HP WORLD 2004
Solutions and Technology Conference & Expo

Increasing Your Return on IT Investment by Virtualizing Your Server Resources

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Agenda

- Adaptive Enterprise and virtualization

- Overcoming virtualization issues:
  - Making sure the right applications receive the right resources at the right time
  - Ensuring a degree of isolation between workloads
  - Allowing for additional resources when and if they are needed
  - Maintaining a high degree of availability while fully utilizing resources
  - Ensuring a strong fit with good management practices

- Making it Real

" Use of virtualization technologies in servers will dramatically improve server utilization rates, increase server flexibility and reduce the overall spending required for servers…Virtualization should become an ongoing effort and part of the server strategy for every enterprise."
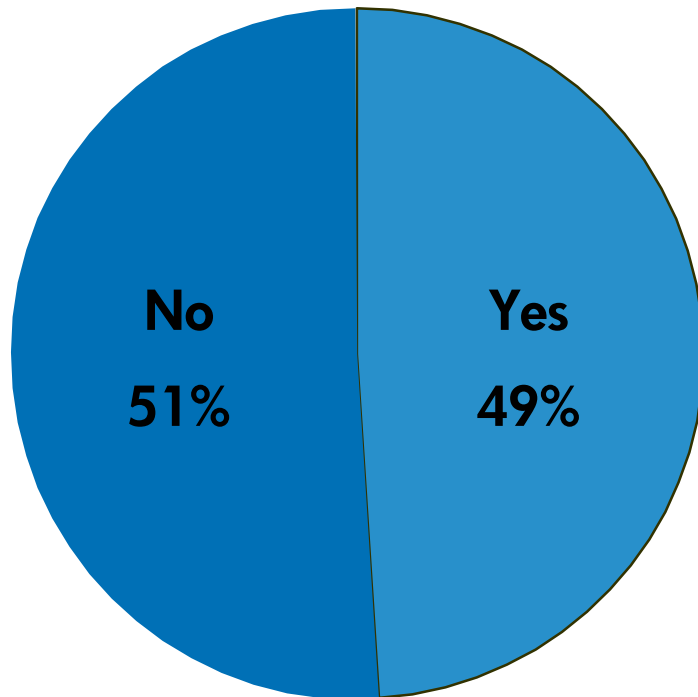
Gartner

Server Virtualization Evolves Rapidly, **2003**

Virtualization Solutions. Enabling the Adaptive Enterprise.

Forrester, *Firms Embark On Virtualization In 2003*, June 2003

Will your company likely undertake a virtualization project in the next 12 months?

No 51%   Yes 49%

Which of the following infrastructure projects will your company likely undertake in the next 12 months?

