redhat.com (e-mail)
  - (703) 356-2803 x62404 (tel)

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