Get Unstuck with JBoss

John Liptak
Get Unstuck with JBoss – An Evolutionary Approach
June 25, 2015

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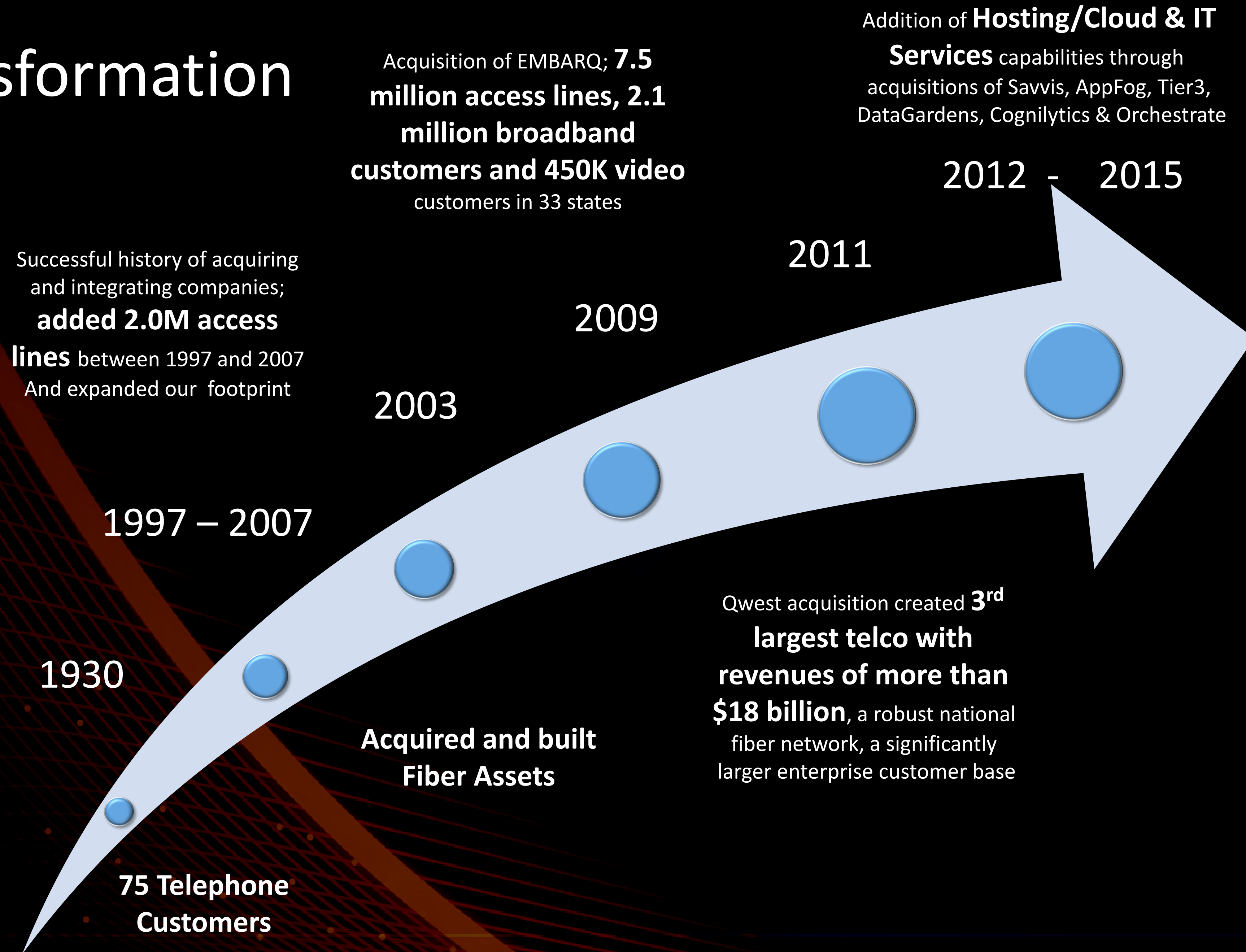**RED HAT SUMMIT**

BOSTON, MA
JUNE 23-26, 2015

John Liptak – John.Liptak@CenturyLink.com

- Principal Architect in the Technology & Strategy group

- Responsible for:

    - Company-wide open source policies and adoption

    - Java performance monitoring and management

    - Architecture lead for our ongoing WLS → JBoss migration and PaaS introduction

    - External consulting engagements

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My Company

CenturyLink

- Third largest telecom company in the U.S.

- Broadband, Voice, Cloud, Managed Hosting and IT Services

- Operates 58 data centers in North America, Europe and Asia

- 250,000-route-mile U.S. fiber network and a 300,000-route-mile international transport network

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Our Transformation

Acquisition of EMBARQ; **7.5 million access lines, 2.1 million broadband customers and 450K video** customers in 33 states

Addition of **Hosting/Cloud & IT Services** capabilities through acquisitions of Savvis, AppFog, Tier3, DataGardens, Cognilytics & Orchestrate

2012 - 2015

2011

Successful history of acquiring and integrating companies; **added 2.0M access lines** between 1997 and 2007 And expanded our footprint

2009

2003

1997 – 2007

1930

Qwest acquisition created **3rd largest telco with revenues of more than $18 billion**, a robust national fiber network, a significantly larger enterprise customer base

Acquired and built Fiber Assets

75 Telephone Customers

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Technology Adoption

Everything you need to know you learned before kindergarten:

Why?

How?

