

Private Cloud for WebSphere Virtual Enterprise Application Hosting

Tracy Smith
Nationwide Insurance

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www.linkedin.com/in/tracysmith2
smitht40@nationwide.com



Private Cloud for WebSphere Virtual Enterprise Application Hosting



- A bit about Nationwide Insurance
- Cloud Computing
- Nationwide Cloud Journey:
 - Adoption of Virtualization
 - Evolving Capability
 - Private Cloud for Java Application Hosting
- Partnership with IBM
- Solution Architecture
- Service Roadmap
- Necessary Changes to Processes and Organization
- Appendices

A bit about Nationwide Insurance



Business:

- Fortune 100 insurance & financial services company
- The No. 1 provider of public-sector retirement plans
- 6th largest provider of variable universal life insurance
- 7th largest auto insurer in the United States
- 7th largest homeowner insurer in the United States
- 7th largest variable annuities provider
- \$20+ billion in revenue in 2011
- 30,000+ employees; 6,000 in IT
- Highly regulated industry

Enterprise Governance

Insurance

Investments

Retirement

Banking

Shared Capabilities

Information Technology:

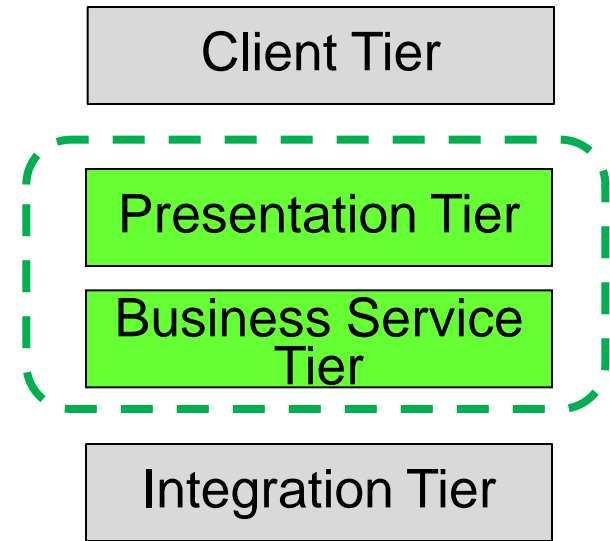
- Federated IT (26 business units)
- Strong architecture governance
- Java / Linux for all new custom development

Private Cloud for WebSphere Virtual Enterprise Application Hosting



Java Hosting is Nationwide's first private cloud service offering, providing an internally hosted Platform as a Service (PaaS).

Java Hosting provides application infrastructure environments for the presentation and business service tiers of internally developed java applications.



The solution architecture builds upon our established capabilities in virtual server provisioning and integrates four new technologies and tools from IBM to provide application infrastructure virtualization.

Cloud Computing



Nationwide's Cloud Computing strategy leverages the definitions and models developed by the National Institute of Standards and Technology (NIST)*:

- *Essential Characteristics*
- *Service Models*
- *Deployment Models*






* "DRAFT Cloud Computing Synopsis and Recommendations", National Institute of Standards and Technology, Special Publication 800-146, May 2011



Cloud Computing: Essential Characteristics



Essential Characteristics*:

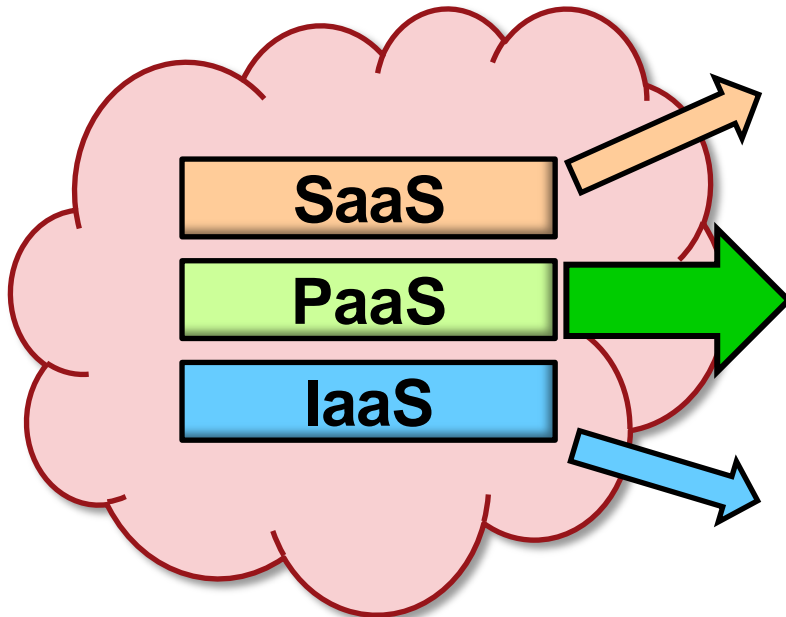
-  1. **Broad network access** - Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous client platforms.
-  2. **Rapid elasticity** – Scalability there when you need it most, avoids over-provisioning.
-  3. **Resource Pooling** – Compute resources are shared, enabled by virtualization technologies, providing economies of scale.
-  4. **Measured Services** – Accurate measurement of usage, pay only for resources consumed.
-  5. **On-demand self-service** – easy to order and use computing resources, enables speed to market.

* “DRAFT Cloud Computing Synopsis and Recommendations”, National Institute of Standards and Technology, Special Publication 800-146, May 2011

Cloud Computing: Service Models

Cloud Computing can be broadly categorized into 3 service models: **Software as a Service (SaaS)**, **Platform as a Service (PaaS)** and **Infrastructure as a Service (IaaS)**.

Our Java Hosting solution is an example of **Platform as a Service**.

