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Running your Java EE 6 Applications in the Cloud

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Agenda

- Introduction to Java EE 6 & Demo
- Java EE 6 on
  - 

  - 

  - 

  - 

- Multi-cloud Vendor Comparison
- Evolving Java EE for Cloud
- Conclusions

Light-weight

- Java EE 6 Web Profile
- Pruning
  - Pruned today, means
    - Optional in the next release
    - Deleted in the subsequent releases
  - Technologies marked in Javadocs
    - EJB 2.x Entity Beans, JAX-RPC, JAXR, JSR 88

- EJB-in-WAR
- No-interface EJB
- Optional “web.xml”/”faces-config.xml”
- Annotation-driven
  - @Schedule
  - @Path
  - @Inject
  - . . .


<web-fragment>
<filter>
<filter-name>wicket.helloworld</filter-name>
<filter-class>org.apache.wicket.protocol.http.WicketFilter</filter-class>
<init-param>
<param-name>applicationClassName</param-name>
<param-value>...</param-value>
</init-param>
</filter>
<filter-mapping>
<filter-name>wicket.helloworld</filter-name>
<url-pattern>/*</url-pattern>
</filter-mapping>
</web-fragment>

Java EE 6 Demo

Oracle's definition of Cloud Computing

- Virtualized elastic platform for applications
  - Standards-based application development/execution platform
  - Includes hardware and software
  - Virtualized and Elastic
  - Runs a wide variety of applications
  - On both public and private clouds

Oracle Exalogic Elastic Cloud

- Hardware and Software engineered to work together
- 100% Fault-tolerant & Scalable On-Demand
- 30 compute servers, 360 cores, 980 GB Solid-state disk, 40 GB/sec Infiniband, Patch centrally
- Servers, Network, Storage, VM, Operating System, Middleware, Develop/Run all applications

Based upon research work ...

What is Amazon ?

- Boot server instances, scale up/down, pay-per-use
- EC2: Compute capacity in the cloud
- S3: Storage capacity in the cloud (1b → 5 GB)
- Simple Email Service, RDS (Database), FWS (fulfillment), SQS (queue), SNS (notification), CloudWatch (monitoring), FPS (payment), VPC (private cloud), EBS (block storage), ...

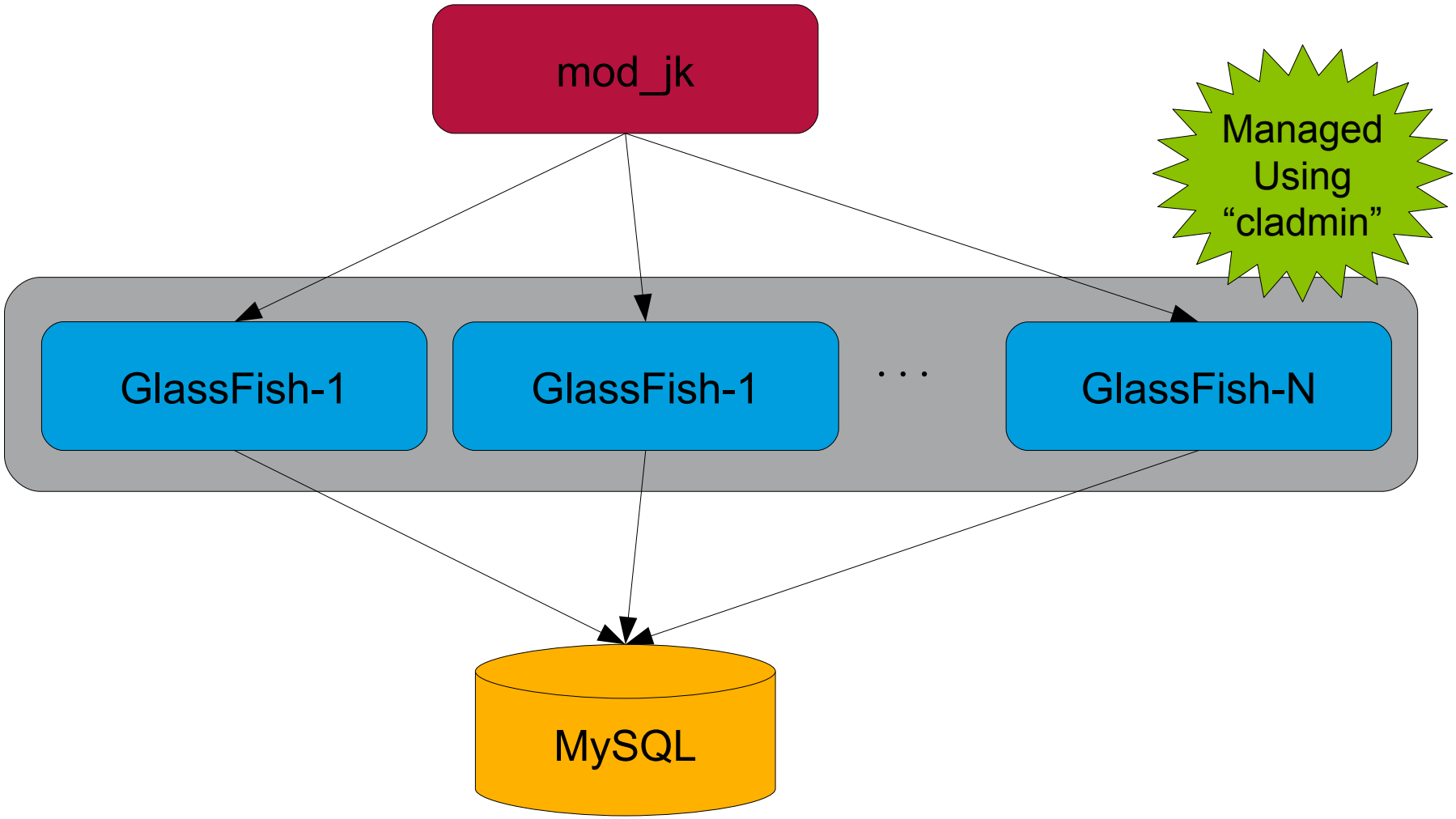
Java EE 6 on Amazon

- 2 New AMIs based on Hardened OpenSolaris
  - Oracle GlassFish Server 3.0 (not released)
  - Apache HTTP Server + mod_jk (not released)
  - Pre-existing MySQL Database 5.1 AMI
- Instances managed by SMF
  - GlassFish: `svcadm restart/`**`enable`**`/disable svc:/application/GlassFish/domain1:default`
  - MySQL SMF: `svcadm enable mysql`
  - mod_jk: `svcadm restart/refresh/`**`enable`**`/disable svc:/network/http:apache22`

Java EE 6 on Amazon

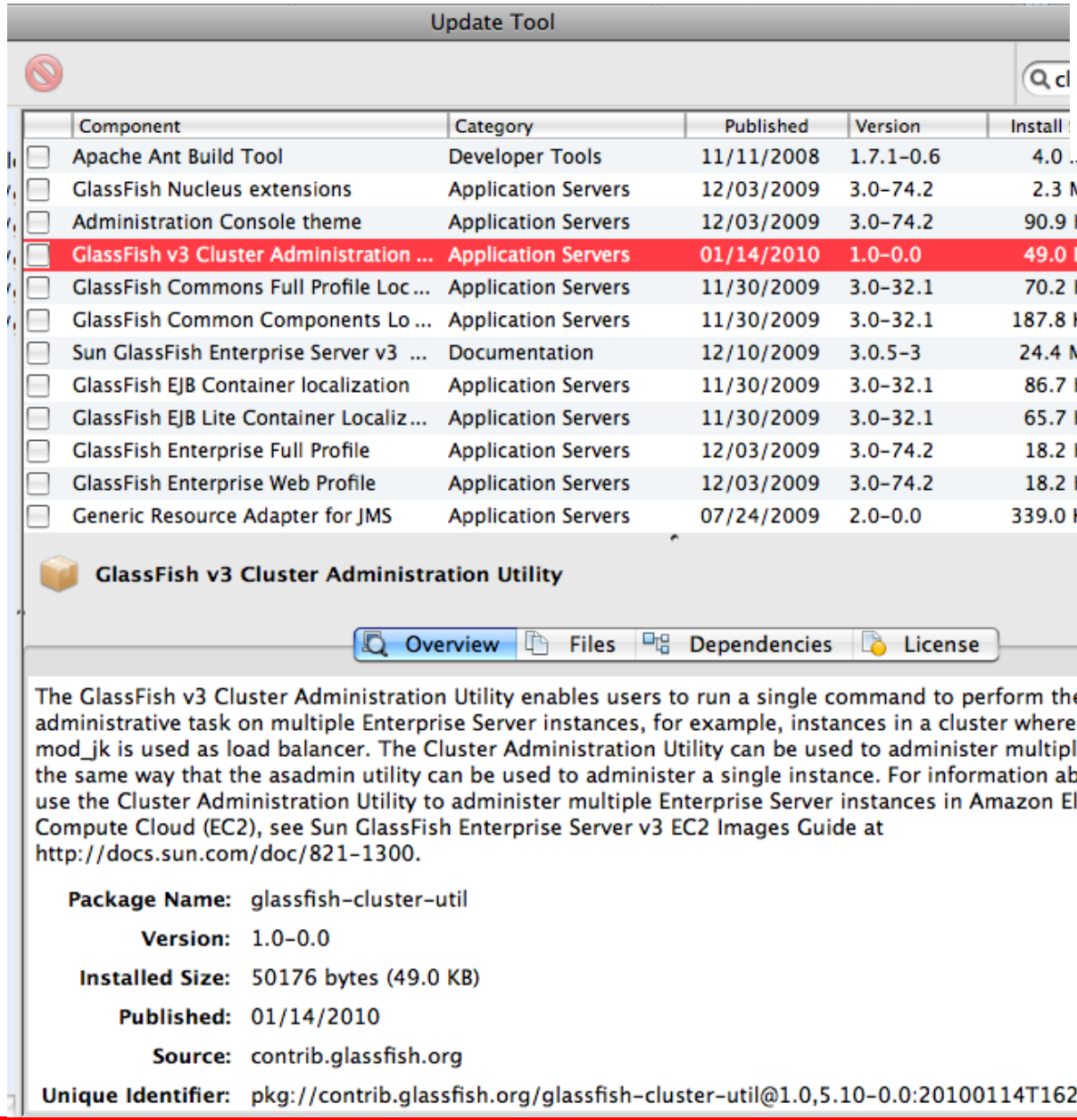

```
# Define a load-balancing worker
worker.list=worker1
#
# Define an ajp13 worker to represent instance1
worker.instance1.type=ajp13
worker.instance1.host=ec2-67-202-51-223.compute-1.amazonaws.com
worker.instance1.port=8009
#
# Define an ajp13 worker to represent instance2
worker.instance2.type=ajp13
worker.instance2.host=ec2-67-202-7-236.compute-1.amazonaws.com
worker.instance2.port=8009
#
# Define the type of worker1
worker.worker1.type=lb
# Add inst1 and inst2 to the balance_workers property of worker1
worker.worker1.balance_workers=instance1,instance2
```

