



Deploying Database clusters in the Cloud

Neil Armitage - Continuent
CloudOpen - Europe

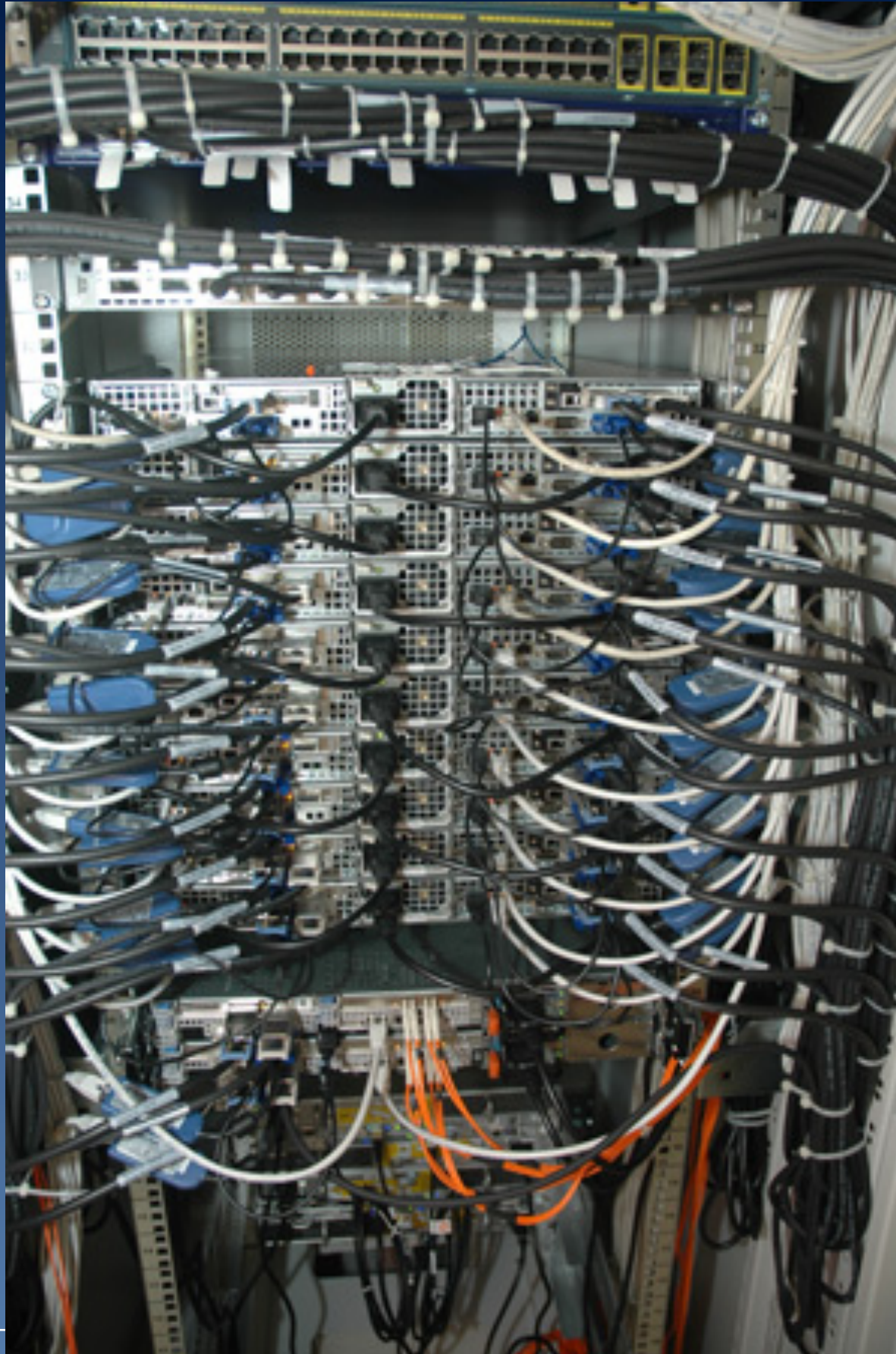
whoami

- DBA Oracle/Mainframes/MySQL (25 Years)
- Deployment Engineer @ Continuent
 - 1 or 2 Customer Deployments/Week
 - On Premise or Cloud deployments
- Developer for Cloud Operations and Deployments @ Continuent



