IBM Software

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Comes to You

Performance, Scalability, Cloud and virtualization in your application

Building the Cloud foundations for your applications with WebSphere

Do you feel like this?

www.GenerallyAwesome.com

Cloud computing benefits

Remove IT Complexity from End Users

Lower IT Operating and Capital Costs

Standardizing Apps, Infrastructure and Service Processes

Shifting from a Capital Investment Model to an Operating Expenses Model

CLOUD COMPUTING

Faster Provisioning

Faster Time-to-Market

Reduced Cost

Increased Flexibility
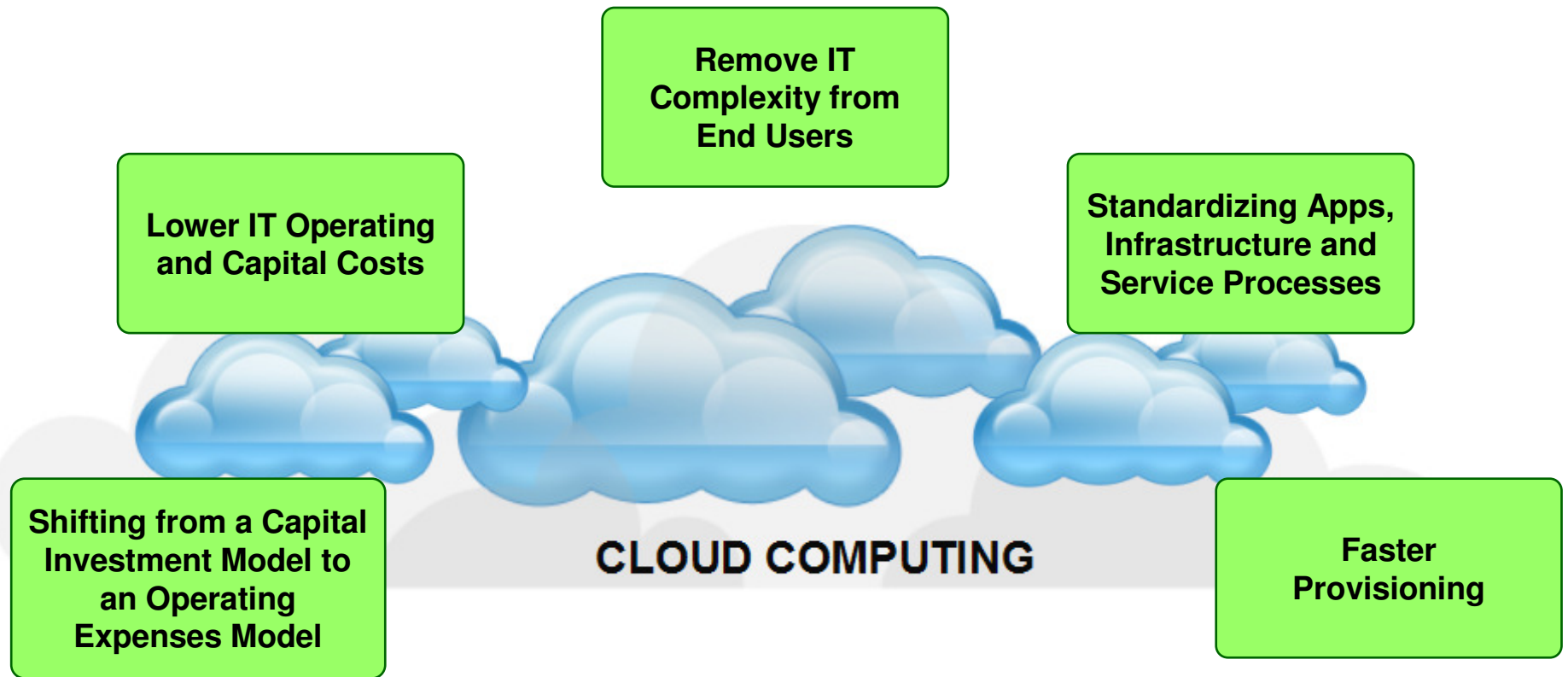
Characteristics of a Cloud

WebSphere & Cloud Computing

Building Blocks
for Cloud

- *More Responsive*: Dynamically allocates resources to meet demands

- *More Optimized*: better utilizes system resources and lowers TCO

- *More Agile*: better aligns IT capabilities with business needs

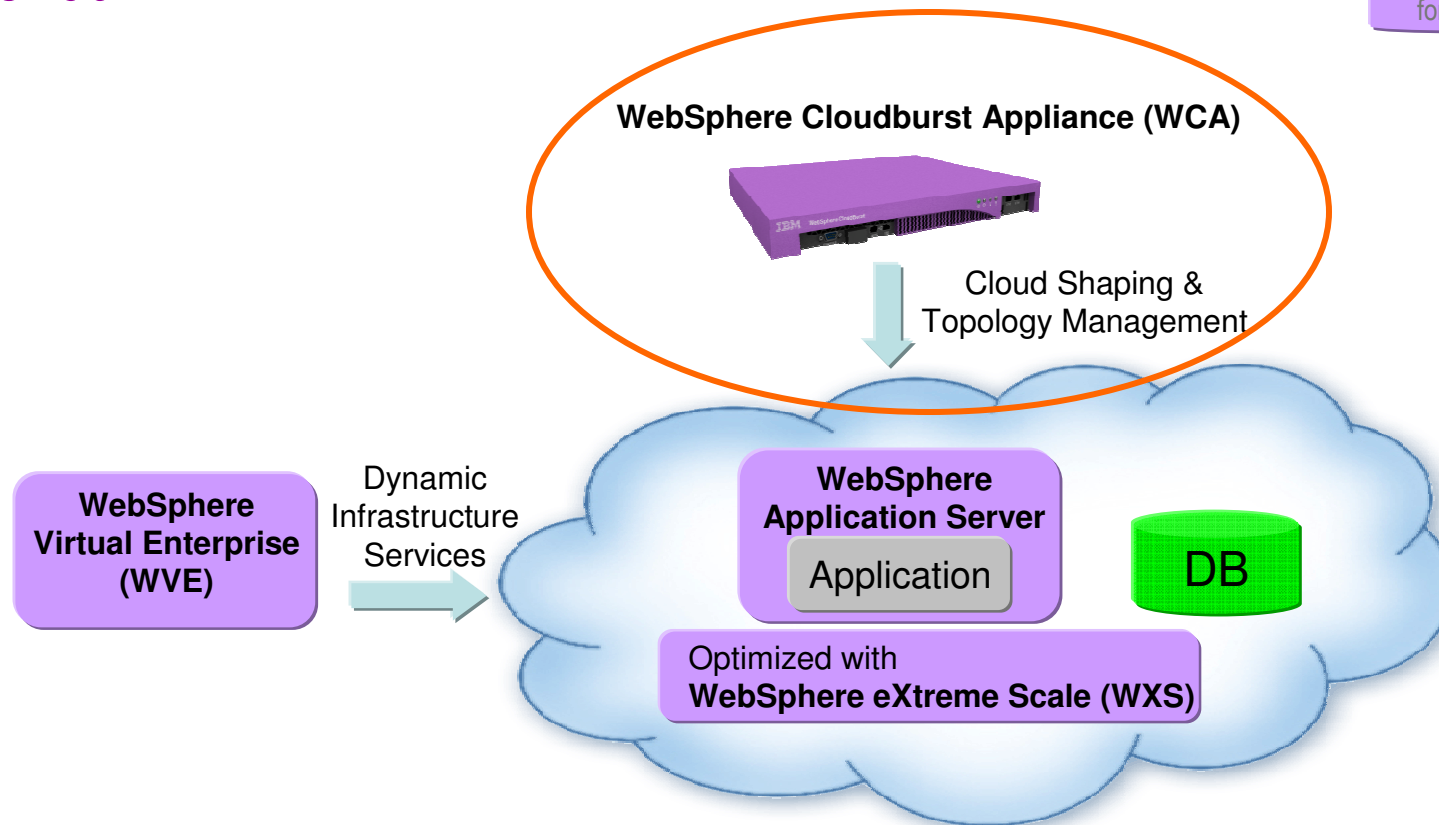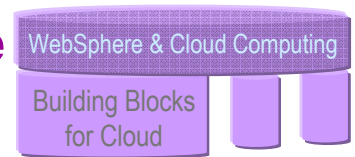- *More Resilient*: prevents, isolates, and recovers from failures
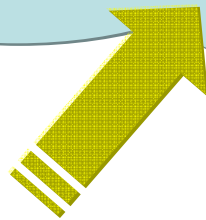
Pre-Cloud middleware was…

- *Scalable*: Add additional resources to meet demands

- *Available*: Redundancy to avoid outages

- *Consolidated*: Shared hardware resources

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Cloud Foundations for your Applications with WebSphere - Agenda

WebSphere & Cloud Computing

Building Blocks for Cloud

WebSphere Cloudburst Appliance (WCA)

Cloud Shaping & Topology Management

WebSphere Virtual Enterprise (WVE)