Storage virtualization only — 15%

Both storage and server virtualization — 47%

Server virtualization only — 38%
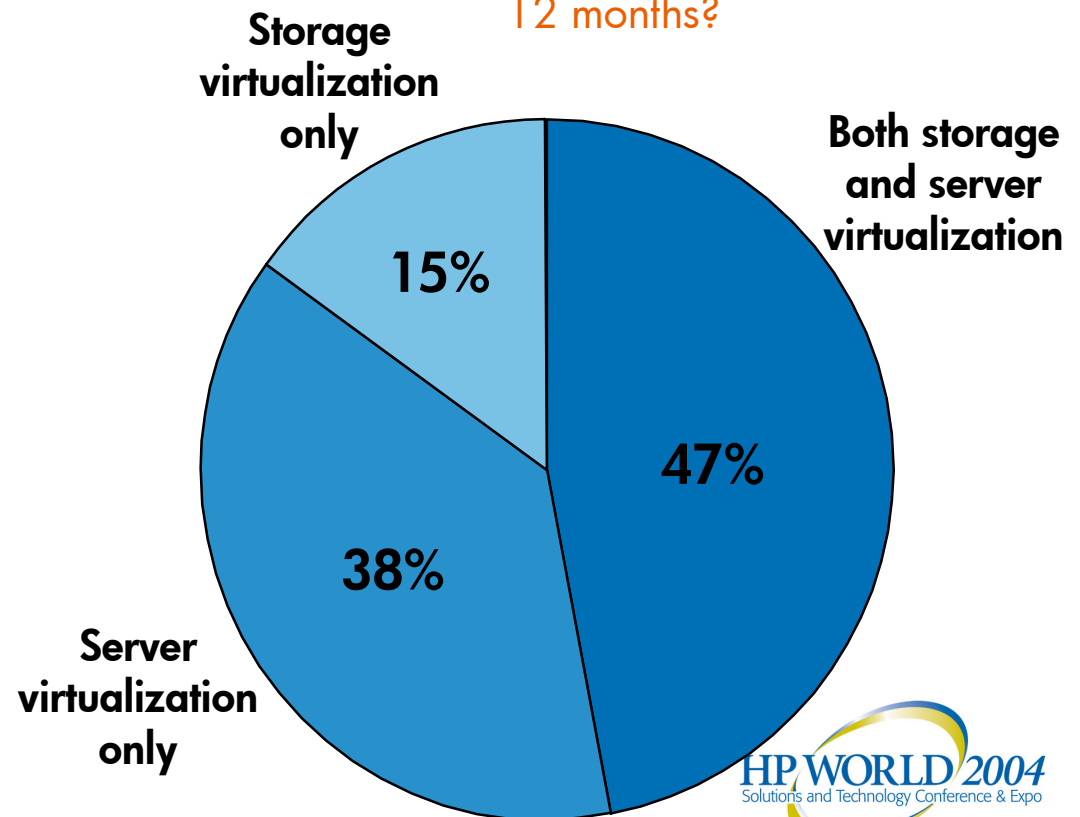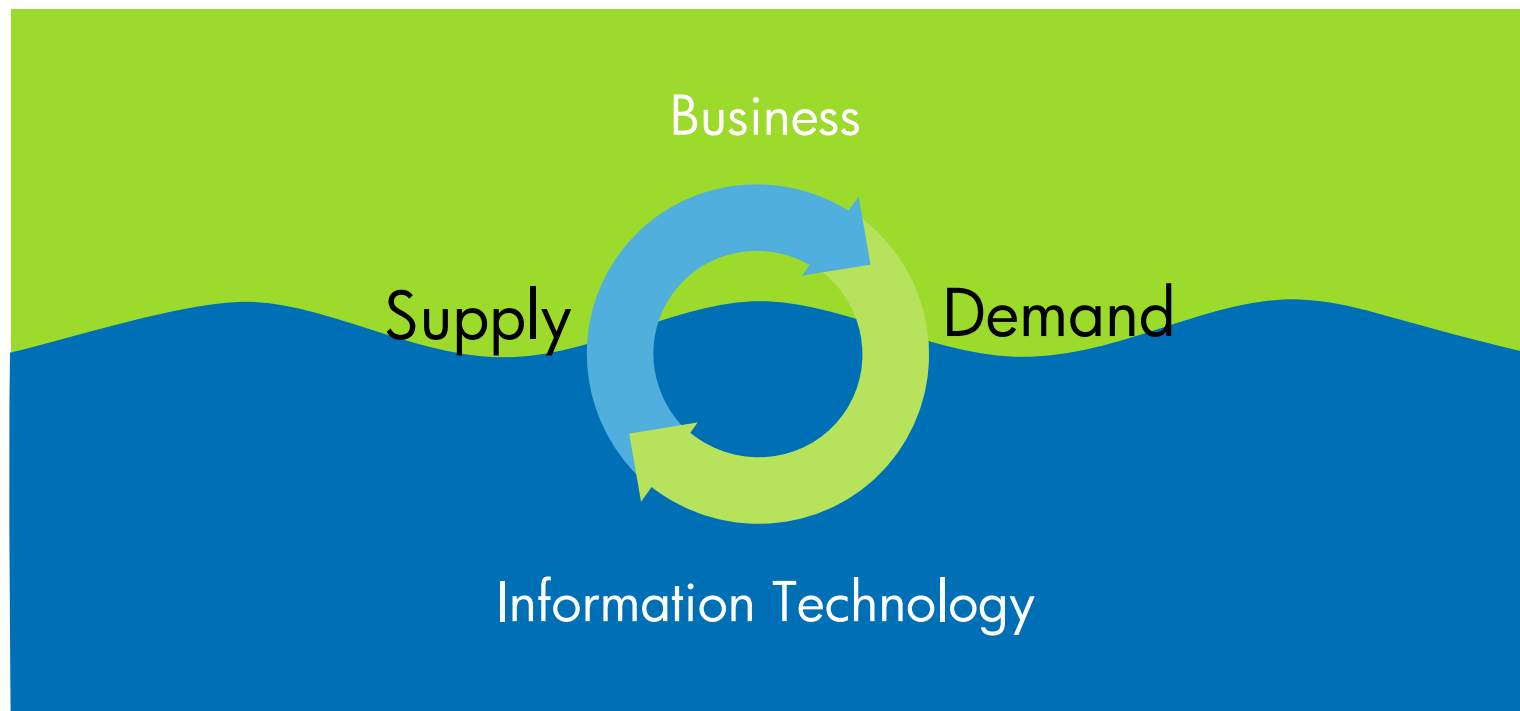
The Adaptive Enterprise

