



IBM Software Group

Driving Towards Higher Levels of Virtualization with Enterprise Application Virtualization

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WebSphere software



Presentation Outline (Sections)



▶ The Basics

- What's all this virtualization stuff, defined?

▶ Server Virtualization and Application Virtualization

- Do I really need application virtualization and management?
- Are they similar? What's good, what's bad about each?

▶ Making Sense of it All

- Enhancing Server Virtualization with Enterprise Application Virtualization



There are Many Types of Virtualization



Enterprise Application Virtualization

- Coordinate, schedule and manage workload across a pool of resources
- Schedulers, workload managers, etc.



Application Virtualization

- Running an application within a VM
- Applies to both desktop and server applications

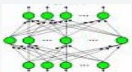


Server Virtualization

- Partitioning / Hypervisors

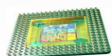


Virtual Memory



Network Virtualization

- Virtual LANs (VLANs)
- Virtual Private Networks (VPNs)



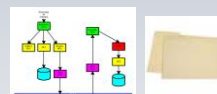
Microprocessor Virtualization

- Multi / Hyper Threading
- Hardware assisted virtualization (Intel, AMD)



Information Virtualization

- Content / Format Virt.
- Location Virtualization



File Virtualization

- Distributed File Systems



Storage Virtualization

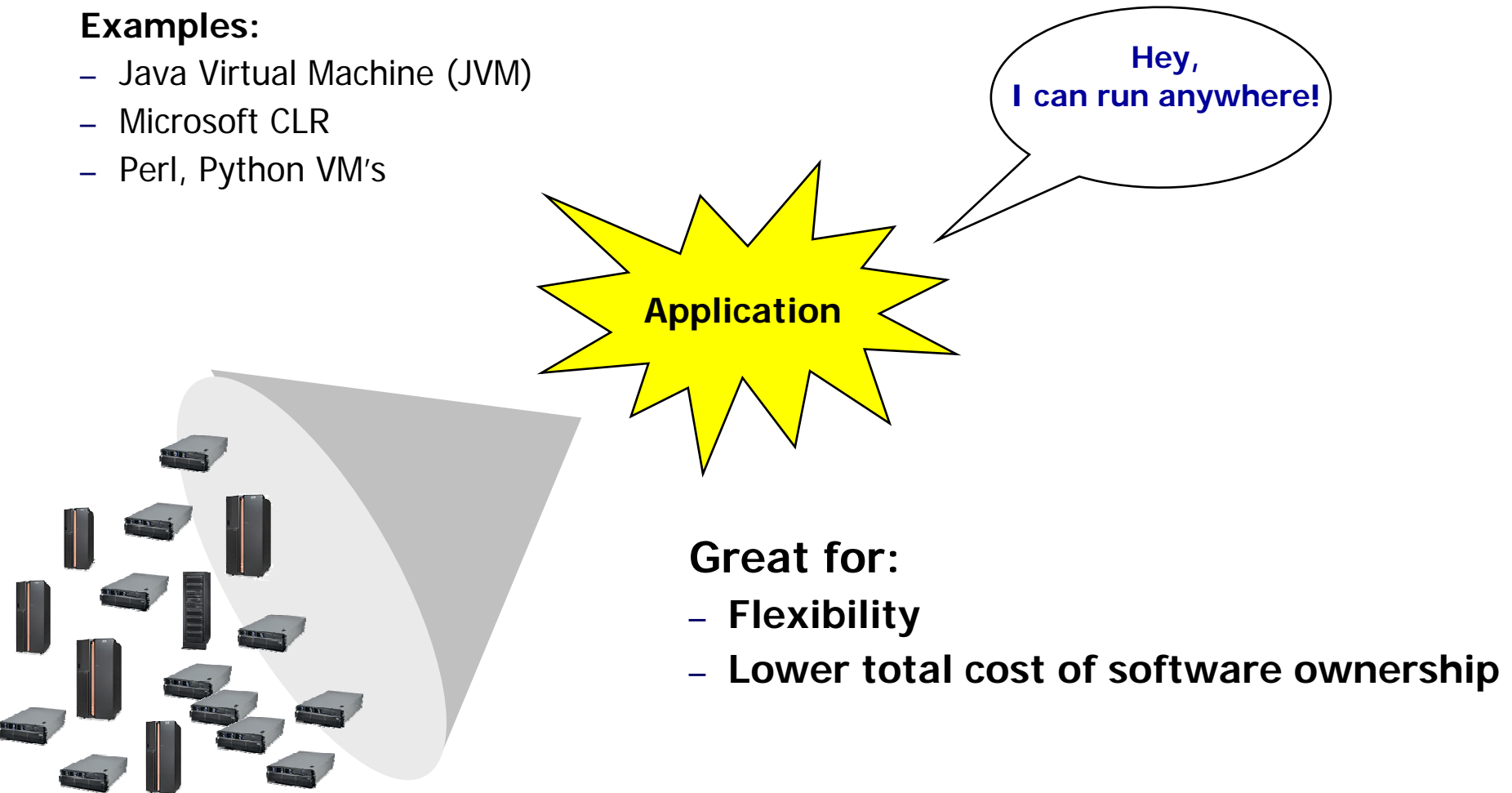


Application Virtualization – The Basic Principle

“Complete isolation from the underlying hardware”

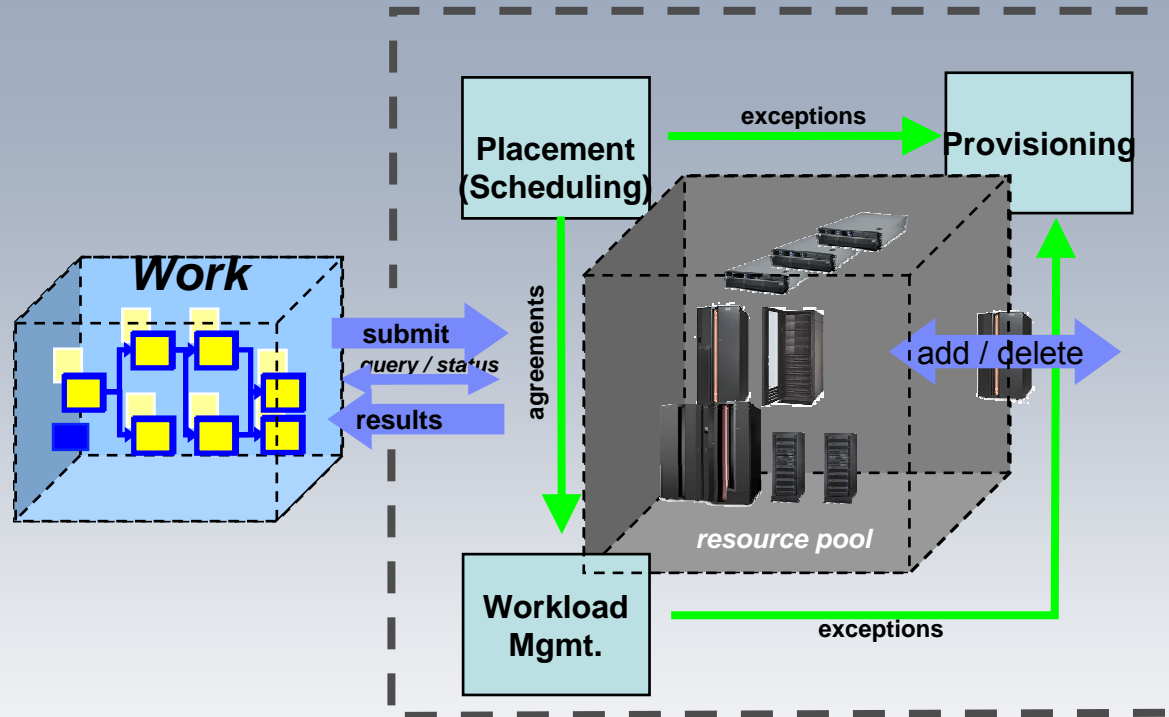
Examples:

- Java Virtual Machine (JVM)
- Microsoft CLR
- Perl, Python VM's



Enterprise Application Virtualization

Adding QoS to the core principle of application virtualization...