What's Next?
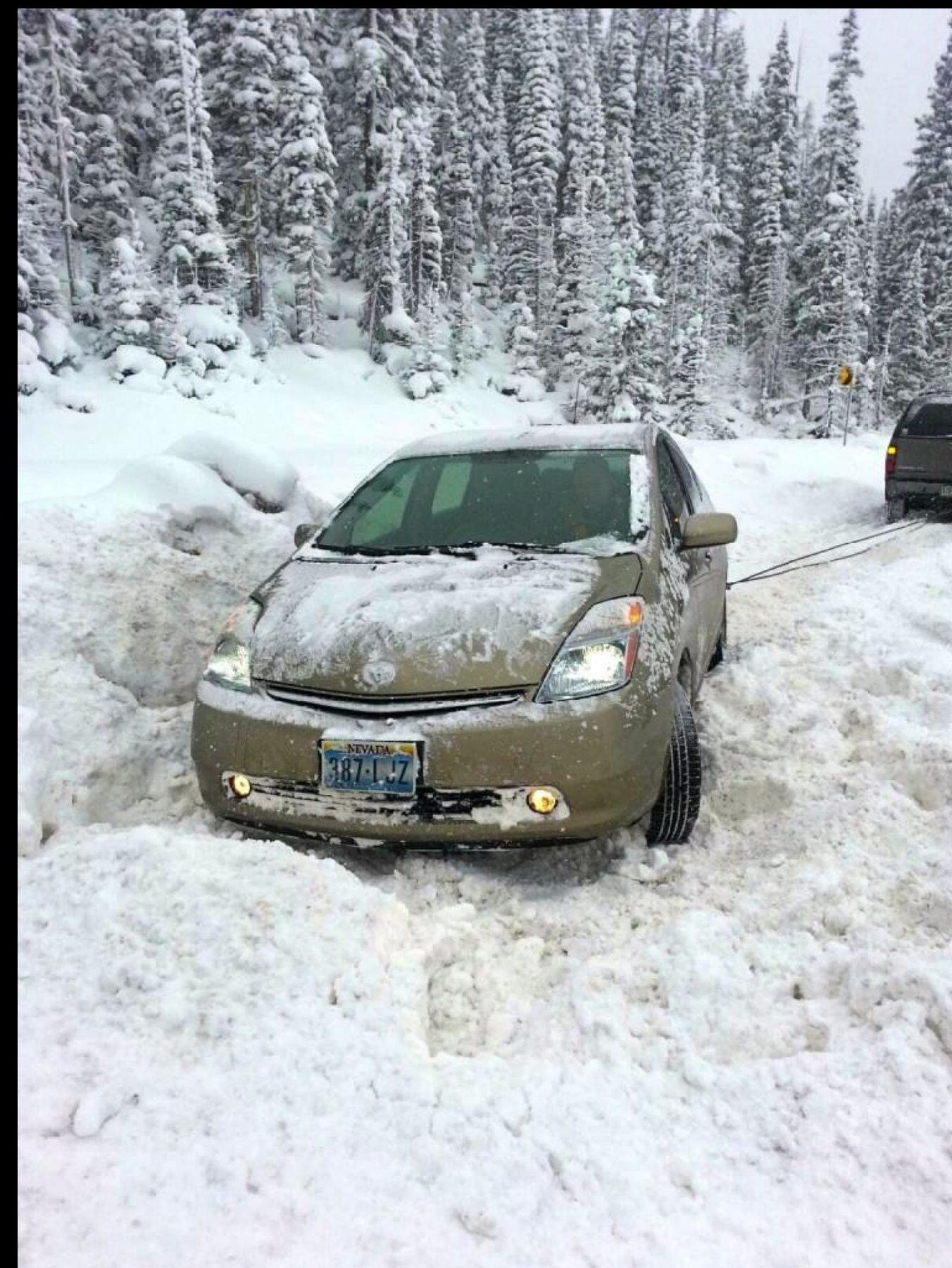
Turning the light bulb on

How Stuck Are You ?

Revolution (2012)

Sprint: Migrating to JBoss Enterprise Middleware in a Big Way

In April of 2011, Sprint approved and funded a major program to replace legacy Oracle WebLogic and IBM WebSphere with JBoss Enterprise Application Platform. As of June 2012, Sprint expects to have migrated over 160 applications utilizing 1,000 CPUs of WebLogic and 100,000 PVUs of WebSphere. Within the scope of this program, Sprint also modernized its infrastructure, migrated stand-alone servers into virtual machines, replaced legacy web servers with Apache, and implemented an architecture that significantly increased IT application scalability, flexibility, and supportability at Sprint.

https://www.redhat.com/resourcelibrary/videos/sprint-migrating-to-jboss-enterprise-middleware-in-a-big-way
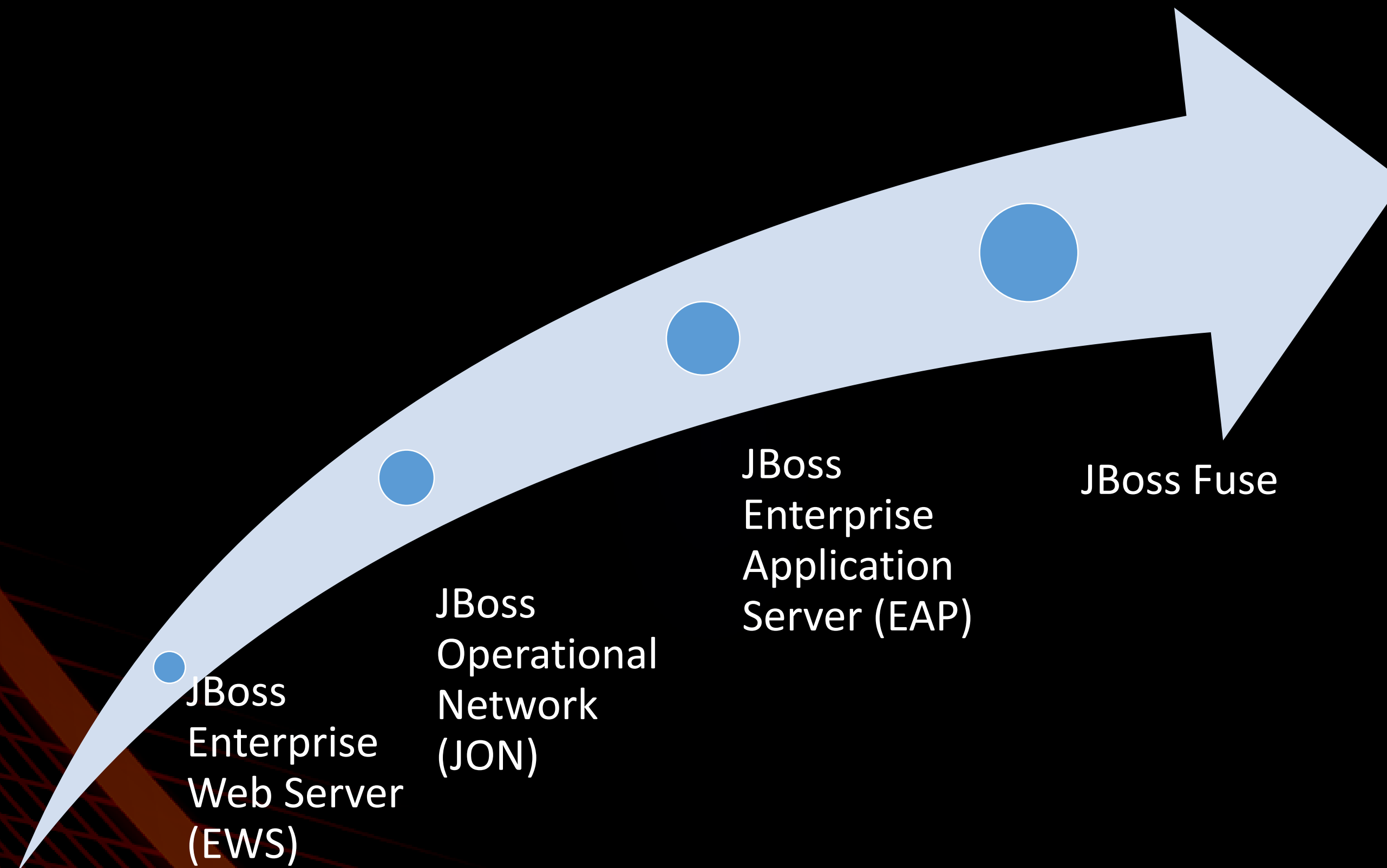
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Evolution

Incremental Improvements
Multiple small improvements over time leading to a transformation of the IT ecosystem
Some improvements don't work and they are not propagated to the next generation.

Extinction
Some products die off because they can't keep up.

JBoss Value Chain

JBoss Fuse

JBoss
Enterprise
Application
Server (EAP)

JBoss
Operational
Network
(JON)

JBoss
Enterprise
Web Server
(EWS)

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Open Source Freedom

Freedom from closed source provides needed flexibility.

Example: object slicing problem

Hibernate uses ROW_NUM to limit query results.

If you use setMaxResults(5)

Fixed by using analytic
DENSE_RANK over partition
by primary key and duplicated order by clause

HISTORY

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"A disciplined, consistent effort to develop, propagate, and exploit them [innovations] should indeed yield an order-of-magnitude improvement" – Fred Brook