Dynamic Infrastructure Services

WebSphere Application Server

Application

DB

Optimized with **WebSphere eXtreme Scale (WXS)**
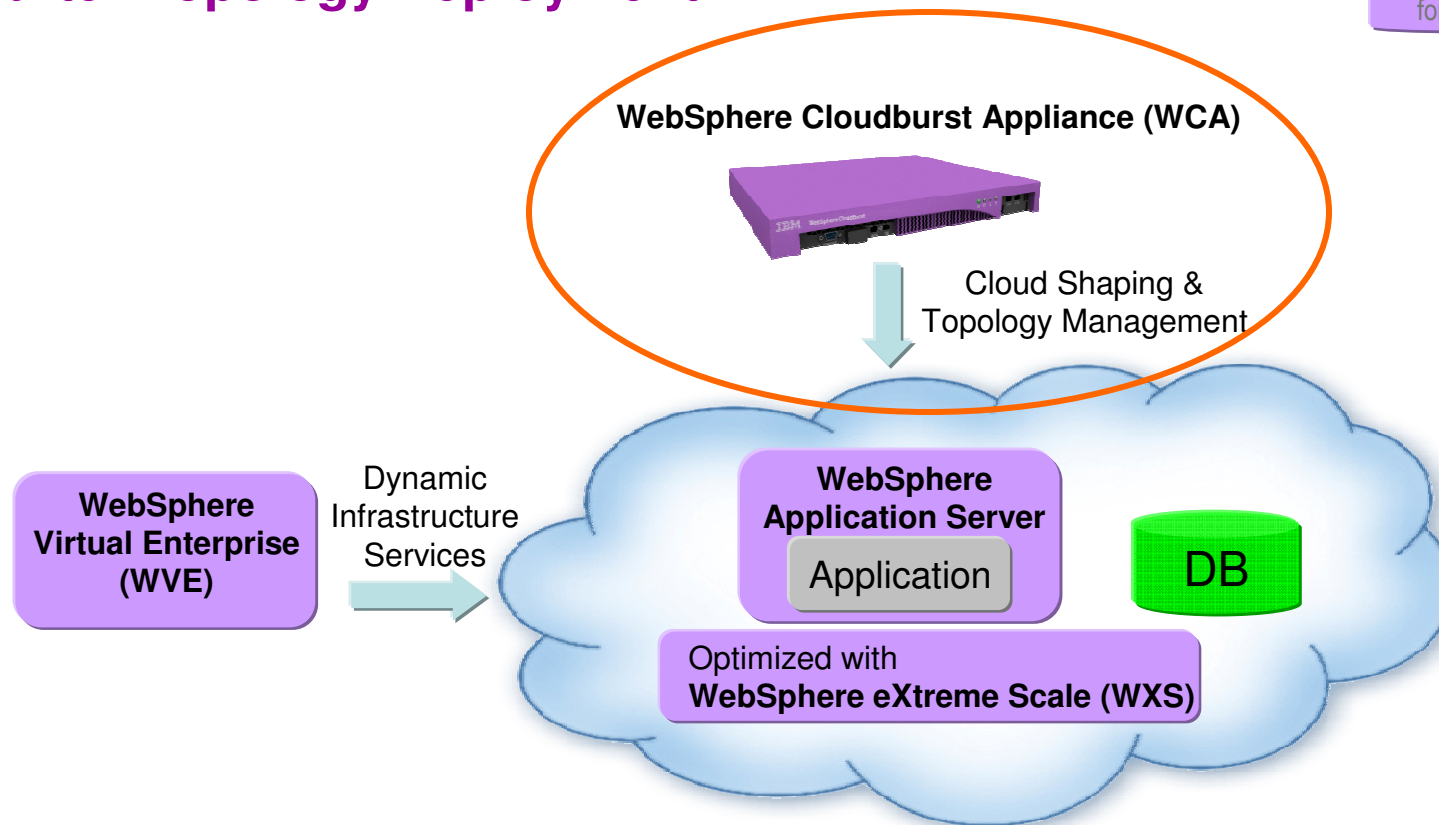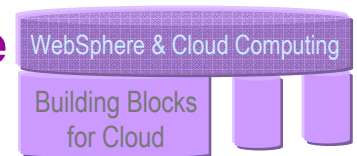
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Cloud Foundations for your Applications with WebSphere - Smarter Topology Deployment

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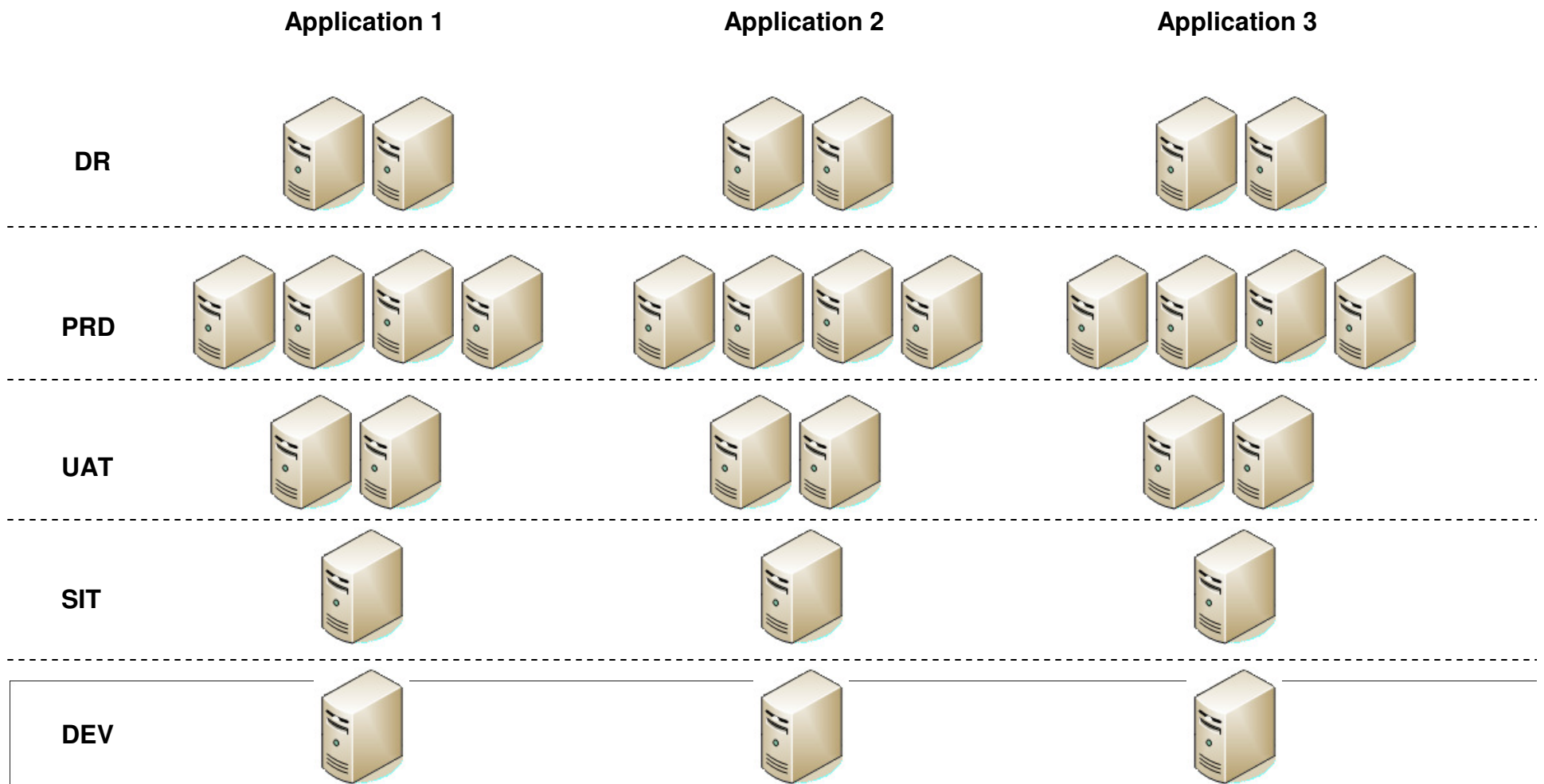Application

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Deployment across technical environments - Traditional

	Application 1	Application 2	Application 3
DR			
PRD			
UAT			
SIT			
DEV			

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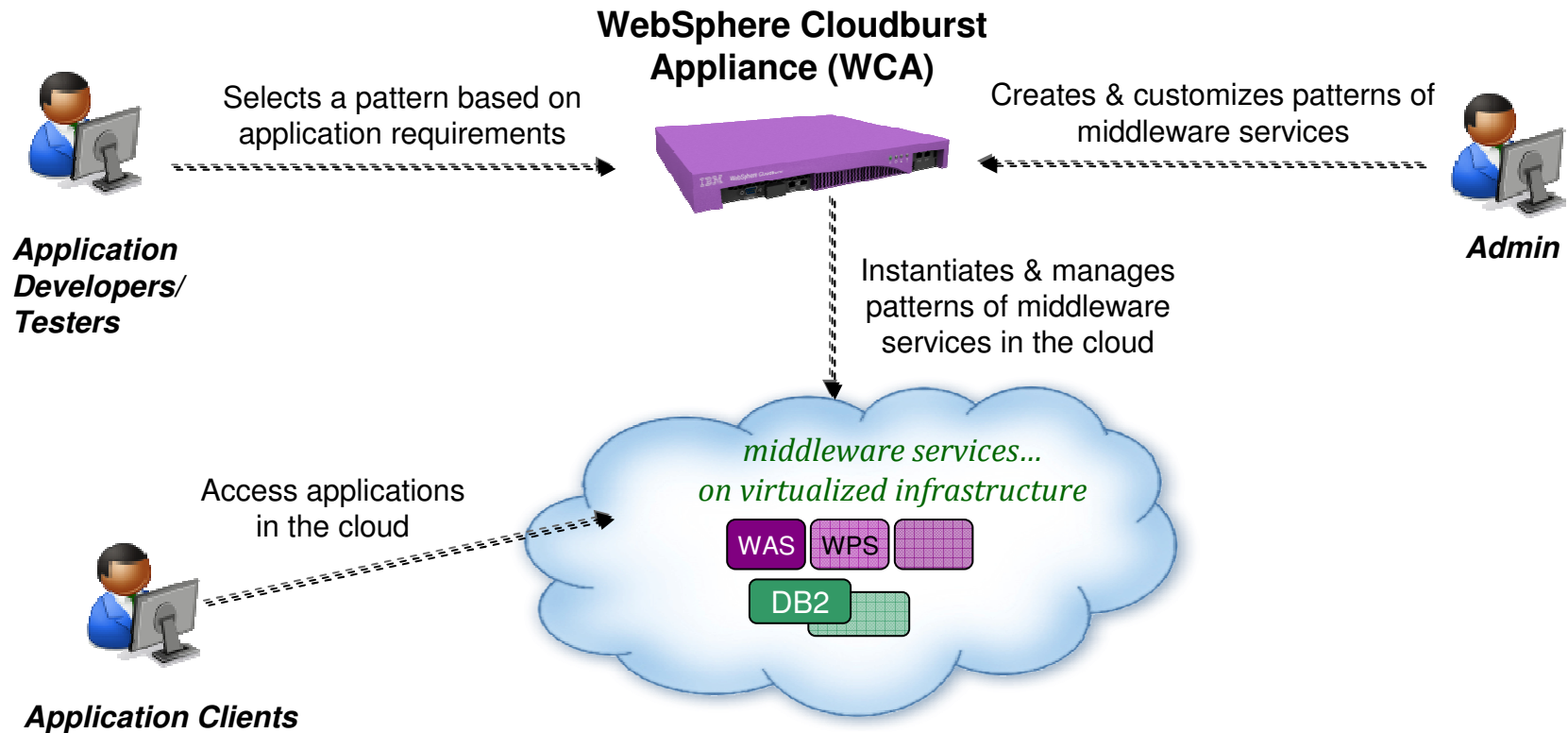Impact2010
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Topology Deployment Pains

