Utility Computing enabled with N1™ Grid
Lisbon – Nov. 29th 2003

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Chief Architect PS EMEA

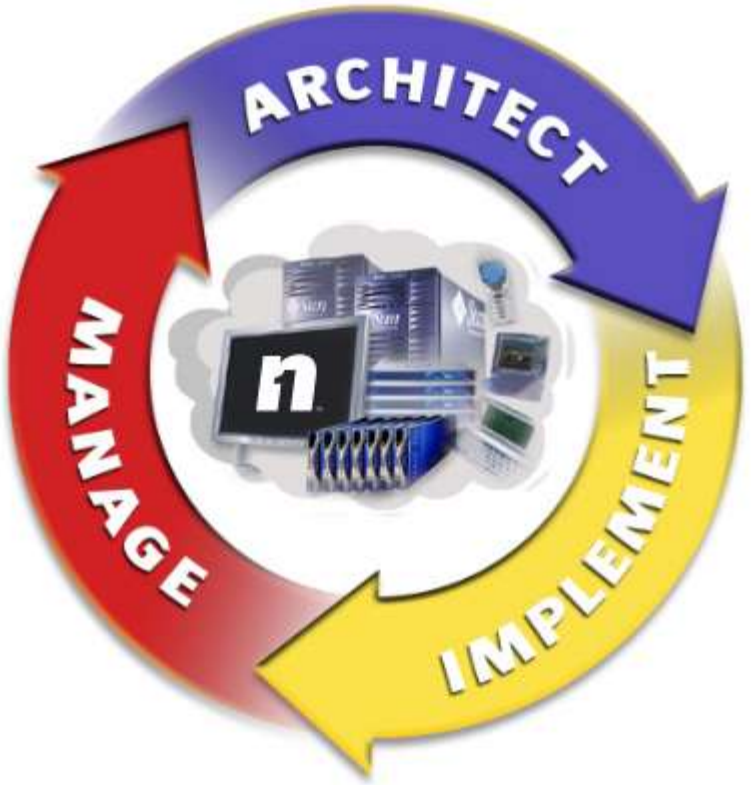
Sun Microsystems

Sun microsystems

We make the net work.

Agenda

- Goals
- Approach and vision
- Technologies
- Where to start today



What are the business drivers?

ALL

Lower our costs and give us a better ROI

Manufacturing - Increase utilization & productivity

In typical six week development and test cycle, more time is spent re-configuring existing resources than running the tests

Life Sciences - Rapidly deploy & shut down projects

We have many new business projects, with many large, temporary datasets, that need to start in hours, not weeks

Commercial Enterprise - Shorten deployment lifecycle

To gain competitive advantage, we really need to reduce deployment times by a factor of 10

Financial Services – Utility – Pay as You Go Model

Pay for capacity as its used and tie IT expense to business initiatives

Utility enablers

- Operating Cost
  - HW Resource optimisation
  - Operator/Administrative efficiency
- Value
  - Agility/flexibility
  - Time to market
- Security
  - Threats/integrity
  - Data protection/Governance
- Billing
  - Chargeback/Metering
  - Procurement

No silver bullets
Requires technology changes through entire stack
Operational Maturity

THE NETWORK IS THE COMPUTER™

Sun's Mission - To Solve Complex Network Computing Problems for Government, Enterprises & Service Providers

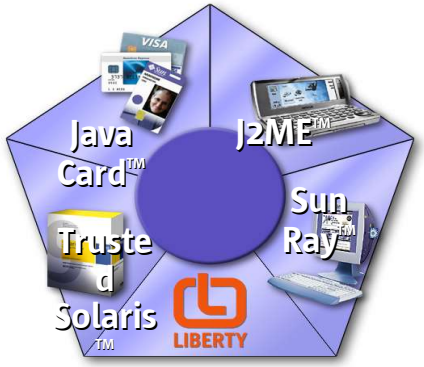
Using 3 Core Strategies -

Attack Cost and Complexity

Sun ONE
Open Net Environment

JAVA™

Accelerate Network Service Deployment



Unleash Mobility with Security

A New Meaning of "System"

What we did inside the F15K box...

We are doing to the network...

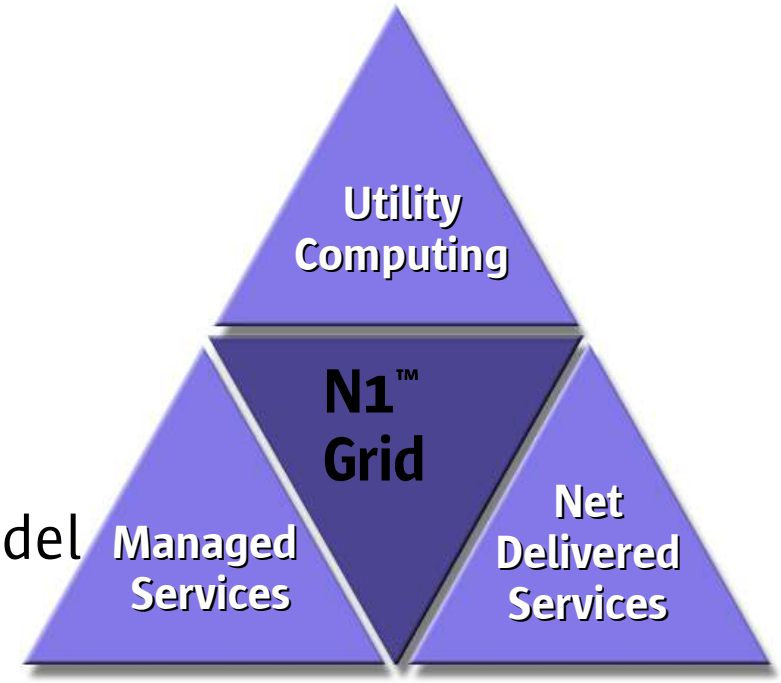
- True scalability: *Add performance without adding management complexity!*
- "Soft configuration" and"Soft cabling"
- Multiple, secure domains
- But with a big difference:
  - Heterogeneous elements
  - Network becomes like SMP backplane

N1™ Grid and Utility Computing

THE ABILITY TO INTELLIGENTLY MATCH IT RESOURCES TO BUSINESS DEMAND ON A PAY-FOR-USE BASIS

Features and Components

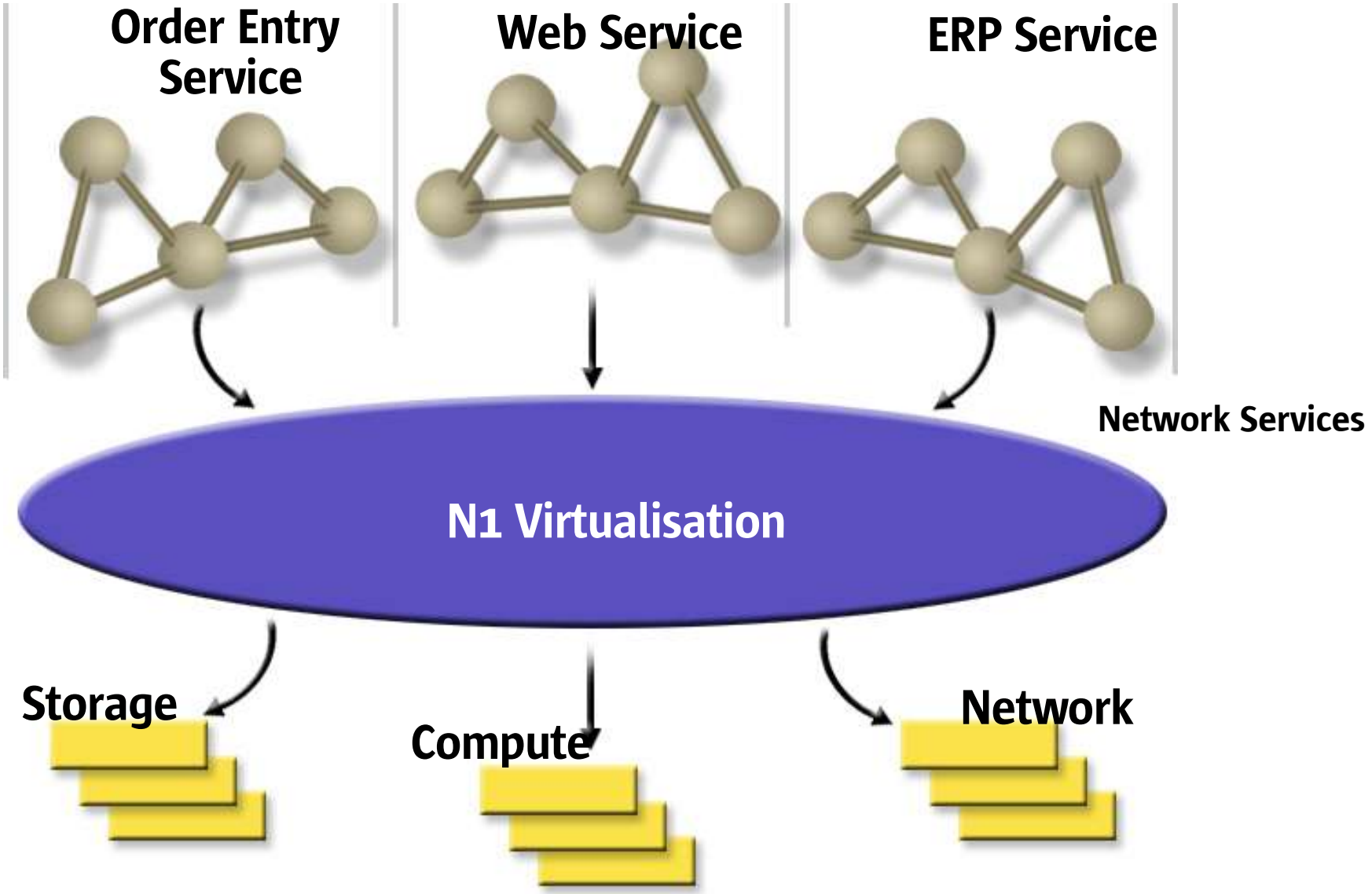
- N1™ Grid Technologies provide foundation
- Usage based pricing options
- IT spend aligned to business cycles
- Granular cost information
- Risk sharing through acquisition model
- Secure tailored solutions