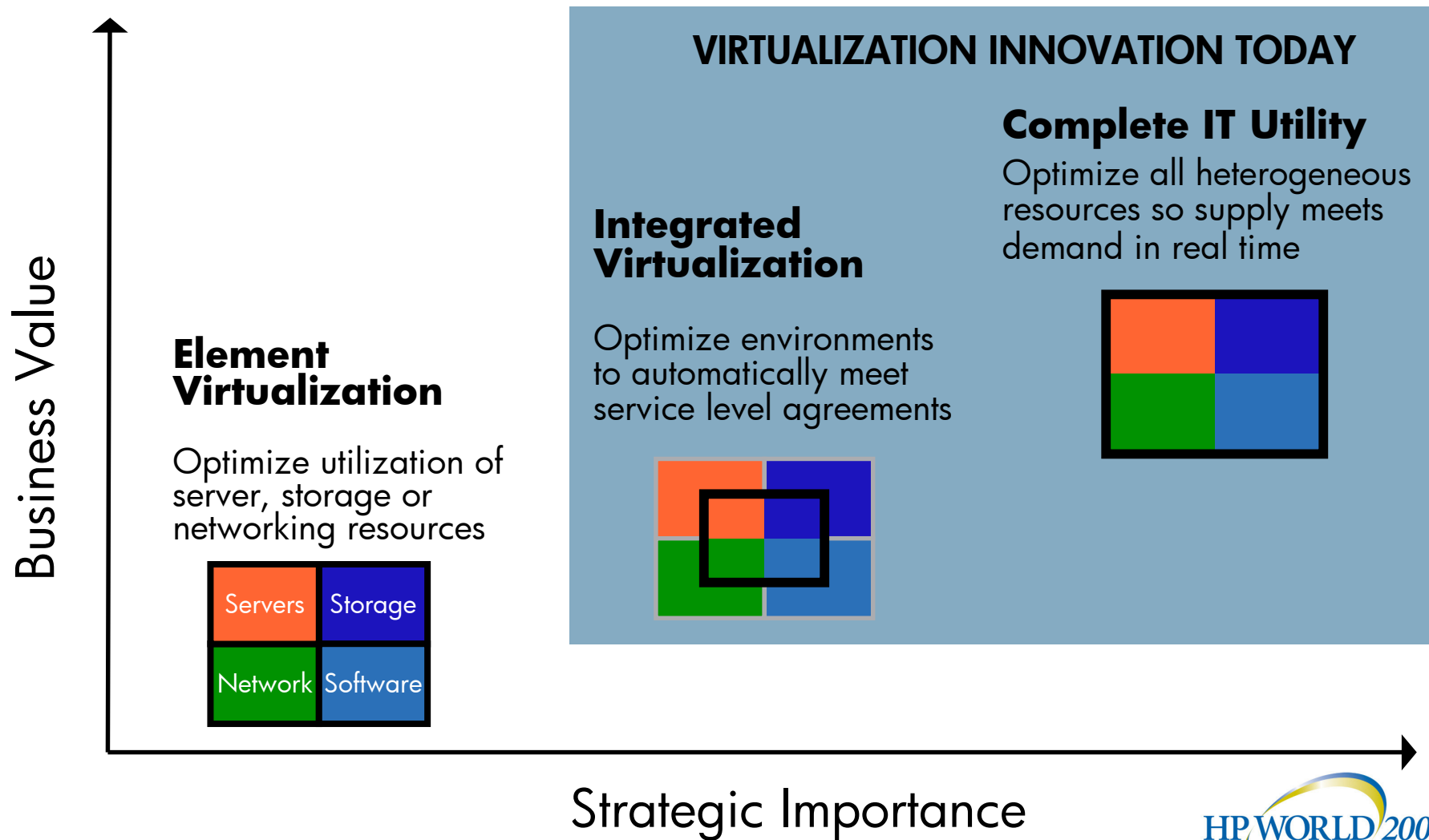Business and IT synchronized to capitalize on change

Business benefits: simplicity, agility, value
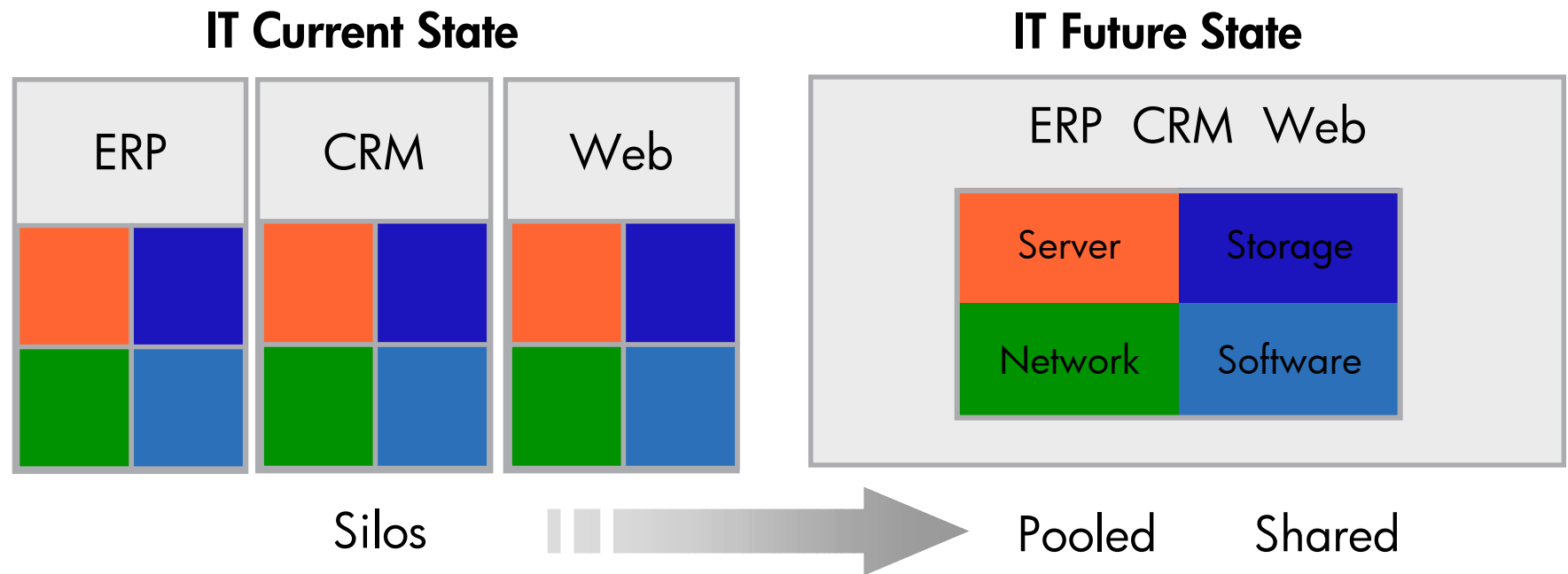
HP's Definition of Virtualization