"All problems in computer science can be solved by another level of indirection" – Butler Lampson
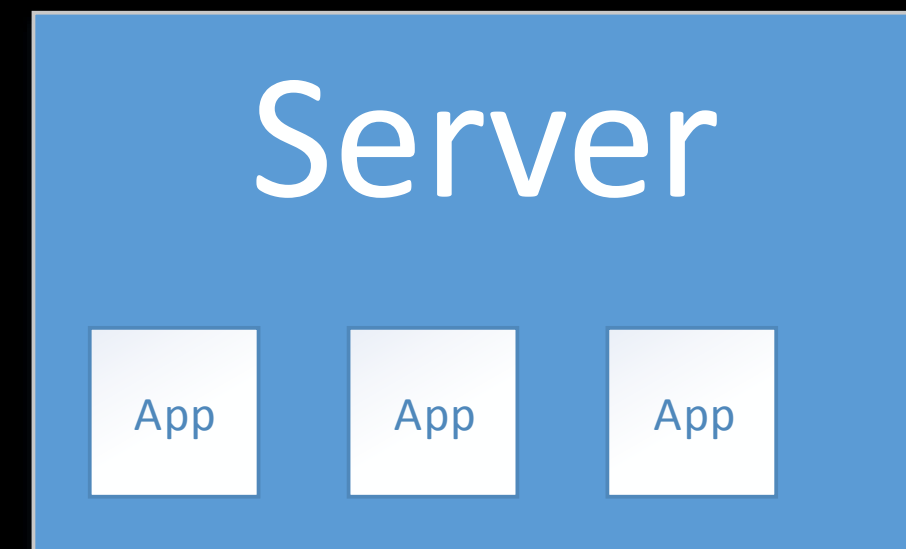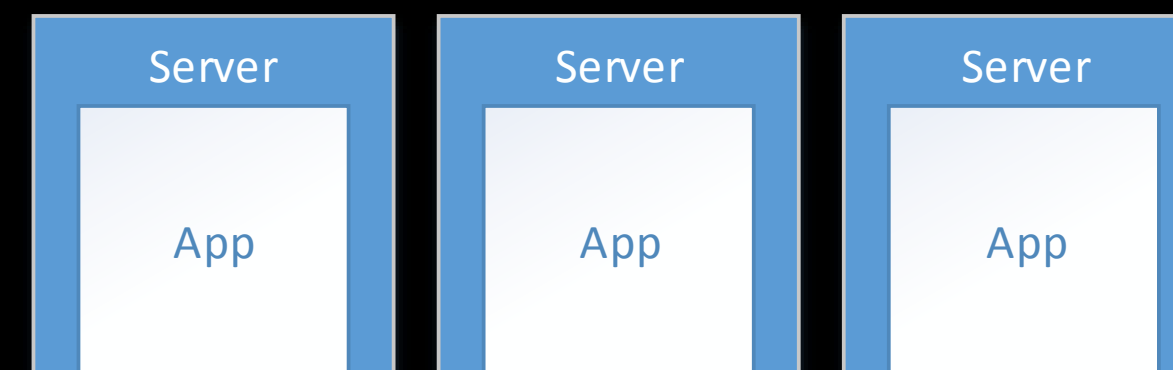
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Historic Progression

Dedicated hardware
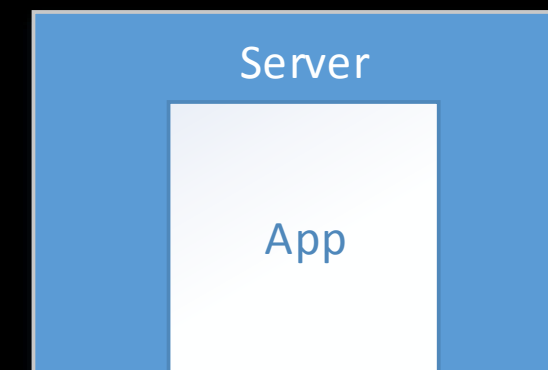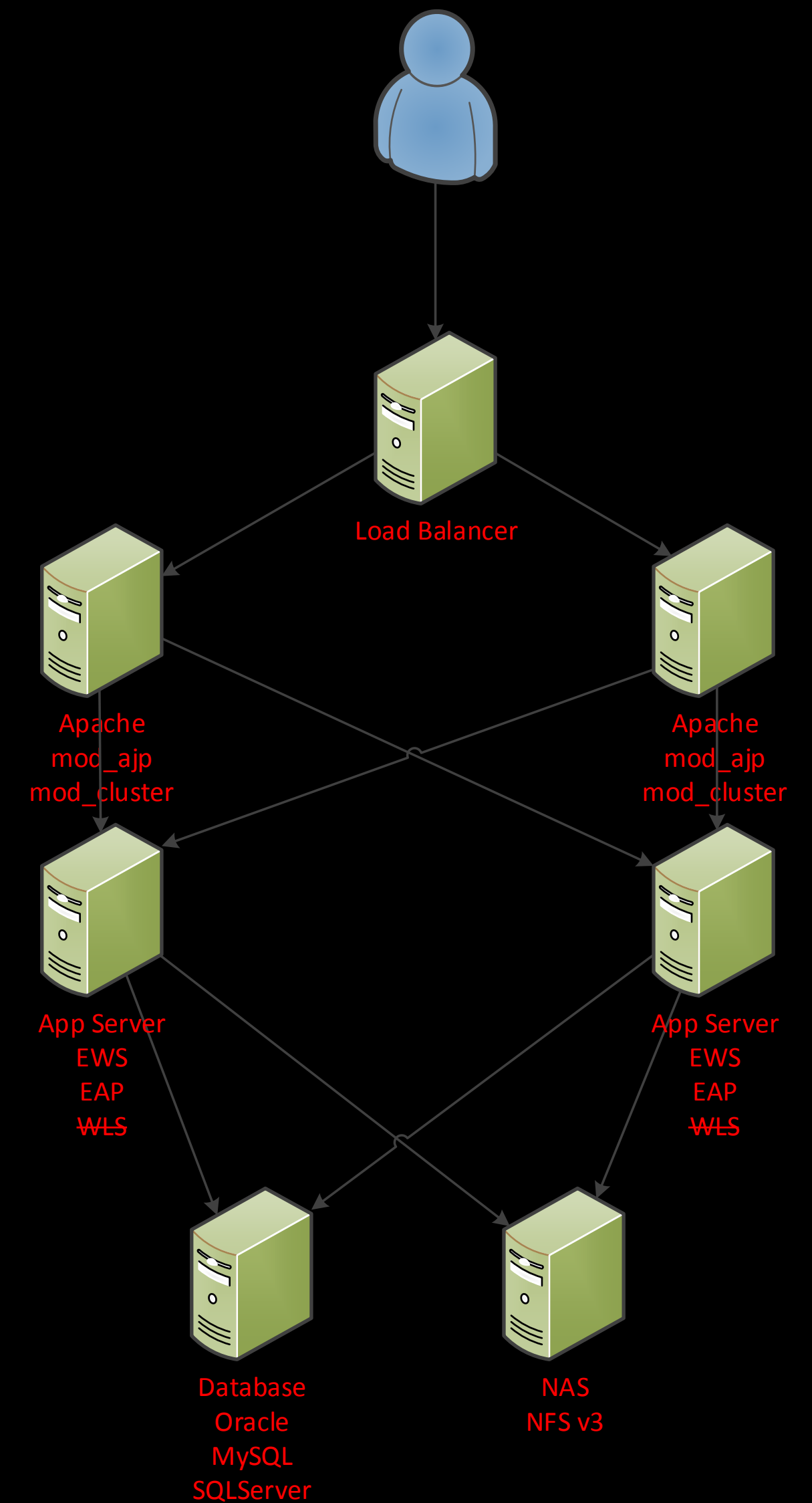

Stacked

- Standard Operating Environment
- Requirements

Virtualized

Standard Deployment

- **Load Balanced**
- **Highly Available**
- **Multiple Application Servers**
- **Separate Database Server**

Load Balancer

Apache
mod_ajp
mod_cluster

Apache
mod_ajp
mod_cluster

App Server
EWS
EAP
WLS

App Server
EWS
EAP
WLS

Database
Oracle
MySQL
SQLServer

NAS
NFS v3

Field of Dreams

Build it and they will come:

MySQL

Tomcat (5.5)