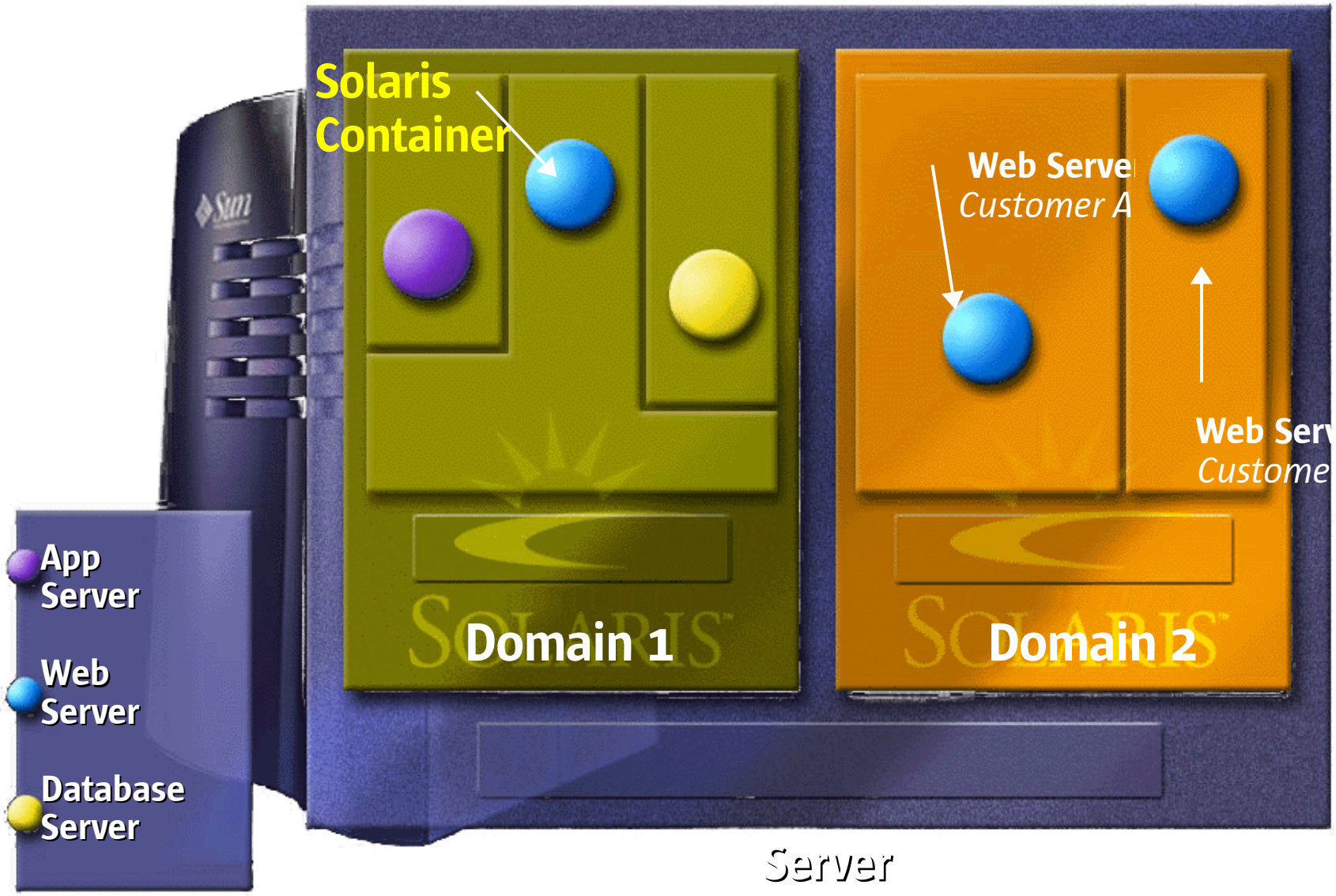
Virtualisation

- Use virtualisation to isolate services from physical changes
- Allows resources moved to where needed
  - Drive up physical utilisation
- Accelerate Service deployment

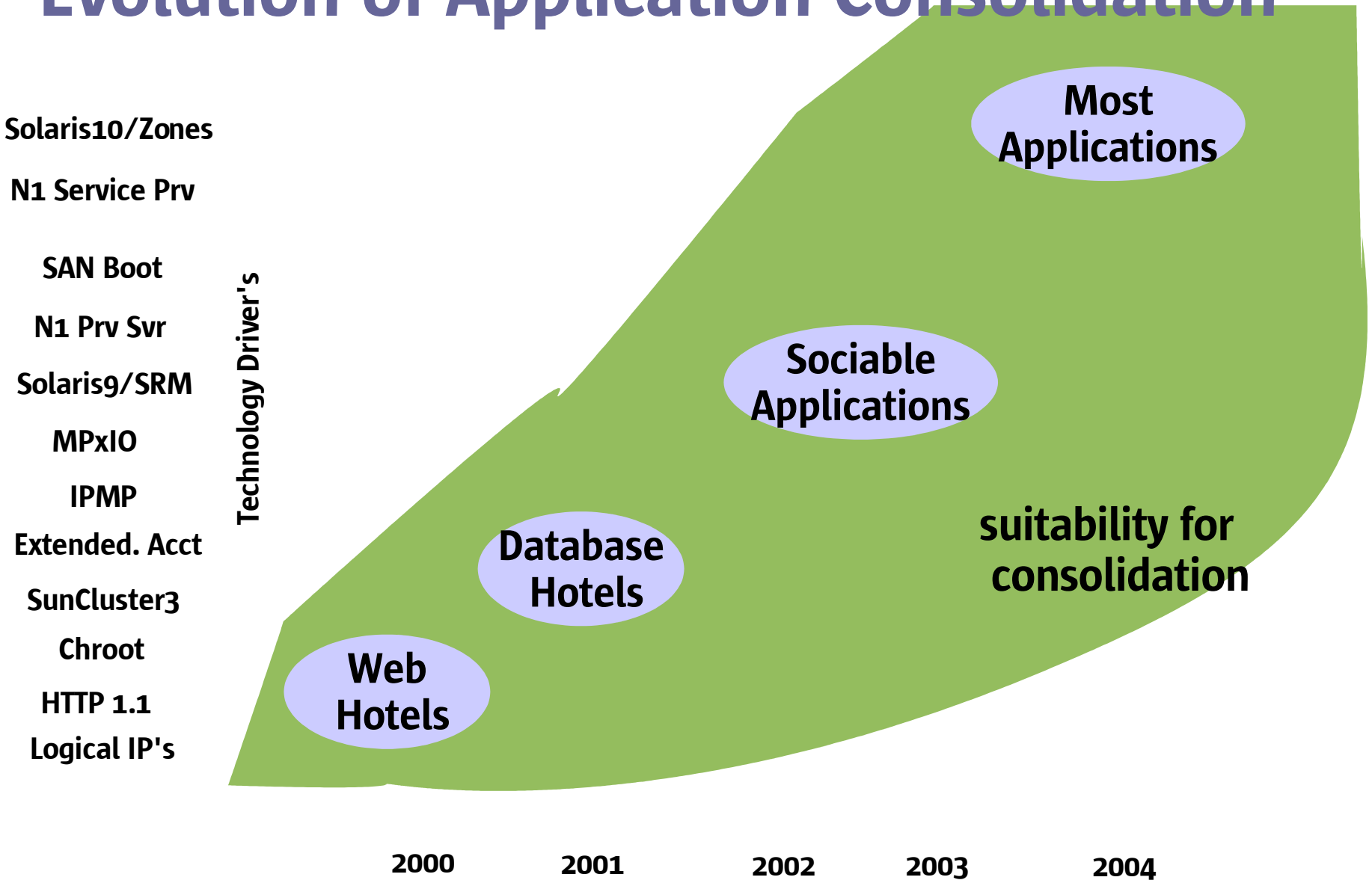
N1™ Grid Virtualisation



Solaris 9 Container



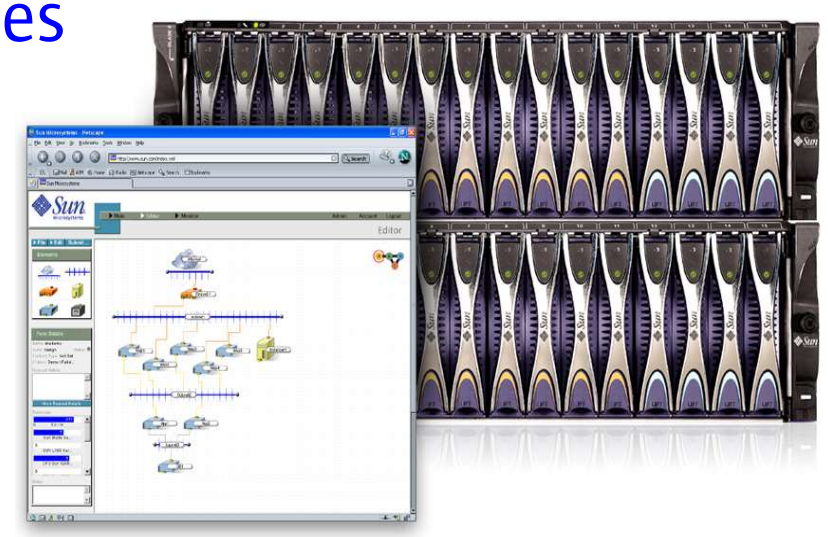
Evolution of Application Consolidation



Sociable Applications

- Sociable Applications don't :-
  - have specific O/S patch or specialised kernel requirements
  - require OS minimization to meet stringent security requirements - e.g. Internet fronting systems
  - cause Namespace collisions with other applications

- Consign the vagrants onto Blades until they can be socialised



Application Based ChargeBack

- UNIX has included a Accounting subsystem since it's AT&T days.
- Initial implementation was designed to serve a generalised Time Sharing system model
- Subsequently developed issues with long running and sub-second duration processes, but constrained by POSIX definition
- Solaris resolved both these with Solaris 8 OE 1/01 Extended Accounting subsystem
- Provides the Usage data enabling Application based chargeback to be made.
- Now includes network usage via IPQOS in Solaris 9 update 1