An approach to IT that pools and shares resources
so utilization is optimized and
supply automatically meets demand

HP virtualization spectrum:
Optimizing resources from desktop to datacenter

Business Value →

VIRTUALIZATION INNOVATION TODAY

Complete IT Utility

Optimize all heterogeneous resources so supply meets demand in real time

Integrated Virtualization

Optimize environments to automatically meet service level agreements

Element Virtualization

Optimize utilization of server, storage or networking resources

Servers	Storage
Network	Software

Strategic Importance

The benefit: Reduce costs and increase agility simultaneously

IT Current State

ERP	CRM	Web

Silos

IT Future State

ERP CRM Web

Server	Storage
Network	Software

Pooled   Shared

Silo IT – inefficient

- Fixed capacity and cost
- Under-utilized + over-provisioned
- Complex and difficult to change

Virtual IT – agile

- Dynamic capacity – pay per use
- Optimized resources
- Simplified and flexible

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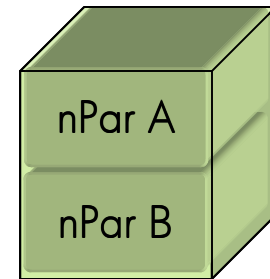# HP Virtual Server Environment in action
Usage scenarios

A

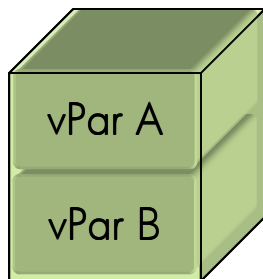Optimizing cluster utilization within a data center

B

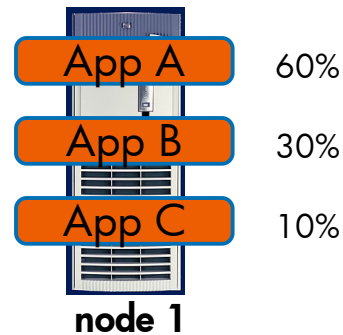Optimize utilization across data centers for disaster tolerance

C

nPar A

nPar B

Consolidating multiple production environments on the same server

D

vPar A

vPar B

Consolidating of test/ dev and production on the same server

E

App A 60%

App B 30%

App C 10%

node 1

Consolidation through application stacking within the same OS image

F
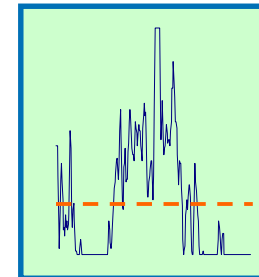
- Instantaneously available resources for a growing environment - iCOD
- addressing high fluctuation

# How to know if server virtualization is right for you…

- CEO/CIO drive for increase ROI on IT spend

- Measured on Service level objectives (SLOs)

- IT viewed as a service/partner to help achieve business goals

- Consolidation of servers is a priority

- Strong centralized or LOB IT function control

- Strong server management practices in place

- Different applications have different priorities

- Workloads peak at variable times

- Servers are generally under-utilized

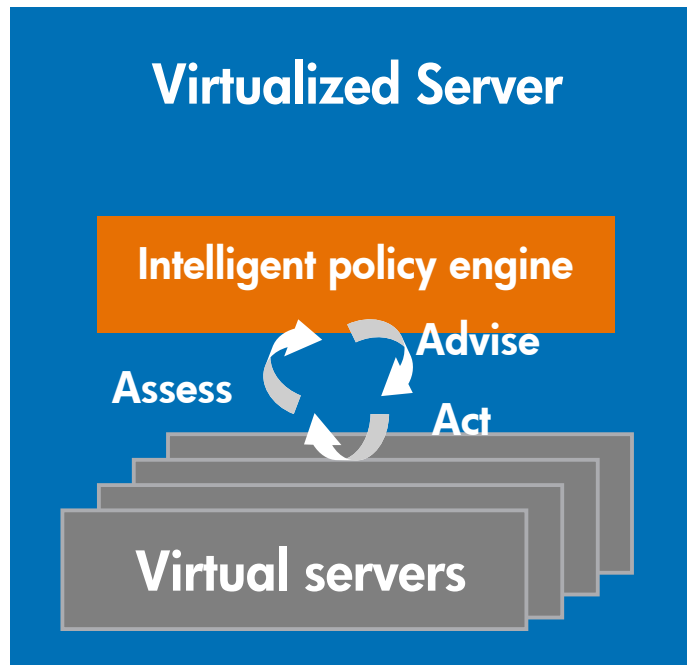# Challenge: Enterprises have unused server capacity yet still can't meet demand