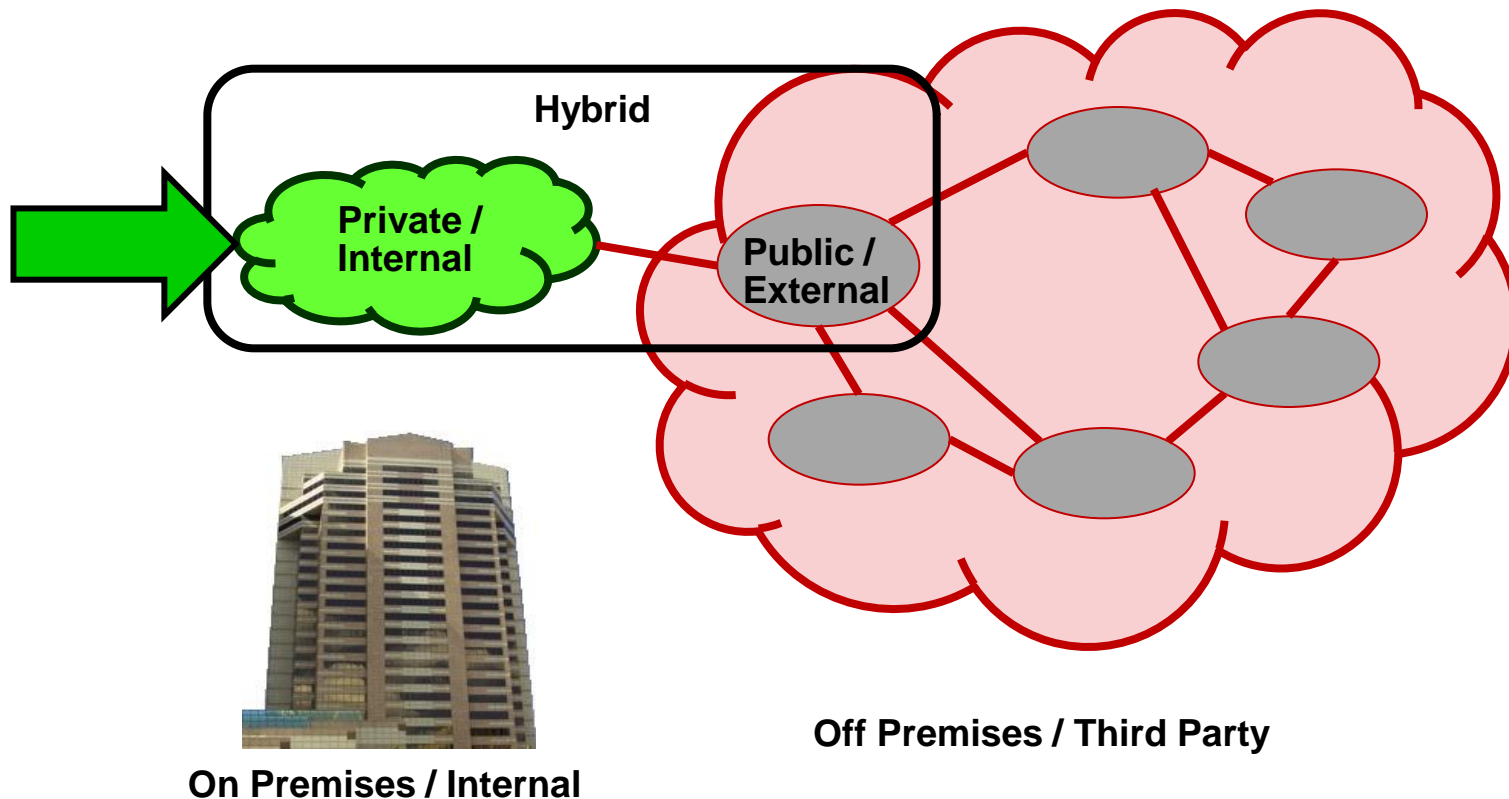


Who Uses It	What Services are Available	Why Use It?
Business Users	Email, Office Automation, CRM, Website Testing, Wiki, Blog, Virtual Desktop	To complete business tasks
Developers and Deployers	Service and application test, development, integration and deployment	Create or deploy applications and services for users
System Managers	Virtual machines, operating systems, message queues, networks, storage, CPU, memory, backup services	Create platforms for service & application test, development, integration & deployment

Cloud Computing: Deployment Models

All three Cloud service models (SaaS, PaaS and IaaS) can be implemented in the following deployment models: Public Cloud, Private Cloud, or Hybrid Cloud.

Our Java Hosting solution is an example of a Private Cloud.



Cloud Computing Deployment Models

Nationwide Cloud Journey



2011 - 2012
“Private Cloud”

- Platform optimization
- “Fit For Purpose”
- WebSphere automation and standardization



2006 - 2010
“Evolving Capability”

- Capacity management
- Availability improvements
- Standardization on Java, Linux



2005
“Adoption of Virtualization”

- Significantly better TCO
- Faster server provisioning
- Improved Disaster Recovery

Nationwide Cloud Journey: Virtualization



Nationwide benefits from server virtualization:

- 50% reduction in monthly Web application hosting costs
- 80% reduction in data center floor space needs; power conservation
- 50% reduction in hardware and operating system support efforts
- 70% average CPU utilization
- Savings on middleware costs (WebSphere, UDB, and Oracle)

2005

“Adoption of Virtualization”

- Significantly better TCO
- Faster server provisioning
- Improved Disaster Recovery

Nationwide Cloud Journey: Evolving Capability

SHARE
Technology - Connections - Results

- Statement of direction was all Linux virtualized to z
- z9 > z10 > z196 Engine speed increases were beneficial to TCO. TCO was validated at each upgrade.
- Growth to 800 servers under zVM management lead to opportunities for Virtual Network tuning

2006 - 2010
“Evolving Capability”

- Capacity management
- Availability improvements
- Standardization on Java, Linux

- Virtualization caused currency issue for Linux
- Server standardization was difficult to maintain across Test / Production
- Chargeback model drove interesting virtualization tactics (JVM Stacking)