Enables per Container Chargeback to be implemented

The Solaris 10 N1 Grid Container

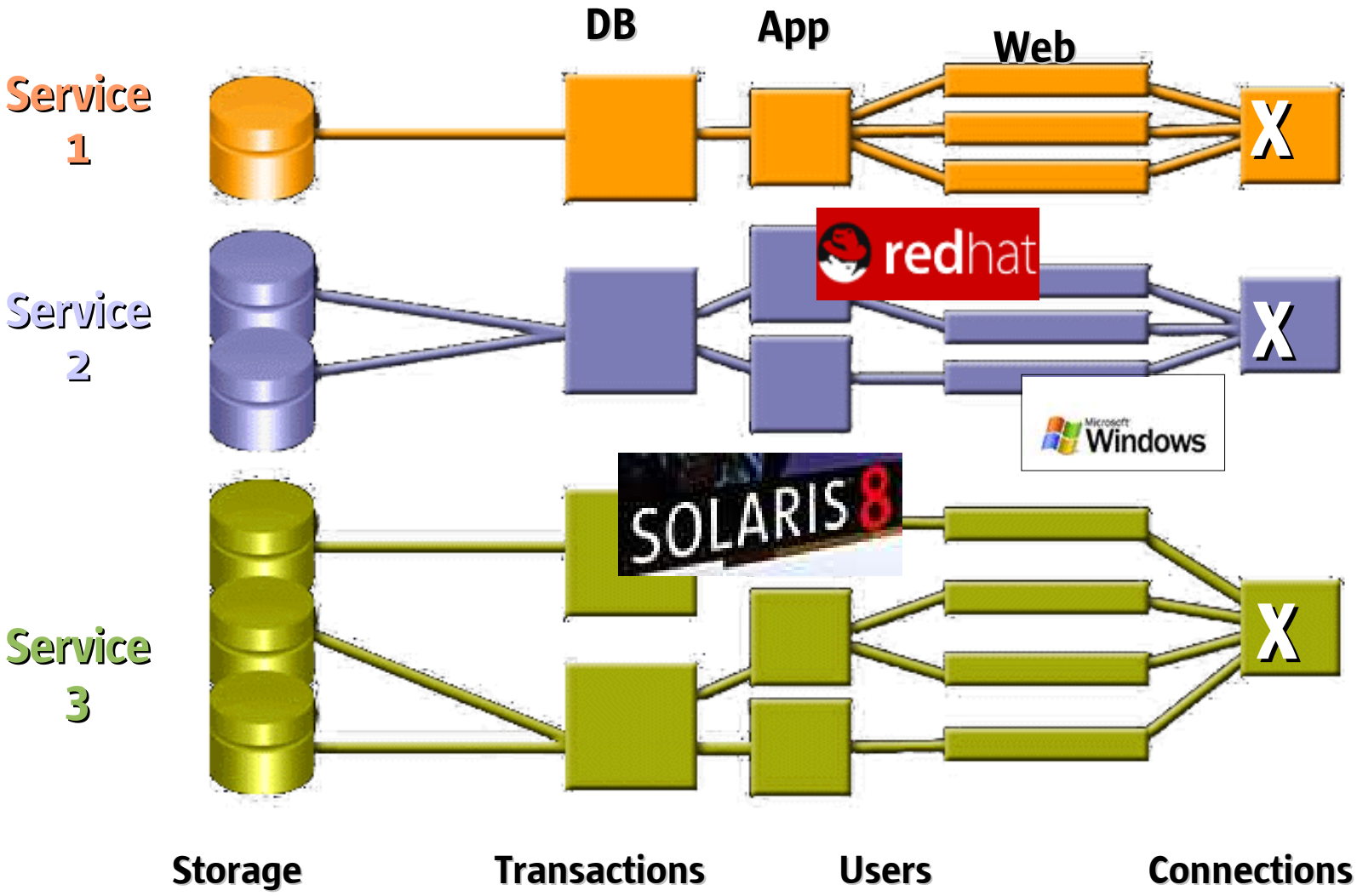
- Allows the OS to behave as multiple machines
- Each isolated and secure (own IP address, root password)
- Allows Consolidation of most workloads

Download Solaris 10 now under the Solaris Express program

Infrastructure Provisioning

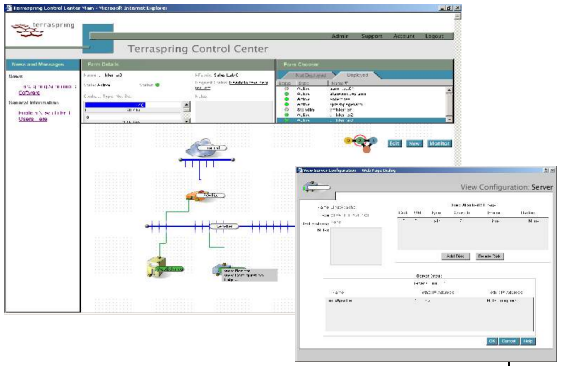
- Shared pools of resources
  - Secure multi-tenancy
- Allocate as needed
- Dynamically shifting
- “Wire Once — Reprovision Forever”
- JumpStart/Flash for Data Centers
- N1™ Grid PS for Blades

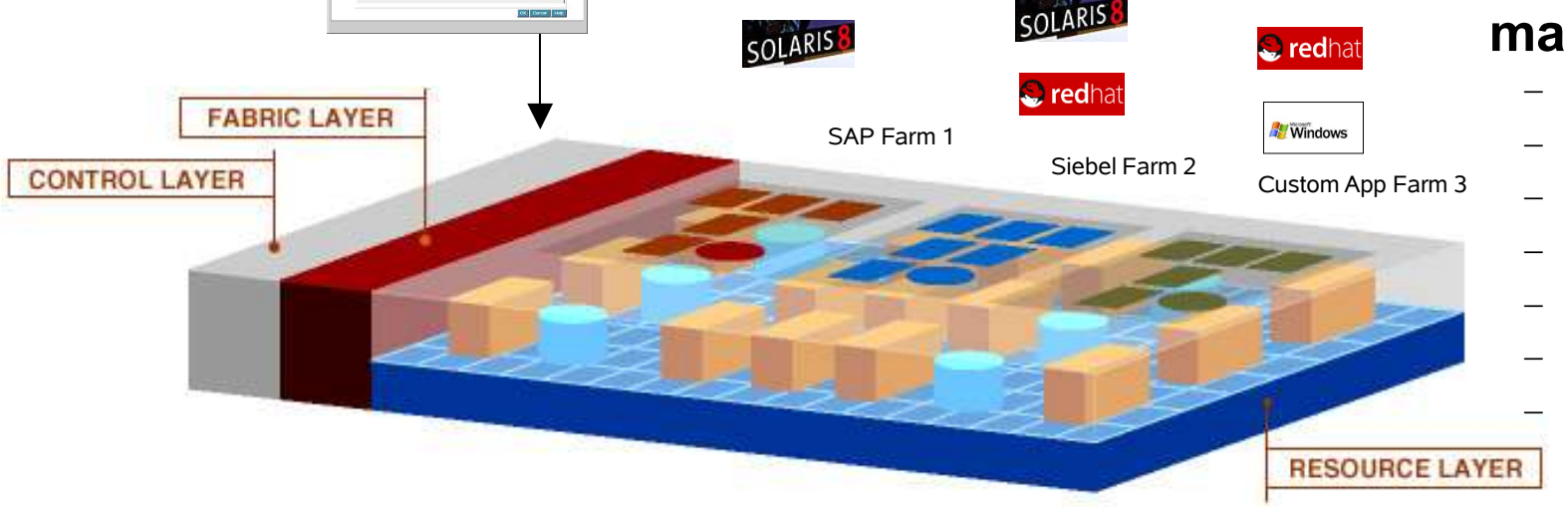
E-to-E Service Architecture



From design to online with no manual intervention

VLANs based on Layer 2 switching enable wire-once soft recabling & automated re-provisioning of heterogeneous compute and storage resources