Utilization at an actual HP customer

Tremendous amount of unutilized capacity

Yet these systems are unable to handle the load
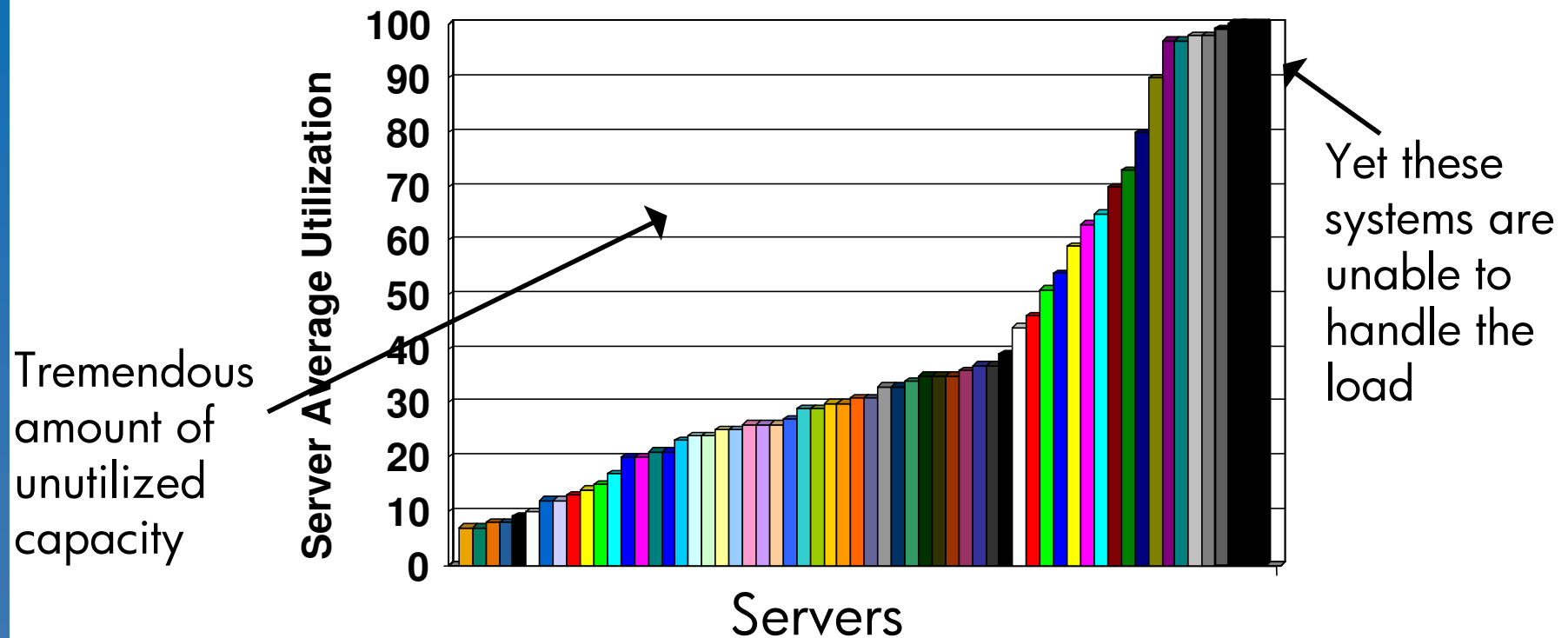
Most reports put average utilization at approx 30%

A Virtualized Server should…

Virtualized Server

Intelligent policy engine

Advise

Assess

Act

Virtual servers

- **Increase resource utilization**
  - Dynamic resource allocation

- **Maintain continuous service levels**
  - Simple policy management and highly available

- **Allow you to pay only for what you use**
  - Utility pricing

Consolidate and virtualize server resources
for optimum utilization

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Overcoming Server Virtualization Issues…

- Making sure the right applications receive the right resources at the right time

- Ensuring a degree of isolation between workloads

- Allowing for additional resources when and if they are needed

- Maintaining a high degree of availability while fully utilizing resources

- Ensuring a strong fit with good management practices

Making sure the right applications receive the right resources at the right time…

An SLO consists of:

group A

min CPU: 20%

max CPU: 50%

- A workload (e.g. partition)
- Constraints (min, max CPU)
- A goal (including app-specific metrics)
- Priority
- Conditions (time of day, event, etc)

group A receives 3 shares for each additional user

policy applies 9am to 5pm AND when ServiceGuard package XYZ

Making sure the right applications receive the right resources at the right time…

Examples of Service Level Objectives (SLOs)

Application A	Application B	Application C
Response time SLO	**Response time SLO**	**Job duration SLO**
Transactions will complete in less than 2 seconds.	Transaction will complete in less than 3 seconds	Batch job will finish in less than 1 hour.
Priority 1	Priority 2	Priority 3