Great for:

- Server consolidation / optimization
- Controlling resource usage/allocation within a VM or across VM's
- Tying infrastructure concerns to business / application policies



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Server and Workload Value Propositions are Similar

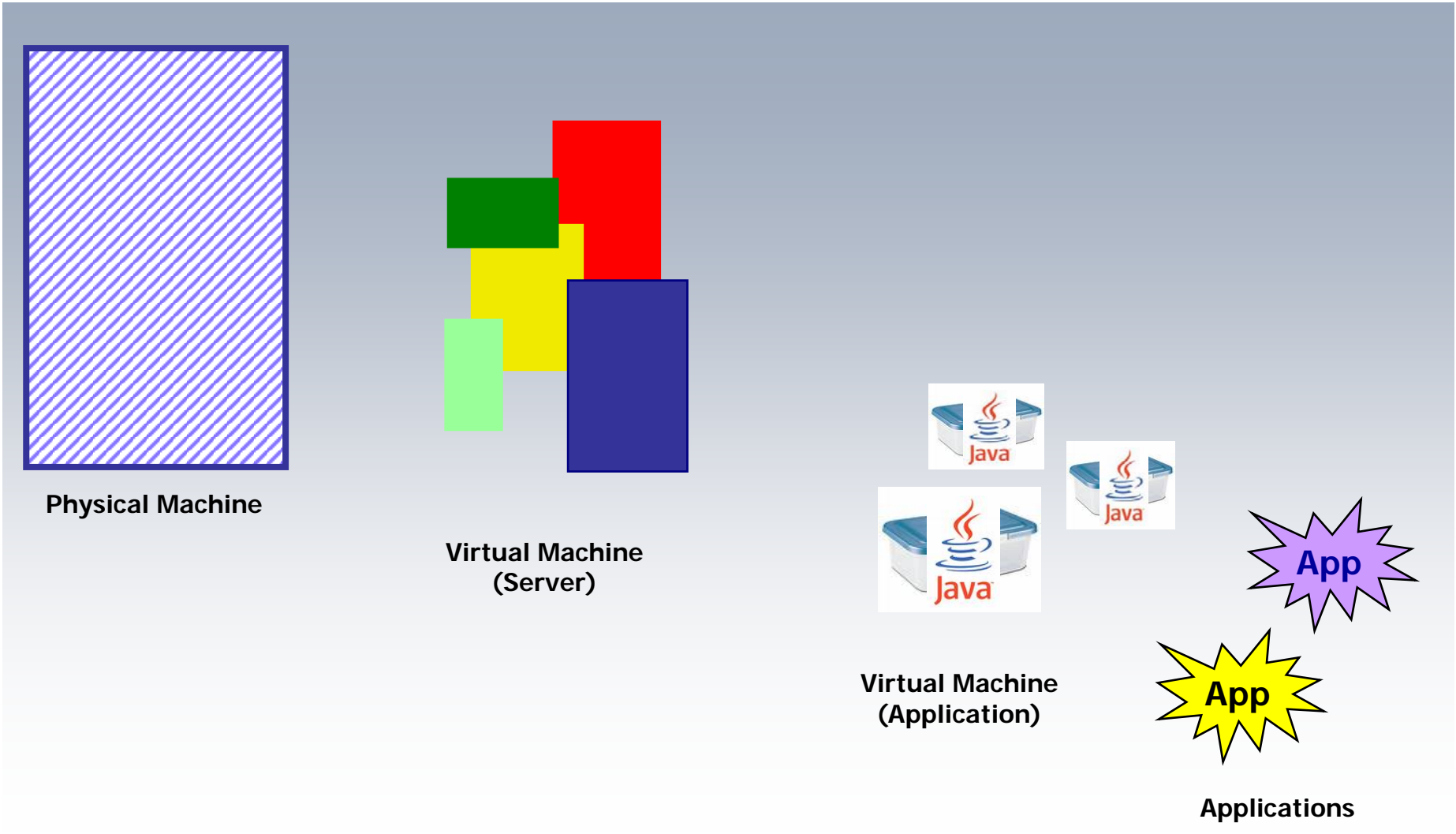
But the approach is very different...