- **TAKES TOO LONG** - The average lead time to get a new application environment up and running is 4-6 weeks
  - Approvals, procurement, shipment, HW installation, license procurement, OS installation, application installation, configuration

- **ERROR PRONE** - 30% of bugs are introduced by inconsistent configurations
  - These bugs are often of the most difficult variety to detect
  - They often emerge when moving between dev/test, QA, production

- **TAKES TOO MUCH HARDWARE** - Because it's so expensive to set up an environment, there is an incentive to hold onto them even when no longer needed "just in case."
  - Future environments = new hardware, instead of recycling returned hardware, and this takes time and money

Deployment across technical environments - Cloud

Application 1　　Application 2　　Application 3

DR

PRD

UAT

SIT

DEV
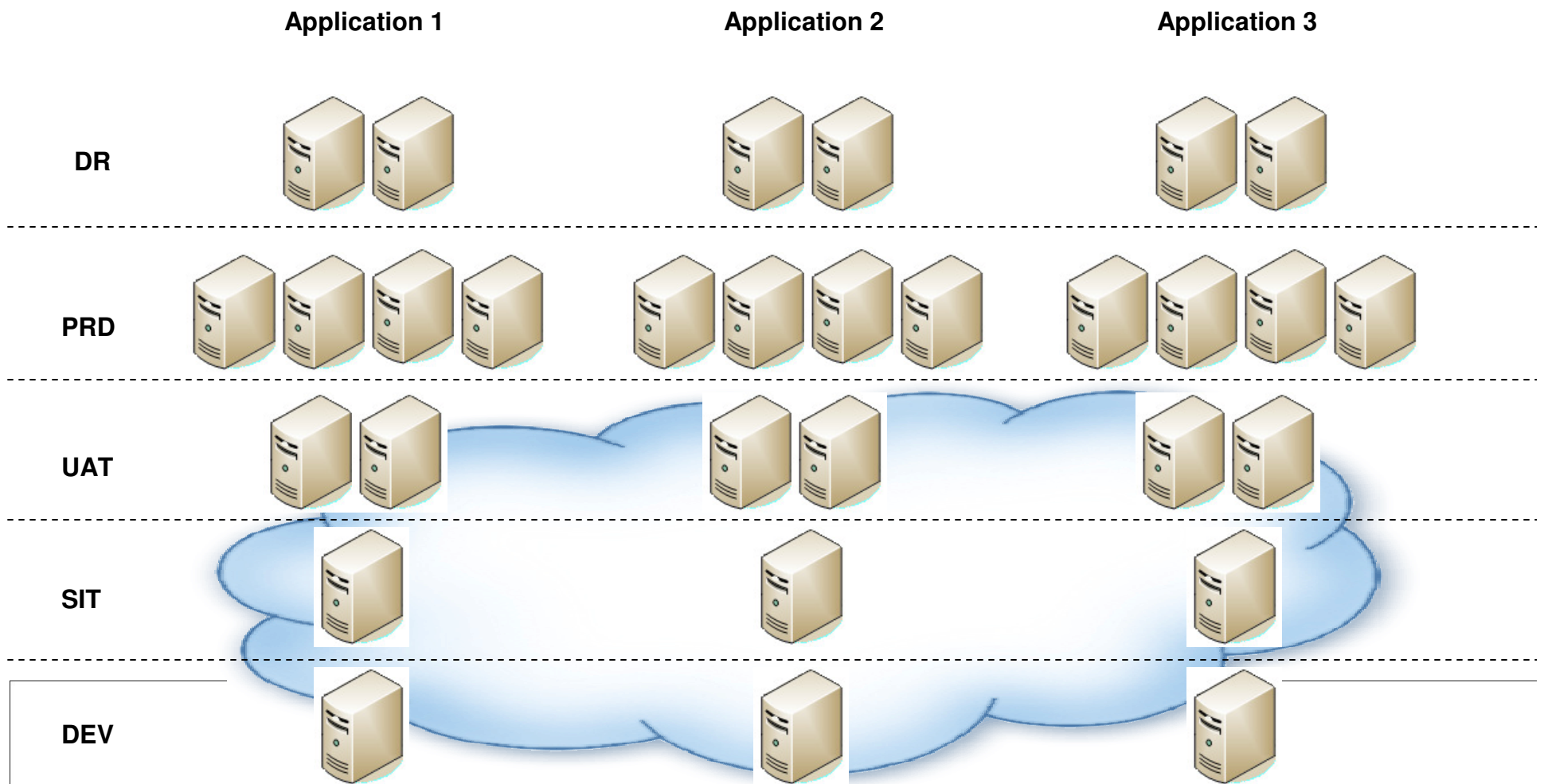
Pattern-Based Deployment of Middleware Services in the Cloud

WebSphere Cloudburst Appliance (WCA)

Selects a pattern based on application requirements

Creates & customizes patterns of middleware services

Application Developers/ Testers

Admin

Instantiates & manages patterns of middleware services in the cloud

Access applications in the cloud

middleware services... on virtualized infrastructure

WAS WPS

DB2

Application Clients

Customers manage patterns of middleware services, and no longer need to deal with the details of middleware installation & configuration

… leading to quicker time-to-value, improved consumability, and lower costs

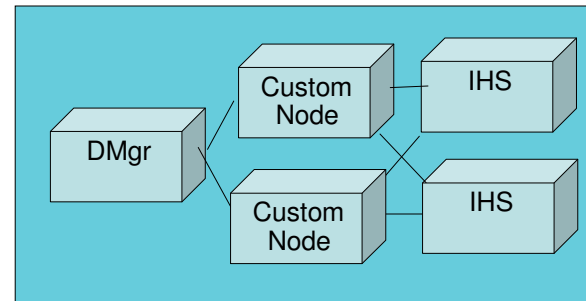IBM Software
Impact2010
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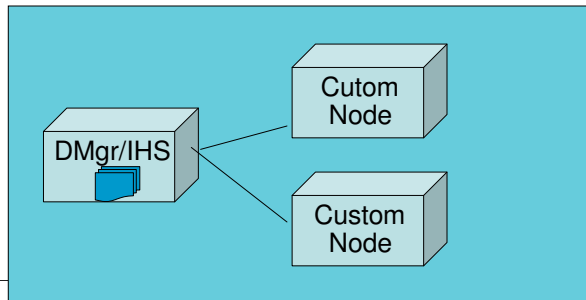
Examples of Middleware Patterns
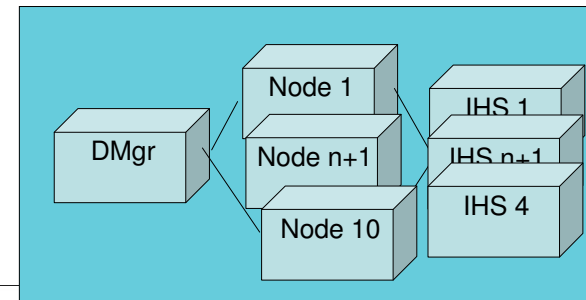

Single Server
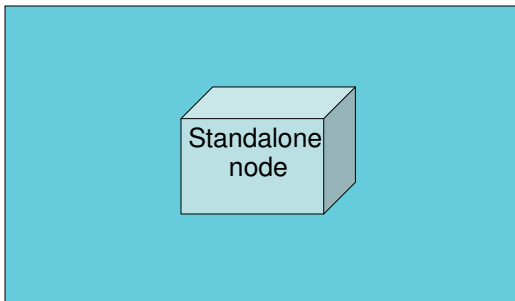
WebSphere cluster

WebSphere cluster (dev)

WebSphere cluster (large)

Advanced Options for messaging, session persistence, and global security available
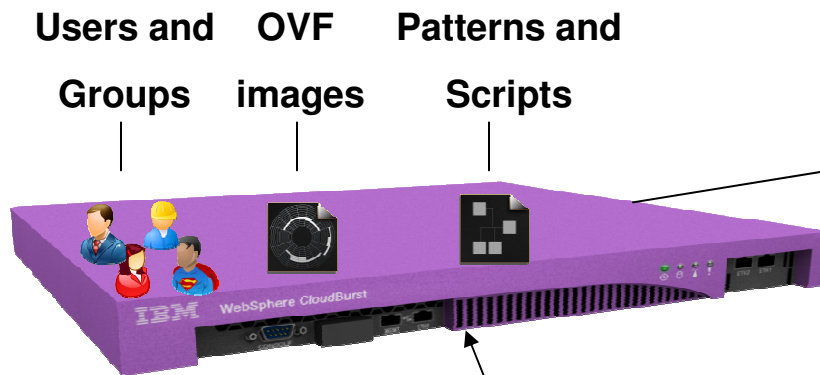
What is WebSphere CloudBurst Appliance (WCA)?