Workload management should <u>automatically</u> reconfigure CPU resources to <u>satisfy SLOs</u> in <u>priority order</u>, based on <u>business goals</u>

Ensuring a degree of isolation between workloads…

Hard partitions with multiple nodes	Hard partitions within a node	Virtual partitions within a hard partition	Resource partitions w/in a single OS image
Clusters	**Hard Partitions**	**Virtual partitions**	**Resource Partitions**
– Complete hardware and software isolation – Node granularity – Multiple OS images	– Hardware isolation per cell – Complete software isolation – Cell granularity – Multiple OS images	– Complete software isolation – Dynamic CPU migration – Multiple OS images	– Dynamic resource allocation – Share (%) granularity – 1 OS image

Isolation
highest degree of separation

Flexibility
highest degree of dynamic capabilities

Customer example: Consolidating BEA WebLogic Server

Large Financial Services Company

- 29,000 employees in 40 countries
- 82-year history
- Earned nearly $1.8 billion in 2001

Superdome partition

| default PSET | workload PSET 1 | workload PSET 2 |
| 0 1 2 3 | 6 5 | 7 4 |

other workloads and spare capacity

WebLogic 1
queue = 37
free threads = 0

WebLogic 2
queue = 0
free threads = 4

WLM WebLogic toolkit | WLM WebLogic toolkit

Workload Manager

Solution

- Processor Sets (pSets) provide the optimal performance and throughput for WebLogic-based applications

- Workload Manager will dynamically resize processor sets for optimal performance

Results

- Improved utilization while maintaining service levels

- 40 % time-to-production reduction
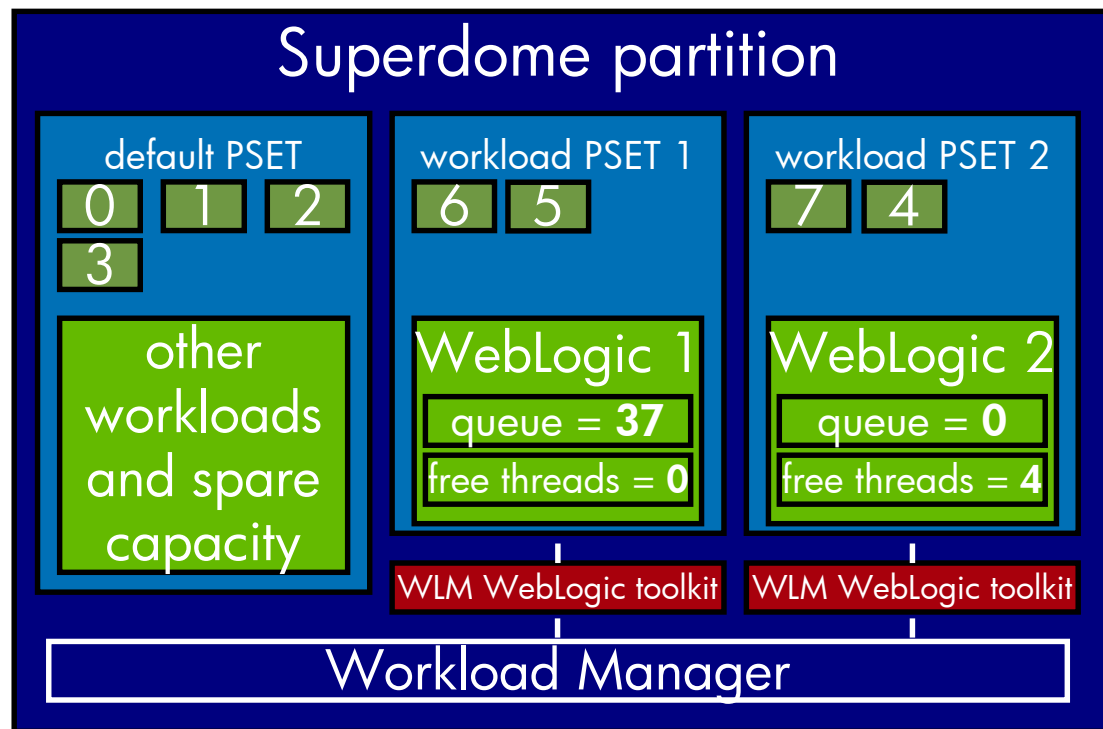
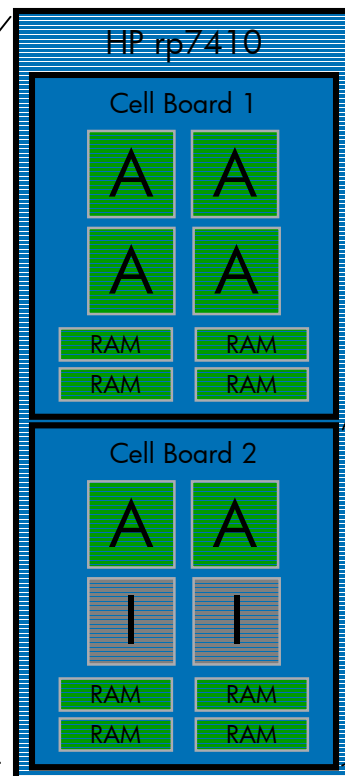# Allowing for additional resources when and if they are needed...