On-premise/Colo deployments

- Raise a project
- Get Approval
- Order hardware
- Rack and cable hardware
- Connect to network
- Install Operating System
- Connect to SAN



Cloud deployments

- Enter credit card number
- call API

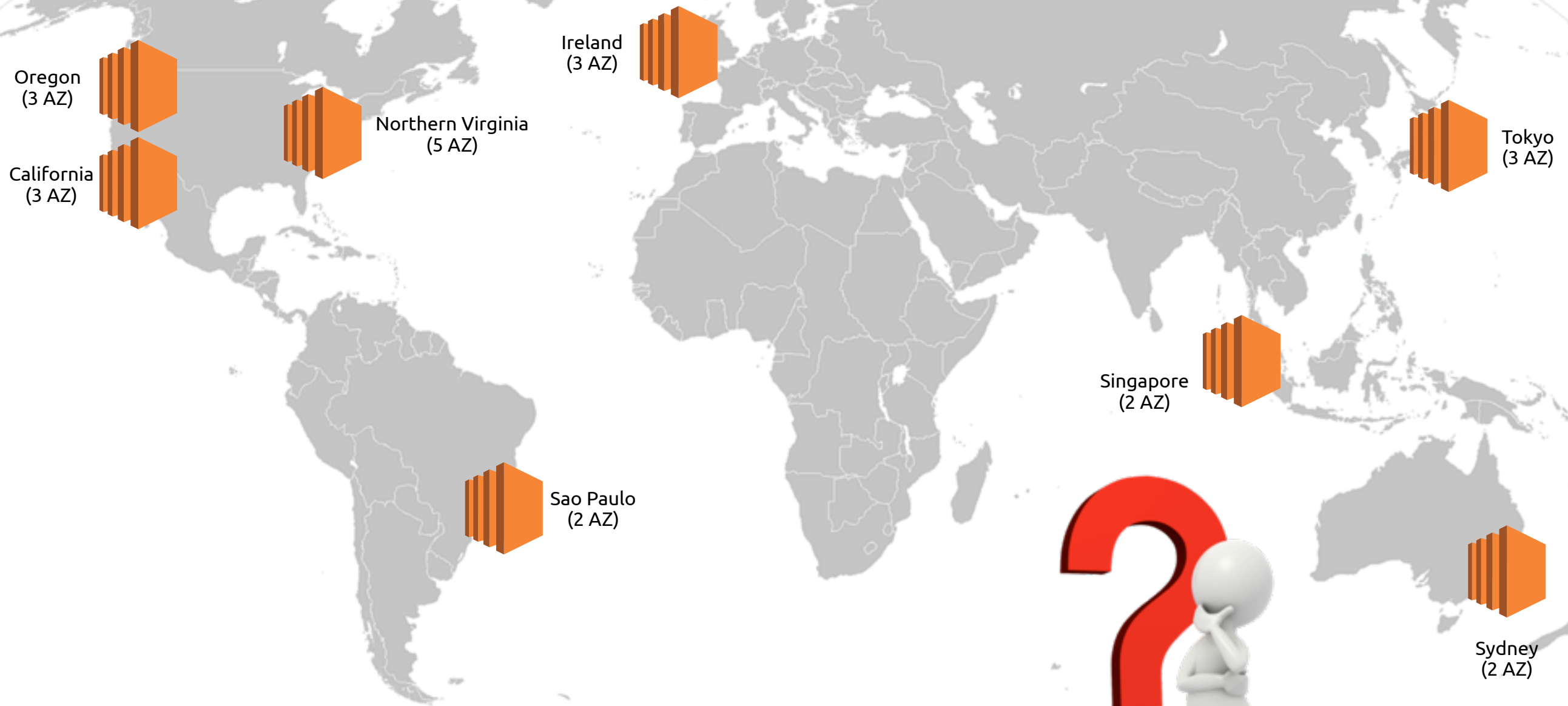
```
nova boot --image centos6-x86_64 --flavor m1.large db1  
nova boot --image centos6-x86_64 --flavor m1.large db2  
nova boot --image centos6-x86_64 --flavor m1.large db3
```

```
ec2-run-instances ami-xxxxxx -k ${EC2_KEYPAIR} -t m1.large  
ec2-run-instances ami-xxxxxx -k ${EC2_KEYPAIR} -t m1.large  
ec2-run-instances ami-xxxxxx -k ${EC2_KEYPAIR} -t m1.large
```