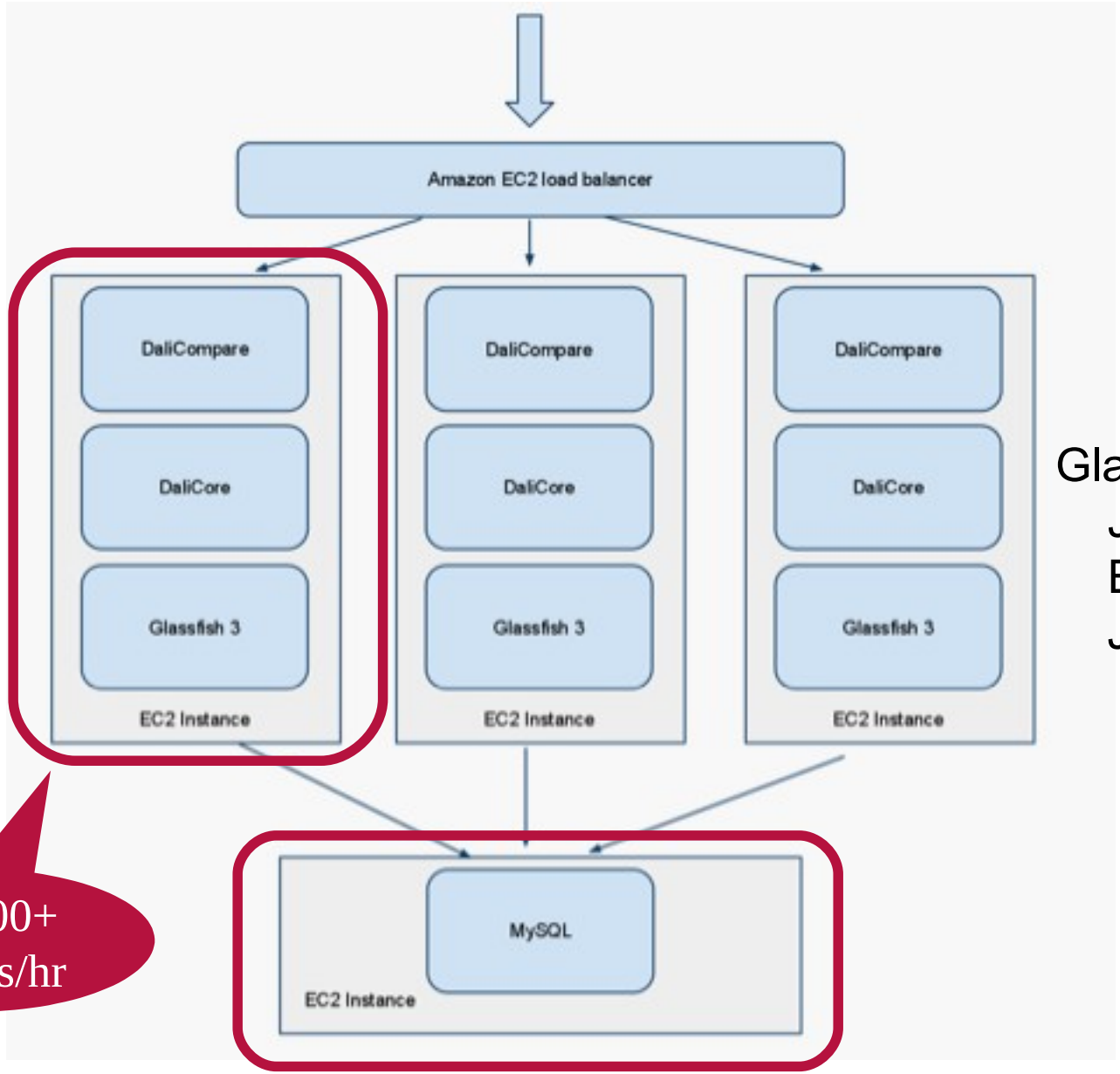
AJP_INSTANCE_NAME
in GlassFish instances


mod_jk
Managed Using "cladmin"
GlassFish-1
GlassFish-1
. . .
GlassFish-N
MySQL

How to Deploy ?

- Launch MySQL AMI, create database, user, privileges, …
- Launch 1 or more GlassFish AMI
  - Set `AJP_INSTANCE_NAME` in each GlassFish
- Administer multiple instances using `cladmin`
  - `--target` *instance-list* OR `set AS_TARGET="..."`
  - `cladmin create-jdbc-connection-pool` …
  - `cladmin deploy ~/samples/hello.war`
- Launch `mod_jk` AMI
  - Configure “worker.properties”


Update Tool
Component
Category
Published
Version
Install
Apache Ant Build Tool
Developer Tools
11/11/2008
1.7.1-0.6
4.0
GlassFish Nucleus extensions
Application Servers
12/03/2009
3.0-74.2
2.3 MB
release.glassfish...
Administration Console theme
Application Servers
12/03/2009
3.0-74.2
90.9 KB
release.glassfish...
GlassFish v3 Cluster Administration ...
Application Servers
01/14/2010
1.0-0.0
49.0 KB
contrib.glassfish...
GlassFish Commons Full Profile Loc...
Application Servers
11/30/2009
3.0-32.1
70.2 KB
stable.glassfish....
GlassFish Common Components Lo...
Application Servers
11/30/2009
3.0-32.1
187.8 KB
stable.glassfish....
Sun GlassFish Enterprise Server v3 ...
Documentation
12/10/2009
3.0.5-3
24.4 MB
release.glassfish...
GlassFish EJB Container localization
Application Servers
11/30/2009
3.0-32.1
86.7 KB
stable.glassfish....
GlassFish EJB Lite Container Localiz...
Application Servers
11/30/2009
3.0-32.1
65.7 KB
stable.glassfish....
GlassFish Enterprise Full Profile
Application Servers
12/03/2009
3.0-74.2
18.2 KB
release.glassfish...
GlassFish Enterprise Web Profile
Application Servers
12/03/2009
3.0-74.2
18.2 KB
release.glassfish...
Generic Resource Adapter for JMS
Application Servers
07/24/2009
2.0-0.0
339.0 KB
dev.glassfish.org
GlassFish v3 Cluster Administration Utility
Overview
Files
Dependencies
License
The GlassFish v3 Cluster Administration Utility enables users to run a single command to perform the same administrative task on multiple Enterprise Server instances, for example, instances in a cluster where Apache mod_jk is used as load balancer. The Cluster Administration Utility can be used to administer multiple instances in the same way that the asadmin utility can be used to administer a single instance. For information about how to use the Cluster Administration Utility to administer multiple Enterprise Server instances in Amazon Elastic Compute Cloud (EC2), see Sun GlassFish Enterprise Server v3 EC2 Images Guide at http://docs.sun.com/doc/821-1300.
Package Name: glassfish-cluster-util
Version: 1.0-0.0
Installed Size: 50176 bytes (49.0 KB)
Published: 01/14/2010
Source: contrib.glassfish.org
Unique Identifier: pkg://contrib.glassfish.org/glassfish-cluster-util@1.0,5.10-0.0:20100114T162921Z