Single Physical Node
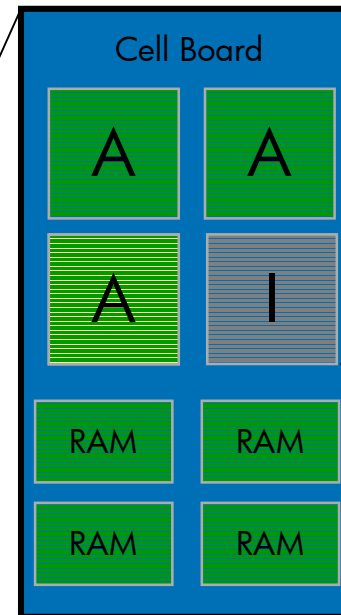e.g. single 8-CPU HP rp7410

Cell Board level
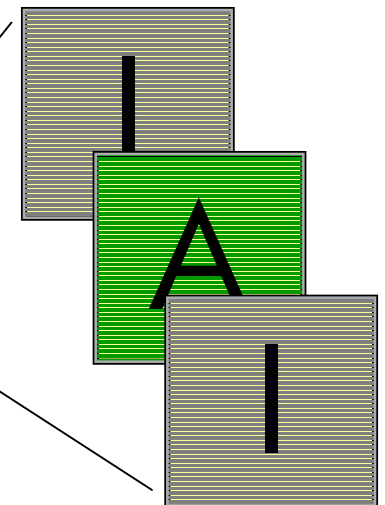Inactive cell board containing four dormant CPUs

Component Level
One or more inactive CPUs per cell board

Temporary
Temporary use (30 days/ 720 hours) of iCOD CPUs

HP rp7410

Cell Board 1

| A | A |
| A | A |

| RAM | RAM |
| RAM | RAM |

Cell Board 2

| A | A |
| I | I |

| RAM | RAM |
| RAM | RAM |

Cell Board

| A | A |
| A | I |

| RAM | RAM |
| RAM | RAM |

I

A

I

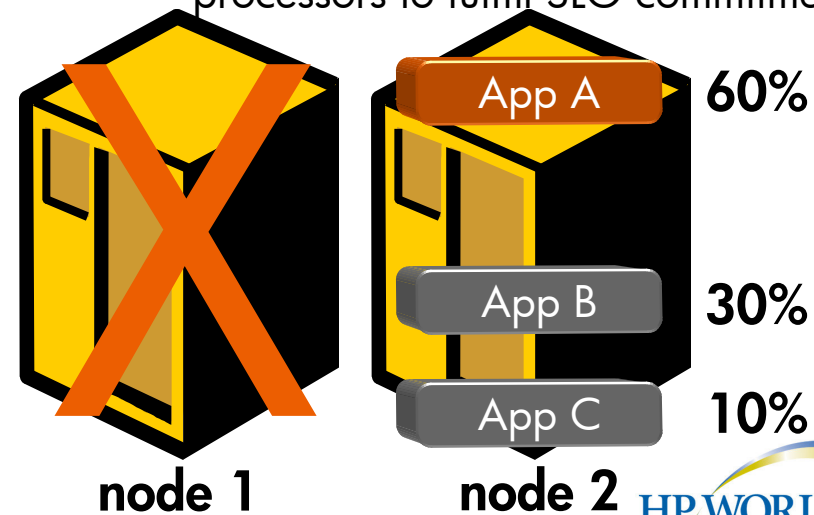A = Active
I = Inactive

Granularity / Flexibility

Maintaining a high degree of availability while fully utilizing resources…

- **HA**
  - analyzes new infrastructure configuration
  - automatically moves package(s)
- **Workload Management**
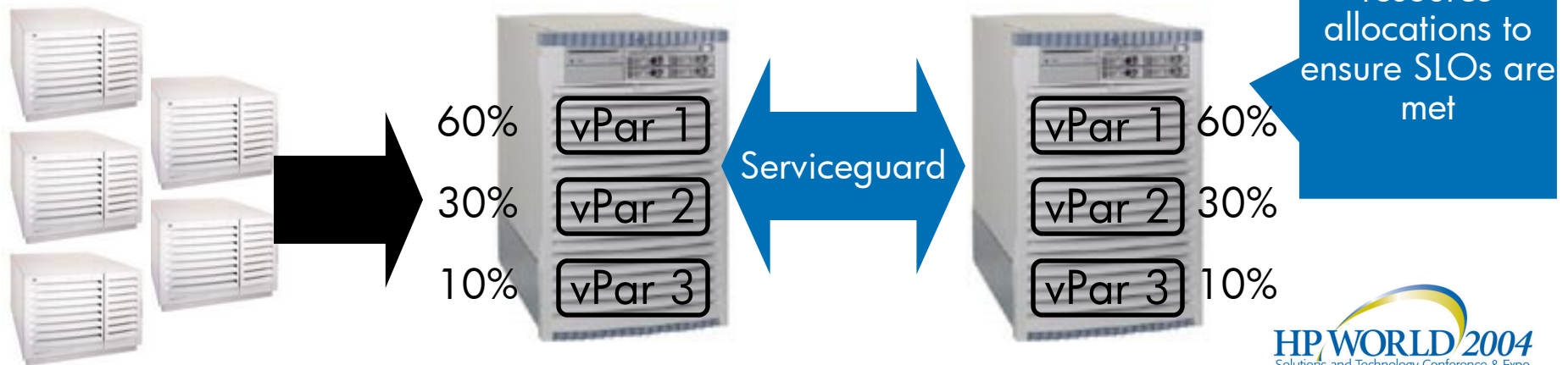 - automatically aware of new package
  - re-priorities packages & resources to maintain SLA goals & commitments
- **Instant Capacity**
  - communicates with WLM
  - alerts or instantly activates additional processors to fulfill SLO commitments