	Server Virtualization	Enterprise Application Virtualization (WebSphere XD)
Scope	OS image (coarse) Resource focused	Application (fine) Application & resource focused
Consolidation	Vertically stack OS images	Vertically stack JVMs, etc. (runtime containers); policy-based workload management
Optimization	Resource usage (e.g. CPU) in virtual machines	Application SLA's
High Availability	Restart VM instances on alternate hosts when a host is detected as failed	Assure a minimum # of dynamic cluster instances are always running
Reliability	Cluster monitoring with visual alerts; determined by HA and capacity; manual operator intervention	Health monitoring of application servers with automatic correction or route around
Admission Control	Check capacity requirements of the VM against available capacity of the pool	<ul style="list-style-type: none"> ▪ Traffic throttling via the On Demand Router ▪ Ensure node has capacity to run application server



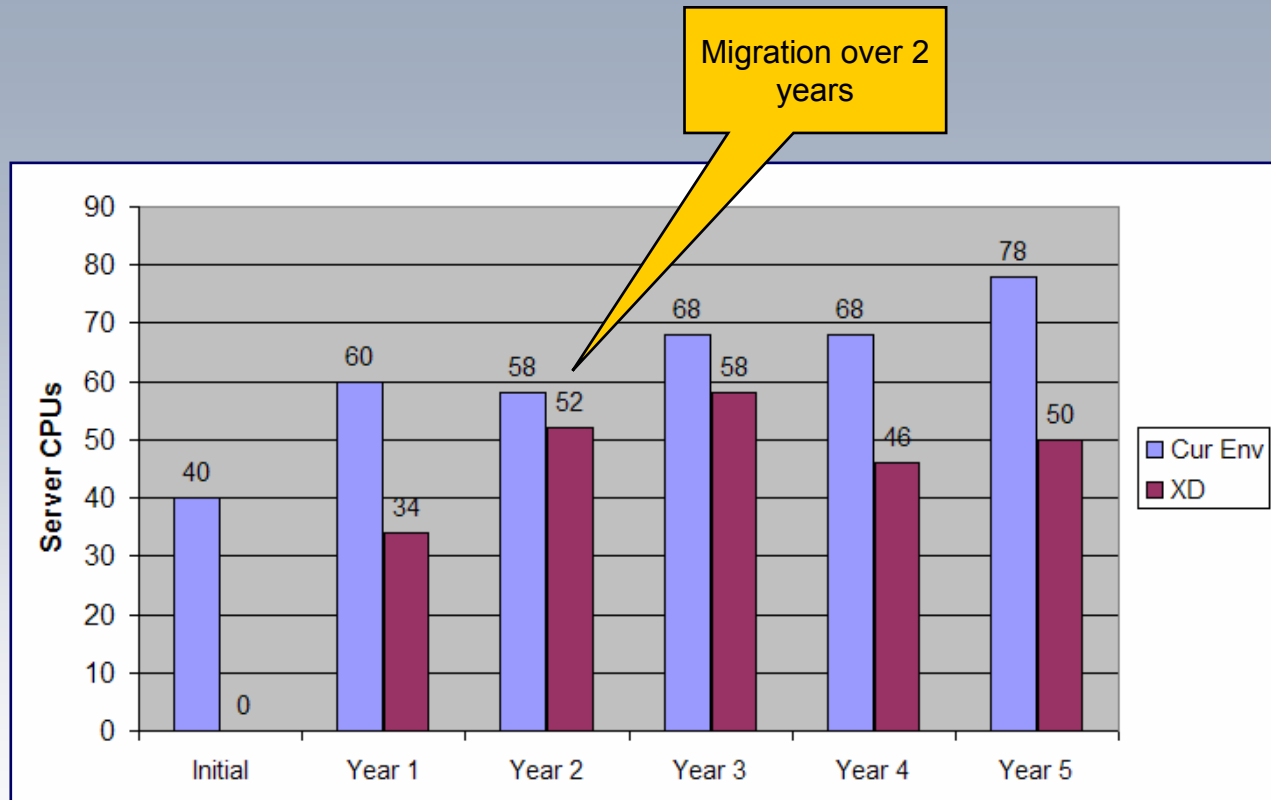
The Spectrum of Consolidation

It is often easier to start with applications and then proceed to OS / virtual machines...