Infrastructure Lifecycle management

- Design
- Configure
- Template
- Activate
- Monitor
- Flex
- Archive

Editor Screen

Editor Actions

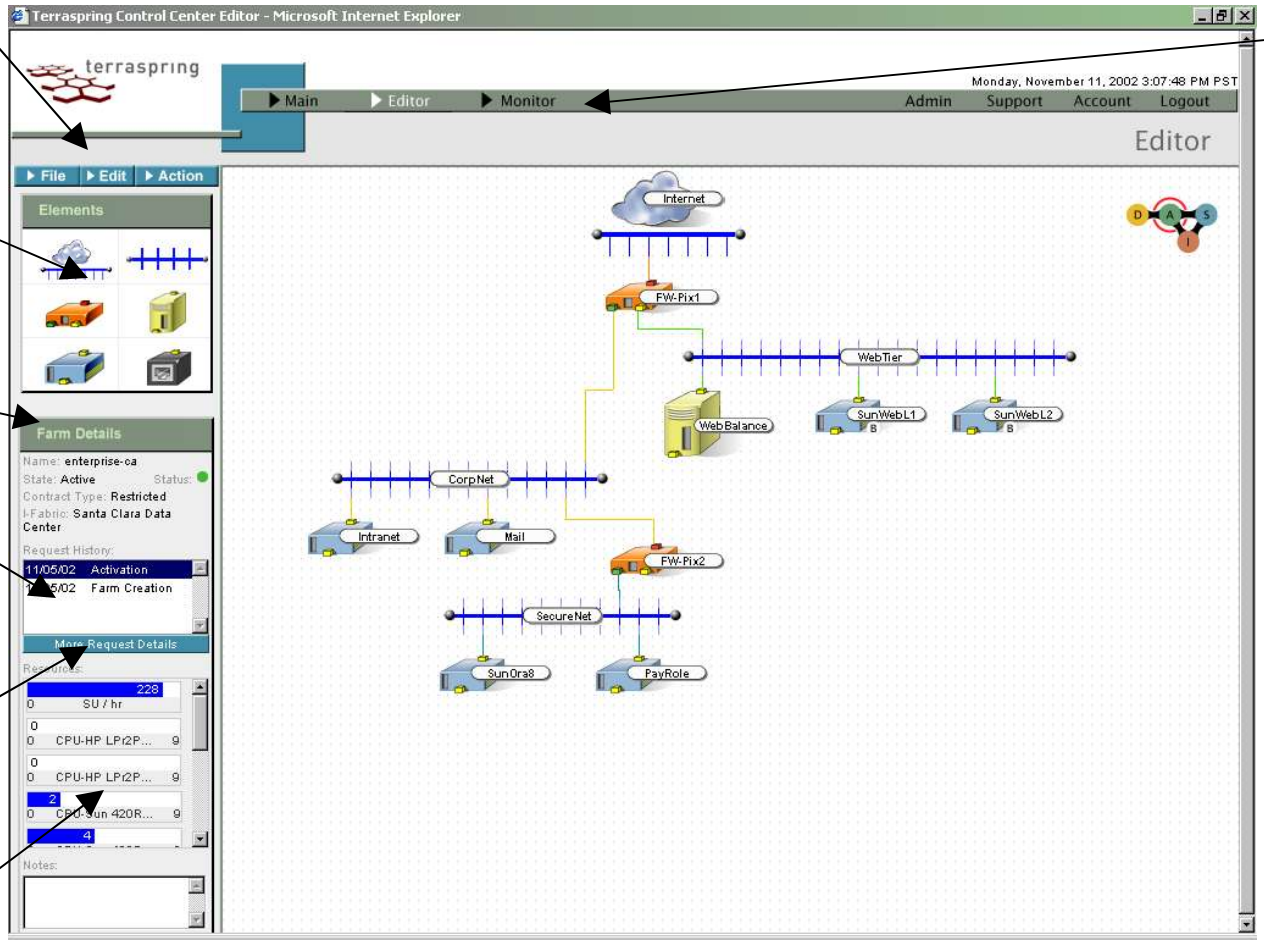
Elements Palette

Farm Details

Request History

More Request Details

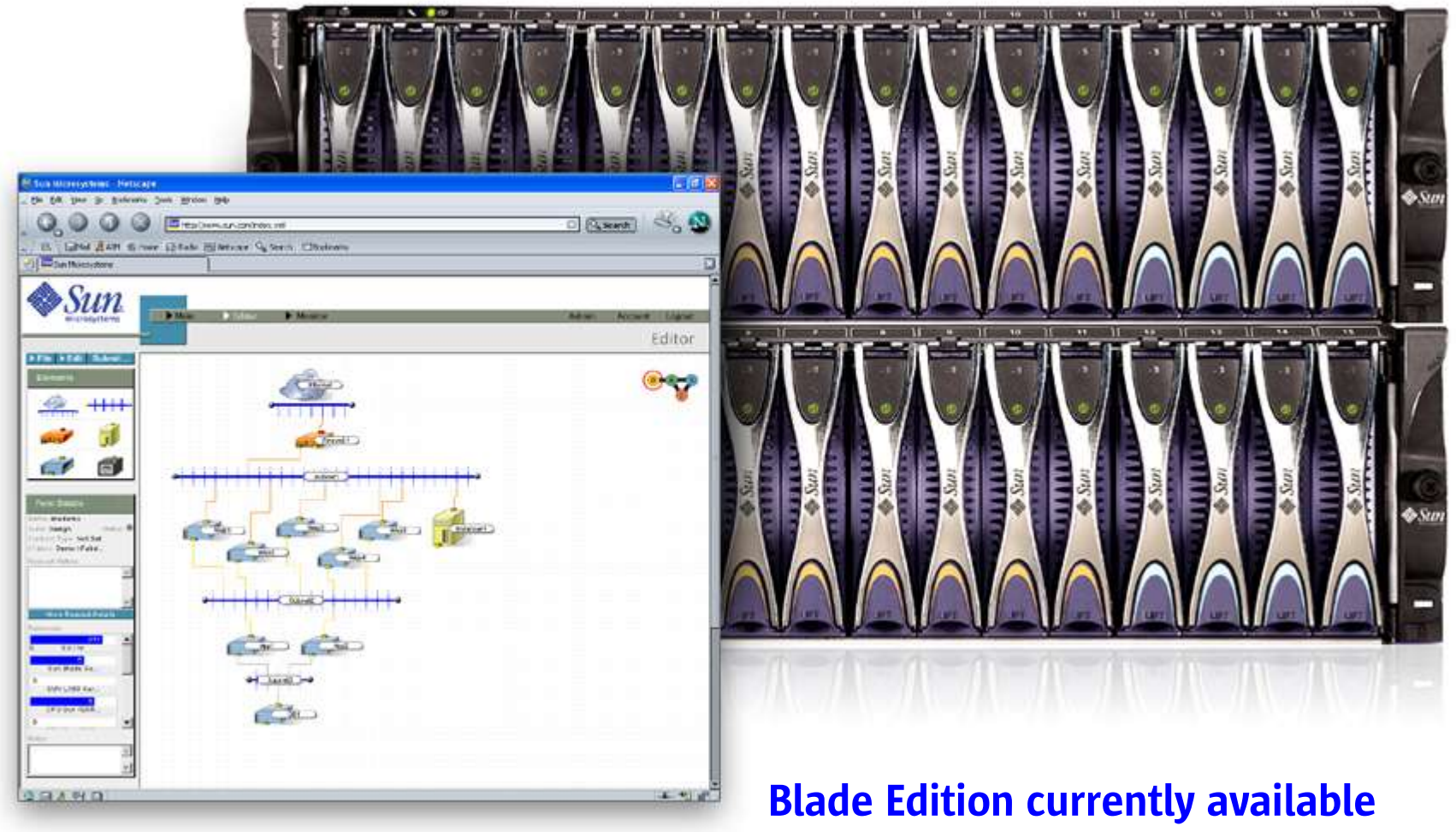
Resource Meter



Navigation

The customer has complete control of topology and applications

N1™ Grid Provisioning Server