Nationwide Cloud Journey: Evolving Capability



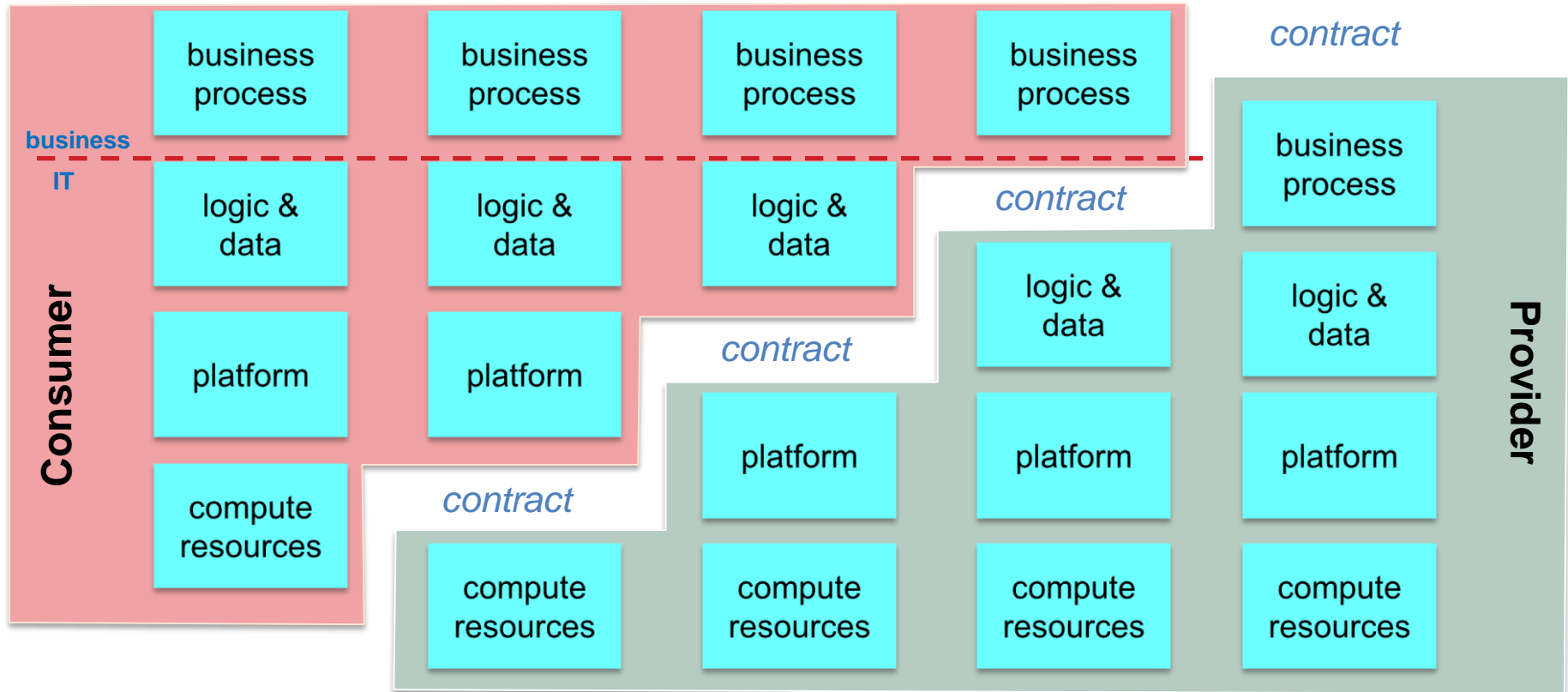
Insourced

IaaS

PaaS

SaaS / ASP

BPO



Java Application Hosting Service



Nationwide Cloud Journey: Private Cloud: Z Platform Optimization



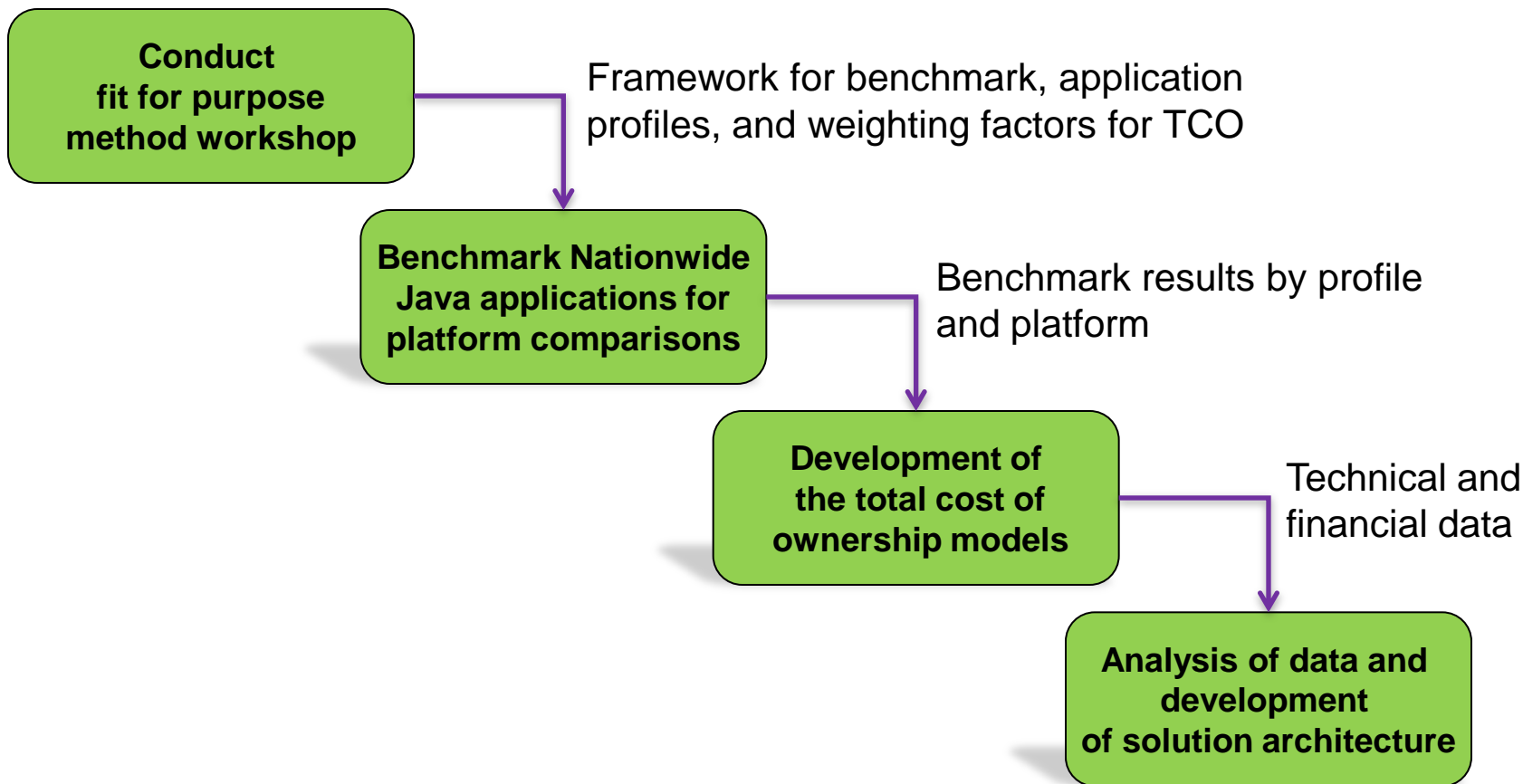
2011 - 2012
“Private Cloud”

- Platform optimization
- “Fit For Purpose”
- WebSphere automation and standardization

- Systems z Platform optimization:
 - Consolidated mainframes into a shared environment of traditional and zLinux workloads
 - Improved disaster recovery and availability capabilities
 - Positioned the environment to leverage zBX and expert integrated systems
 - Improved networking capabilities

Nationwide Cloud Journey: Private Cloud: “Fit For Purpose” Analysis

The “fit for purpose” objective was to create a process based approach for determining the most appropriate platform to run the various Java workloads at Nationwide.



Nationwide Cloud Journey: Private Cloud: “Fit For Purpose” Outcome



The project team identified four specific workload types (patterns) that exemplified java application behaviors at Nationwide:

20% of apps



- **Type A:** Data Intensive - Workload is IO intensive and has a high degree of thread interaction. (e.g.: High volume OLTP databases)
- **Type B:** Workload is highly threaded, moderate thread interaction and moderate to high CPU demand. (e.g.: large JEE applications).

80% of apps



- **Type C:** Workload of small discrete applications, low demand for IO and CPU, fewer thread interaction. (e.g.: web deployable unit)
- **Type D:** Analytics - Workloads have low IO and high sustained CPU demand. (e.g.: Grid Computing).

Nationwide had no significant Java applications in use for Type A or D workloads.

Java application portfolio is roughly a 20/80 mix of Type B and Type C workloads.

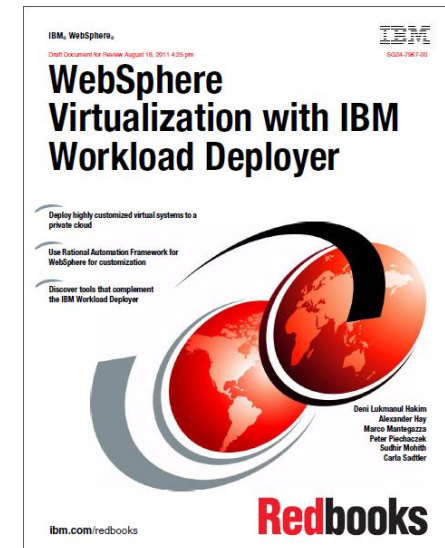
Middleware tooling enabled Java workload mobility between zSeries and x86 platforms.

The empirical performance data from the study confirmed that Type B and Type C applications can run on both platforms, with a Type B preference for x86 and Type C preference for zLinux.

Partnership with IBM



- IBM has provided architecture and engineering expertise throughout the Proof-Of-Technology and Pilot phases
- IBM engineers and a Nationwide engineer collaborated on a resident development of a RedBook:
 - “WebSphere Virtualization with IBM Workload Deployer”
- IBM continues to provide technical support for the integration of the four new products

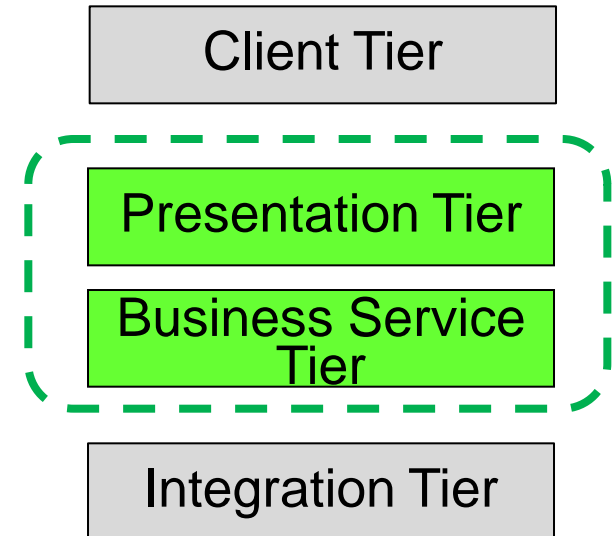


Solution Architecture: Application Hosting



Java Hosting is Nationwide's first private cloud service offering, providing an internally hosted Platform as a Service (PaaS).

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The solution architecture builds upon our established capabilities in virtual server provisioning and integrates four new technologies and tools from IBM to provide application infrastructure virtualization.