100,000+ surveys/hr

GlassFish 3.0.1
- JAX-RS
- EJB 3.1
- JPA 2

Pricing

US – N. Virginia | **US – N. California** | EU – Ireland | APAC – Singapore

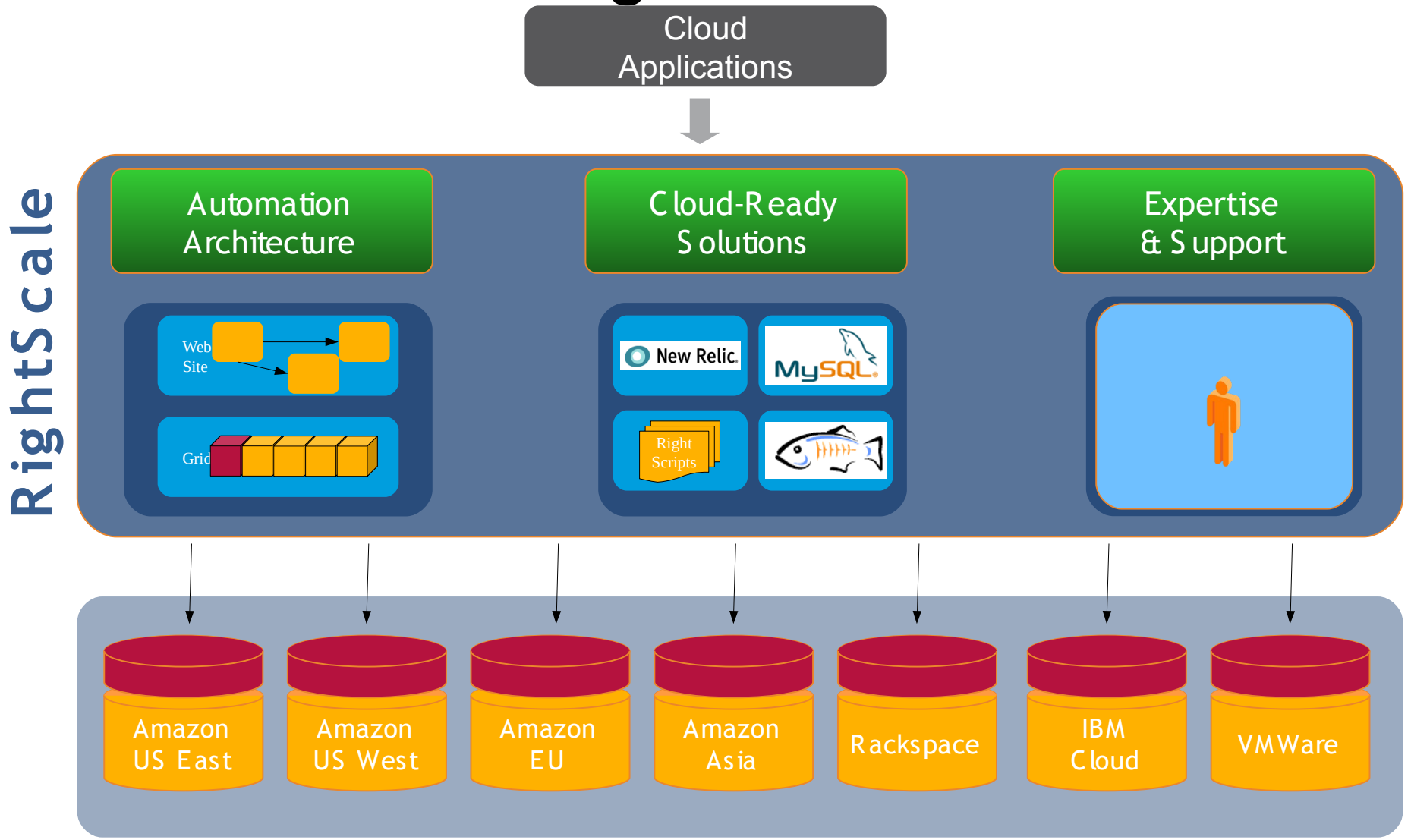
Standard On-Demand Instances	Linux/UNIX Usage	Windows Usage
Small (Default)	$0.095 per hour	$0.13 per hour
Large	$0.38 per hour	$0.52 per hour
Extra Large	$0.76 per hour	$1.04 per hour
High-Memory On-Demand Instances		
Extra Large	$0.57 per hour	$0.69 per hour
Double Extra Large	$1.34 per hour	$1.58 per hour
Quadruple Extra Large	$2.68 per hour	$3.16 per hour
High-CPU On-Demand Instances		
Medium		
Extra Large		

Data Transfer In	US & EU Regions	APAC Region
All Data Transfer	Free until June 30, 2010 *	Free until June 30, 2

Data Transfer Out **	US & EU Regions	APAC Region
First 1 GB per Month	$0.00 per GB	$0.00 per GB
Up to 10 TB per Month	$0.15 per GB	$0.19 per GB
Next 40 TB per Month	$0.11 per GB	$0.15 per GB
Next 100 TB per Month	$0.09 per GB	$0.13 per GB
Over 150 TB per Month	$0.08 per GB	$0.12 per GB