Blade Edition currently available

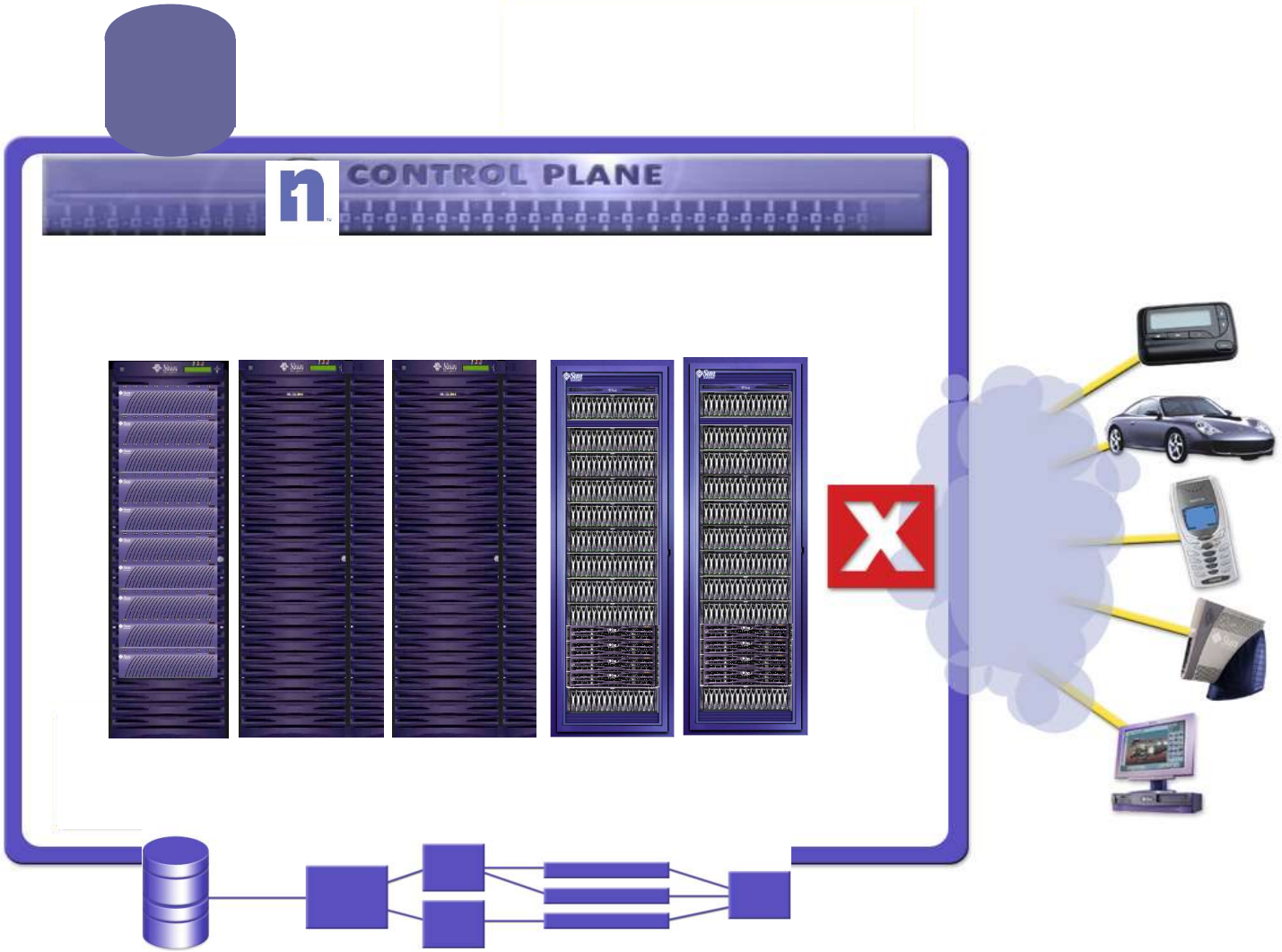
Provision and Virtualize resources

Configure network

Provision storage

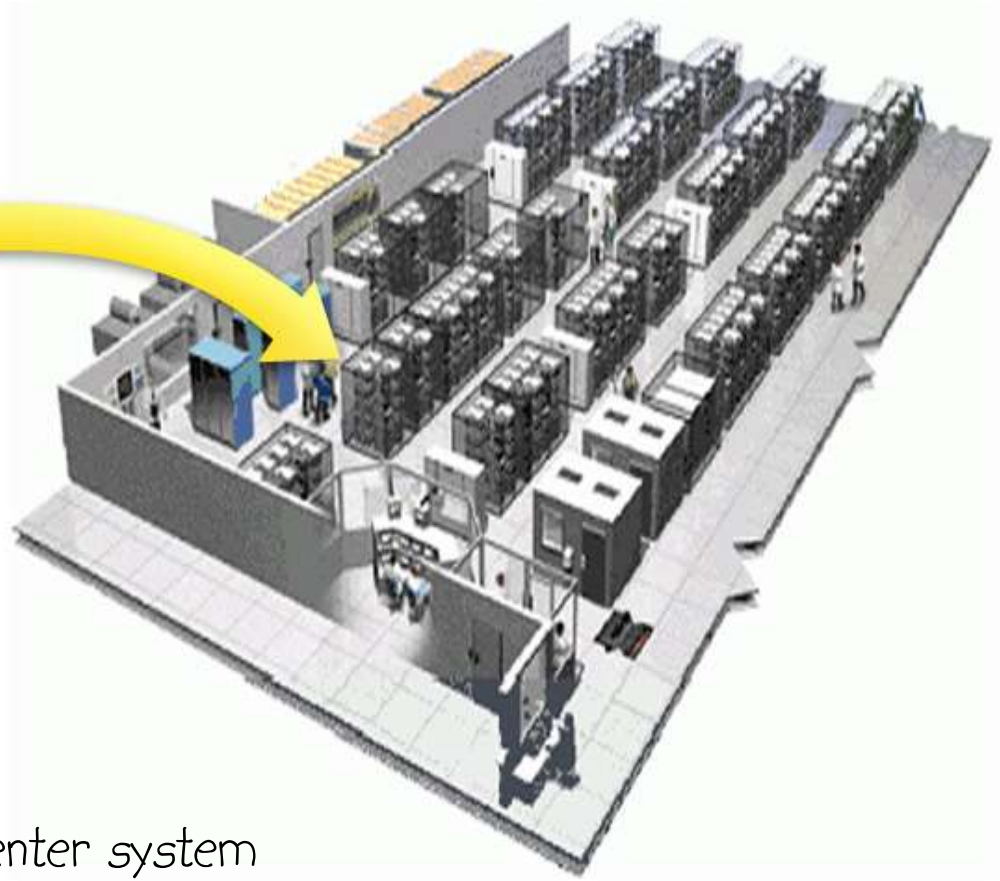
Deploy Images

Ready for apps…



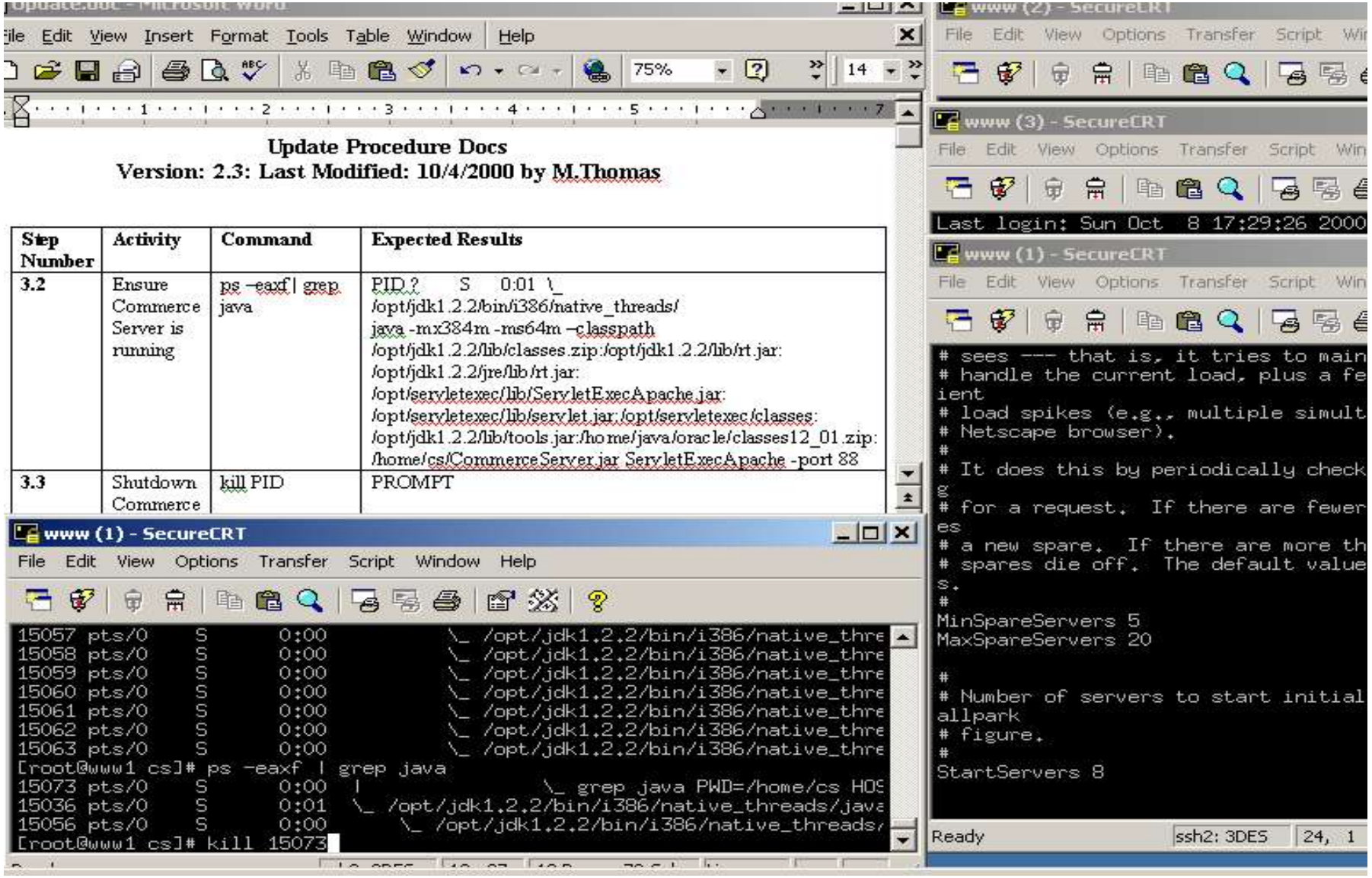
Old Systems Are Components in the New One

Server connected
to networks

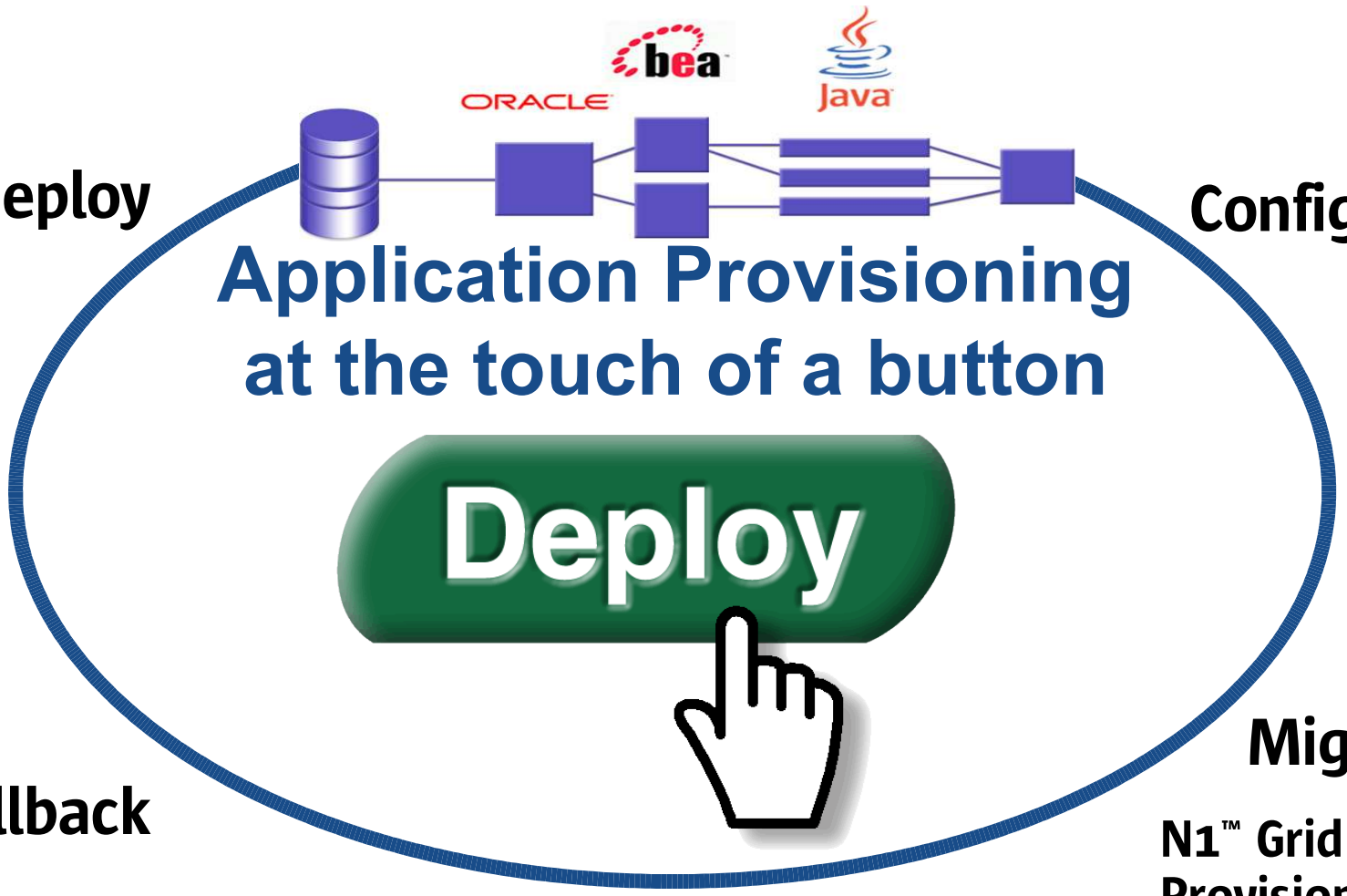


Datacenter system
built from networks

The Typical Method ....