1. An appliance from IBM…

Includes
- hardware
- WebSphere CloudBurst function
- WebSphere Application Server images
- WebSphere Application Server patterns
- WebSphere Process Server images
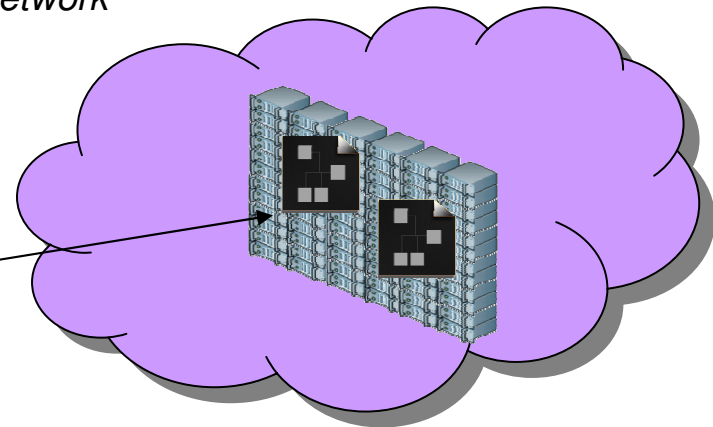- WebSphere Process Server patterns

Users and Groups   **OVF images**   **Patterns and Scripts**

Web Browser, CLI, Web 2.0 UI

2. …that manages your on-premise cloud…

Bring your own Enterprise cloud
- hypervisors
- storage
- network

3. … comprising WebSphere Virtual Systems
- Customize and extend images and patterns for your applications
- Dispense and run in the cloud
- Life-cycle management and optimization

WebSphere Development and Test Organization – WCA Benefits

Overall
- Awesome Product
- Very Simple
- 400K savings with 6% adoption across Infrastructure

Infrastructure Savings
- Increased utilization from 6% - 60%
- 80% increase in system admin efficiency
- End User deployment failures down 45%

Pattern Deployments
- 20-30 minute Deploys
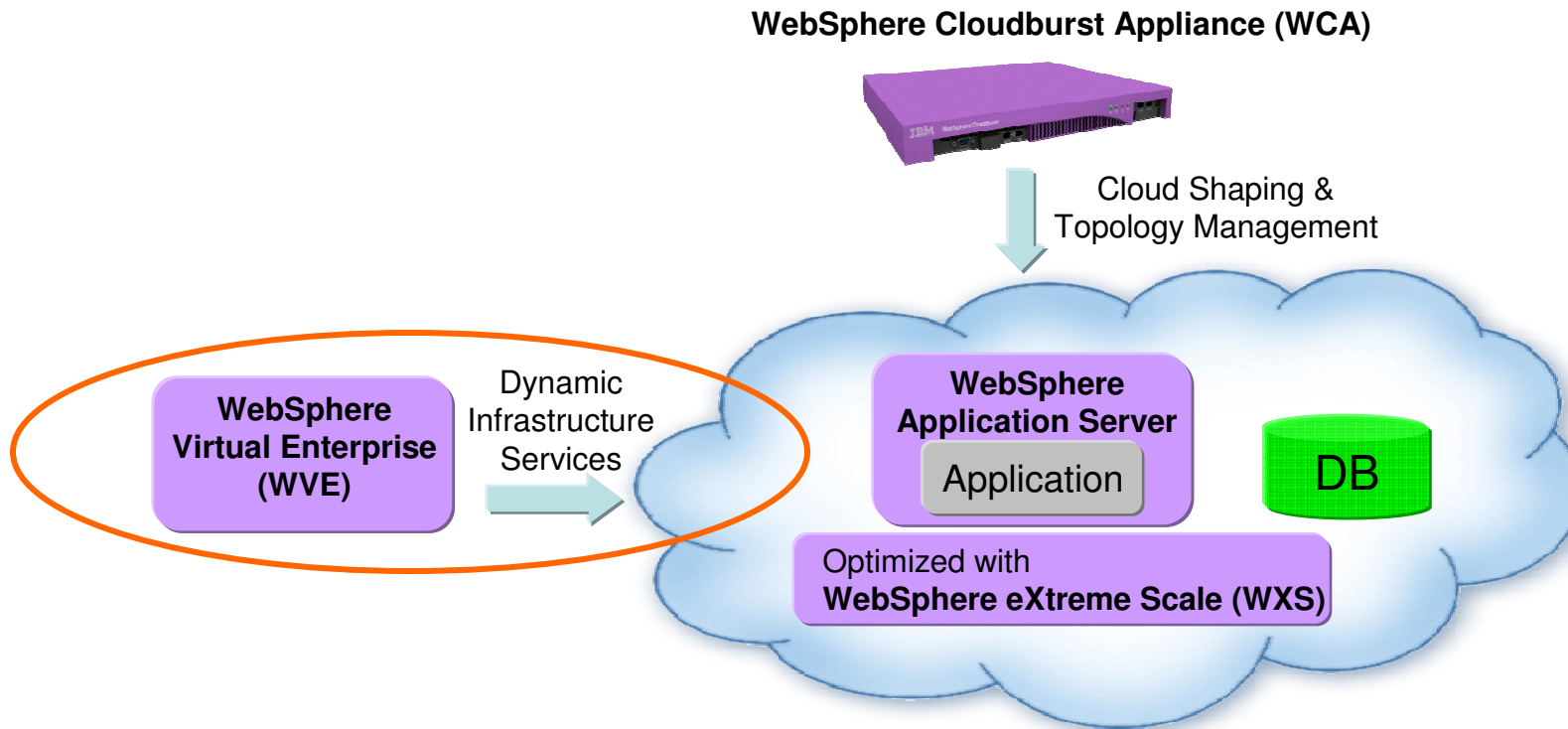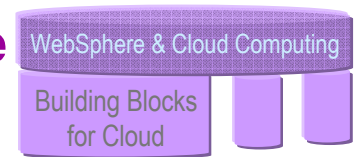- Daily Pattern Migration with builds

Script Packages
- No modification to existing tests
- All Test Applications in patterns

"Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. Actual performance in a user's environment may vary."

Cloud Foundations for your Applications with WebSphere - Smarter Operational Efficiency

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Building Blocks for Cloud

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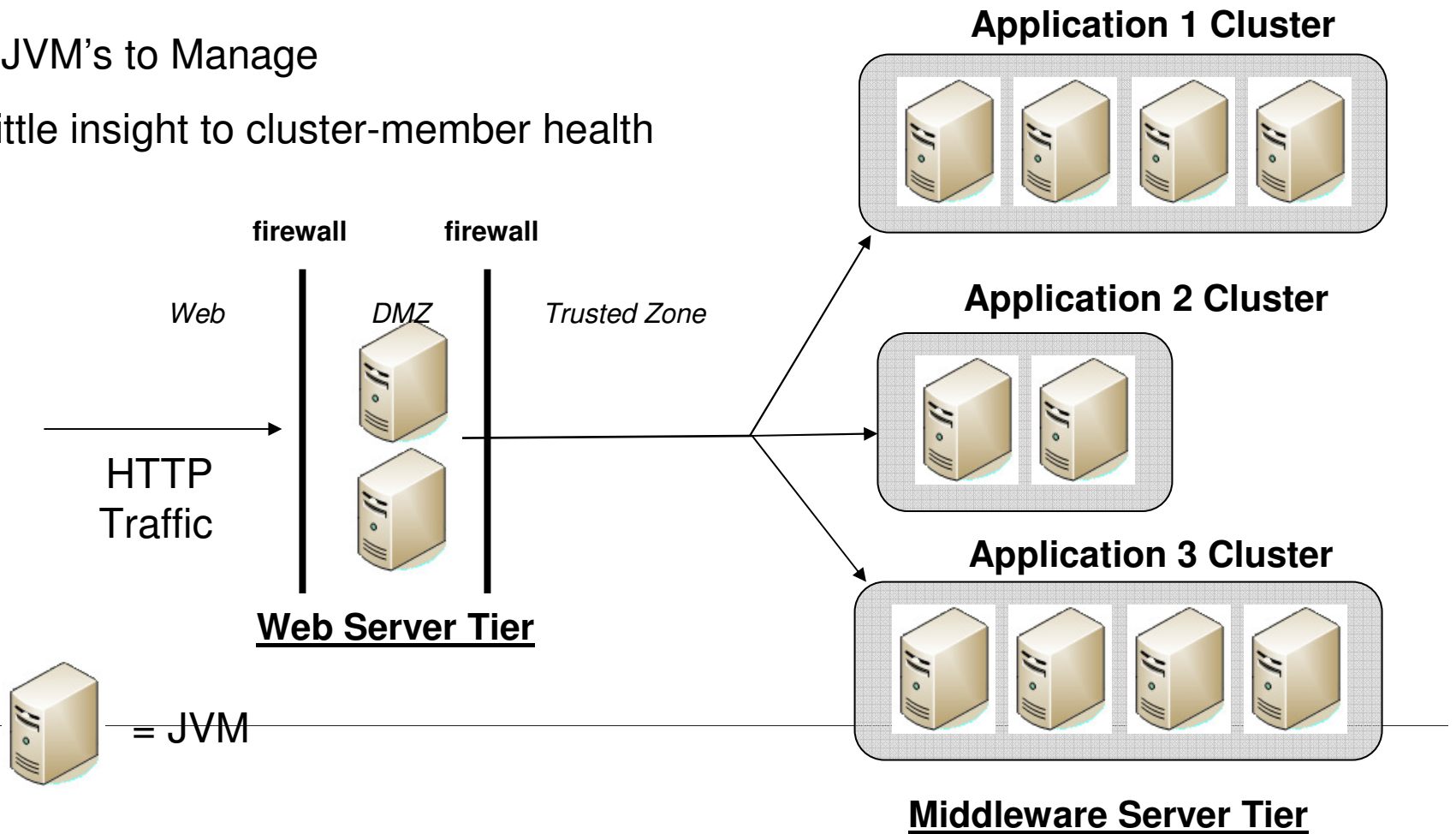
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Deployment across technical environments - Cloud
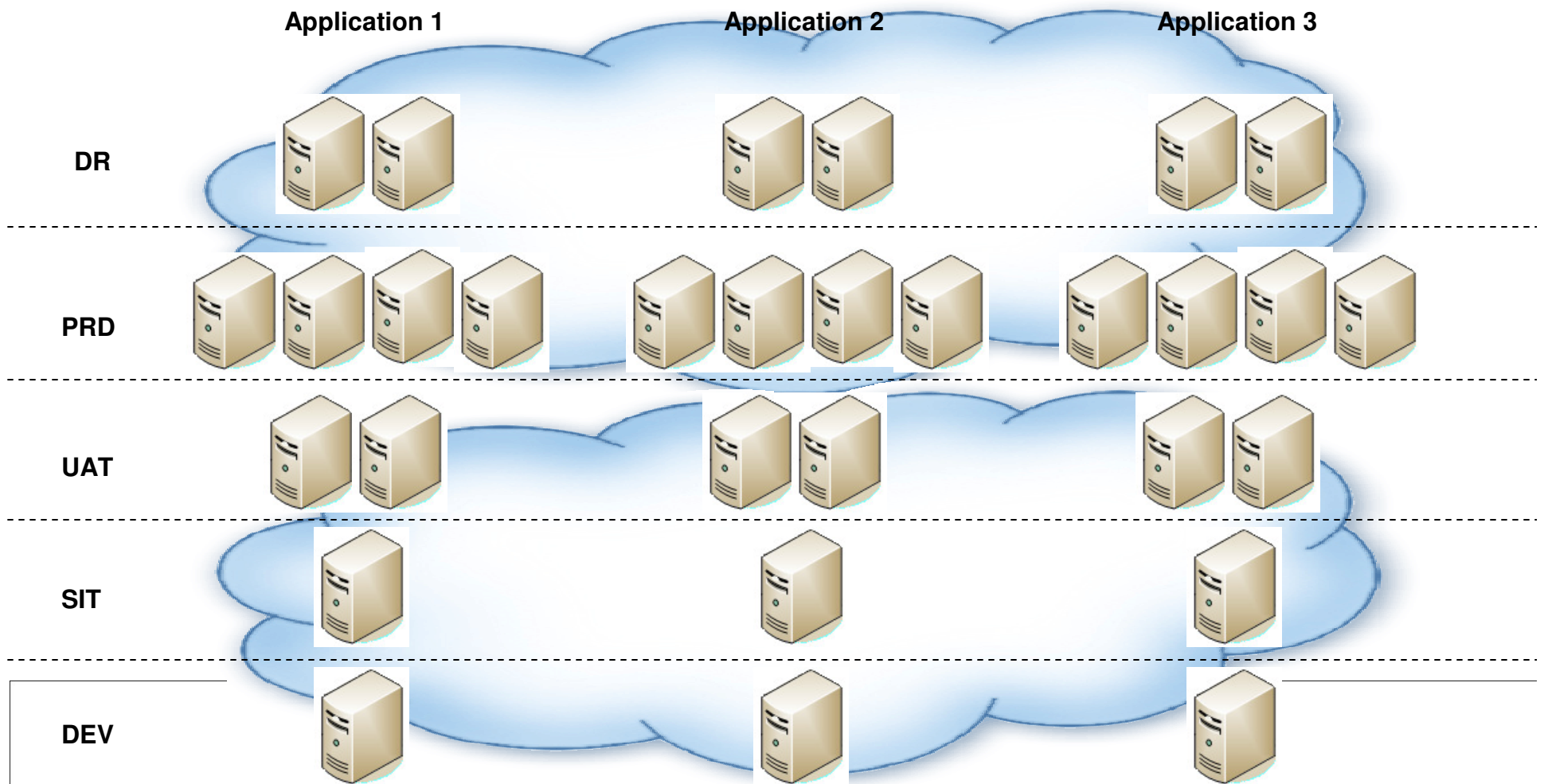
Traditional Middleware Architecture