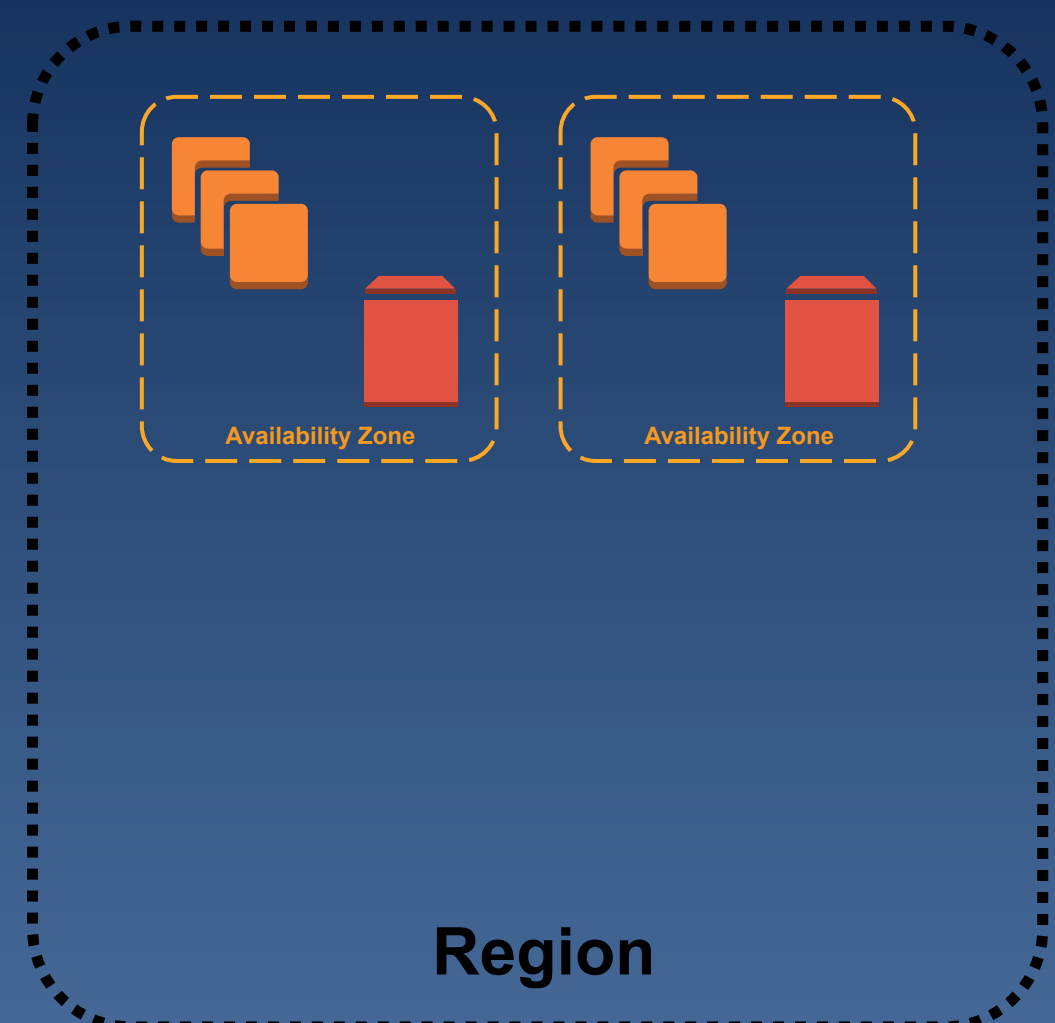