Optimization w/ Enterprise Application Virtualization

Yet, the consolidation and financial benefits are just as powerful...



→ ~ \$3.0M savings over 5 years

→ Breakeven in 12 months

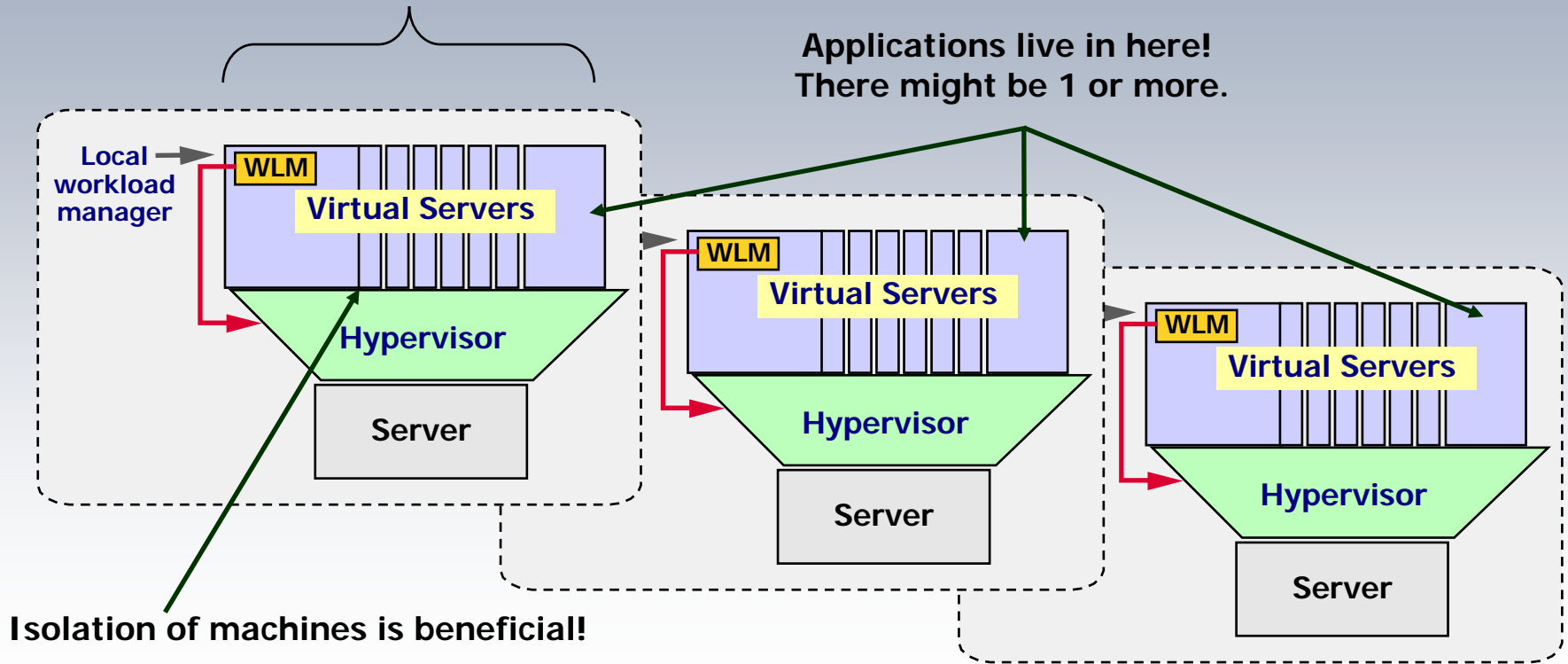


Is Server Virtualization Enough?

Usage of server virtualization is difficult to tie to business or application policy...

WLM / resource allocation based on CPU, memory utilization

- IT metric focused
- Within a machine, not across a set of machines
- Applications can hog resources within a VM



An Example: Monster.com



June 15, 2007



500 VM's running on 17 servers

- ✓ Cut power and hardware spending, improved efficiency
- ✓ Ability to provision new machines quickly

"But as Monster's virtual environment got big, and got big fast, management problems arose. The worst one: The company **didn't have enough visibility into which applications were competing with each other** across storage and server resources—and this was **affecting IT's ability to meet service-level goals**, says Pete King, manager of monitoring and analysis at Monster.