-Application clusters are statically defined

-Low CPU utilization

-Many JVM's to Manage

-Very little insight to cluster-member health

Application 1 Cluster

firewall   **firewall**

Web   *DMZ*   *Trusted Zone*

Application 2 Cluster

HTTP
Traffic

Web Server Tier

Application 3 Cluster

= JVM

Middleware Server Tier

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Middleware Infrastructure Pain

1. ## Static Middleware Infrastructure

   - Doesn't react well to spikes in demand
   - Resources are under-utilized
   - Not well-aligned with the business

   The infrastructure should manage provisioning application and middleware resources to achieve some stated business level objectives.

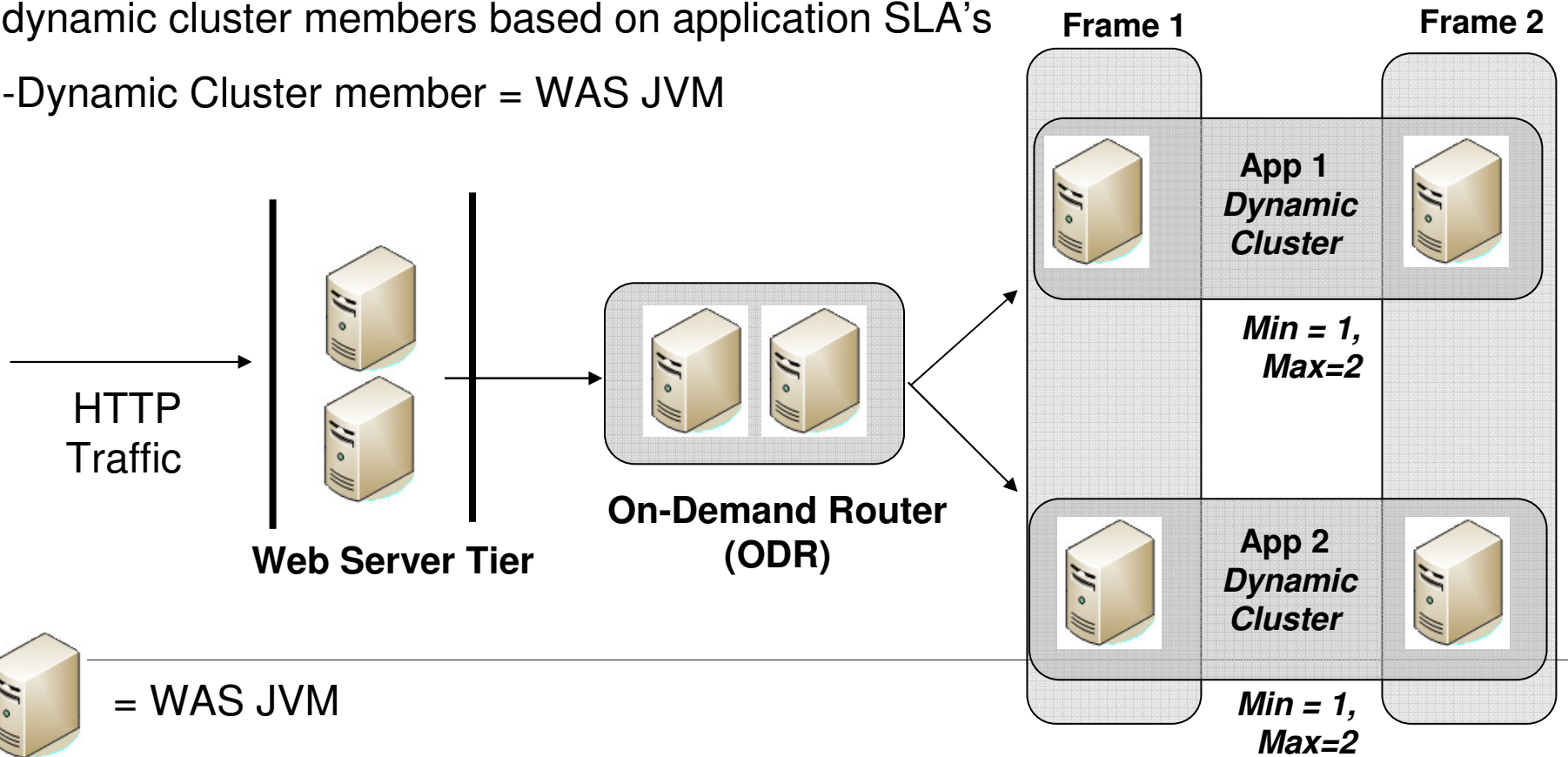2. ## Fragile Middleware Infrastructure

   - System can't detect that a failure will probably occur
   - Failures aren't isolated, and impact more than it should

   The infrastructure should monitor and react to conditions that effect the "health" of the cluster-member JVM's

Optimizing the Pool of Resources with Dynamic Clusters

-Applications are installed to a **Dynamic Cluster**

-ODR uses <u>policies</u> to determine when to start/stop
dynamic cluster members based on application SLA's

-Dynamic Cluster member = WAS JVM

Frame 1   **Frame 2**

App 1
*Dynamic
Cluster*

*Min = 1,
Max=2*

HTTP
Traffic

Web Server Tier

**On-Demand Router
(ODR)**

App 2
*Dynamic
Cluster*

*Min = 1,
Max=2*

= WAS JVM

Application Prioritization: Doing What's Important to You

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

- **Service policies** are used to define application <u>service level goals</u>

- Allow workloads to be classified, prioritized and intelligently routed

- Enables application performance monitoring

- Resource adjustments are made if needed to consistently achieve service policies

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

WebSphere Virtual Enterprise ensures SLAs are met with optimal hardware resources

| Application Name	Priority	Avg. CPU Utilization
Kuala Lumpur	High	60%
Johor Bahru	Medium	25%
Kuching	Low	36%