(see detailed Nationwide Web Application Architecture in Appendix)



Solution Architecture: New Technologies

**IWD
(IBM
Workload
Deployer)**

Secure hardware appliance that allows application middleware environments to be configured once, and then catalogued into a list of ready-to-run certified environments



**RAF
(Rational
Automation
Framework)**

Customizable framework to set up new cells and environments; apply patches and upgrades; deploy applications; and automate middleware configuration settings.



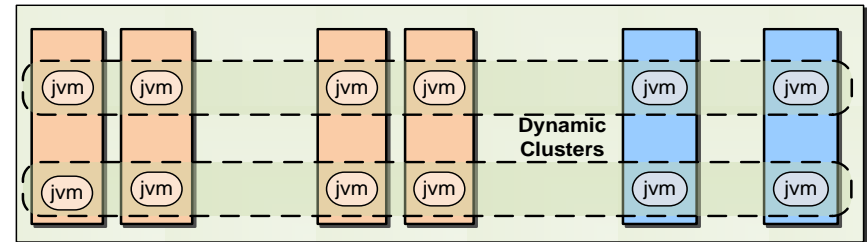
**IBM
Datapower
XC10
Appliance**

Highly available appliance for caching session databases and service responses.



**WVE
(WebSphere
Virtual
Enterprise)**

Provides application infrastructure virtualization capabilities; can be thought of as a *hypervisor for application servers*.

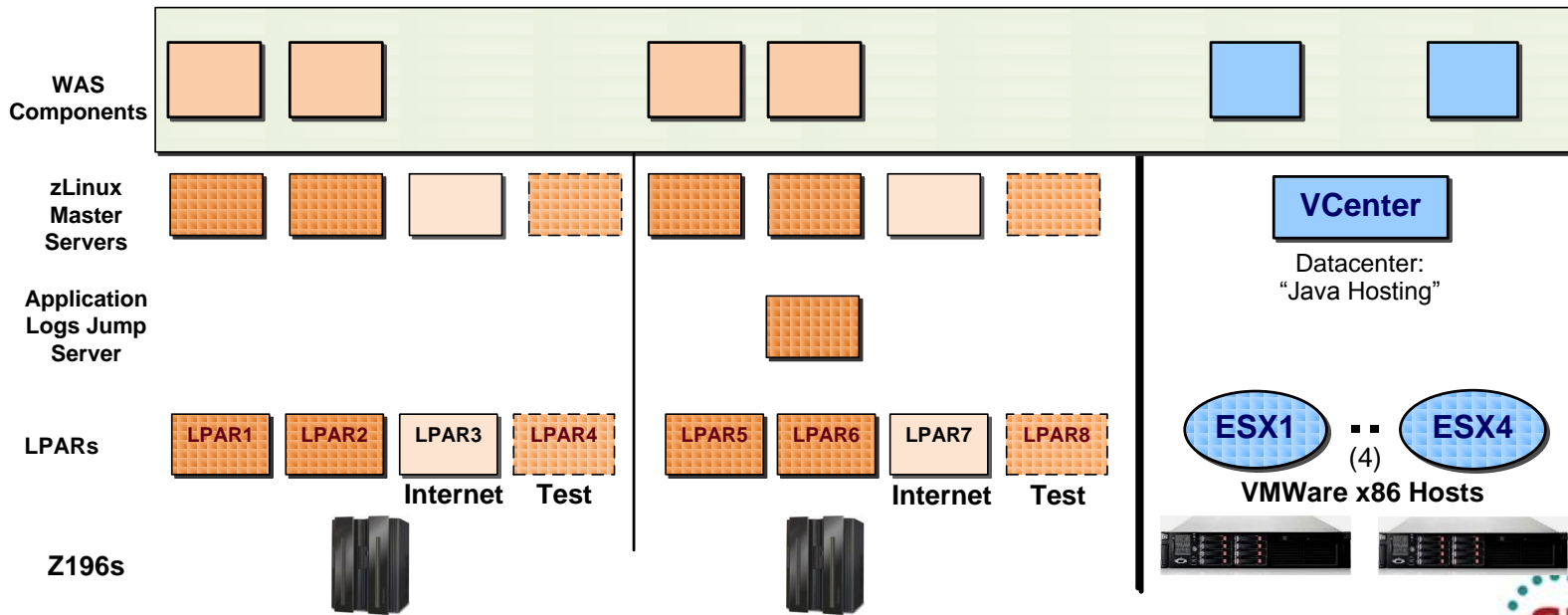
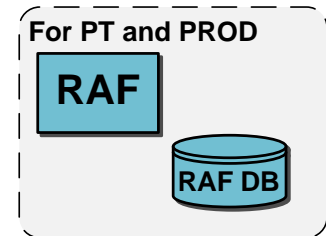
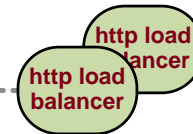
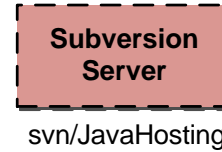
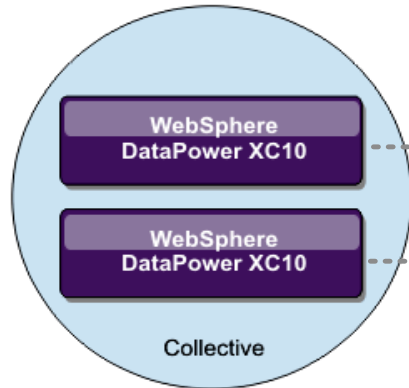


(see Glossary in Appendix for explanations and acronyms)