Didn't come

- No monitoring support

- No Admin support

- No platform support
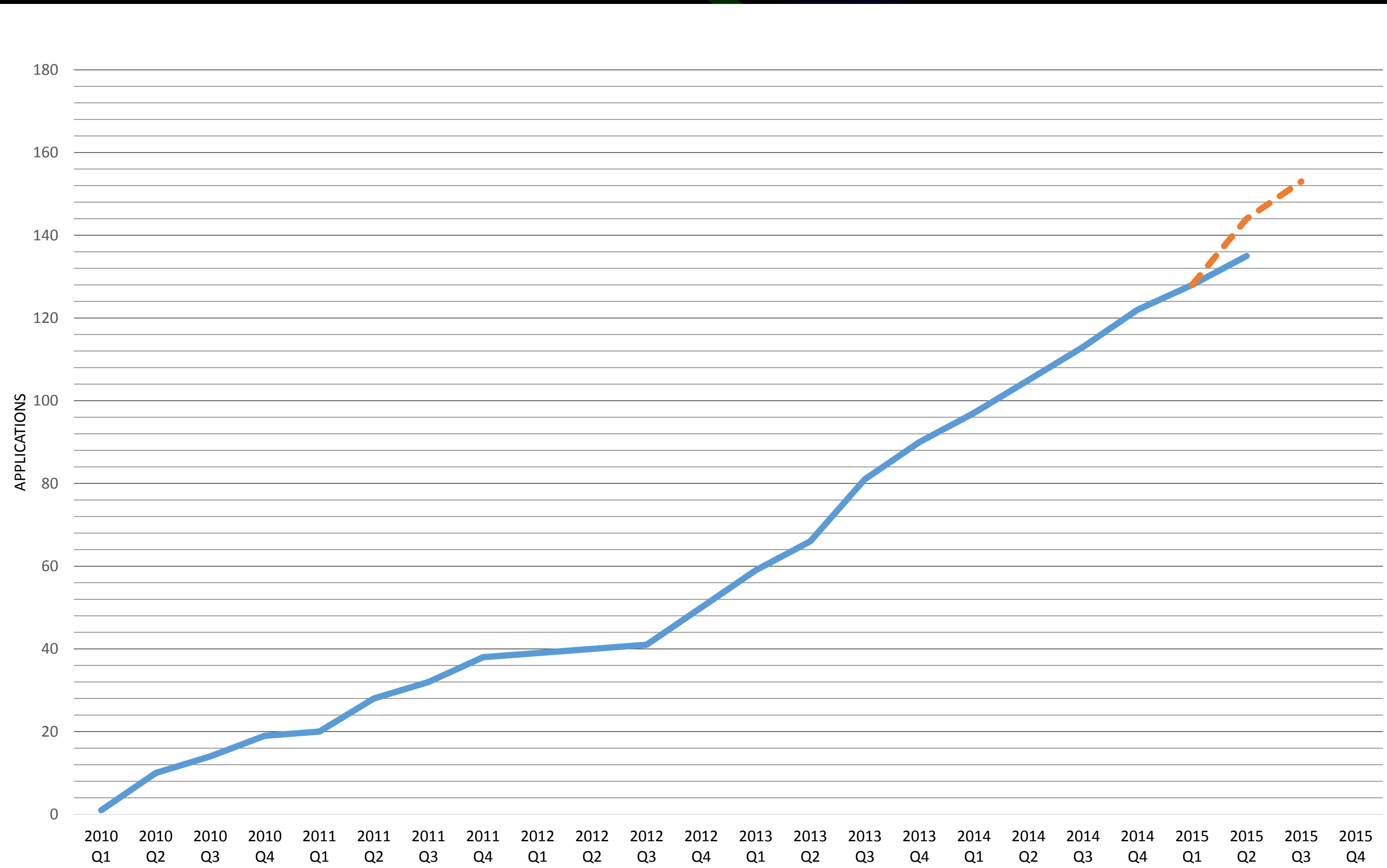
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Learn from Failure

- Business Case – break even on hardware replacement and reduced memory usage

- Density – Move from old hardware with 1G heaps to new hardware with 256M

- Manageability – Have to provide same or better support to development teams
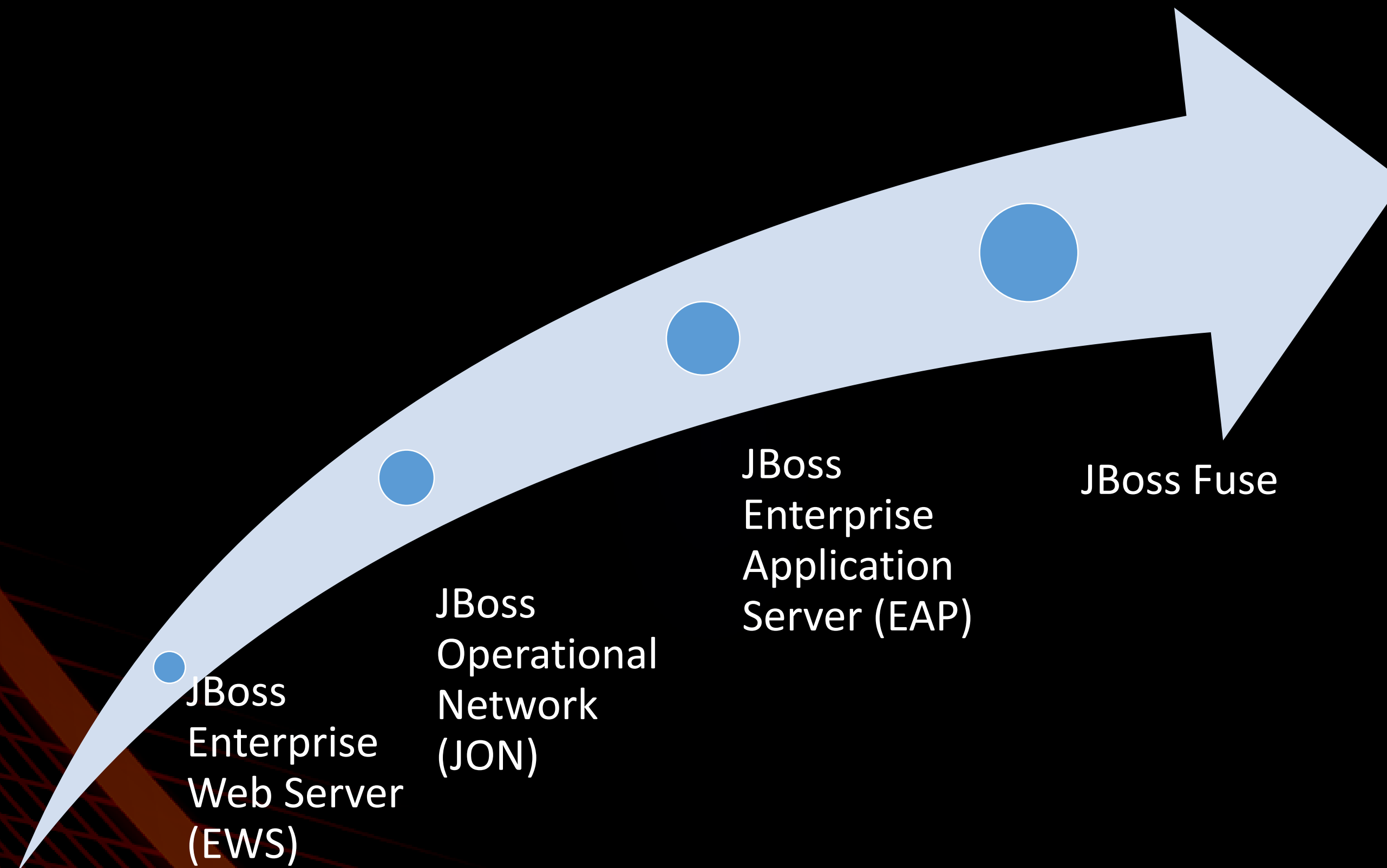
Required Ingredients

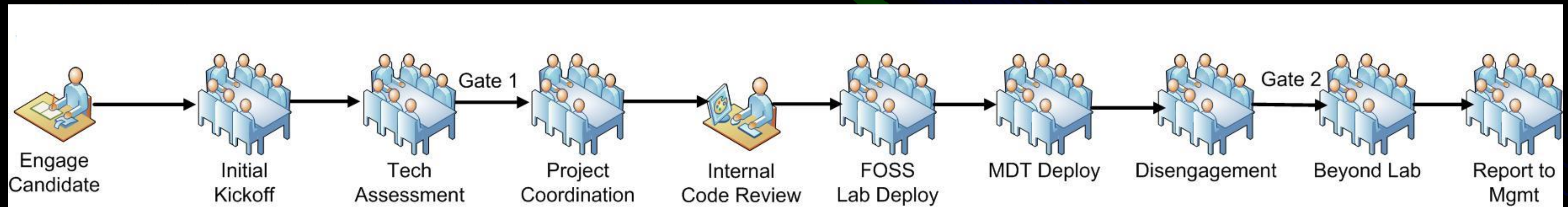- Management Support

- Business Case ROI

- Facts vs. Fear

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EVOLUTION

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FOSS Migration

Process Evolution Too!