One Touch Application Provisioning



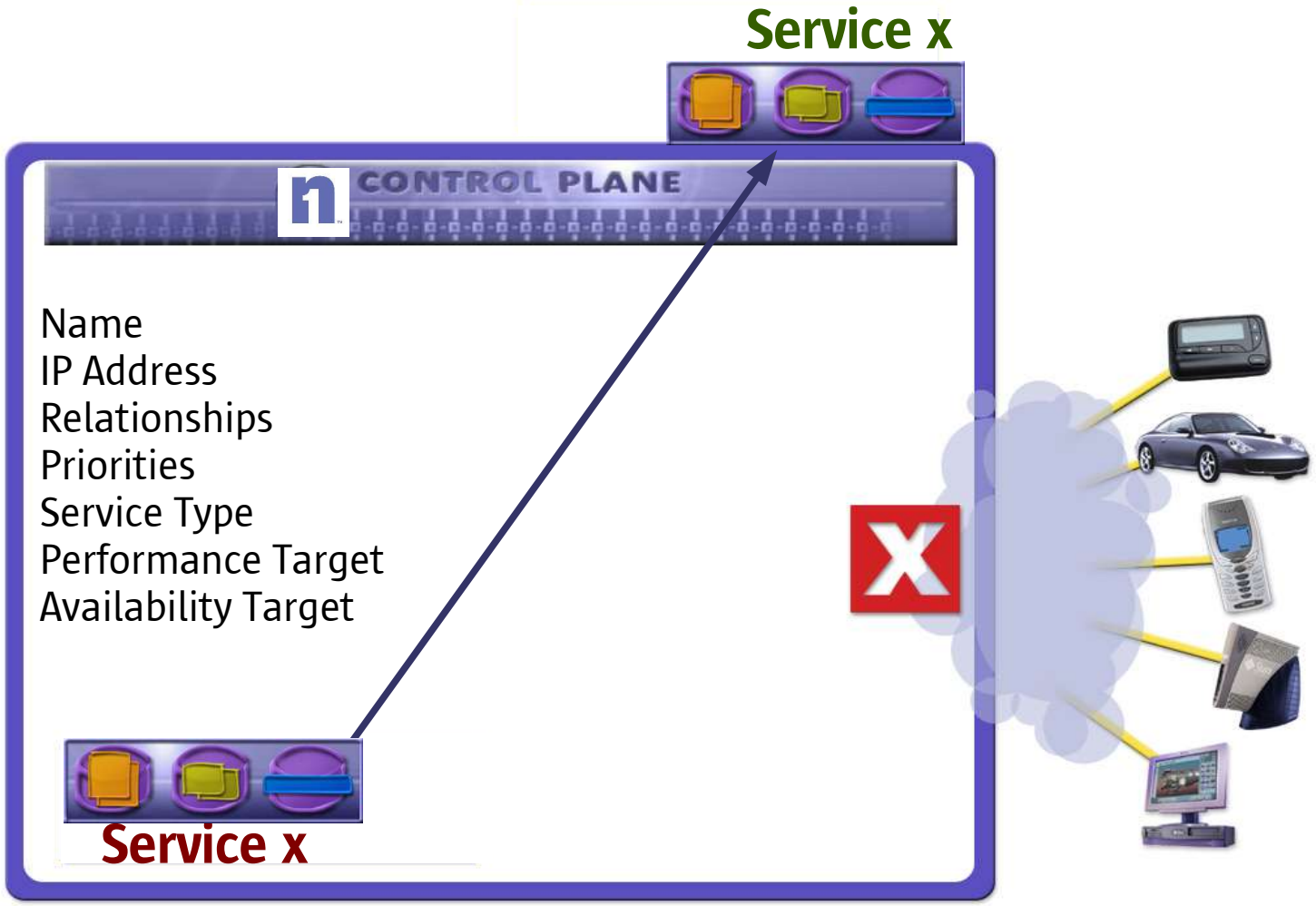
Package Service

Prepare application for deployment

Build application component

Define the service to N1™ GridSPS

Submit service



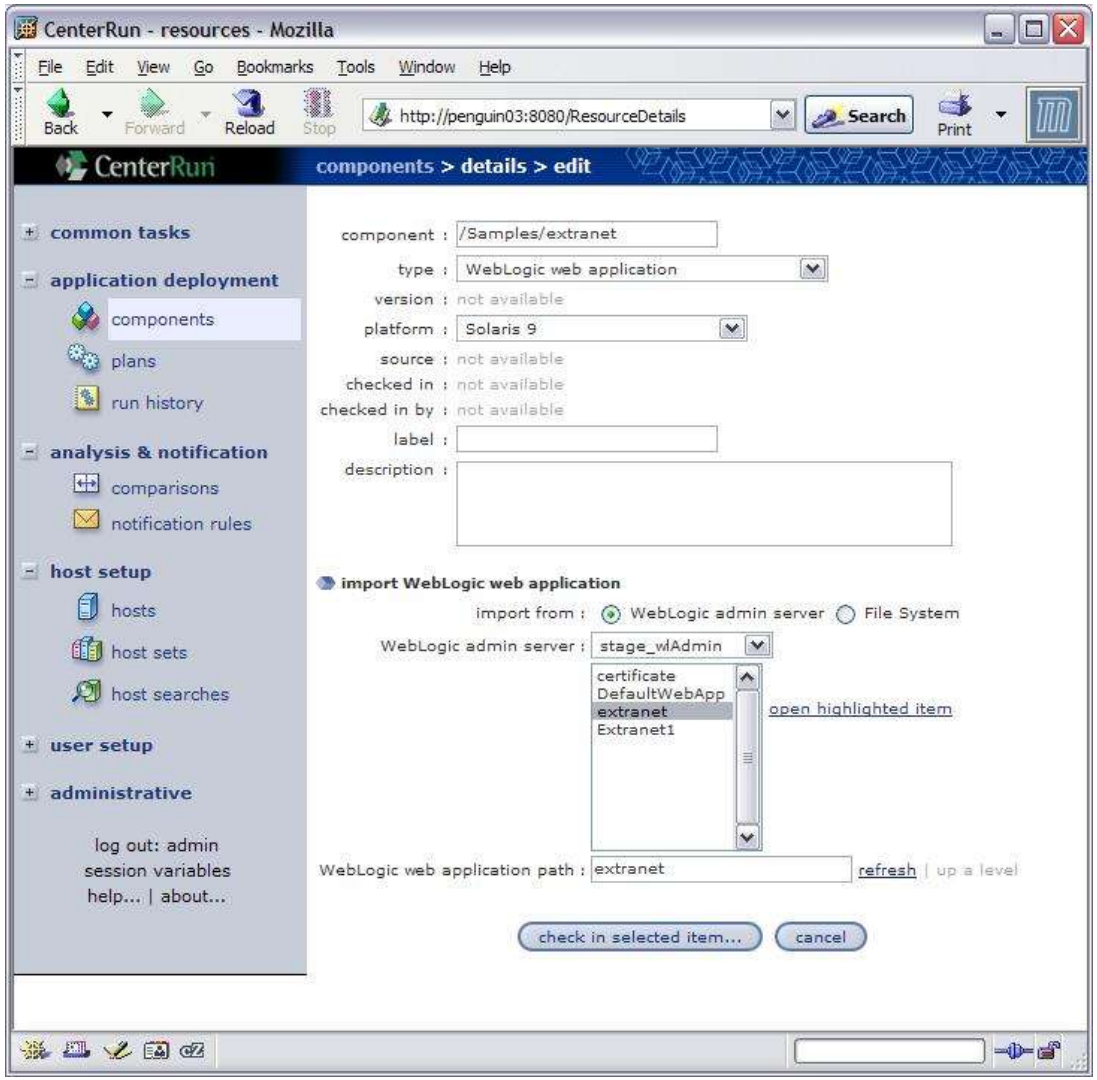
N1™ Grid Service Provisioning Server Feature Areas

- ✓ 1. Application Capture
- ✓ 2. Automated Provisioning
- ✓ 3. Version Control & Reporting
- ✓ 4. Application Comparison
- ✓ 5. CenterRun Administration
- ✓ 6. CenterRun Extensibility

CenterRun™
DATACENTER SOFTWARE

Manage Plans and Components

- ✓ Component-based approach
- ✓ Intelligent check-in from reference servers
- ✓ File system-based check-in from servers



Some Managed Application Technologies

Application Tiers

Custom Code / Content / Configuration

- J2EE Applications
- Enterprise Archive (EAR)
- Web Archive (WAR)
- Java Archive (JAR)

- IIS Web Site
- IIS Virtual Directory
- COM/COM+
- DLL

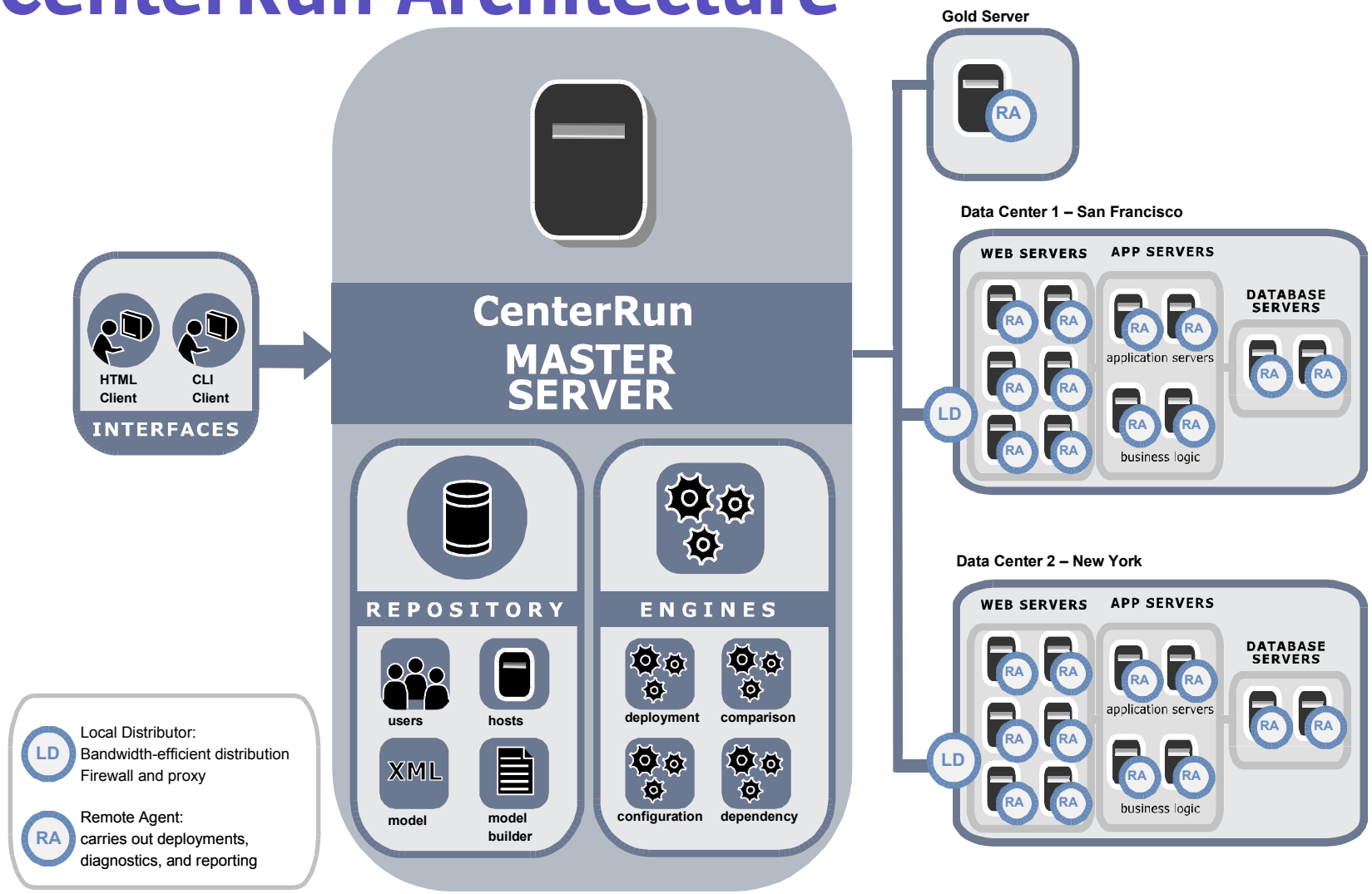
- MSI Application
- Windows Registry Keys
- Windows Data Source
- .Net Assembly

Web Server	Application Server	Database Server
Sun ONE, IIS, Apache	Sun ONE, WebLogic, WebSphere, COM+	SQL Server, Oracle, DB2