http://aws.amazon.com/ec2/pricing/

Java EE 6 on RightScale

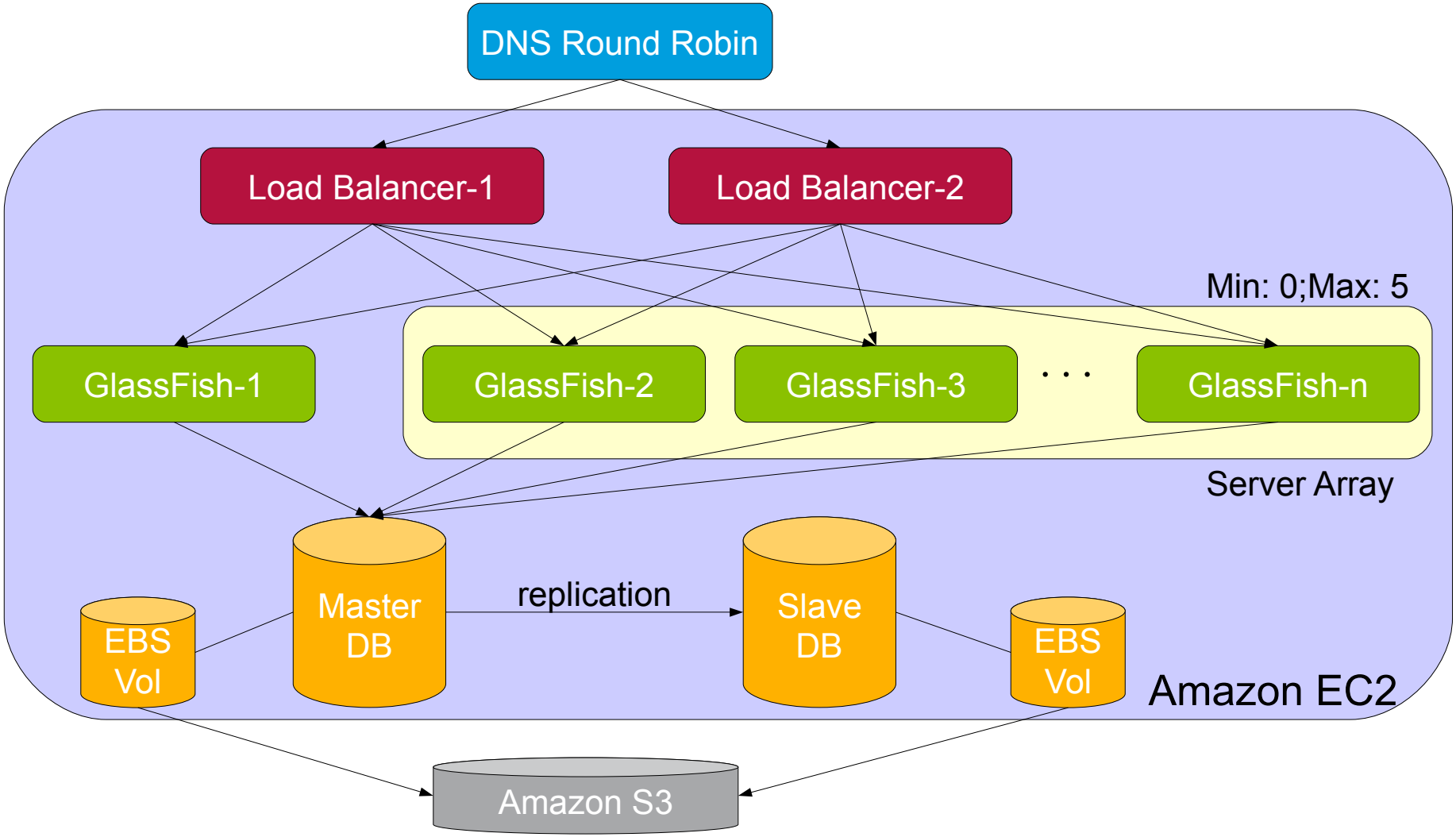


How to Deploy ?
Macro Definition

RIGHTSCALE®

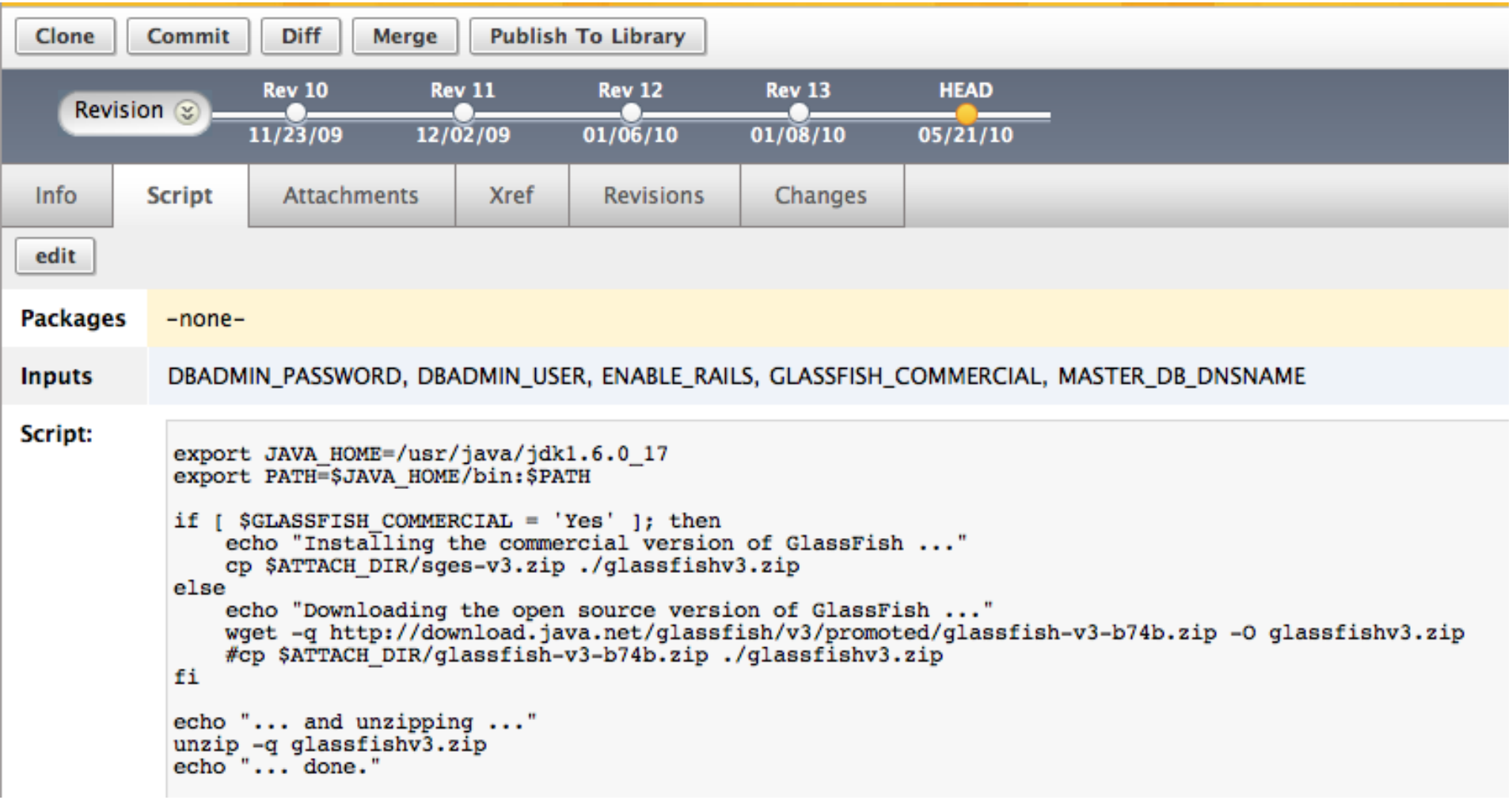
- Launches a new virtual server with clean install of Ubuntu
- Install GlassFish Server Open Source Edition 3.0
- Detects database in the deployment
  - Installs MySQL Connector/J Driver
  - Creates a JDBC Connection Pool and Resource
- Install samples
  - Archives (WAR/EAR/...) stored in S3

High Availability Deployment



RightScripts

RIGHTSCALE®



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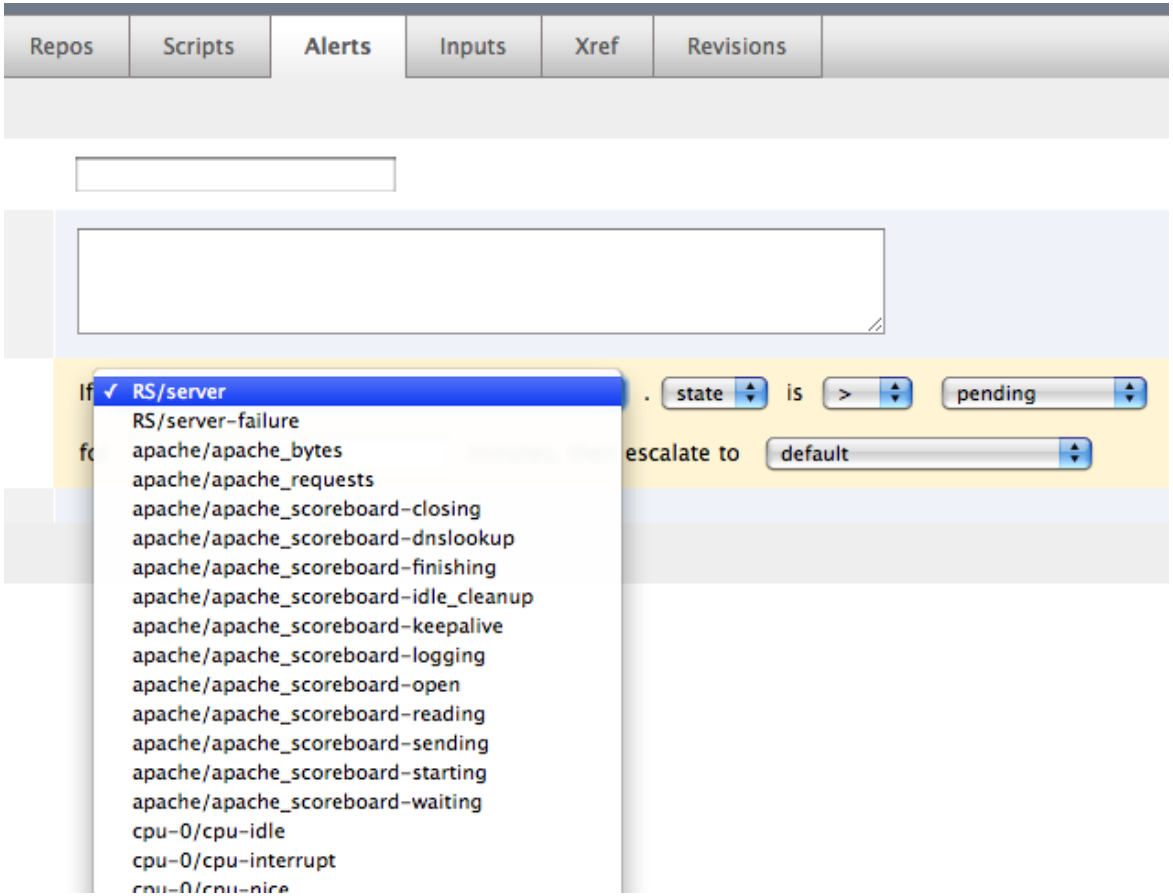
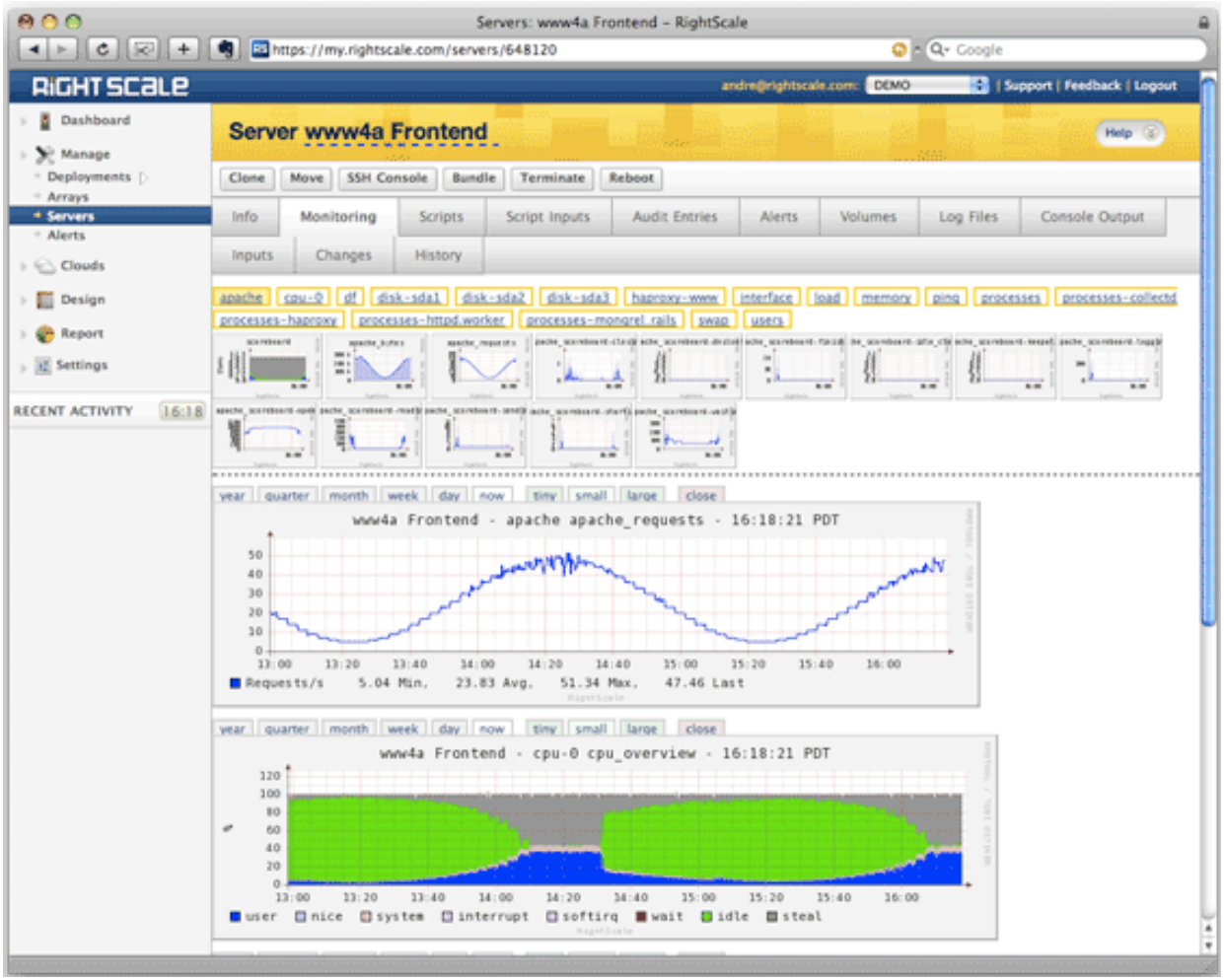
Alerts