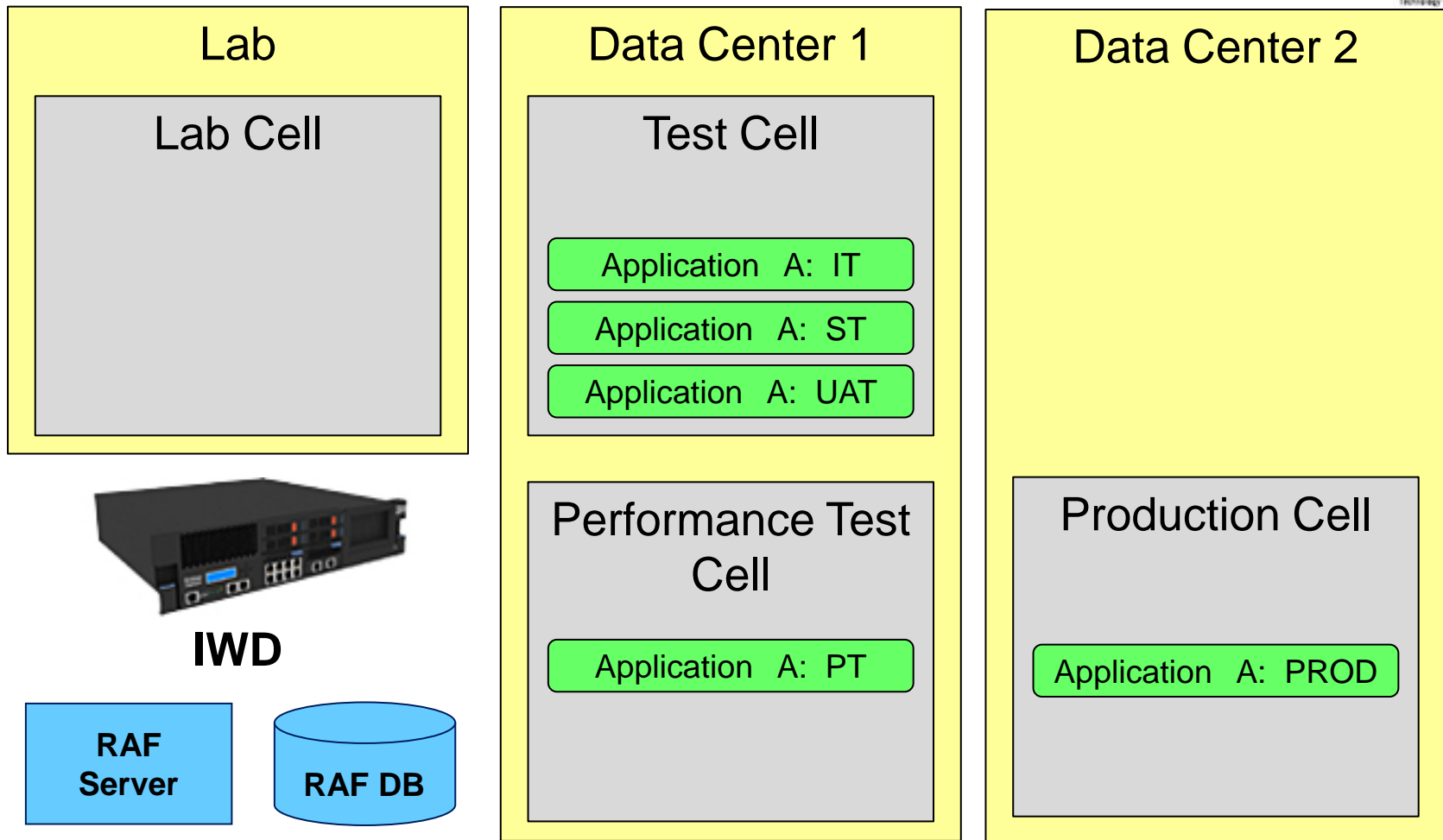
Solution Architecture: Supporting Tools



Java Hosting: Production Tools

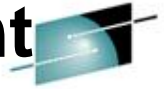


Solution Architecture: Environment Overview



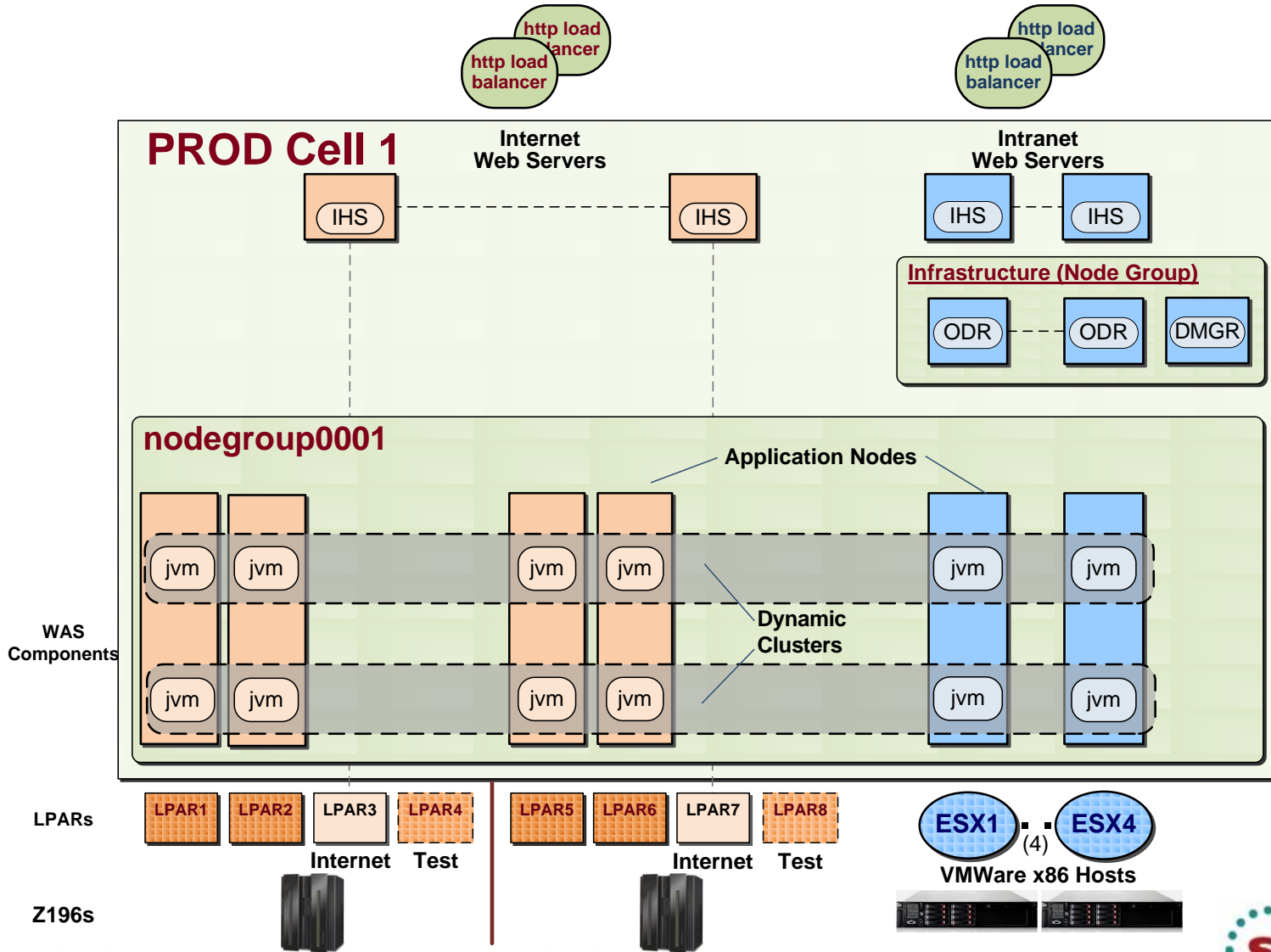
Automation patterns and scripts maintain both environment and application configuration consistency.