Application Server Pool
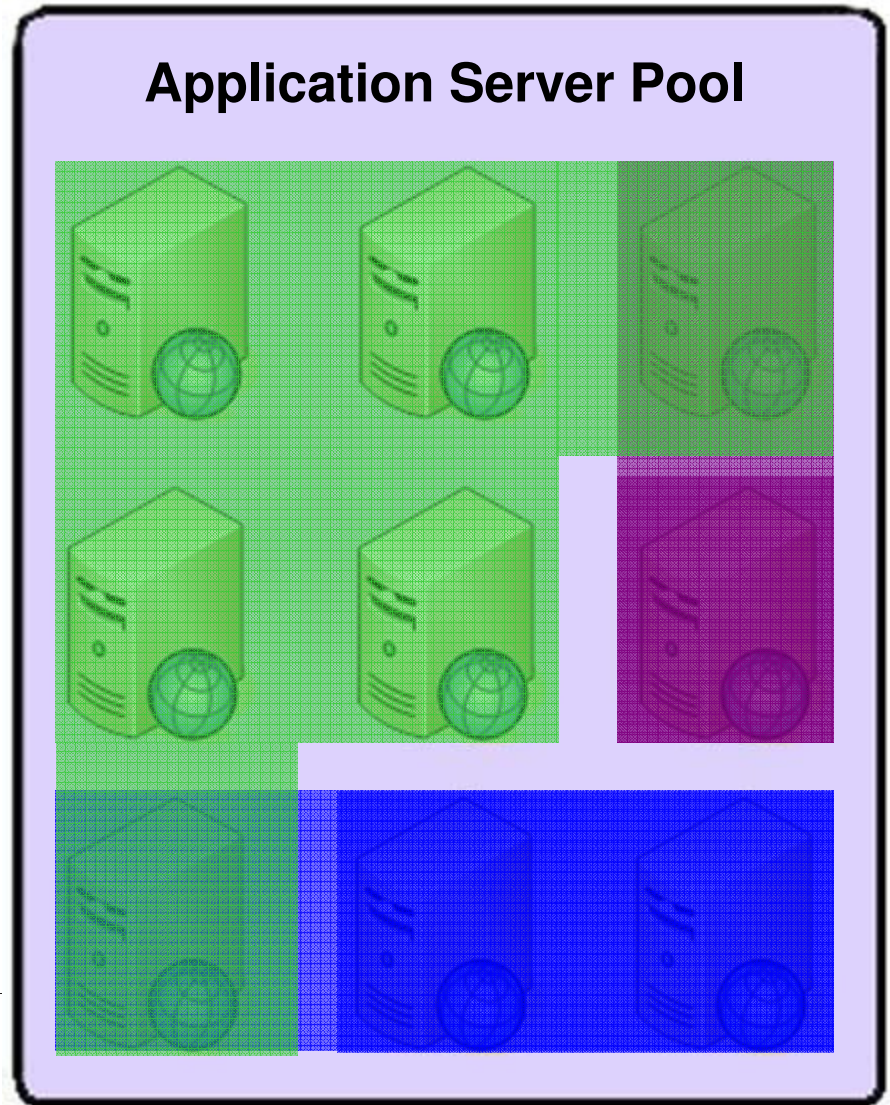
Hypothetical scenario #1:
Interest rates DROP in KUL

Health Management – Health Policies

Helps mitigate common health problems before production outages occur

- Health policies can be defined for common server health conditions

- Health conditions are monitored and corrective actions taken automatically
  - Notify administrator
  - Capture diagnostics
  - Restart server

- Application server restarts are done in a way that prevent outages and service policy violations
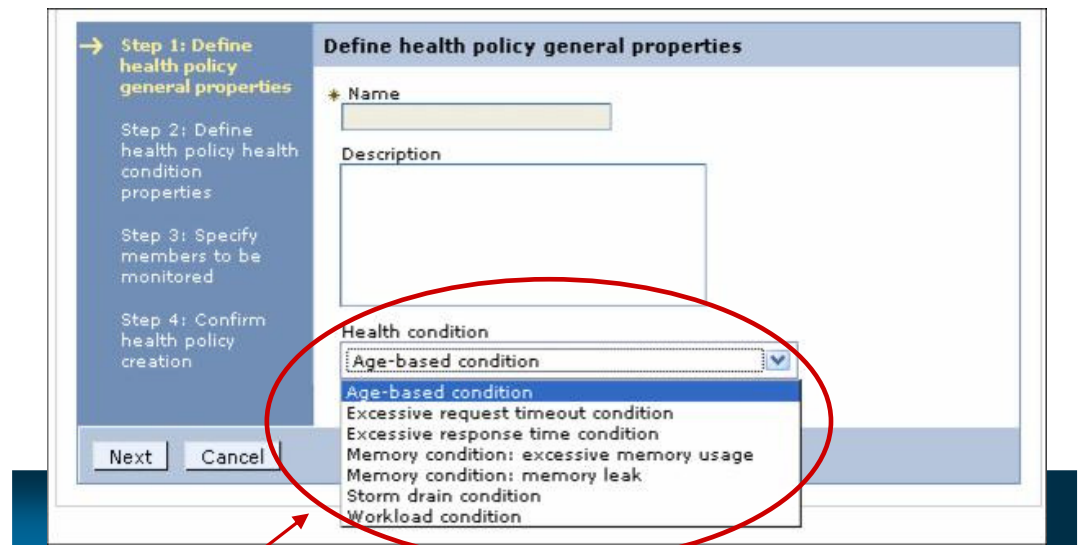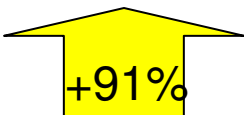

Health Conditions
- **Age-based:** *amount of time server has been running*
- **Excessive requests:** *% of timed out requests*
- **Excessive response time:** *average response time*
- **Excessive memory:** *% of maximum JVM heap size*
- **Memory leak:** *JVM heap size after garbage collection*
- **Storm drain:** *significant drop in response time*
- **Workload:** *total number of requests*
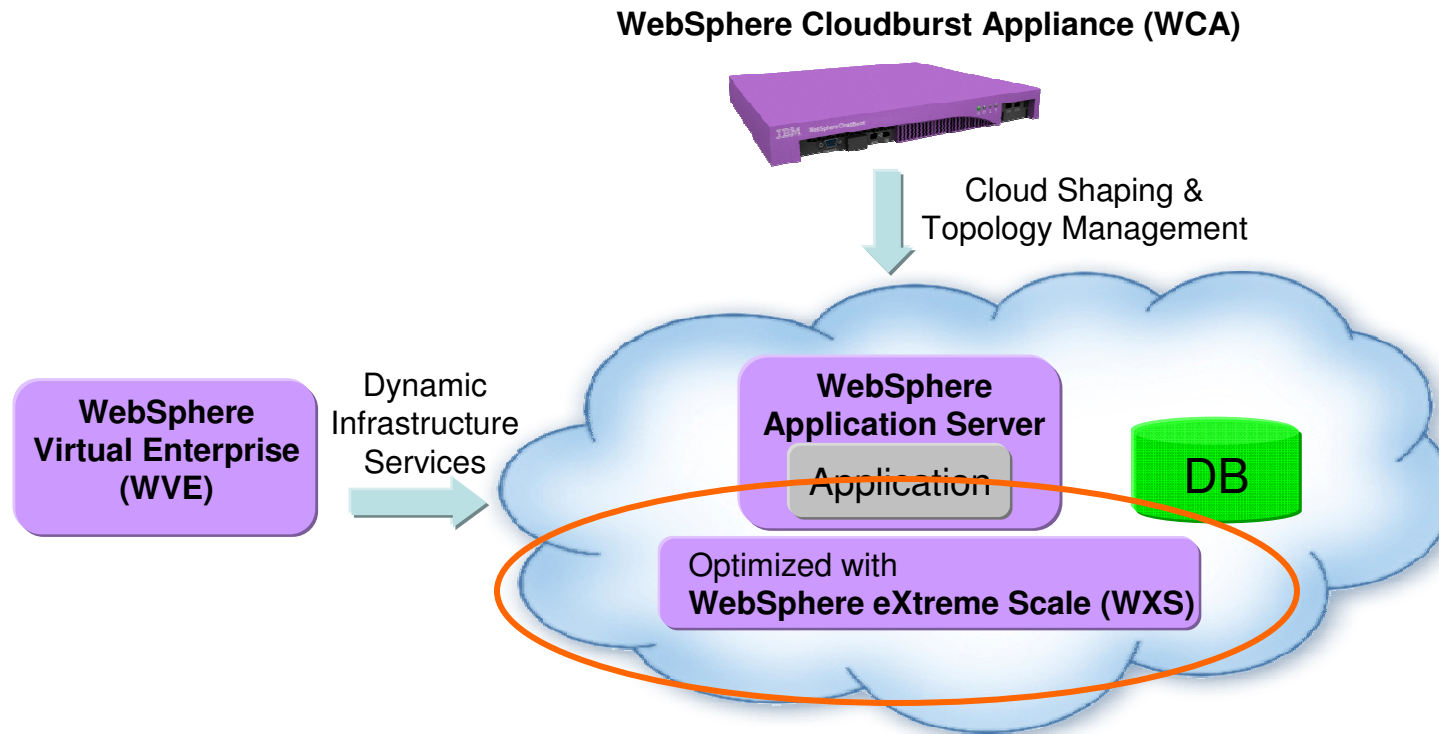
WVE Benefits: Global Financial Institution

	Prior to Jan. 2008	ETA June 2008
Application server	WAS ND v6.0	WAS ND v6.1
Management server	none	WebSphere Virtual Enterprise
# of machines	32	14 -56%
Hardware	Mixed	Blades
Operating system	Windows	Linux
# of applications	22	42+ +91%

*Note: Currently has 8 applications in production managed by WebSphere Virtual Enterprise*