Repos
Scripts
Alerts
Inputs
Xref
Revisions
If
RS/server
RS/server-failure
apache/apache_bytes
apache/apache_requests
apache/apache_scoreboard-closing
apache/apache_scoreboard-dnslookup
apache/apache_scoreboard-finishing
apache/apache_scoreboard-idle_cleanup
apache/apache_scoreboard-keepalive
apache/apache_scoreboard-logging
apache/apache_scoreboard-open
apache/apache_scoreboard-reading
apache/apache_scoreboard-sending
apache/apache_scoreboard-starting
apache/apache_scoreboard-waiting
cpu-0/cpu-idle
cpu-0/cpu-interrupt
state
is
>
pending
escalate to
default

RIGHTSCALE



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Pricing

RIGHTSCALE®

Our Plans	Developer Edition	Website Edition	Premium Edition	Enterprise Edition	Social Gaming Solution Pack	Grid Computing Solution Pack
Pricing						
Integration, Access & Support Fee	N/A	$2,500	$4,000	Call	Free	$5,000
Monthly Fee	Free	$500	$1,000	Call	$3,500	$1,500
RightScale Compute Units (RCU) included		15,000	15,000	Call	30,000	40,000
Additional Server Time (per RCU)		Call	Call	Call	Call	Call
Accounts	1	1	2	5	2	2
Core Features						
Management Dashboard	☑	☑	☑	☑	☑	☑
Lifecycle Support	Limited	☑	☑	☑	☑	☑
Server Templates	Limited	☑	☑	☑	☑	☑
Social Gaming Deployments					☑	
Multi-server Deployments	☑	☑	☑	☑	☑	☑
Automation Engine		☑	☑	☑	☑	☑
Monitoring	Limited	☑	☑	☑	☑	☑

http://www.rightscale.com/products/plans-pricing/

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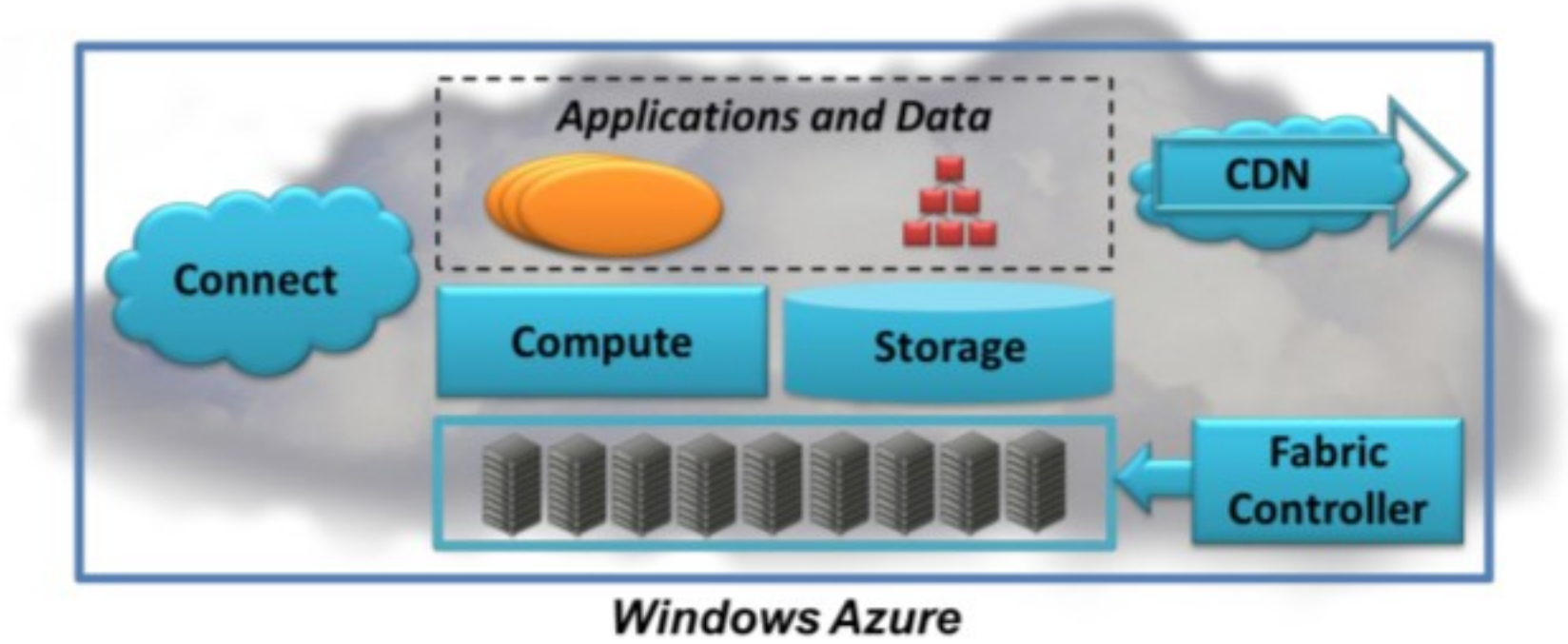
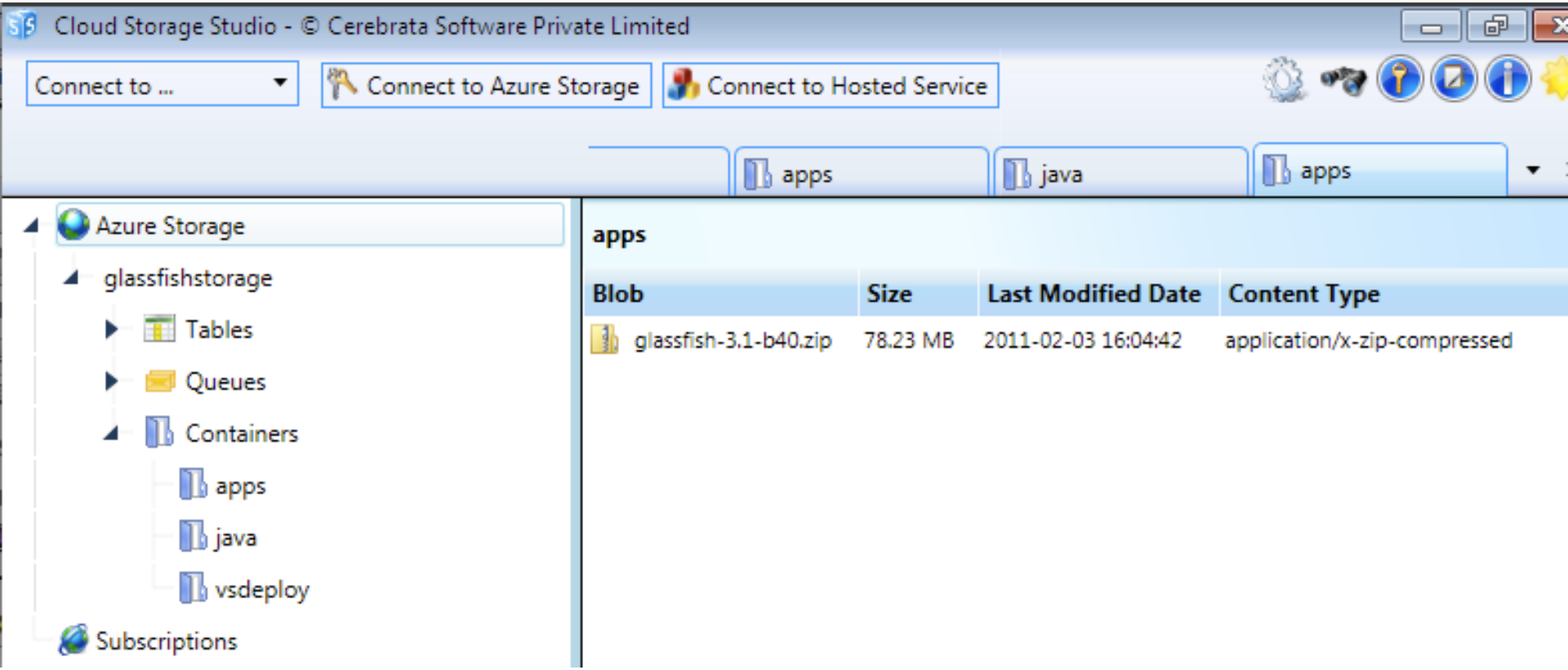
What is Azure ?