Operating System Level

Patch, Hotfix, Service Pack

N1™ Grid Service Provisioning System / CenterRun Architecture

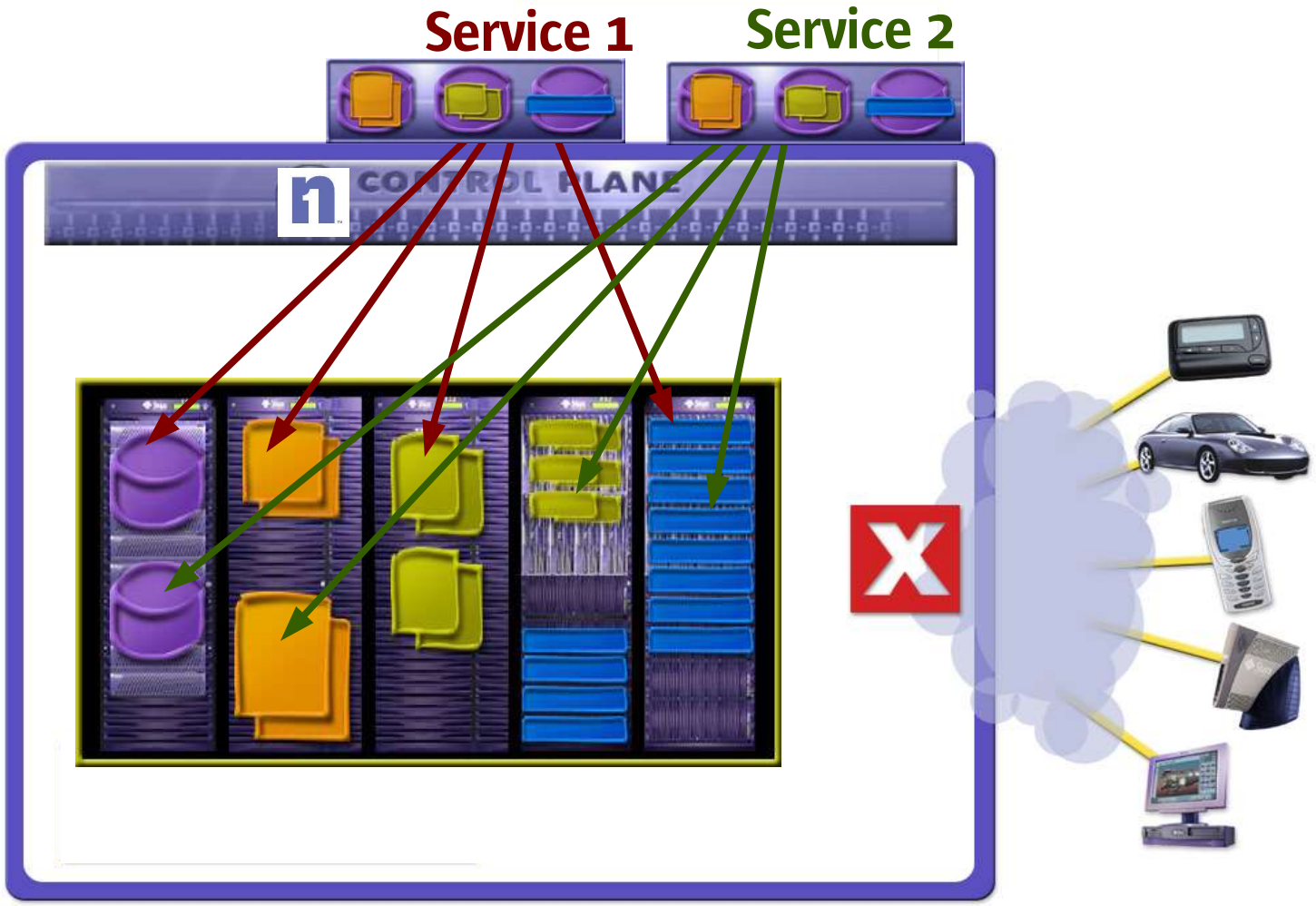


Deploy Services on Virtual Platform

Multiple applications/services sharing platform

N1™ Grid PS provisions storage, compute, and network elements

N1™ Grid SPS provisions applications and services



N1™ Grid Data Platform

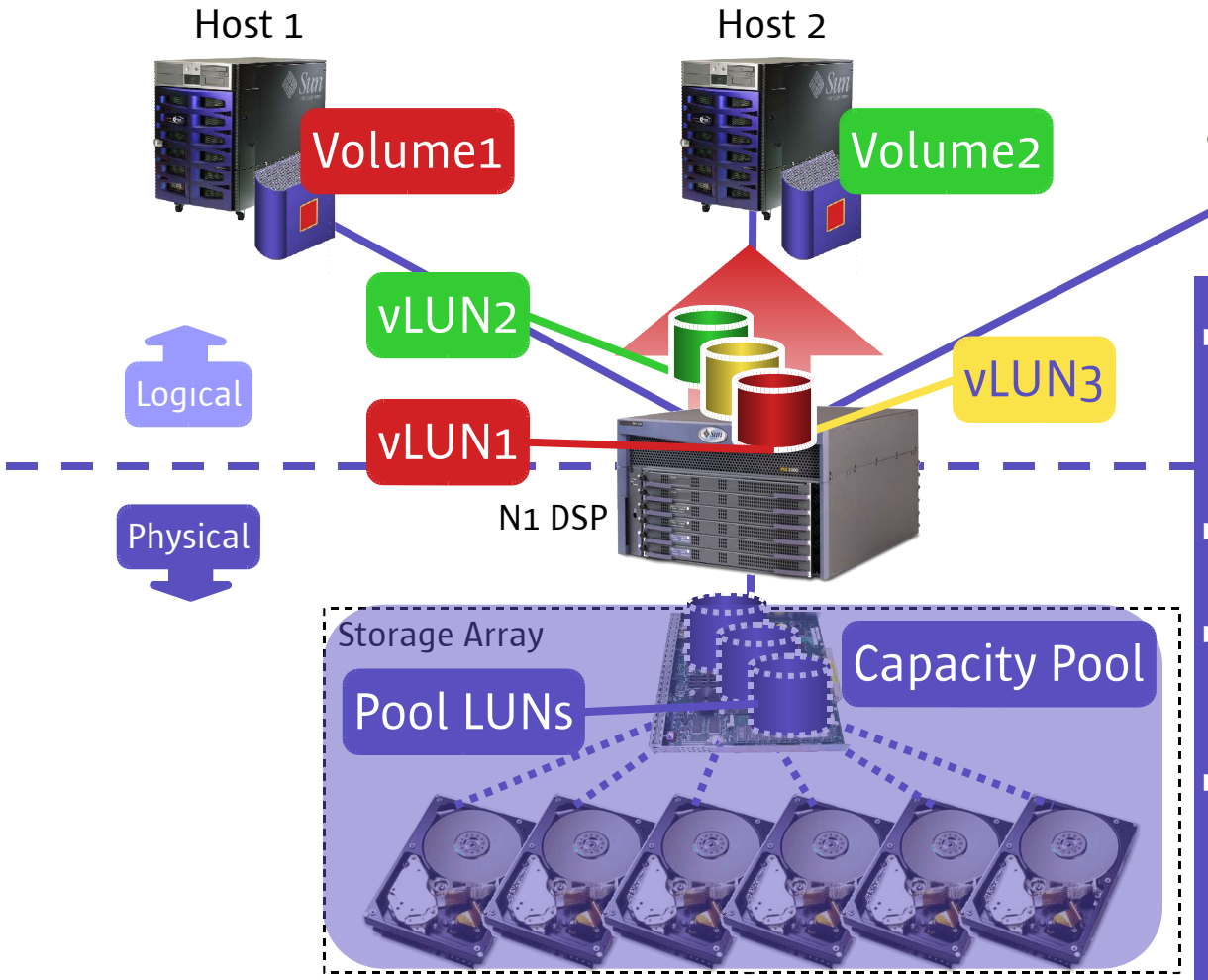
Unifying Storage Management

Pool Heterogeneous Storage

Secure Provisioning

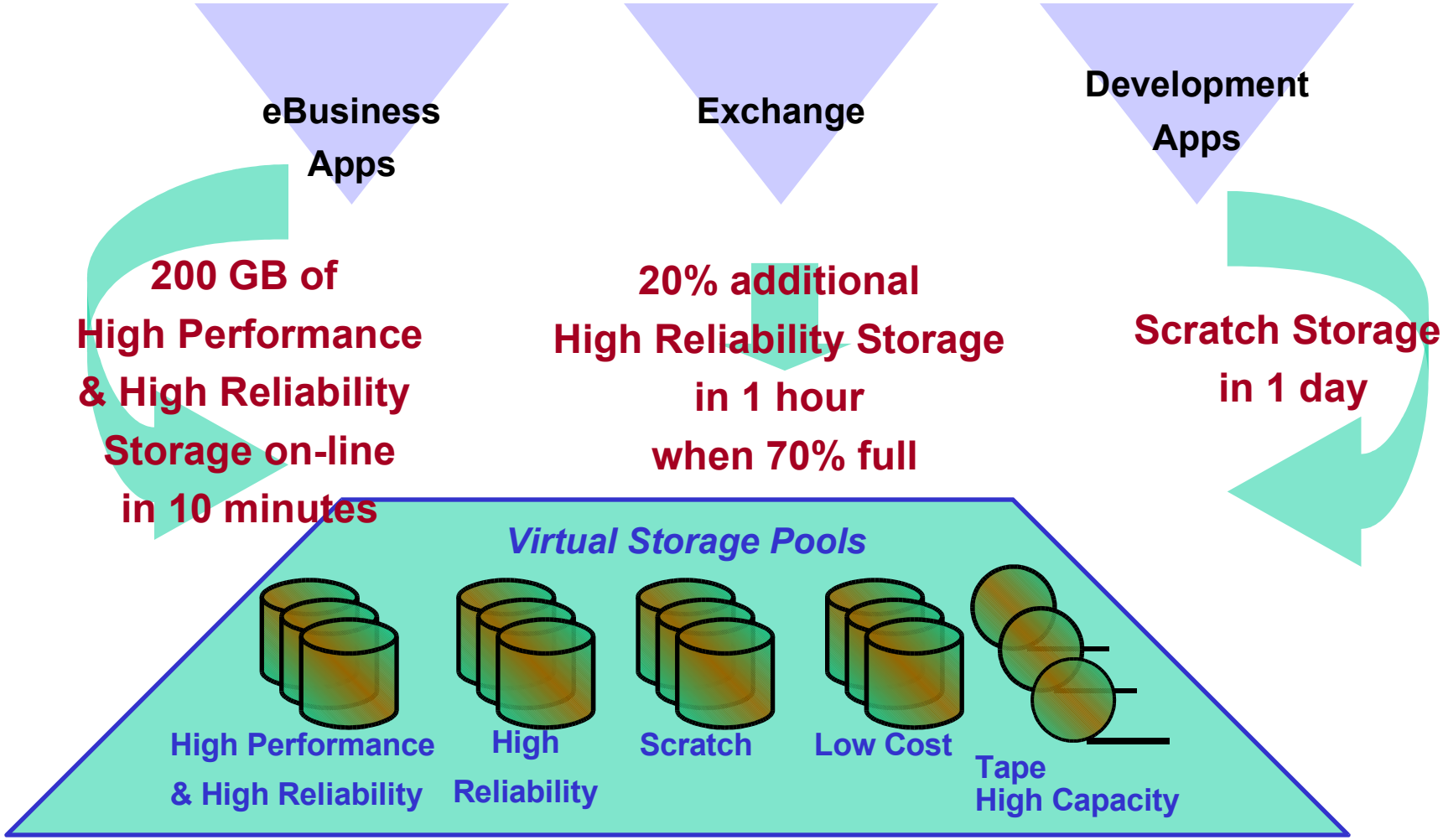
Simplify Management

Host LUNs <>Capacity LUNs

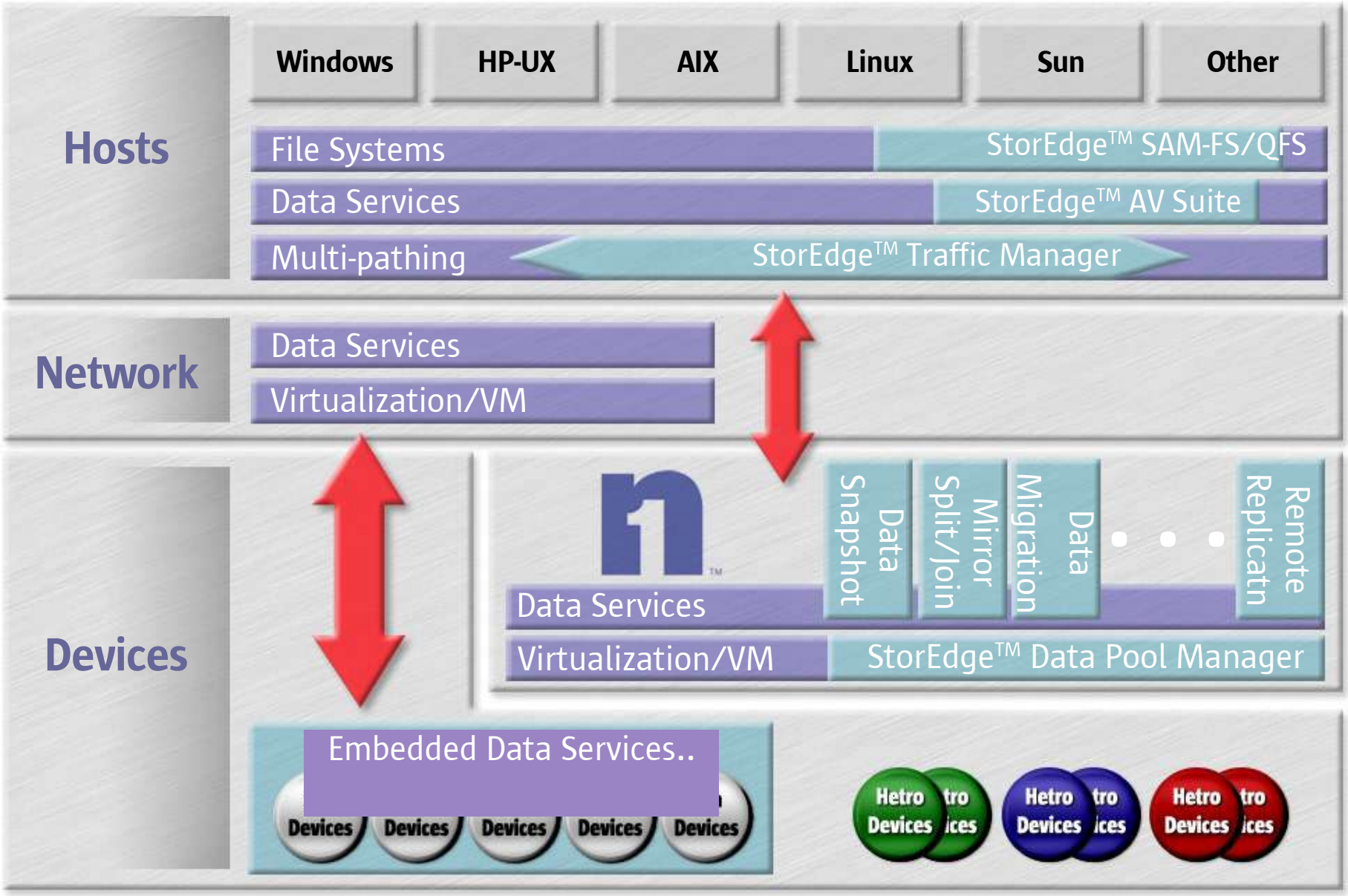


- By introducing a new layer of indirection, logical binding between storage capacity and host volumes is broken
- Virtual LUNs now is provisioning host volumes
- Raw storage resources are classified and added to the storage pool
- Storage pool capacities can be assigned to vLUNs dynamically, enabling more granular storage resources allocation

Storage Provisioning



Sun Data Path Services



N1™ Grid Customers

Customer 1

- Mission critical
- Heterogeneous
- Distributed
- Expected $10.2M saving over 3 years; payback within 6 months

Customer 2

- Shared use environment
- Frequent re-purposing
- Environment setup time down 65%

Customer 3

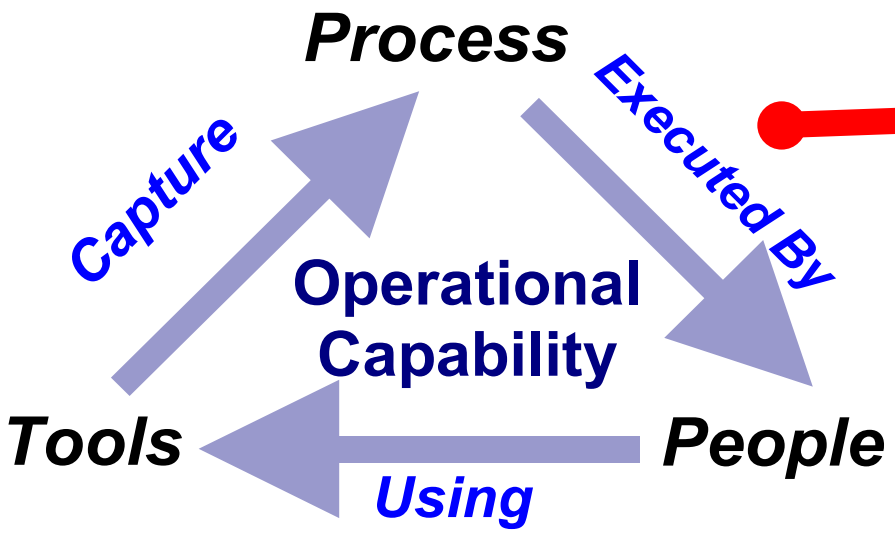
- Mission-critical
- Clearly defined business objectives
- High rate of change
- Service provisioning down from 1 week to 1 day

How do I plan for N1™ Grid?

- What are the relevant CTQs?
  - Measurable Success Factors
- Desired Results from N1™ Grid…
  - Operational Efficiency
    - Automate Common Tasks
    - Provide Standardization
    - Increase Density
    - Decrease Time to Deploy/Market
    - Provide Service Mobility (N1™ Grid PS/CenterRun/…)
  - These Provide…
    - Increased Strategic Flexibility
  - Think about process…

Today, N1™ Grid requires Operational Maturity