This single process evolved over time to a process with multiple options

Organizational Flexibility

One size did not fit everyone.

Provide options:

- Directing application team work
- Factory model
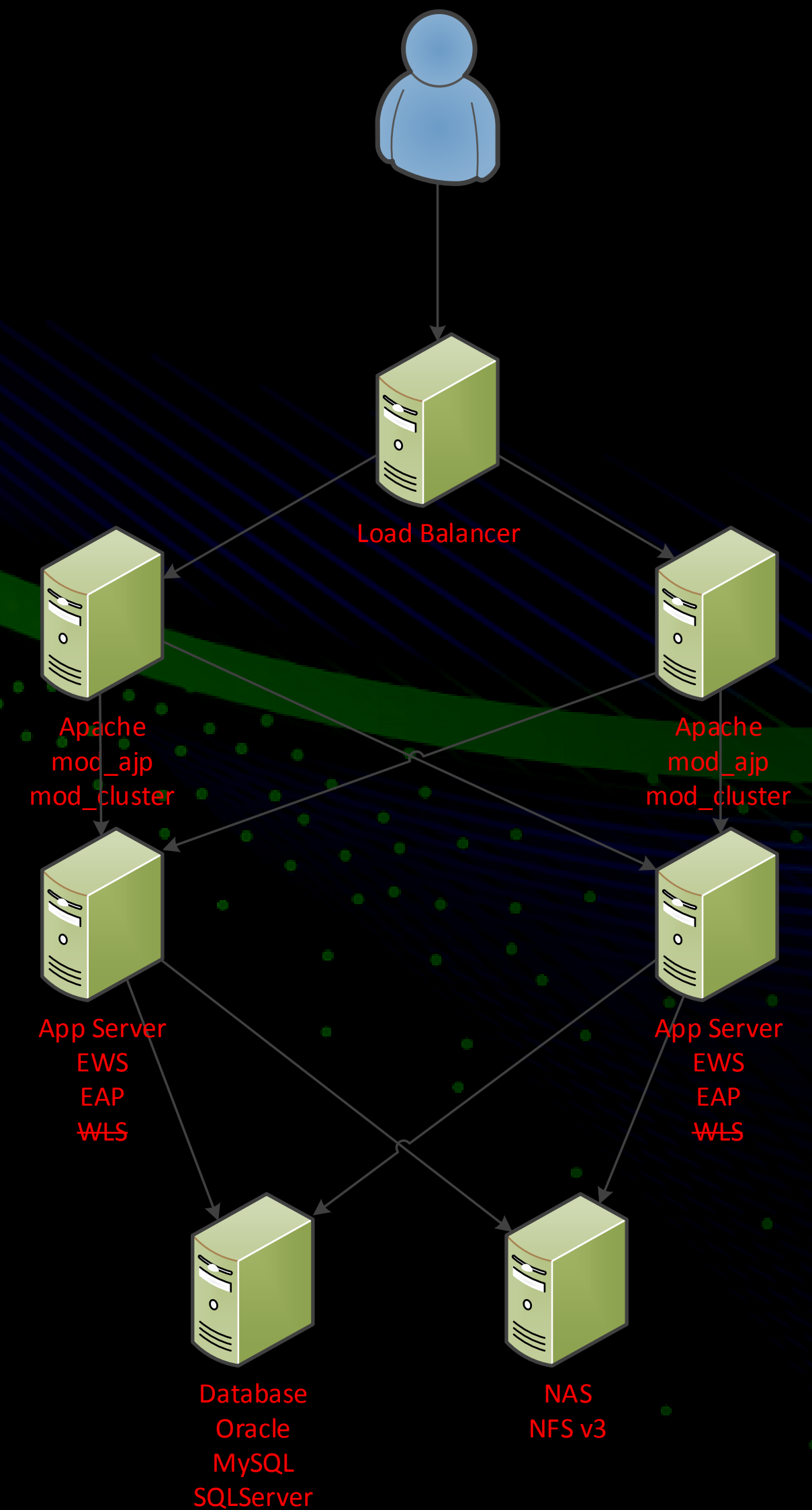- Ad-hoc consulting/Mentoring

Factory Model

- Get access to source code – work just like developers on the existing team

- Update Application

  - Code
  - Build Process
  - Deliverable

- Running version in development/integration

- Code review and hand-back step

Standards

- ## What we provide
  - Middleware
  - Services access
- ## What we allow
  - No editing of configuration files
- ## How we deploy it

Load Balancer

Apache
mod_ajp
mod_cluster

Apache
mod_ajp
mod_cluster

App Server
EWS
EAP
WLS

App Server
EWS
EAP
WLS

Database
Oracle
MySQL
SQLServer

NAS
NFS v3

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Winning Standardization

- ## Make standards easier than custom efforts

  - Provide reasonable defaults
  - Provide multiple options
  - Make teams do the extra work for customization

- ## Solicit input from subject matter experts

  - Web developers
  - Database experts
  - Networking
  - Security

- ## Have a reasonable exception process

  - Third party software
  - Existing contracts
  - High cost conversions
  - Time

- Backup
- Recovery
- Security
- Patching
- Etc.

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Training

Red Hat Consulting
- JBoss ON
- EAP
- Fuse

Train the trainer consulting

Wiki for converting applications

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THE IMPLEMENTATION

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Adoption Selection

Pick 3 Apps

- Small, simple, easy win

- Large, simple, visible

- Complex application with flexibility

Include a Technology POC

My list: EJB, JMS, TIBCO RV, Camel, Struts 2, Spring, AspectJ, JAX-RPC, JAX-WS, REST, native Hibernate and JPA

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What to Upgrade?

Required

- JDK 7+
- Remove or replace end of service life products
- Remove or replace components no longer approved