Windows Azure
Microsoft's Cloud Services Platform



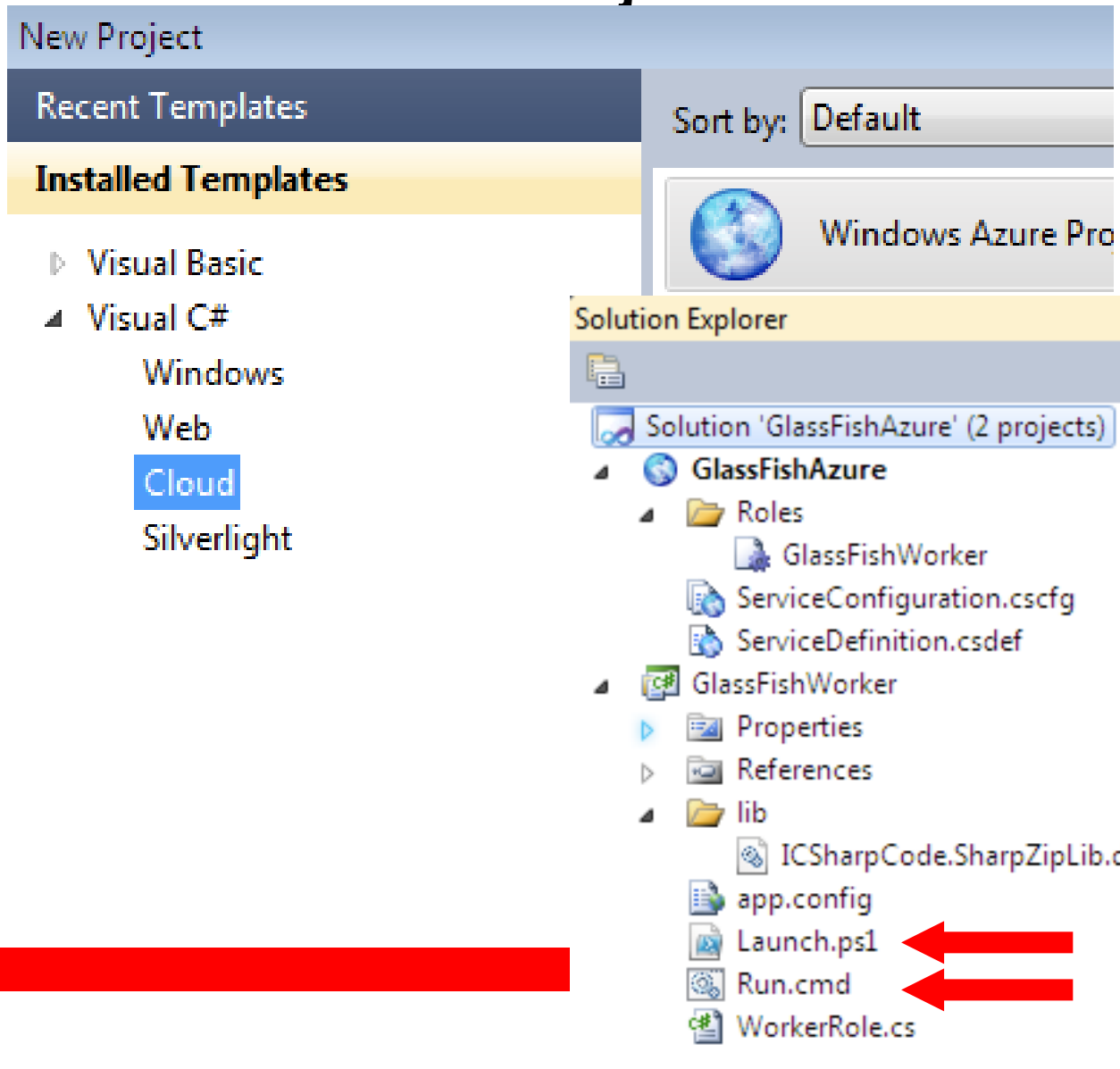
How to deploy ?
Azure Storage

Windows Azure
Microsoft's Cloud Services Platform



How to deploy ?
Visual Studio Project

Windows Azure
Microsoft's Cloud Services Platform



How to deploy ?

Launch.ps1

```
$connection_string =
'DefaultEndpointsProtocol=http;AccountName=YOUR-
STORAGE;AccountKey=YOUR-KEY'
```

```
# JDK
$jdk = 'jdk1.6.0_23.zip'
download_from_storage 'java' $jdk $connection_string (Get-
Location).Path
unzip ((Get-Location).Path + "\" + $jdk) (Get-Location).Path
```

```
# GlassFish
$glassfish = 'glassfish-3.1-b40.zip'
download_from_storage 'apps' $glassfish $connection_string (Get-
Location).Path
unzip ((Get-Location).Path + "\" + $glassfish) (Get-Location).Path
```

```
# Launch GlassFish
.\jdk1.6.0_23\bin\java `-jar
.\glassfish3\glassfish\modules\admin-cli.jar start-domain --verbose
```

How to deploy ?
Expose GlassFish ports

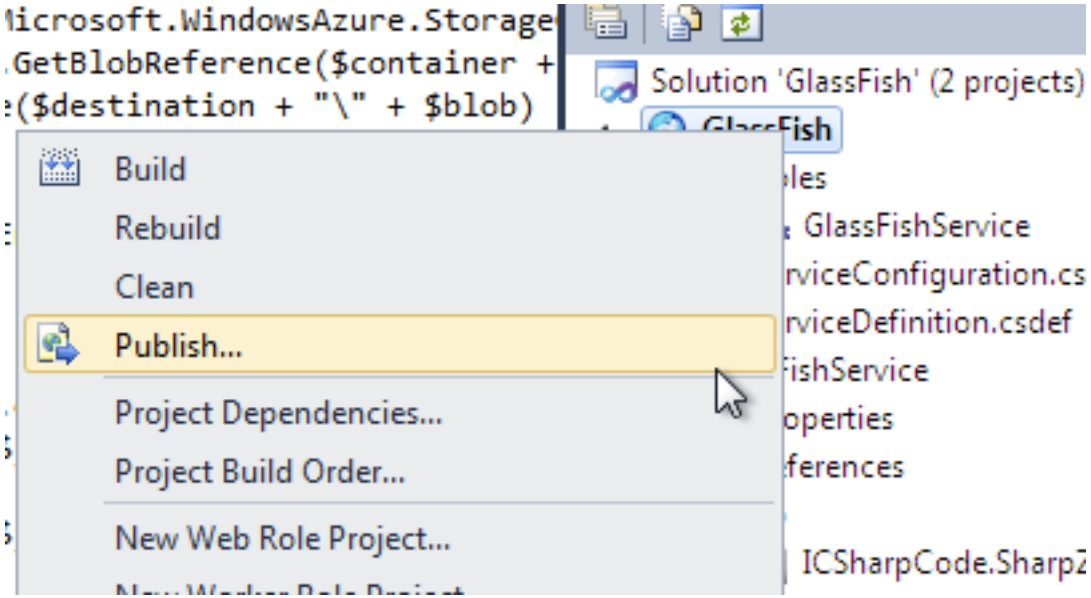
Windows Azure
Microsoft's Cloud Services Platform