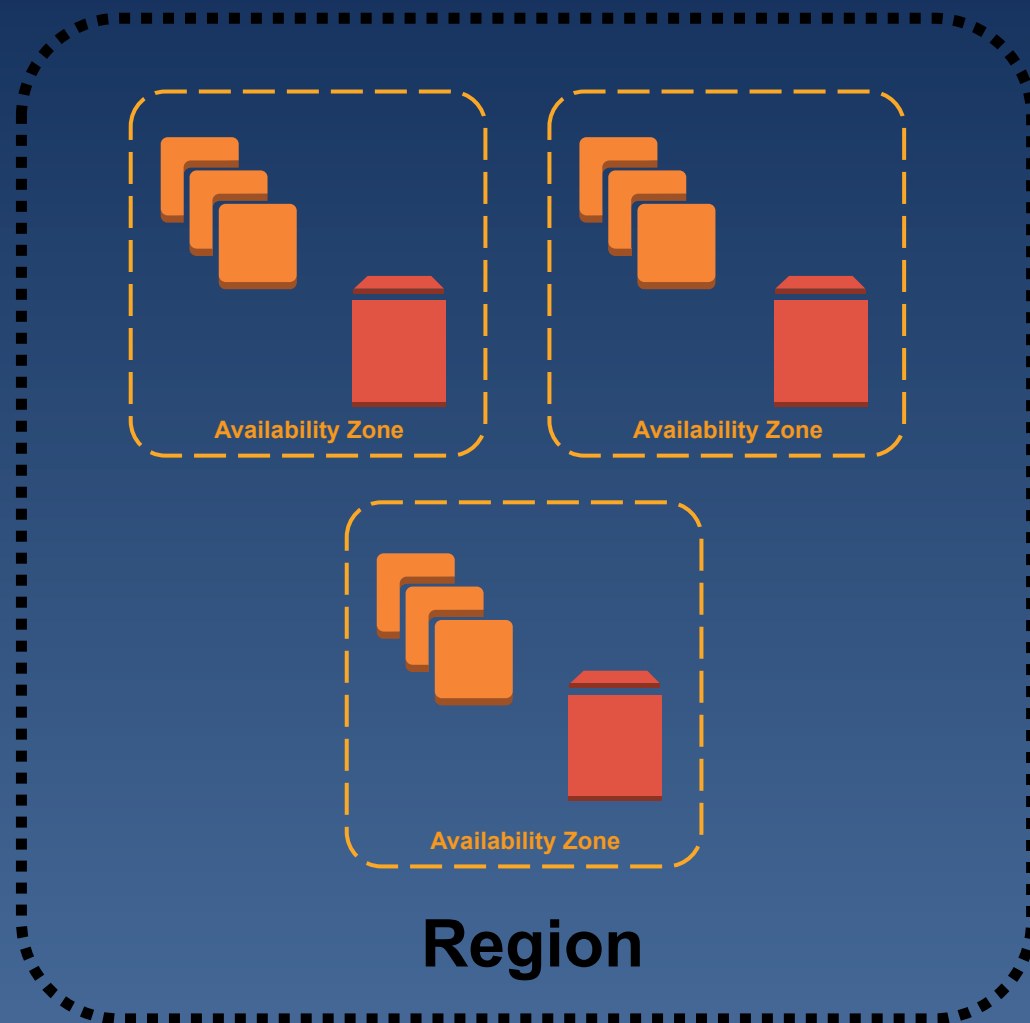
Cloud Providers