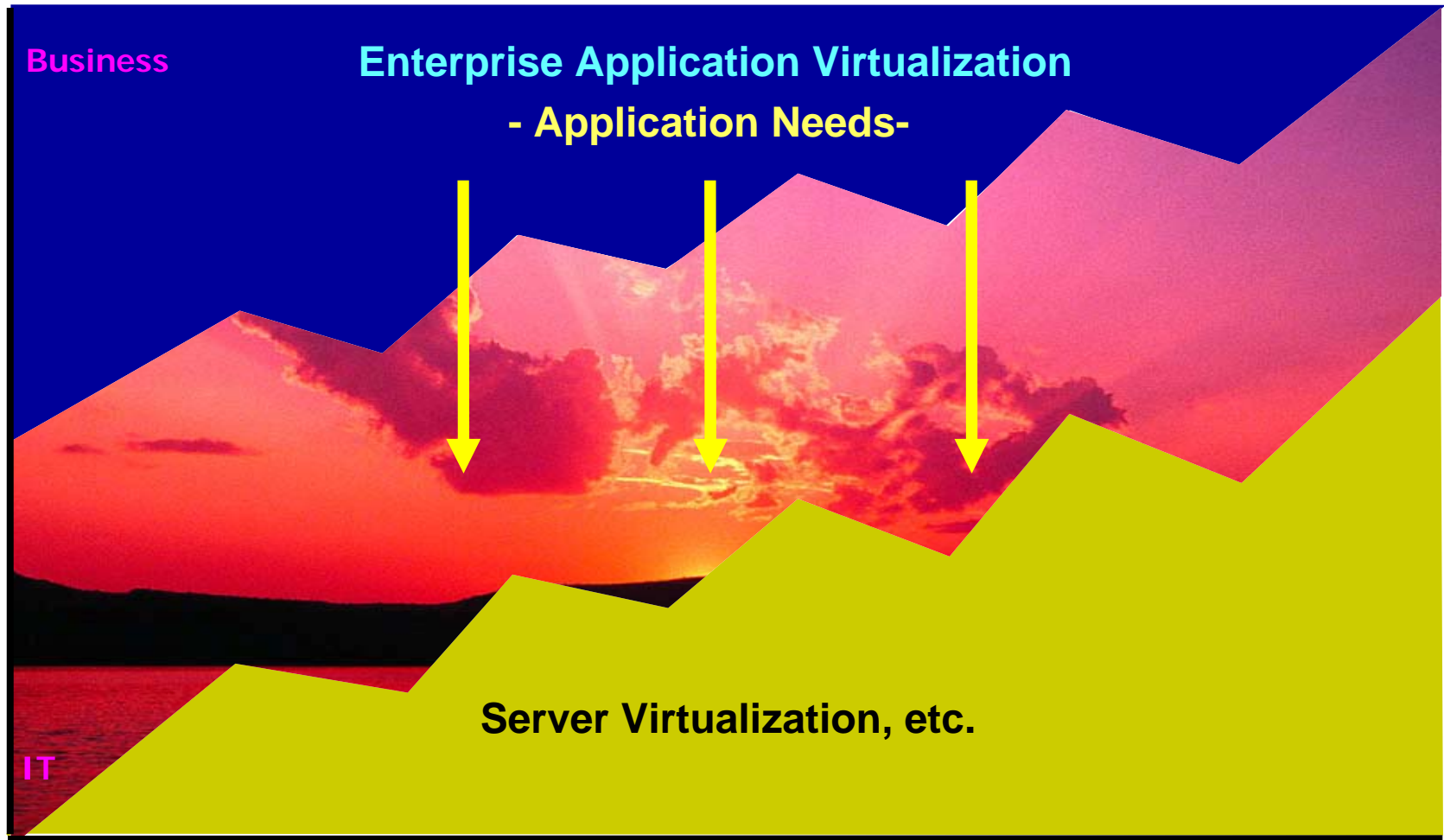
'We ran into a lot of contention,' says King."

http://www.cio.com/article/117256/How_Server_Virtualization_Tools_Can_Balance_Data_Center_Loads/1



Combining the Two Approaches can be Very Powerful...