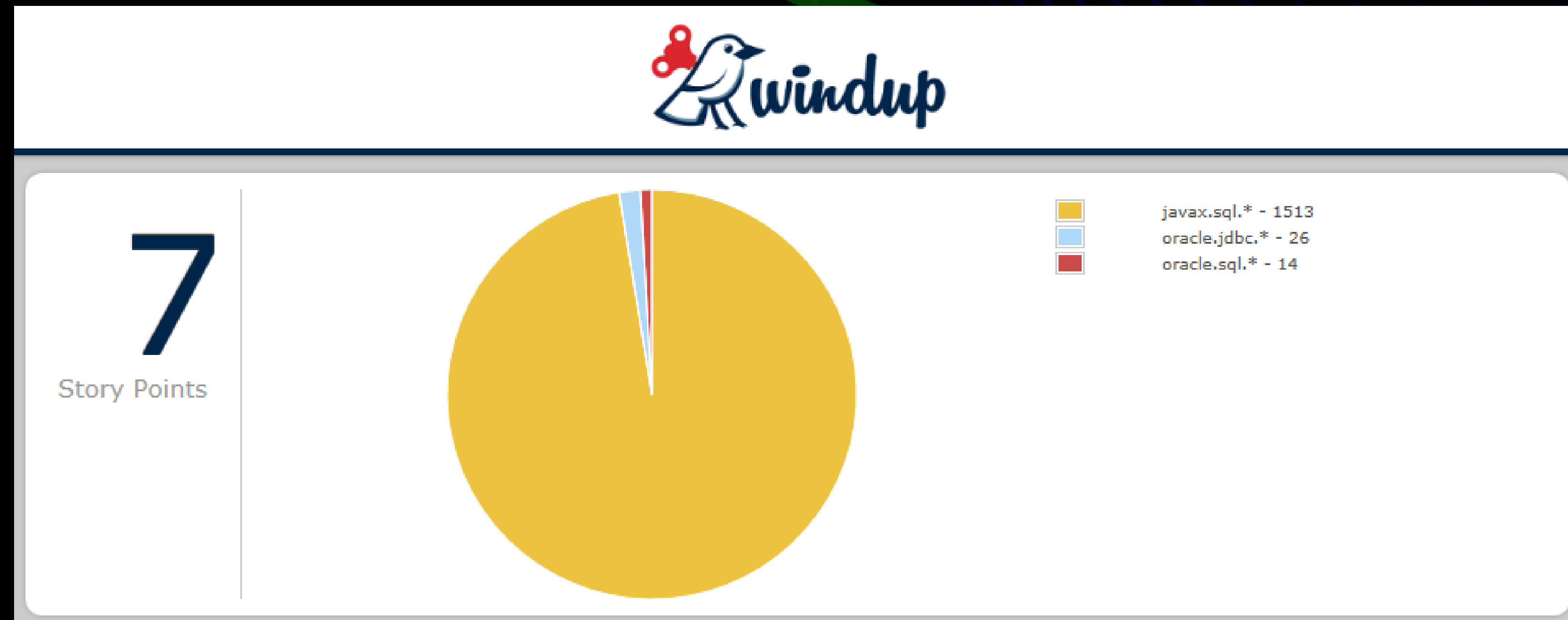Application wish list

- Framework changes
- Services updates

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Windup and tattletale

Cost arguments

- JPA vs. Entity upgrade

- RMI

- Corba

- Portal

Operational Readiness Review

TIBCO

JMS

EJB

XA Transactions
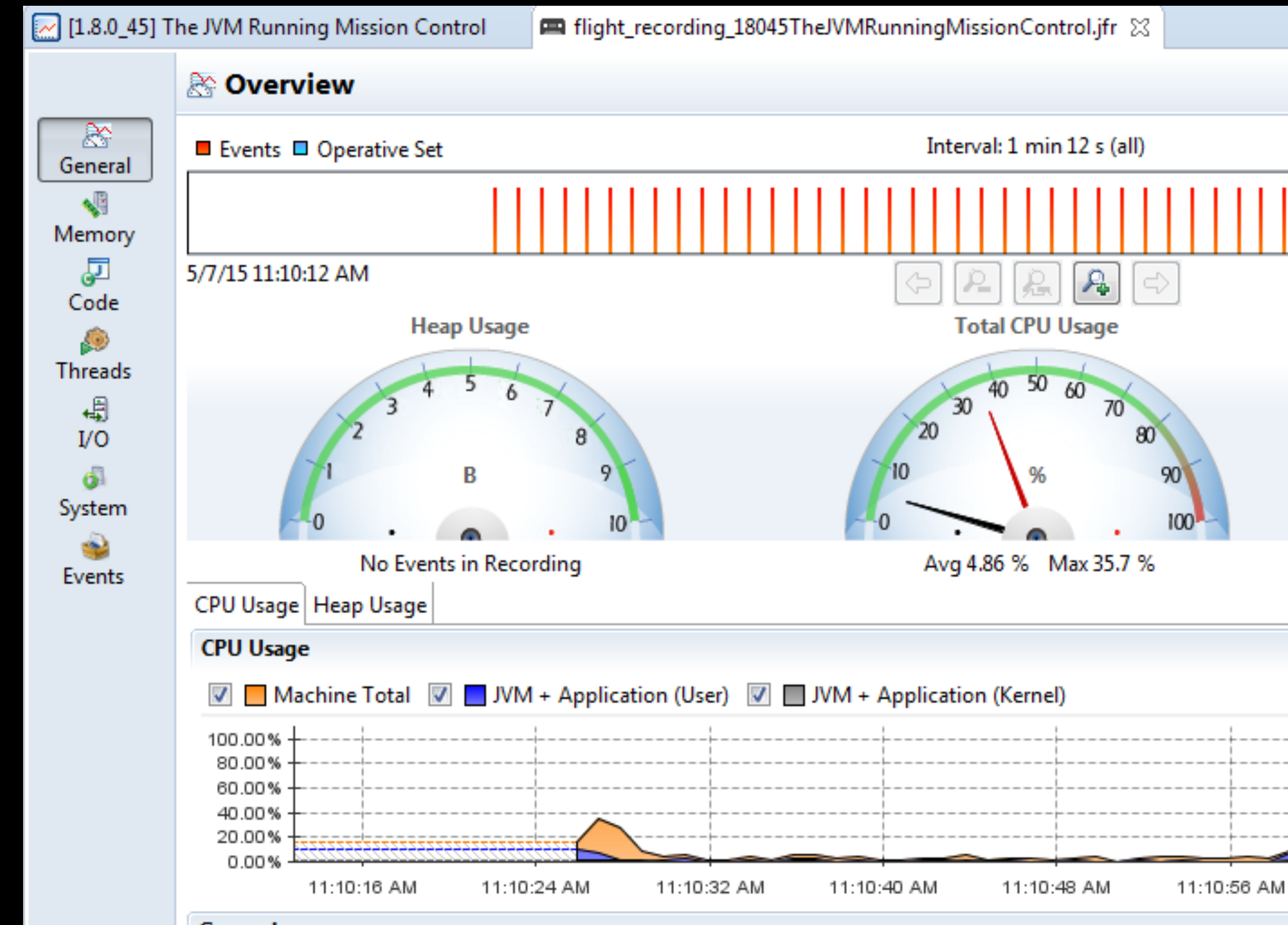
Spring

Session Replication
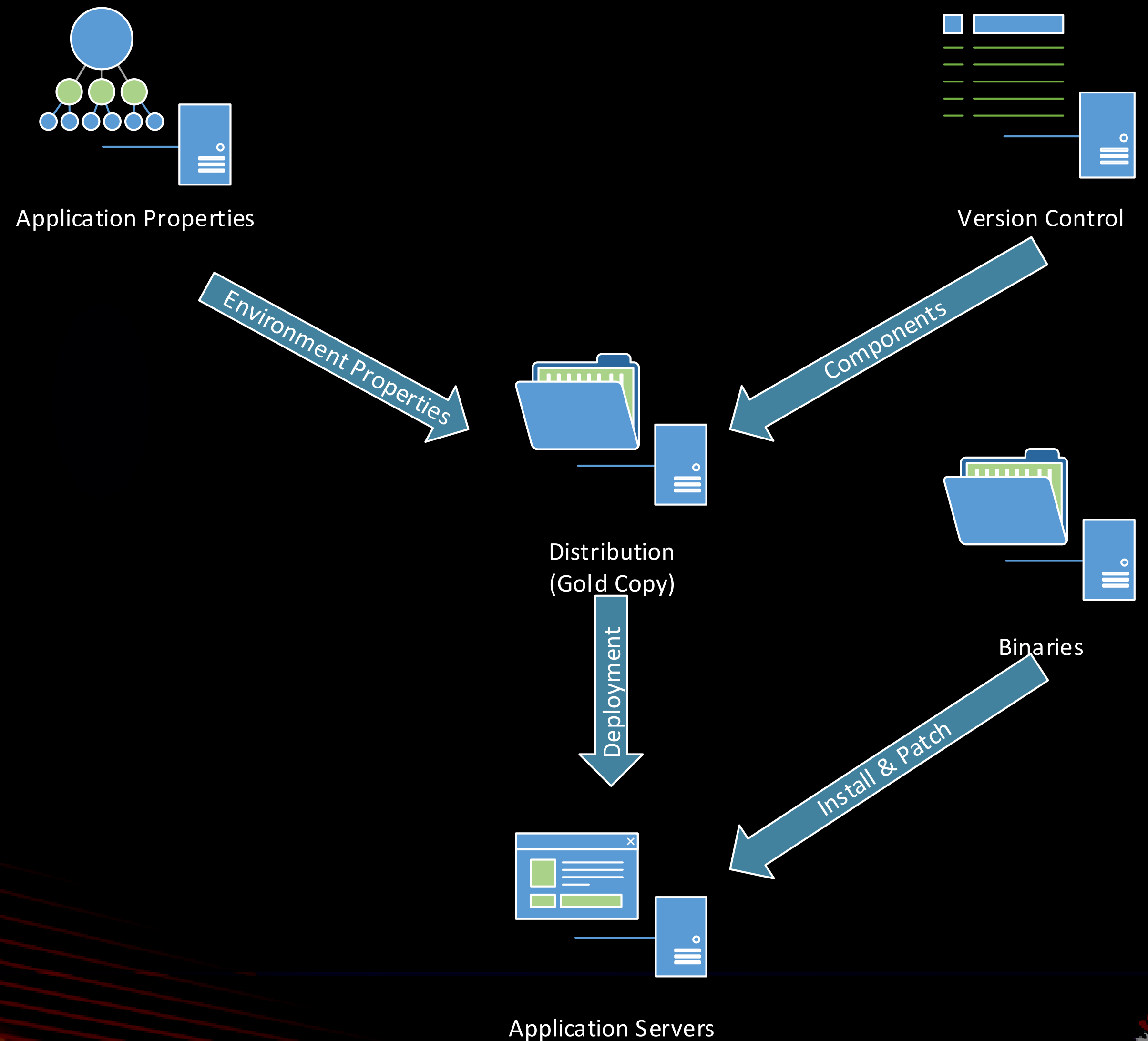
BPM

Load and Performance

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Load Test

Require a Load Test
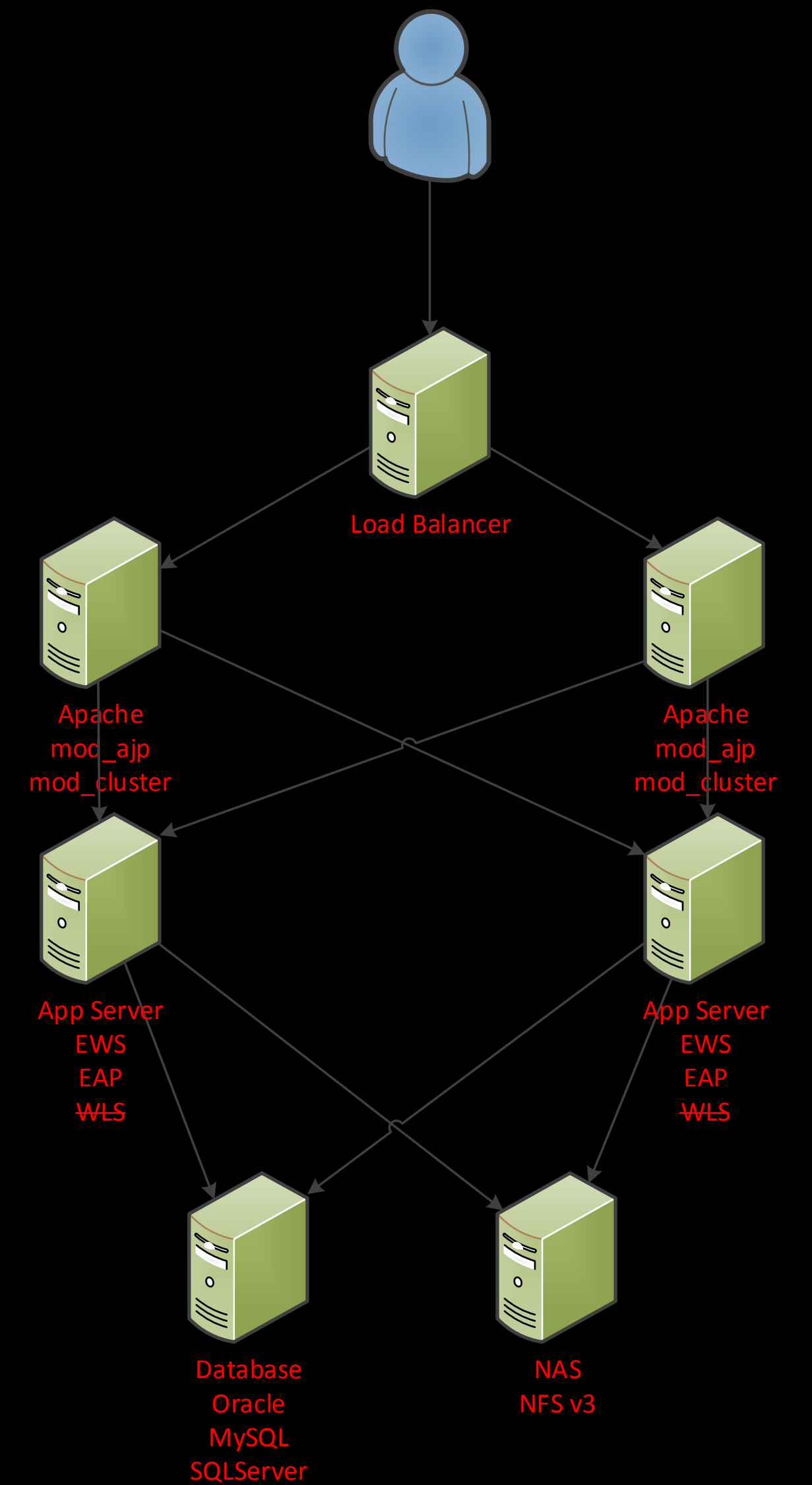
Java Mission Control

 VisualVM

Eclipse
Memory Analysis
Tool (MAT)

Deployment

+Standard deployment

+Application artifacts

+Environment (logging, cron jobs, etc.)

 = running application

Application Properties

Version Control

Environment Properties

Components

Distribution
(Gold Copy)

Binaries

Deployment

Install & Patch

Application Servers

Layers to validate

SSL

Load balancing

Failover

Security

Load Balancer

Apache
mod_ajp
mod_cluster

Apache
mod_ajp
mod_cluster

App Server
EWS
EAP
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App Server
EWS
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Database
Oracle
MySQL
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JBoss PRODUCT SPECIFICS

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EWS

Simple –

No editing xml files

- Use META-INF/context.xml for resources

Property file deployment

No libraries provided

Auto add truststore or keystore if provided

Applications

- Epicentric Portal to iText

- Integration Gateways

- Large numbers of web applications

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JBoss Operational Network

Operations

- Used to track and view performance across multiple layers

- Use custom scripts for deployment

Development access

- Allowing development teams to view data is key

- Share in all environments via LDAP groups

History

- Historical data is the most valuable feature

- What was my application doing last Tuesday at 2:00 a.m.?