App A

node 1

App B — 80%

App C — 20%

node 2

if node 1 is taken out of service

node 1

App A — 60%

App B — 30%

App C — 10%

node 2

Customer Example: HA and WLM

- Solution: 2 x rp8400 with 3 vPars each
  - Serviceguard to ensure high availability
  - Workload Manager to move resources between development and production environments to ensure SLOs.
    - HP-UX WLM installation and configuration took 1.5 hours for all 6 vPars.
  - New version of SAP installed.
  - New and detailed reports can be run, end of month processing finishing on time.

WLM modifies resource allocations to ensure SLOs are met

60% | vPar 1   Serviceguard   vPar 1 | 60%

30% | vPar 2   vPar 2 | 30%

10% | vPar 3   vPar 3 | 10%

Ensuring a strong fit with good management practices…

Platform Management

- Optimize uptime and administration
- Easy to setup and use
- Extends to complete device lifecycle management
- Reduces hardware lifecycle costs

Enterprise Management

- Heterogeneous coverage
- Increased IT service availability & performance
- Modular and integrated
- Manage entire solution stack
- Attach business context to IT service

Making it Real: HP VSE integrates all key virtualization techniques…

HP Virtual Server Environment (VSE)

Intelligent policy engine

Virtual servers

Consolidates & virtualizes server resources for optimum utilization

Control	Availability	Partitioning	Utility Pricing
✓ Workload Manager	✓ Serviceguard	✓ nPars	✓ iCOD
✓ global WLM	✓ Serviceguard manager	✓ vPars + Virtual Machines	✓ TiCOD
✓ Systems Insight Manager (SIM)	✓ SGeRAC	✓ Process Resource Manager / pSets	✓ PPU
	✓ Fast Failover	✓ Secure resource partitions	

Partner integration

✓ HP VSE is application transparent
✓ Workload management toolkits for Oracle, BEA, SAS, Apache
✓ Serviceguard certified with 1000s of applications
✓ Serviceguard exclusive integration with Oracle RAC within and across data centers
✓ HP VSE Quick Start Solution for BEA and Oracle

HP Virtual Server Environment – Unique differentiation…

HP Virtual Server Environment

Intelligent policy engine

Advise

Assess

Act
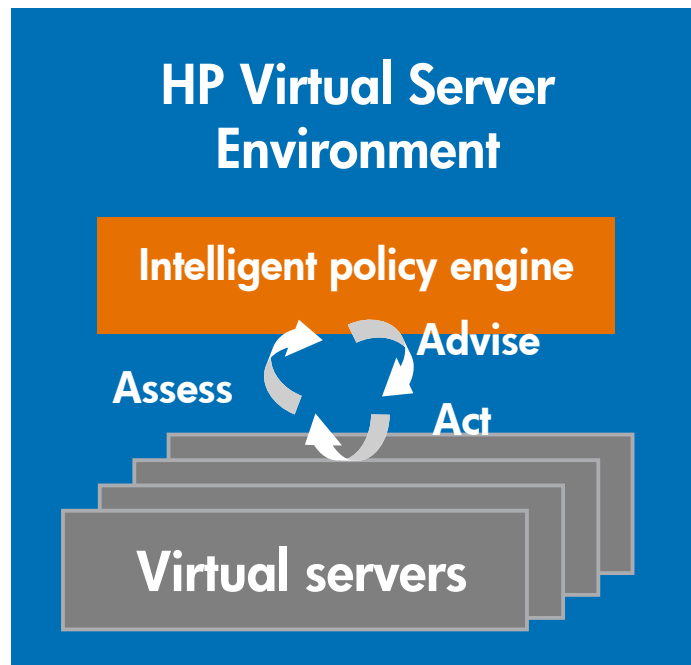
Virtual servers

Consolidates and virtualizes server resources for optimum utilization

- Double resource utilization
  - Only goal-based workload management in the UNIX market
  - All Multi-OS virtualization tools integrated with HP SIM
  - Extending server virtualization into middleware and database layer with BEA and Oracle integration

- Maintain continuous service levels
  - Unique integration between virtualization and high availability
  - Only continuously available UNIX Oracle solution - exceeds mainframes
  - Manage service levels from across partitions to across continents

- Pay only for what you use
  - Tight integration with utility pricing

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