and N1™ Grid improves Operational Maturity



Focus here

Advance here

- 4- IT / Business metric linkage
- 3- Service level management
- 2- Proactive management
- 1- Event driven management
- 0- Chaotic, minimal IT operations

Gartner Management Maturity Model

Define Processes via Use Cases

- Concentrate on "what", not "how"
- Capture requirements in terms of behavior
- Identify clear roles and responsibilities
- Abstract design from implementation

Sun Financial Utility offerings:

Flexible acquisition programs which extend traditional lease

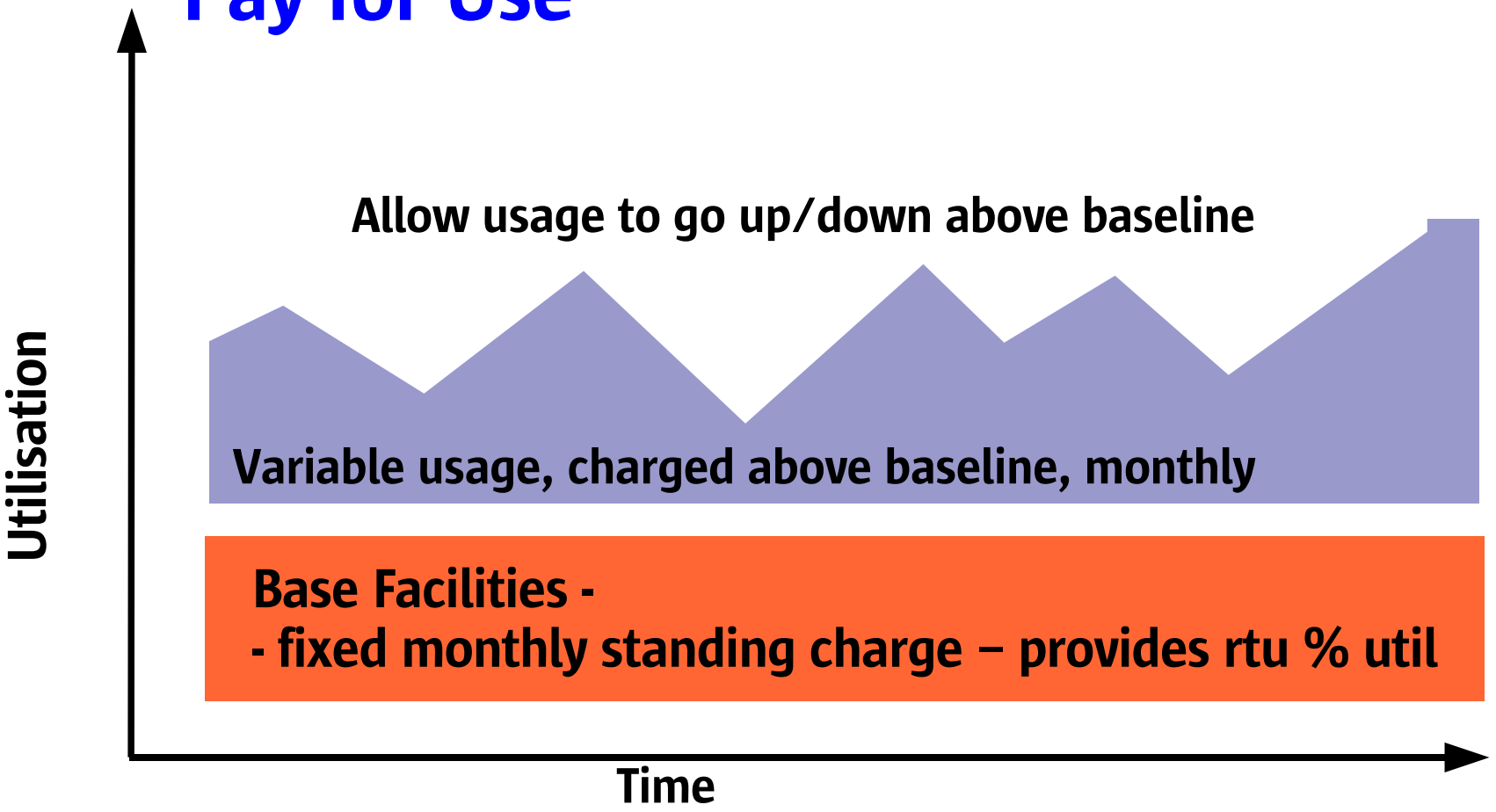
- Capacity on Demand
- Sun Power Units – Pay for use

Capacity on Demand - COD

- Warm standby CPU/memory board option at reduced acquisition costs
- Applies to entire Sun Fire range
- Purchase RTU when required - no downtime upgrade
- T-COD is a temporary RTU license for cyclical loads

See http://www.sun.com/datacenter/cod/

Pay for Use



See http://www.sun.com/service/utility/index.html

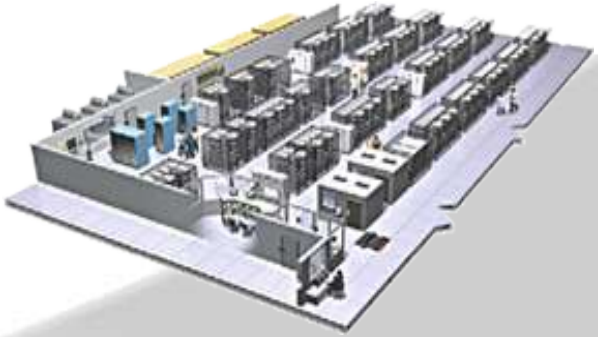
People changes

- Requires Operational maturity before processes are automated
- Requires cultural change so that End Users move away from owning the hardware
  - Data Center owns the HW
    - Charges out to Users on a pay-per-use
    - Moves applications and data when needed, transparently to Users.
  - Systems are procured and configured as identically configured resource units. Configure for flexibility not for today's workload.

N1 Utility available today

Solaris 8 Metering
N1 Grid Server Provisioning Server – Blade Edition
N1 Grid Service Provisioning System
Solaris 9 N1 Grid Containers
COD, T-COD, Sun Power Units
N1 Data Manager
N1 Consulting Services

N1 Grid
Data Centers



Enable the Data Center
for the N1 Grid

Today

Rolling out soon

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http://www.sun.com/n1

Sun microsystems
We make the net work.