Solution Architecture: Production Environment

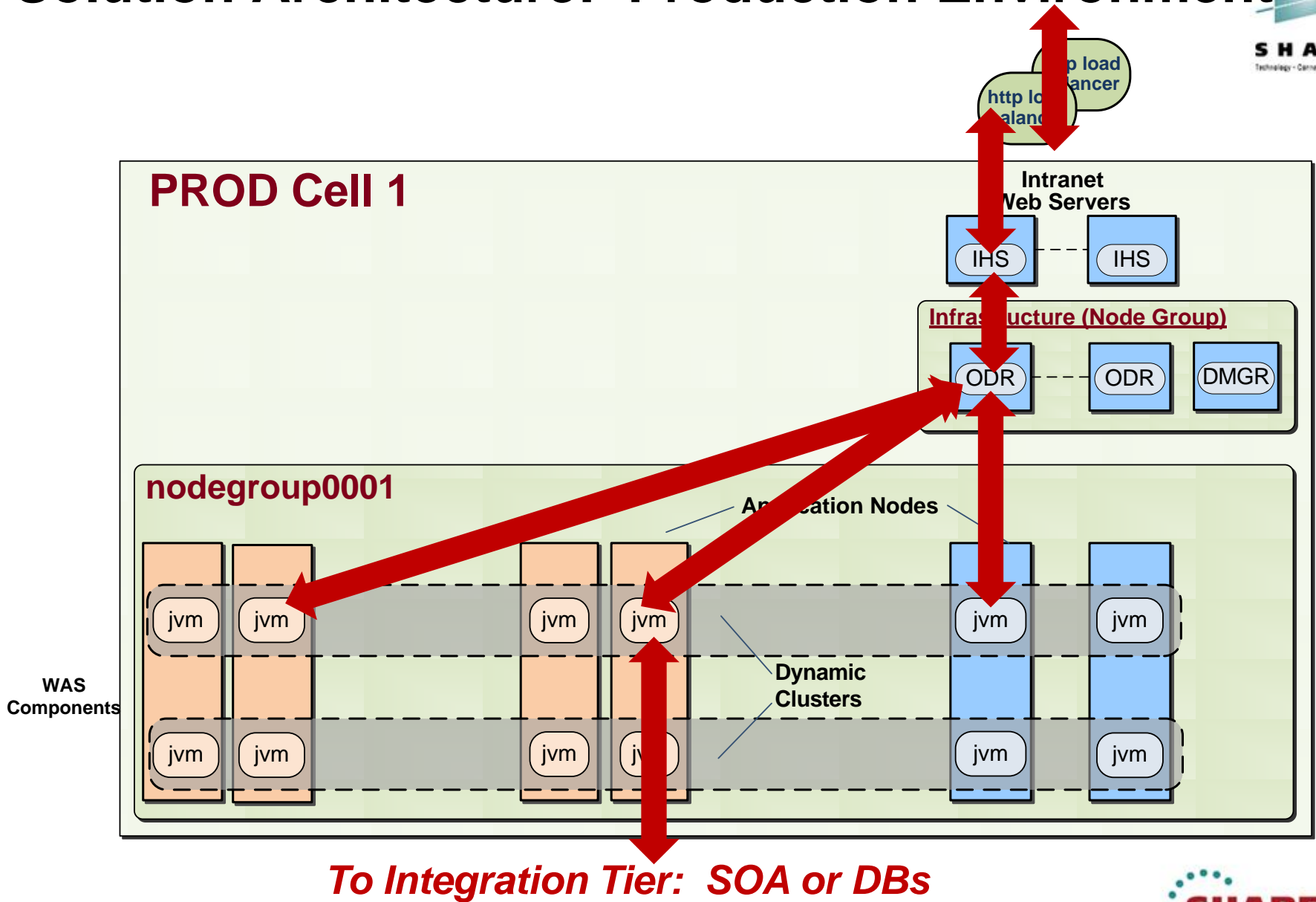


SHARE
Technology - Connections - Results

Java Hosting: PRODUCTION Cell

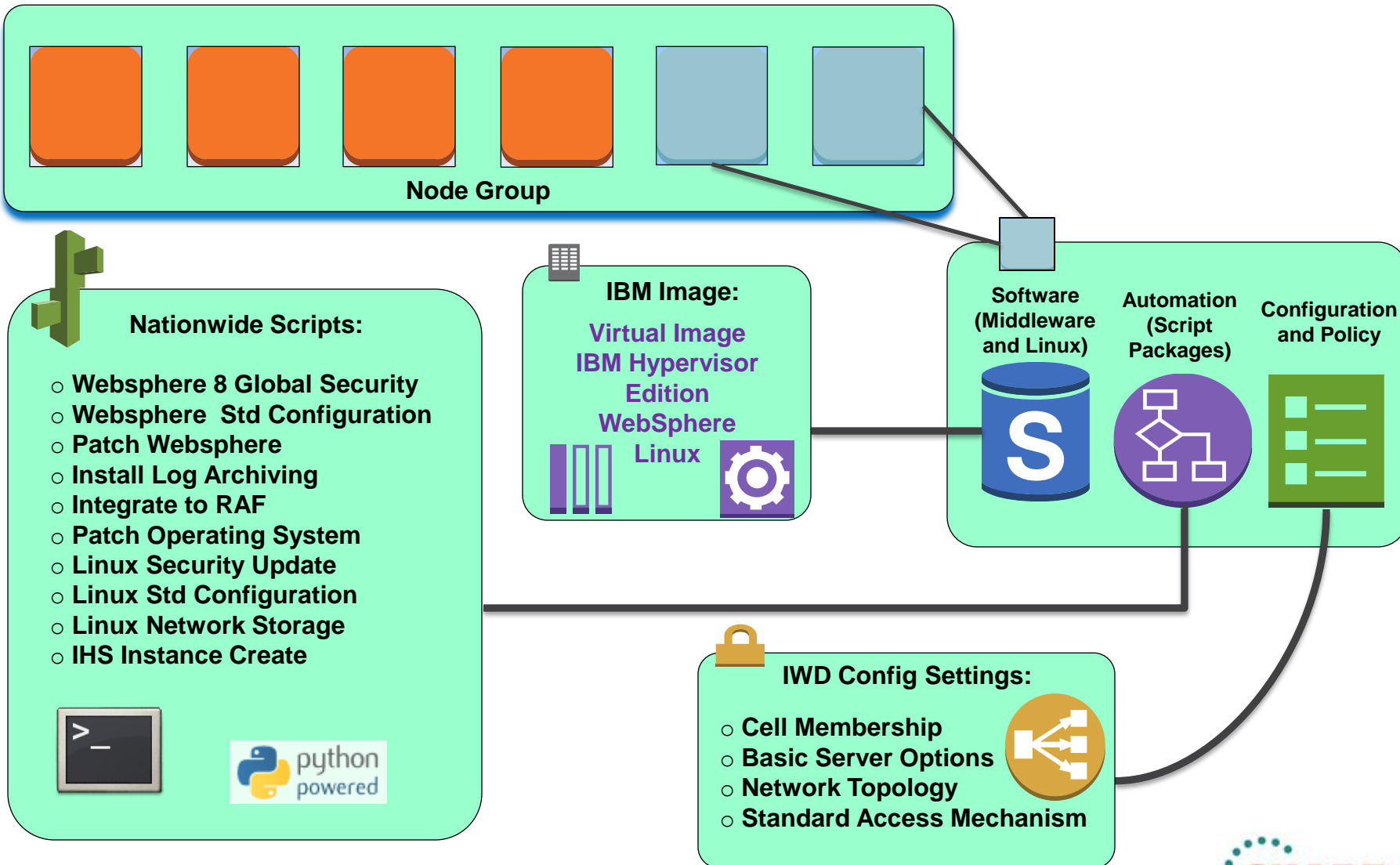


Solution Architecture: Production Environment



To Integration Tier: SOA or DBs

Solution Architecture: Anatomy of an IWD Pattern



Solution Architecture: IWD Patterns

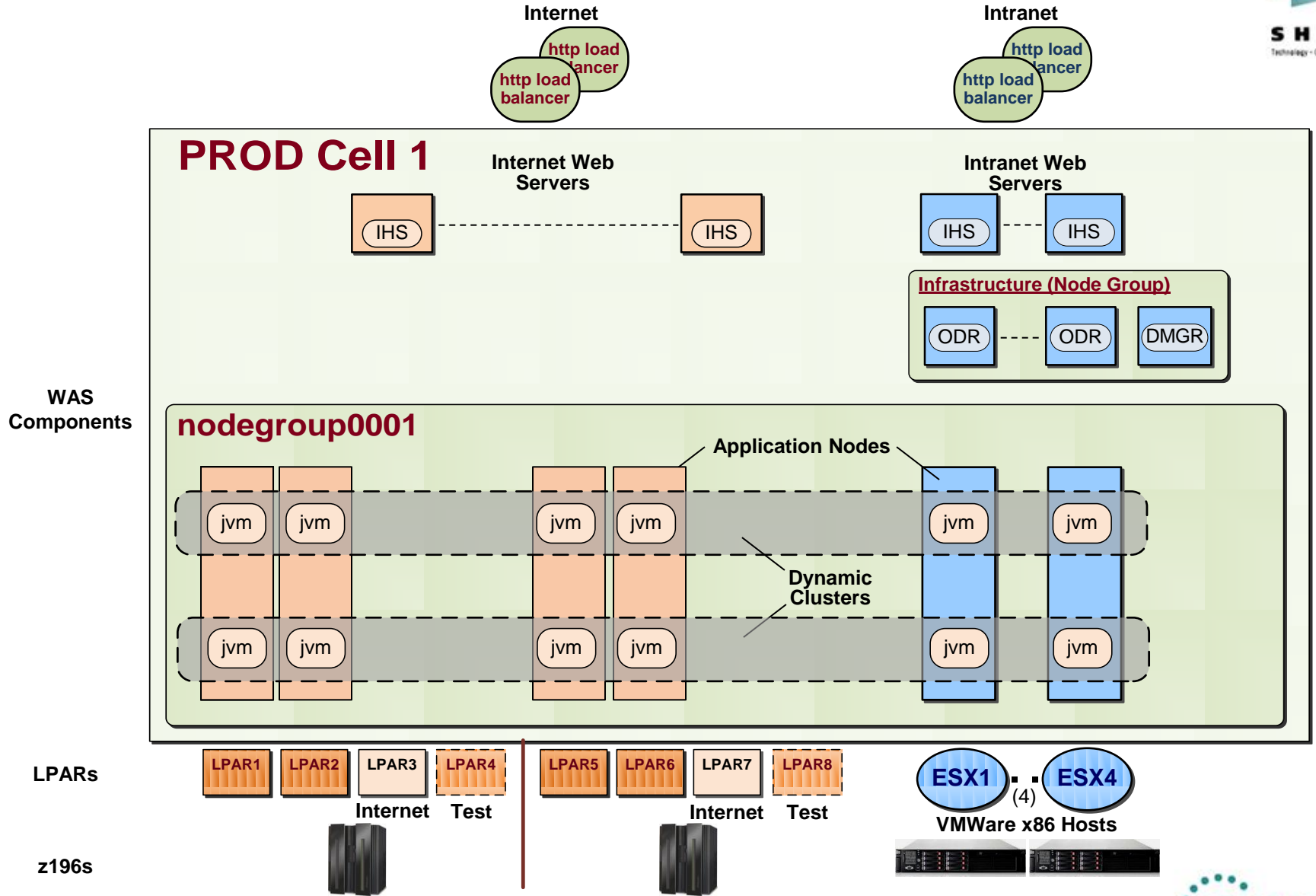


Order	Nationwide Scripts	IWD Provisioning Patterns									
		ESX					zLinux				
		DMGR	ODR	IHS Intra	IHS Inter	Custom Node	ODR	IHS Intra	IHS Inter	Custom Node	
	Master Wrapper										
1	WAS 8 Global Security	X									
2	WAS Std. Configuration	X	X			X	X			X	
3	Stop WAS	X	X			X	X			X	
4	Patch WAS to 8.0.0.3 FP3	X	X	X	X	X	X	X	X	X	
5	Install Log archiving	X	X	X	X	X	X	X	X	X	
6	Set up RAF Client	X	X	X	X	X	X	X	X	X	
7	zLinux Patch SLES-11						X	X	X	X	
8	SLES11-- Finishing script	X	X	X	X	X	X	X	X	X	
9	SLES11-- Package removal	X	X	X	X	X	X	X	X	X	
10	Set up NFS mounts	X	X	X		X	X	X		X	
11	IHS: Create Instances			X	X			X	X		
12	SLES11-- Post Re-boot	X	X	X	X	X	X	X	X	X	
13	Delete VM	X	X	X	X	X	X	X	X	X	

(see "IWD Pattern Scripts" in Appendix for description of scripts)



Solution Architecture: Automated Provisioning



WAS Components

LPARs

z196s

Service Roadmap: Java Application Hosting



	2012	2013	2014
Java Hosting Environment	WVE (WAS 8.0) SLES 11	WVE (WAS 8.0) RHEL 6 + DB2 ? + MQ ?	WVE (WAS 8.5) RHEL 6 + DB2 ? + MQ ?