Drive all virtualization constructs, usage and semantics from the perspective of applications



Some Specifics...

Extending the value of server virtualization with enterprise application virtualization...

Better Isolation Characteristics and Resiliency

- Ensure an application within a VM does not consume all resources in a VM and impact other applications running in the VM
- Health management of applications – fixing the problem, or routing around the problem

Increased Management Efficiencies

- Drive up utilization – fully utilized virtual machines – using intelligent workload management to prevent virtual machine sprawl

Movement, allocation of resources based on application needs

- Assign CPU and memory resource based on application requirements



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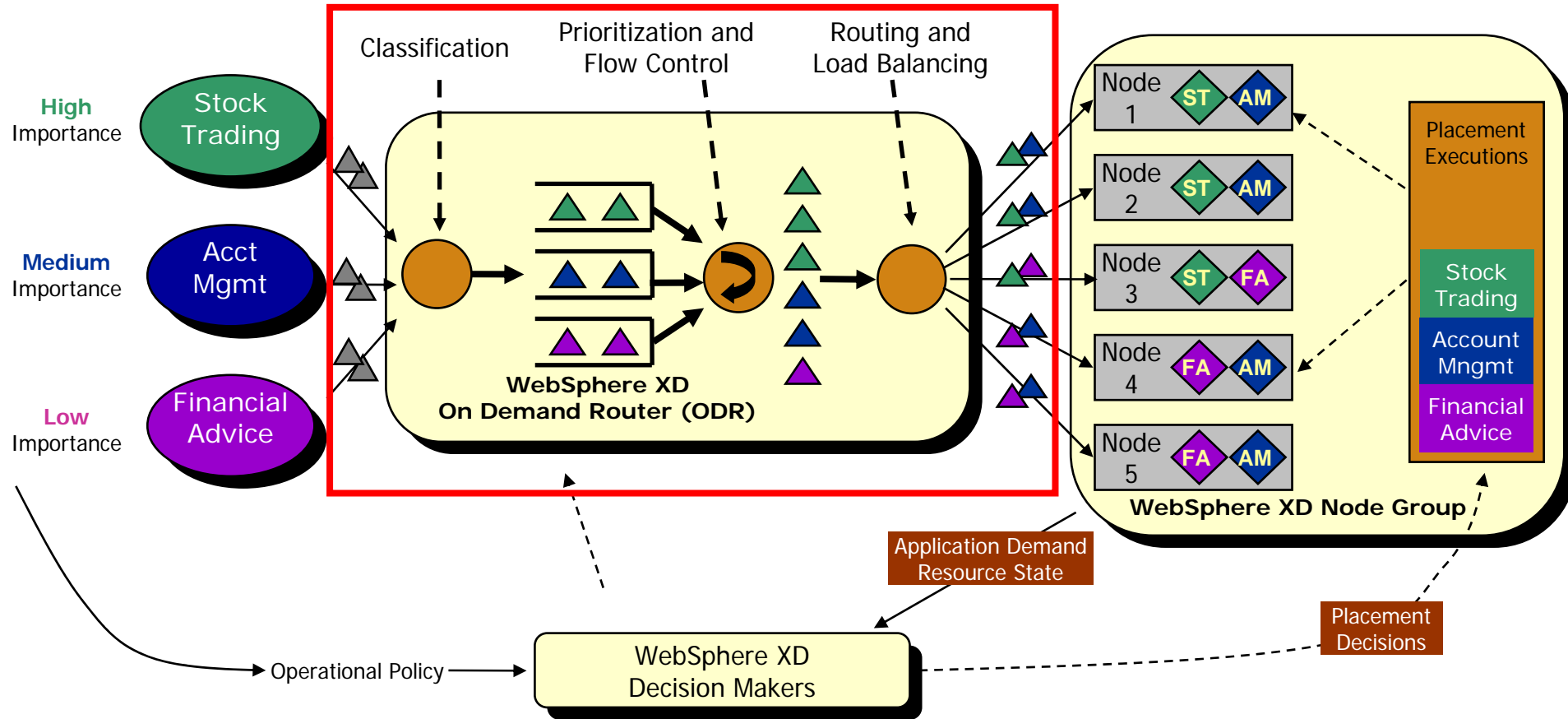
▶ Making Sense of it All