ServiceDefinition.csdef | ServiceConfiguration.cscfg | Run.cmd | Launch.ps1 | WorkerRole.cs

```
<?xml version="1.0" encoding="utf-8"?>
<ServiceDefinition name="GlassFishAzure" xmlns="http://schemas.microsoft.com/ServiceHosting/200
  <WorkerRole name="GlassFishWorker">
    <Imports>
      <Import moduleName="Diagnostics" />
    </Imports>
    <Startup>
      <Task commandLine="Run.cmd" executionContext="limited" taskType="background" />
    </Startup>
    <Endpoints>
      <InputEndpoint name="Http_Listener_1" protocol="tcp" port="80" localPort="8080" />
      <InputEndpoint name="Http_Listener_2" protocol="tcp" port="8181" localPort="8181" />
      <InputEndpoint name="Http_Listener_3" protocol="tcp" port="4848" localPort="4848" />
      <InputEndpoint name="JMX_Connector_Port" protocol="tcp" port="8686" localPort="8686" />
      <InputEndpoint name="Remote_Debug_Port" protocol="tcp" port="9009" localPort="9009" />
    </Endpoints>
  </WorkerRole>
</ServiceDefinition>
```

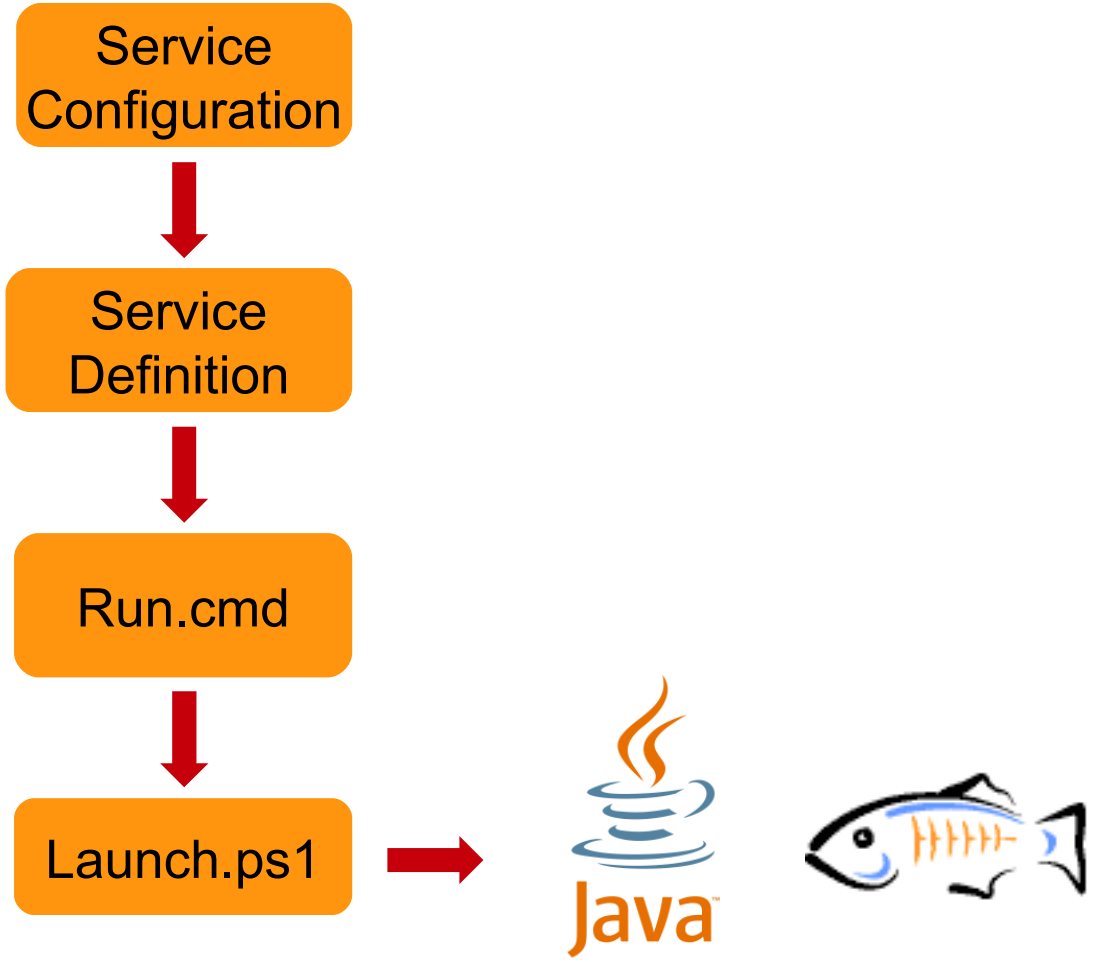
How to deploy ?
Publish

Windows Azure
Microsoft's Cloud Services Platform



How to deploy ?
Publish

Windows Azure
Microsoft's Cloud Services Platform



http://blogs.sun.com/arungupta/entry/ttod_155_glassfish_in_azure

Pricing

- Offers - Consumption or Commitment
  - 30-day FREE pass
- Platform offer comparison table

Pricing

Windows Azure
Microsoft's Cloud Services Platform

	Introductory Special	Cloud Essentials	MSDN Premium[6]	Development Accelerator Core	SQL Azure Development Accelerator Core	Development Accelerator Extended	Consumption
Windows Azure							
Compute[2]	25 hours (small compute instance)	750 hours (extra small compute instance) 25 hours (small compute instance)	750 hours (small compute instance)	750 hours (small compute instance)	N/A	750 hours (small compute instance)	$0.12 per hour (small compute instance) $0.05 per hour (extra small compute instance)[3]
Storage	500 MB of storage	3 GB of storage	10 GB of storage	10 GB of storage	N/A	10 GB of storage	$0.15 per GB stored per month
Storage transactions	10,000 storage transactions	250,000 storage transactions	1,000,000 storage transactions	1,000,000 storage transactions	N/A	1,000,000 storage transactions	$0.01 per 10,000 storage transactions
Content Delivery Network							$0.15 per GB transferred from North America & Europe locations $0.20 per GB transferred from other locations $0.01 per 10,000

http://www.microsoft.com/windowsazure/offers/popup/popup.aspx?lang=en&locale=en-US&offer=COMPARE_PUBLIC

http://blogs.sun.com/arungupta/entry/wishlist_for_windows_azure

Java EE 6 on Joyent

- High performance and reliable public, private, and hybrid cloud
- Environment
  - Language: Java, PHP, Ruby, …
  - Server: GlassFish, Apache, nginx, …
  - Database: MySQL, Oracle, ...

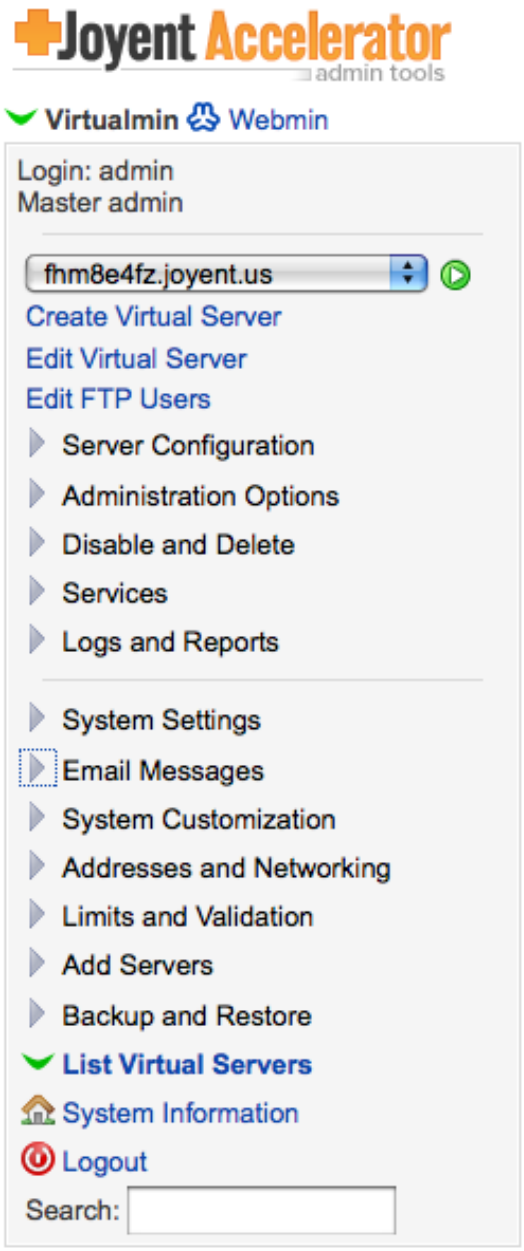
Vs Amazon

JOYENT PUBLIC CLOUD	AMAZON EC2
Technology stack designed for applications, with simplified management and maximized scalability and performance.	Technology designed to replicate hardware in the "cloud". Operating systems, application software, and management solutions are all required add-on products.
Simple and straightforward pricing – $125 per GB RAM per month with CPU, CPU bursting, Storage, and Network included standard.	Complex by-the-second pricing that requires a spreadsheet to determine charges
Persistent storage included	Persistent storage requires additional service
Network transfer included	Network transfer is an additional service
Professional Services for scale and performance	No services of this kind offered
Available for licensing and as a packaged, private cloud offering through Dell	No private or hybrid cloud solutions available from Amazon
Offers top of the line hardware and networking equipment in its data centers	Amazon EC2 is less upfront about its equipment offering
Persistent Public IP Addresses by default (NAT, Private IPs, and Load Balancing are also available)	Elastic IP Addresses increase complexity
Guaranteed minimum CPU with bursting capability	No bursting capability offered
Dedicated support for infrastructure issues	Support costs extra
Enterprise grade SLA, with 100% availability guarantee	Less robust SLA