Implementation Scope	<ul style="list-style-type: none"> Default for new Java Application Submissions 	<ul style="list-style-type: none"> Default for new Java Application Submissions Migration of standard java applications 	<ul style="list-style-type: none"> Default for new Java Application Submissions
I&O Released Products	<ul style="list-style-type: none"> Tests environment PT-Prod environments 	Development Self-service	Additional environments Self-service
New Features	<ul style="list-style-type: none"> JVM Health Mgmt 	<ul style="list-style-type: none"> Application Editions? Service Policies 	

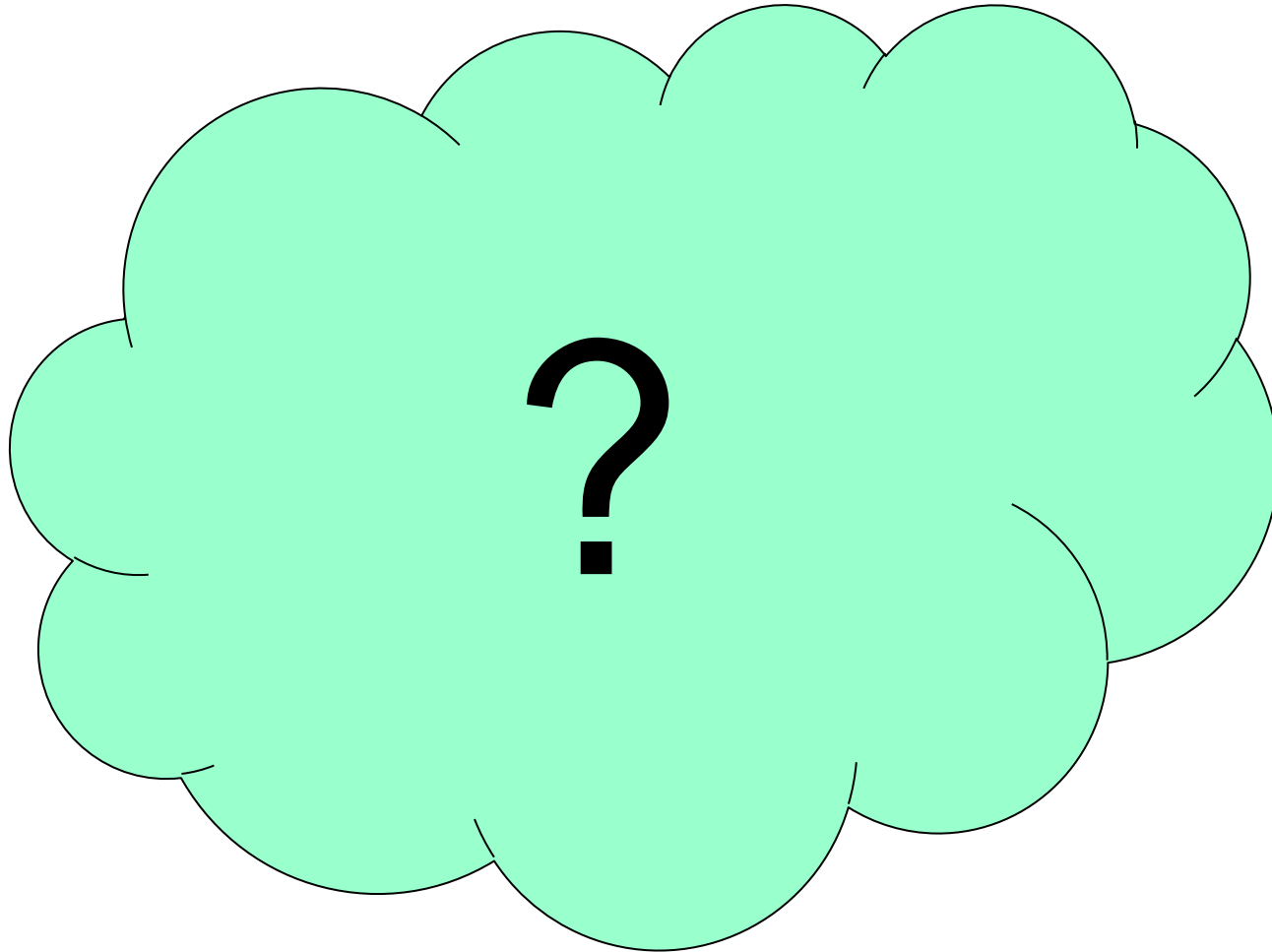
Necessary Changes



- Java Hosting is part of a more comprehensive delivery model change from infrastructure components (servers, storage, middleware, etc) to service (application hosting).
- Billing and recovery models are changing from many component parts to integrated higher level services with explicit service levels.
- Faster delivery timeframes require greater automation, pre-provisioning of resources, and reduced handoffs between component infrastructure teams.
- Nationwide is currently analyzing anticipated changes to organizational model within infrastructure teams.
- Application teams desiring faster and lower cost service need to adopt greater standardization in application architectures.