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WebSphere XD: A Prime Example

The On Demand Router applies sophisticated classification and flow control algorithms to intelligently manage workload



WebSphere XD and Application Policy / Prioritization

XD easily allows an administrator to specify the relative importance of applications; XD then manages to it

- **Service policies** are used to define application service level goals
- Allow workloads to be classified, prioritized and intelligently routed
- Enables application performance monitoring
- Resource adjustments are made if needed to consistently achieve service policies

Welcome administration | Logout | Support | Help

Service Policies

Service Policies

A Service Policy defines a business goal and an importance, and contains one or more Transaction Classes. The Service Policies define an Operational Policy which is used by a component in the Proxy Server to categorize and filter work in the queue.

Preferences

Select	Name	Importance	Goal	Description
<input type="checkbox"/>	Default_SP		Discretionary	
<input type="checkbox"/>	Gold_SP	High	Avg response 1 second	Gold Service Policy
<input type="checkbox"/>	Platinum_SP	Highest	Avg response 1500 Milliseconds	Highest SP

Total 3

Service Policies define the relative importance and response time goals of application services; defined in terms the end user result the customer wishes to achieve



Extending the Value of Server Virtualization

Tying applications & workload to business policy can help manage virtualization in the large

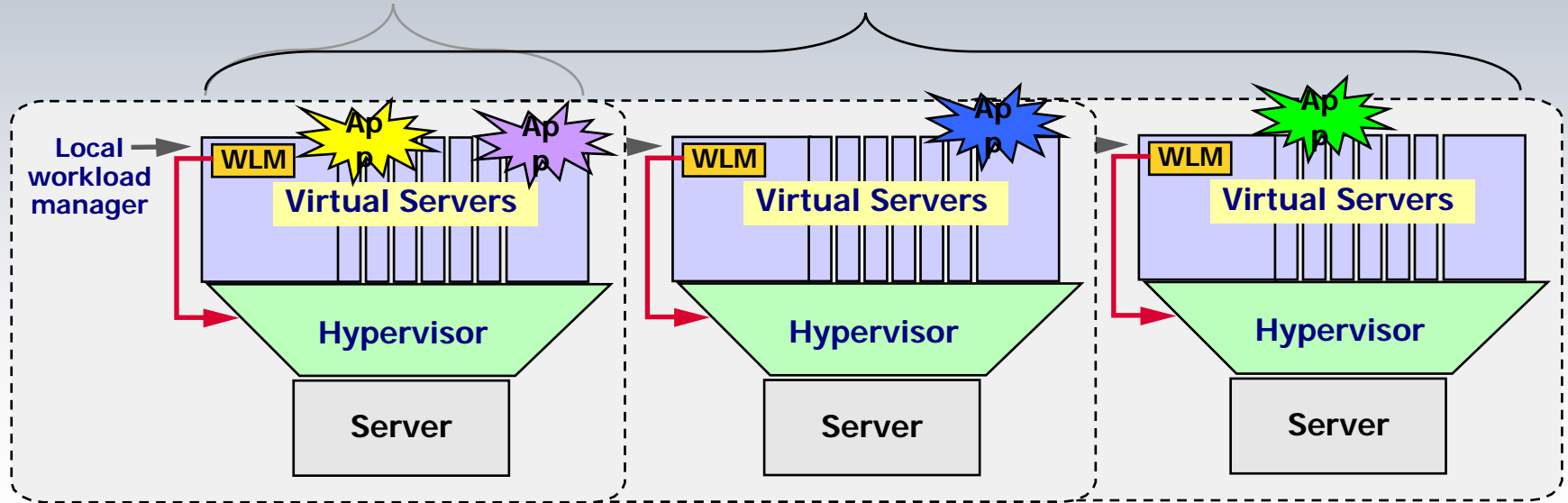
Enterprise Application Virtualization



Traffic Shaping
Admission Control
Etc.

Application Policy / Prioritization

- Within a physical machine
- Across physical machines





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