EAP

Run multiple servers in standalone mode

Startup scripts allow for automatic creation of clones with port offsets

Includes custom JAAS realms for application security

No editing standalone.xml

Property file deployment

Re-sync on startup

XA support

Session Replication

EAP Modules

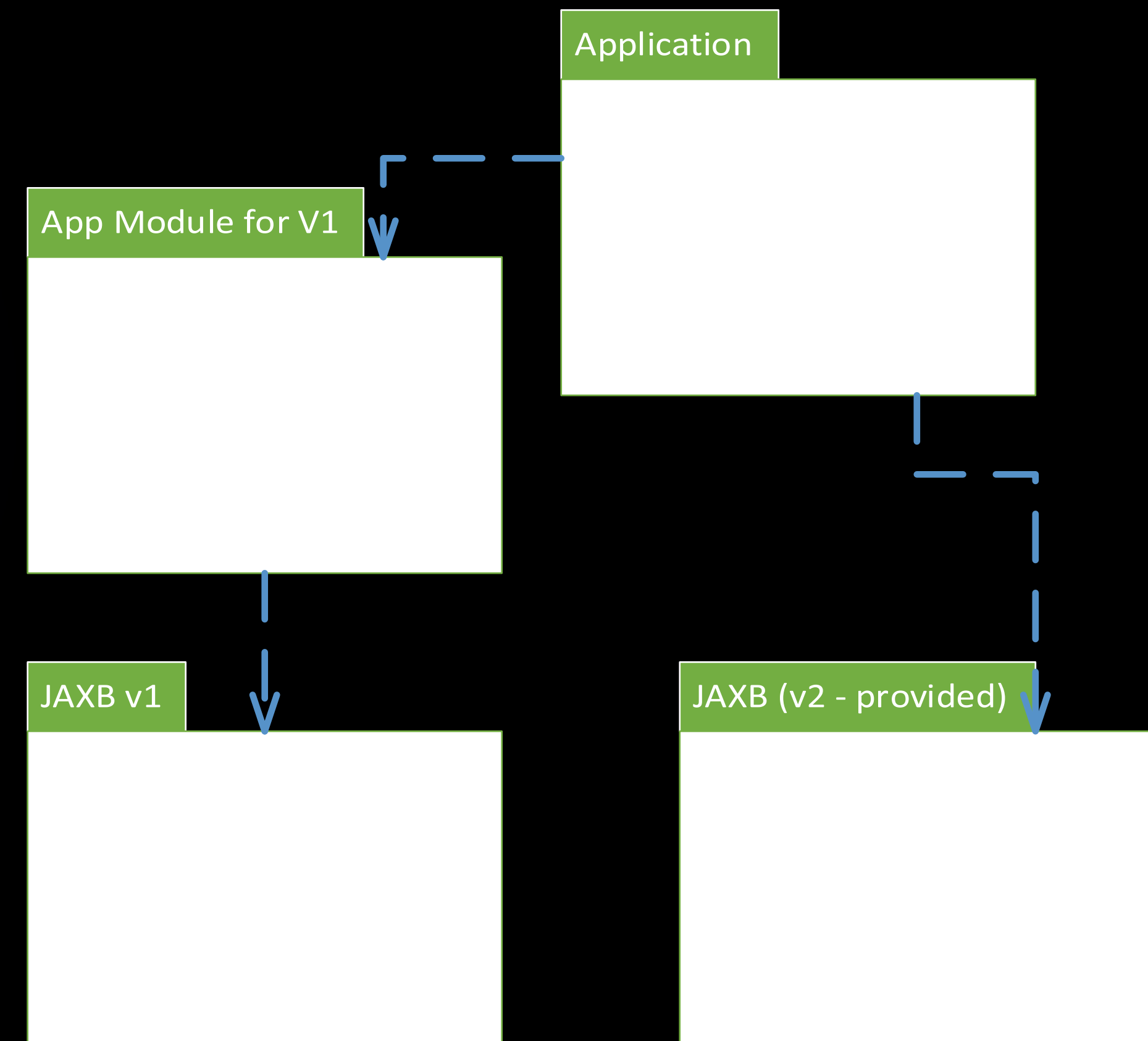Provide operations curated modules

- Database Drivers
- Security

Take advantage of multiple versions
if necessary

- JAXB versions

File URI

vfs:// vs. file://

Learn about jboss-deployment-structure.xml

Application

App Module for V1

JAXB v1

JAXB (v2 - provided)

EAP CLI Scripts

Allow applications to start with different configurations (standalone, full, full-ha)

Use CLI to customize

- Database pools

- JMS pools

- Database drivers

- URL endpoints for WSDL

Applications

- ## Account services

  MDB issues https://access.redhat.com/solutions/475193 caused by GC pauses
  ```
  @ActivationConfigProperty(propertyName = "clientFailureCheckPeriod", propertyValue = "600000")
  @ActivationConfigProperty(propertyName = "connectionTTL", propertyValue = "-1")
  ```

- ## Quote to order

  Multithreaded deployment issues resolved by adding CDI injected references
  Manual JNDI lookups can leave unresolved deployment references
  ```
  -Dorg.jboss.server.bootstrap.maxThreads=10
  ```

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Fuse & Fabric8

Features – no random bundles

Take advantage of the , separated directories for configuration directories

Discovery protocol for ActiveMQ

Delaying Fabric8 to 6.2 for application endpoints
Branching fabric GIT repository for multiple applications needed deeper understanding and working version was not GA.

Applications

- Multiple Model Driven Workflow (MDW) applications upgrading
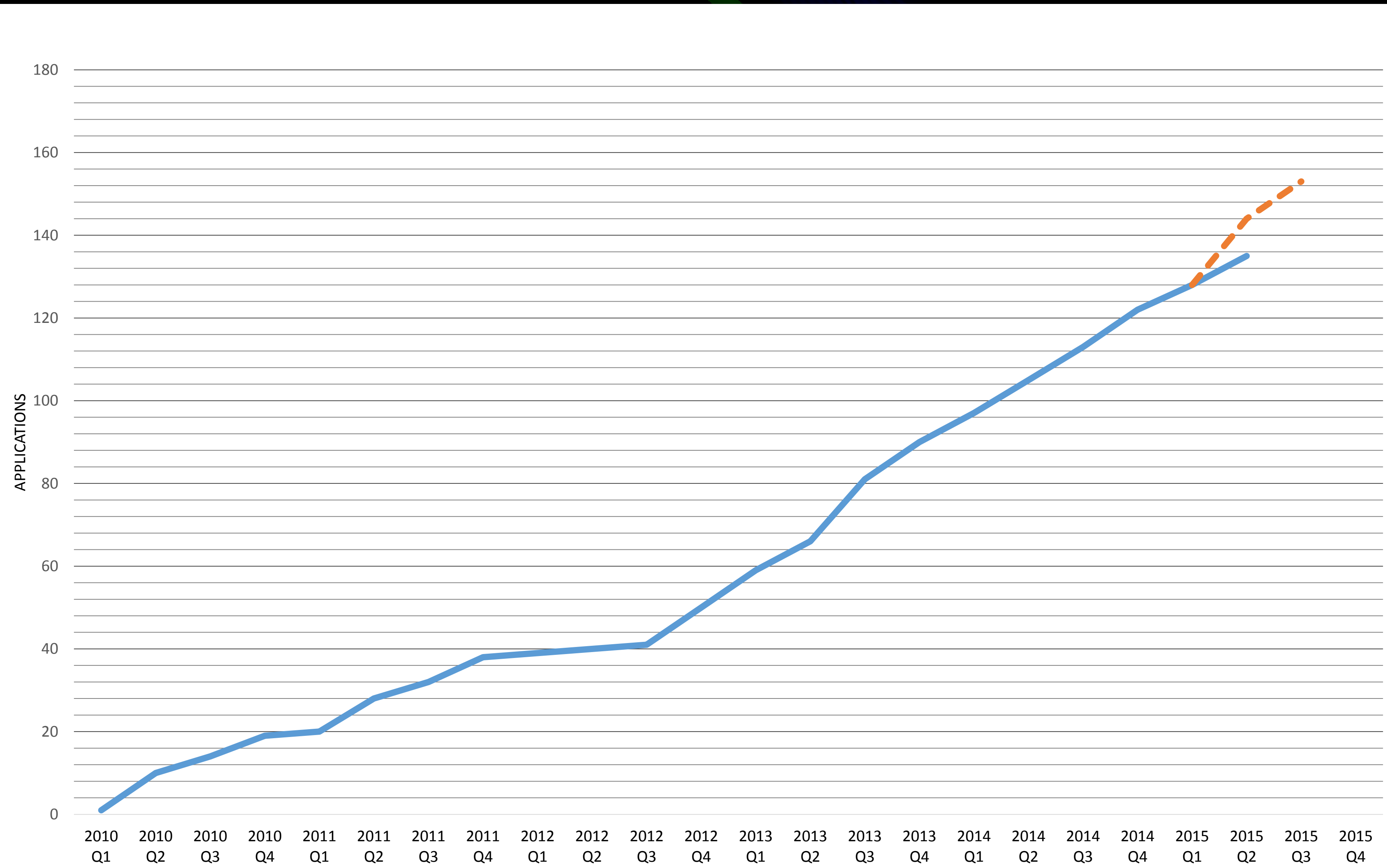- OSGi/ServiceMix applications supporting critical billing functionality

What's Next

Journey to the Cloud

http://www.thinkgig.com/centurylinks-journey-to-the-cloud-a-new-path-weve-walked-many-times-before/

CenturyLink IT team has made a commitment to migrate 90% of our strategic applications to the cloud.

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FOSS Migration

QUESTIONS & DISCUSSION