Questions?



Appendices



Appendix: Solution Architecture: Glossary

(for Solution Architecture: New Technologies slide)



Term	Definition
IWD	IBM Workload Deployer. IBM appliance that is used to provision and manage virtual servers using z/VM and VMware platforms. The appliance allows us to quickly and provision patterned identical middleware servers.
RAF	(IBM) Rational Automation Framework. IBM software product that facilitates complex management tasks of WebSphere environment by automating installation, patching, configuration change management, and application deployment on heterogeneous middleware platforms.
WVE	WebSphere Virtual Enterprise. Extension of IBM <i>WebSphere Application Server</i> , supporting application virtualization.
ODR	On-Demand Router. Specialized server process within the new WVE (WebSphere Virtual Enterprise) infrastructure, providing load-balancing across the multiple JVMs comprising a WebSphere Dynamic Cluster.
WebSphere Dynamic Cluster	New technical component within the WVE environment. In the I&O implementation, a cluster of 6 virtual servers on two virtual platforms, providing high availability for WAS JVMs.
XC10	IBM DataPower XC10 Appliance. IBM caching appliance. Used in the Java hosting environment for session data and service responses.
ACE	Cisco network device that provides load-balancing across redundant web servers for internet and intranet transactions.
DMGR	Deployment Manager. WAS administration application, managing WebSphere.
ESX	The VMware hypervisor (virtual machine manager) used by I&O to provide virtual servers on x86-based hosts.
IHS	IBM HTTP Server IBM's implementation of the Apache webserver, used as the I&O standard webserver.
JVM	Java Virtual Machine. A set of software programs and data structures that use a virtual machine (VM) as a crucial component of the Java Platform.
LPAR	Logical Partition. Within the IBM Mainframe environment, comparable to ESX host.
VMWare	Vendor of virtualization infrastructure products, including virtual machines, and platforms for private clouds, such as the ESX hypervisor.
WAS	WebSphere Application Server. IBM's software application server for java based applications. The standard platform for Nationwide developed and purchased software applications.
zVM	zLinux virtual machine. A completely isolated guest <i>operating system</i> (OS) installation within a zLinux server, executing programs just like a physical machine.
z196	zEnterprise 196. Latest IBM Mainframe platform in use within Nationwide supporting both zOS and zLinux platforms.



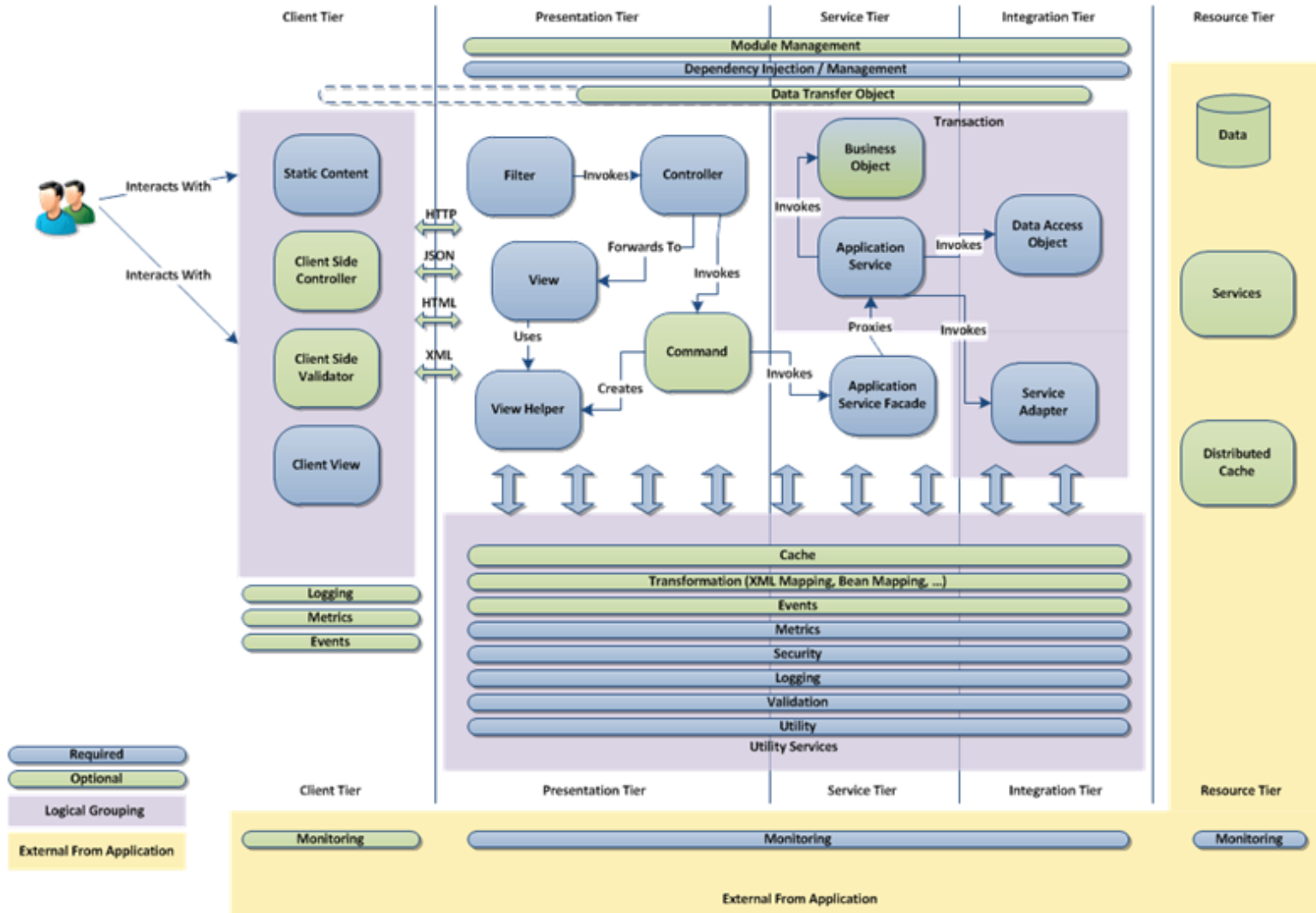
Appendix: Solution Architecture: IWD Pattern Scripts



(for Solution Architecture: IWD Patterns slide)

Script	Description
1	Sets up global security for the DMGR/ODR. Configures the LDAP and grant our group access.
2	Loads standard configuration on all WAS nodes except IHS pattern.
3	Run a command to stop everything in a script package (Makes sure it runs before the next thing in the pattern installation sequence).
4	Patch WAS to 8.0.0.3 FP3
5	Install Log archiving.
6	Set up for RAF connectivity: SSH keys RAF's home directory. (So that RAF later can attach to the nodes with no effort).
7	zLinux Patch SLES-11.
8	Configures the zLinux OS.
9	Removes all unwanted SLES-11 Packages (makes us complinant with the IS Security review).
10	Set up NFS mounts.
11	Includes creating a script to archive logs; Added to IWD IHS patterns.
12	Reboots the virtual server.
13	Automated routine to remove virtual server from monitoring (designed to be flexible).

Appendix: Nationwide Web Application Architecture



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