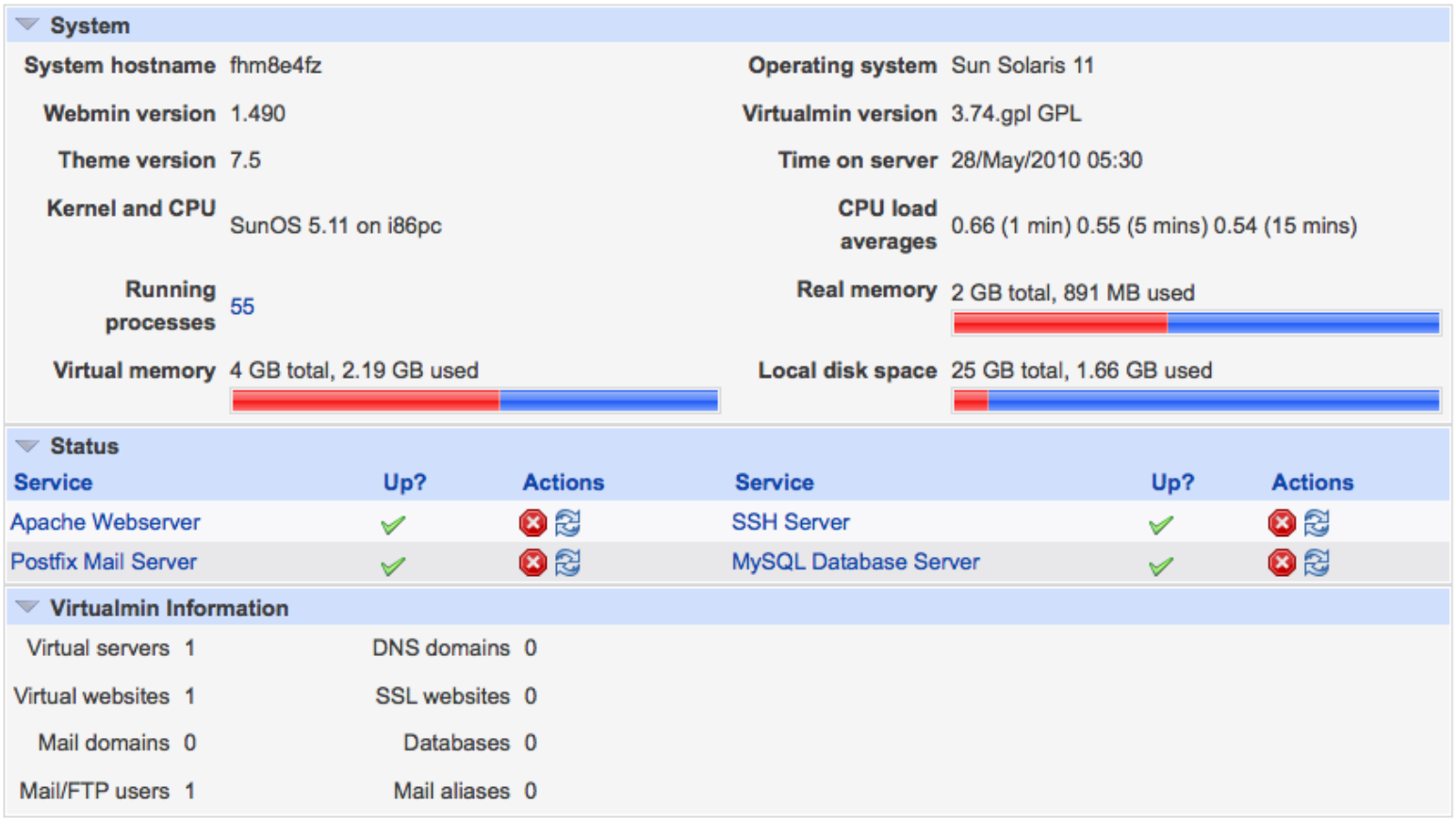
Joyent

Java EE 6 on Joyent

- Smart Machine (nee Accelerators)
  - Public IP Address
  - Root access to Solaris Zone
  - Guaranteed minimum CPU/RAM
  - Dedicated IP address + 100 Mbps connectivity
  - Common packages like MySQL can be installed using *Webmin*
  - “sftp” to upload application packages


Joyent Accelerator
admin tools
Virtualmin
Webmin
Login: admin
Master admin
fhm8e4fz.joyent.us
Create Virtual Server
Edit Virtual Server
Edit FTP Users
Server Configuration
Administration Options
Disable and Delete
Services
Logs and Reports
System Settings
Email Messages
System Customization
Addresses and Networking
Limits and Validation
Add Servers
Backup and Restore
List Virtual Servers
System Information
Logout
Search:

Joyent



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Pricing

Joyent

- Included support issues
  - Inaccessible smart machine
  - Slow performance
  - System-level functionality not working
- $199/incident (max one hour)

	S	M	L
Pricing	**$2999**	**$10999**	**$31999**
Number of Incidents*	20	100	Unlimited

http://www.joyent.com/support/support-programs/

Multi-cloud Vendors

Vendor	Language	Compute	Storage	Provider
RightScale	Bash, Ruby, Perl	Yes	Yes	Amazon, GoGrid, FlexiScale, Eucalyptus
OpenStack	REST	Yes	Yes	Several
SimpleCloud	PHP	No	Yes, Queing	Microsoft, IBM, Rackspace, Nirvanix, GoGrid
libcloud	Python	Yes	??	Several
jClouds	Java, Clojure	Yes	Yes	Several
DeltaCloud	Ruby, REST	Create/Start/ Stop/Reboot /Destroy	No	Amazon, GoGrid, OpenNebula, Rackspace, RHEV-M, RimuHosting
CloudLoop	Java	No	Yes	Amazon, Nirvanix
Dasein	Java	??	Yes	Amazon, Rackspace, vSphere

From the real Java EE 6 users ...

Developers can concentrate on business logic, Java EE 6 is providing a standard for the infrastructure.

Jigsaw puzzle, Modular, standard, less xml, **easy, easy**, have I said **easy**?

Standards compliance, vendor independence, **milliseconds and kilobyte deployment**

Higher integrated specs, simple and annotation driven, single-classloader WARs, **next level of industry standard**

Faster development, **less frameworks/complexity**, more great code shipped

http://blogs.sun.com/arungupta/tags/community+feedback

What does Java EE offer to Cloud ?

- Containers
- Injectable services
- Scale to large clusters
- Security model
- . . .

What can Java EE do for Clouds ?

- Tighter requirements for resource/state
- Better isolation between applications
- Support for multi-tenant applications
- Potential standard APIs for NRDBMS, Caching, WebSockets, JSON, HTML5
- Common management and monitoring interfaces
- Better packaging
  - Apps/Data are (multiple) versioned, Upgrades, Expose/Connect to services, QoS attributes, ...
- Evolution, not revolution!

GlassFish Server Chronology

2006	2007	2008	2009	2010	…

GlassFish v1

Java EE 5, Single Instance

GlassFish v2

Java EE 5, High Availability

GlassFish Server 3

Java EE 6, Single Instance

GlassFish Server 3.1

Java EE 6, High Availability

GlassFish Server Distributions

Distribution	License	Features
GlassFish Server Open Source Edition 3.1 *Web Profile*	CDDL & GPLv2	• Java EE 6 compatibility • Web Profile support • In-memory replication / clustering • Centralized Administration
GlassFish Open Source Edition 3.1	CDDL & GPLv2	• Java EE 6 compatibility • Full Java EE distribution • In-memory replication / clustering • Centralized Administration

Oracle GlassFish Server 3.1
Web Profile
	Commercial	• Adds
		  • Oracle GlassFish Server Control
		  • Patches, support, knowledge base

Oracle GlassFish Server 3.1	Commercial	• Adds
		  • Oracle GlassFish Server Control
		  • Patches, support, knowledge base

Conclusions

- Java EE 6 is light-weight, flexible, easy-to-use
- GlassFish Server Open Source Edition 3.0 and Oracle GlassFish Server 3.0 provides feature-rich implementation
- Java EE 6 applications can be easily deployed on Amazon, RightScale, Azure, Joyent, and other clouds.
- Java EE 7 will provide a standards-based programming model for PaaS environments.
- Talk to us at users@glassfish.dev.java.net.

References

- glassfish.org
- oracle.com/goto/glassfish
- blogs.sun.com/theaquarium
- youtube.com/user/GlassFishVideos
- @glassfish

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Running your Java EE 6 Applications in the Cloud

Arun Gupta, Java EE & GlassFish Guy
blogs.sun.com/arungupta, @arungupta