Cloud Foundations for your Applications with WebSphere - Extreme Scalability and Performance
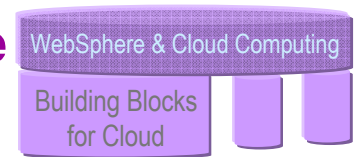
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Linear Scaling of Applications – Data bottlenecks
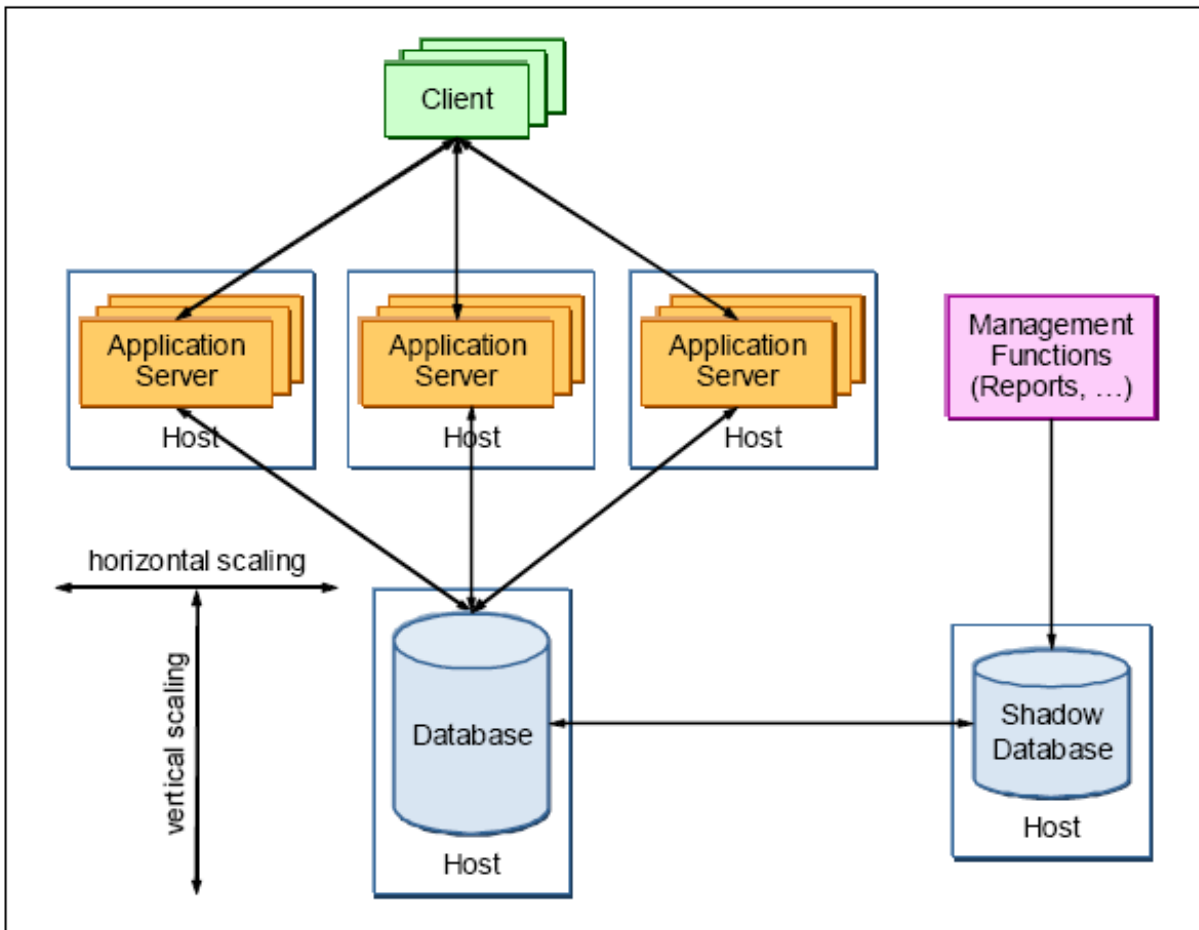
- Applications should scale linearly

- Bottlenecks in data access, logging, and application state (memory) management prevent applications from scaling

- Dynamic Infrastructure Services provide **Auto-Scaling** features for applications…

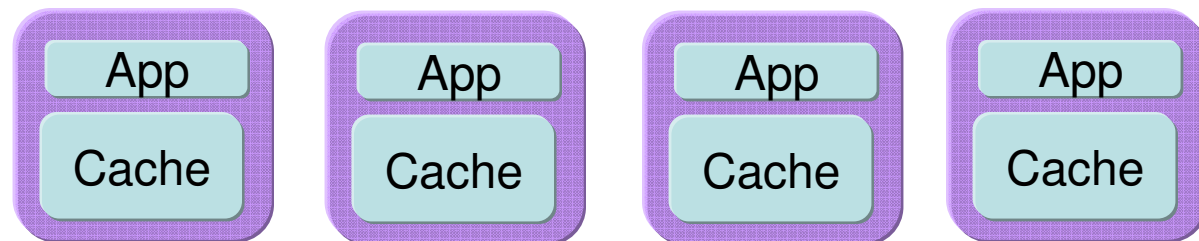-if apps don't scale, they can't take advantage

Linear Scaling of Applications – JVM memory footprint

- With virtualization & consolidation, customers aren't running out of CPU, they are running out of memory!
- Reduce the JVM memory footprint with smarter caching

Conventional Approach

Large app JVM's with duplicate cached data

App	App	App	App
Cache	Cache	Cache	Cache

Smarter Caching Approach

Smaller app JVM's that connect to a fault-tolerant, centralized distributed cache

App   App   App   App

WebSphere eXtreme Scale cache
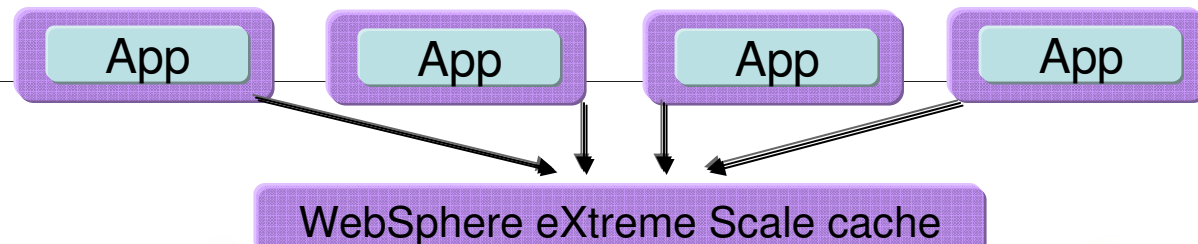
Application topologies today

Web Server Tier   Application Server Tier   Database Tier

Application topologies today

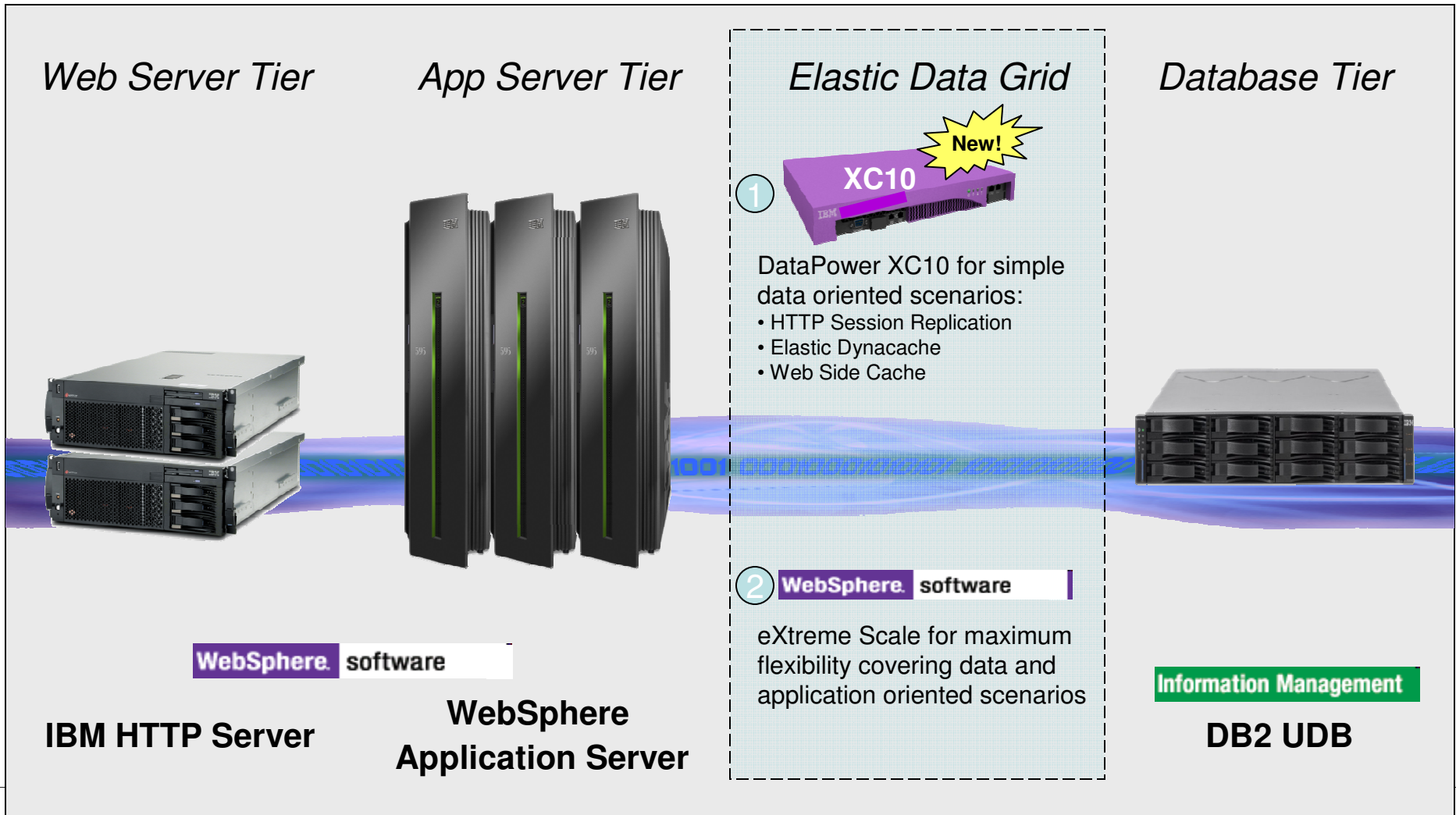**Web Server Tier   Application Server Tier   Database Tier**

Scale with simplicity

Web Server Tier

Application Server Tier

Elastic Data Grid

Database Tier

A	D'
B	C'
C	B'
D	A'
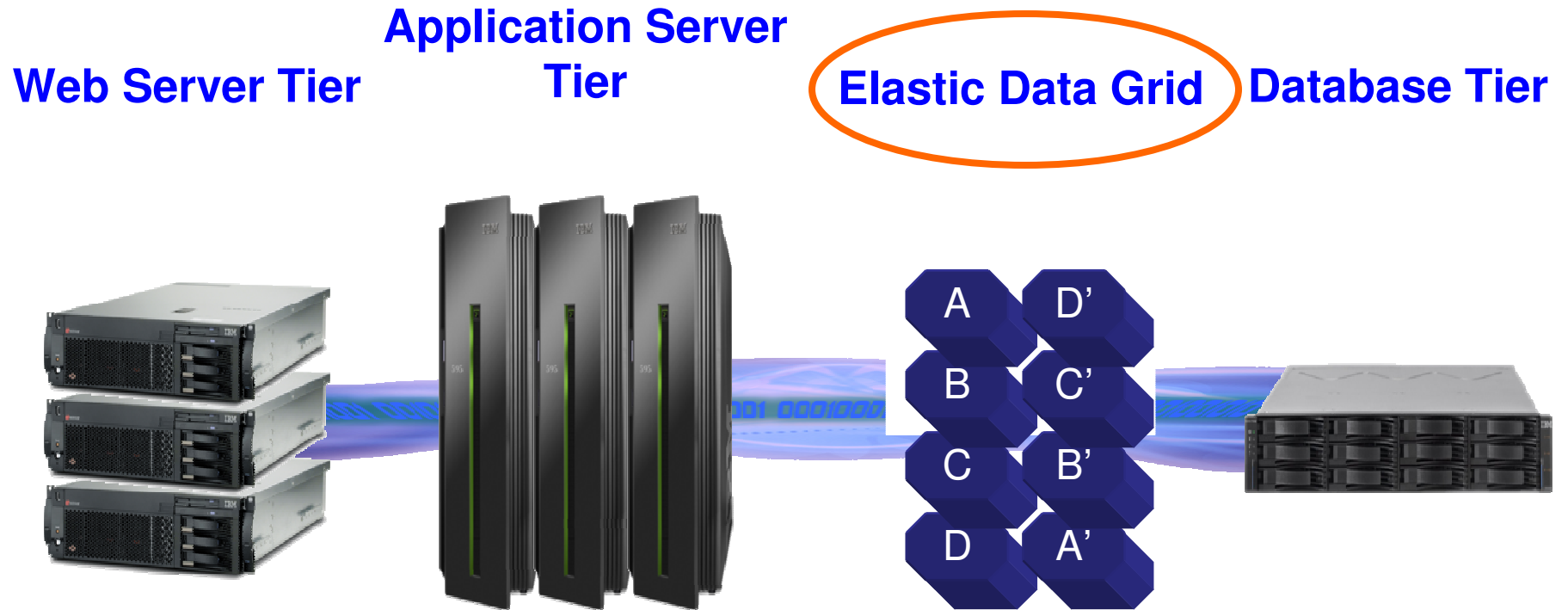
Modern Application Infrastructure Topology

Web Server Tier *App Server Tier* *Elastic Data Grid* *Database Tier*

New!

① **XC10**

DataPower XC10 for simple data oriented scenarios:
• HTTP Session Replication
• Elastic Dynacache
• Web Side Cache

WebSphere software

IBM HTTP Server

WebSphere Application Server

② **WebSphere** software

eXtreme Scale for maximum flexibility covering data and application oriented scenarios

Information Management

DB2 UDB

Scale with Simplicity! Both WebSphere eXtreme Scale and DataPower XC10 Appliance provide distributed object caching that is essential for elastic scalability and next-generation, high performance cloud environments

Extreme scalability is becoming extremely common

Entertainment

5 Billion
requests per day

10x
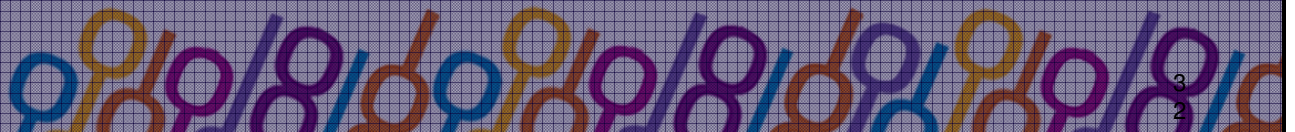reduced response times

Fantasy sports web infrastructure

- **Before:** 60ms response time against Database
- **After:** WXS improved to 6ms response time
- 450k concurrent users
- 80k requests per second up to 1M in 2011
- 6 weeks from concept to production

Support transaction-intensive services

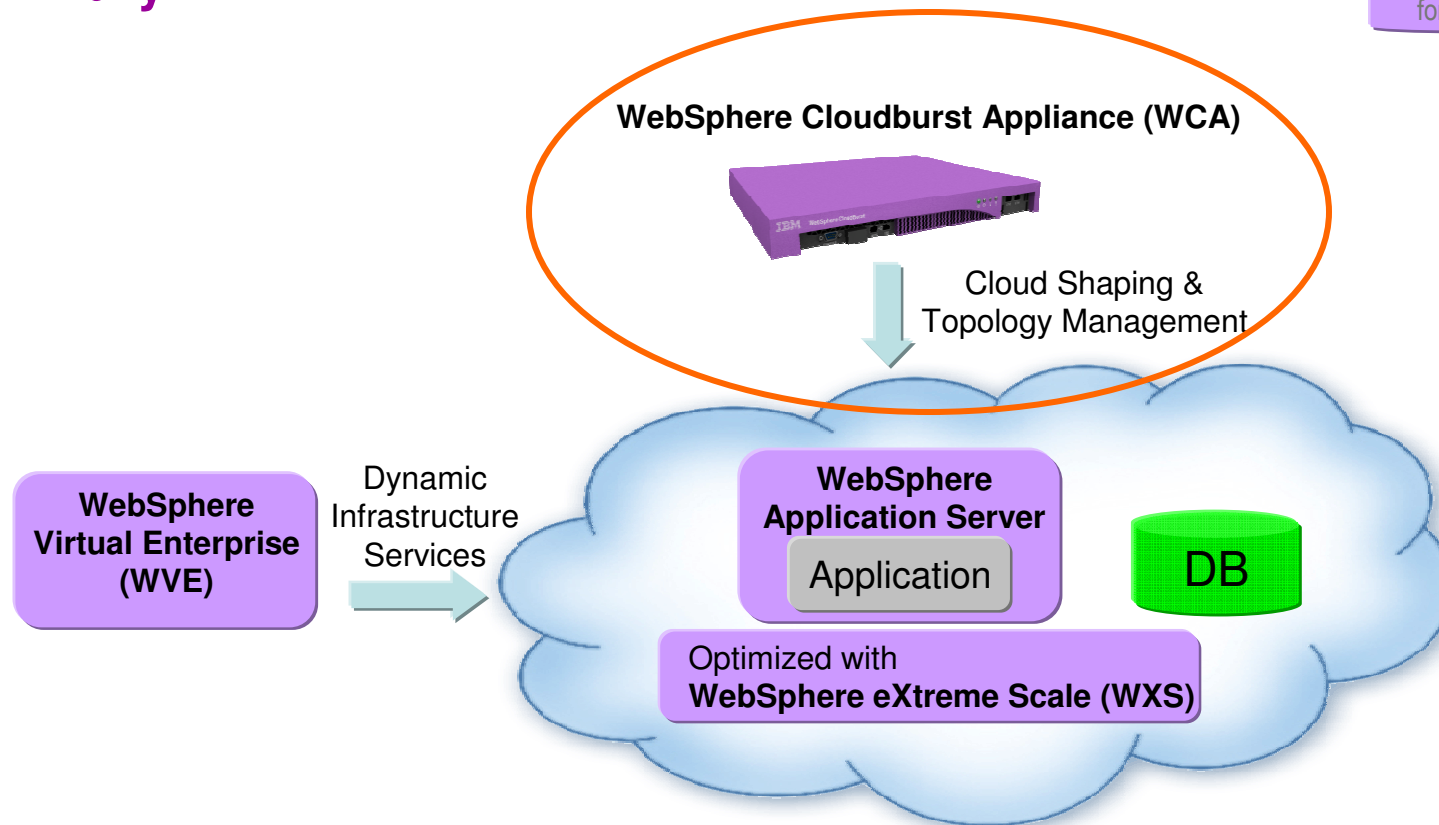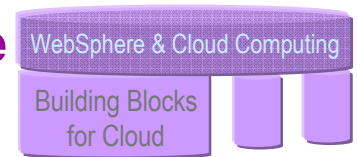Deliver consistent & predictable response times

Take action on growing volumes of business events
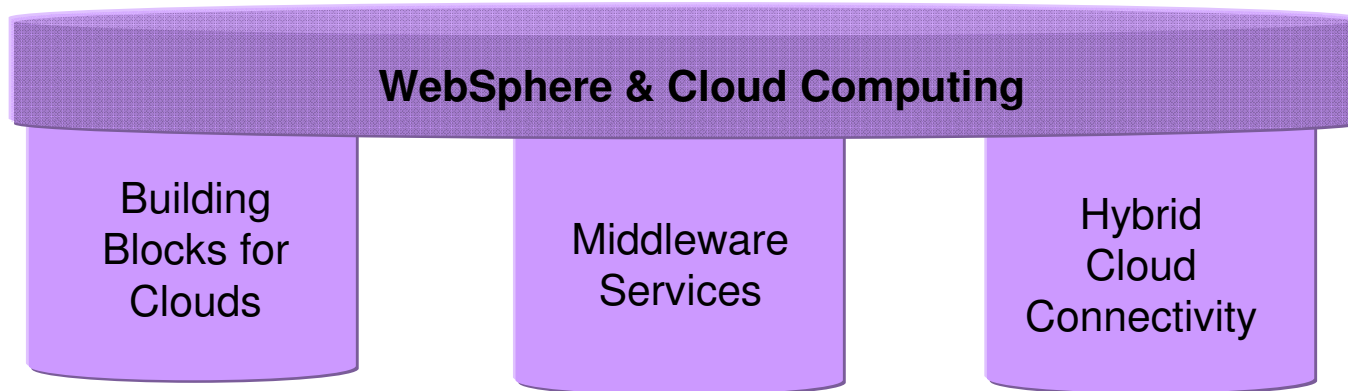
Scale with simplicity and lower cost

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WebSphere in the Clouds: Doing More with Less

WebSphere & Cloud Computing

Building Blocks for Clouds

Middleware Services

Hybrid Cloud Connectivity

Enable you to:

- Accelerate time to value

- Reduce cost of owning and operating enterprise applications and middleware

- Capture new & evolving business opportunities with improved agility

Terima Kasih
Thank You