- Amazon AWS
- RackSpace
- HP Cloud
-
- On Premise Clouds
 - Openstack
 - VMWare

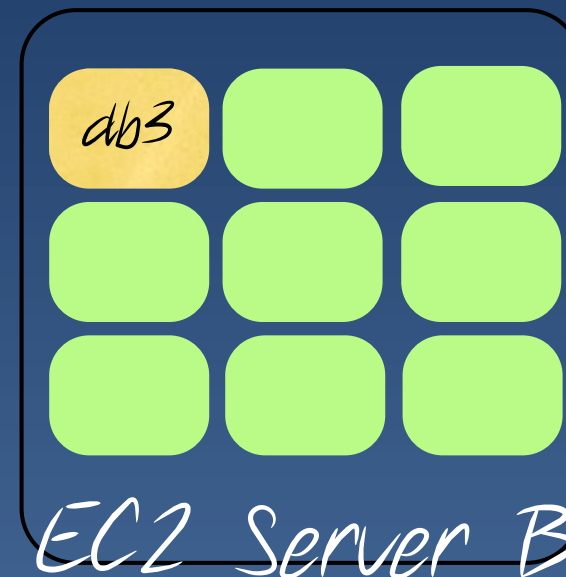
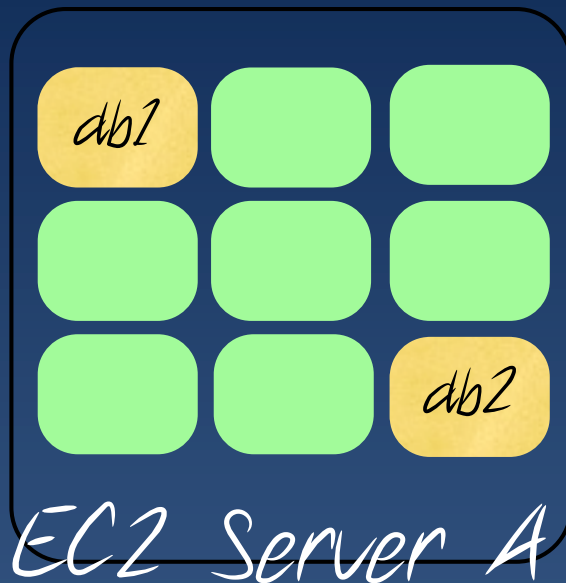
Where is a cloud server located ?



AWS Availability Zones



Cloud Instance Location

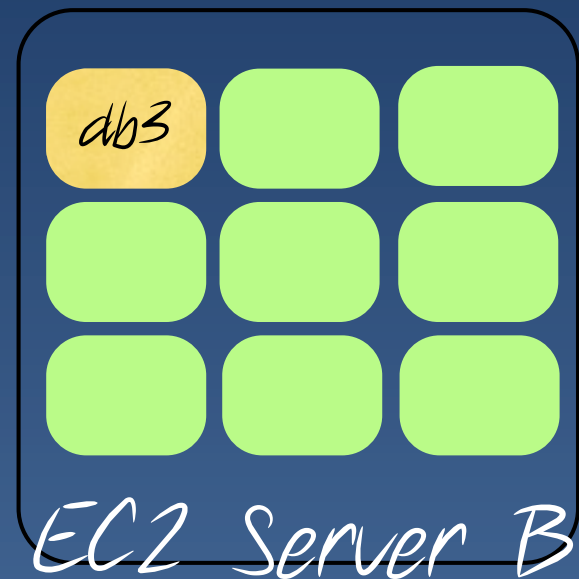


Provision 3 nodes
DB1->DB3

Cloud Instance Location



Server A has died



Where is your data?



Where is your data?



Where is your data?



Where is your data?



Networking in the Cloud

- Can be unreliable
- Where it is?
- What it is?
- Security?



High Availability

High Availability - On Premise

- Ensure servers in different Racks
- Redundant Power
- Redundant Network
- Redundant Disk
- Backup Server in DR location
- Redundant network between DC's

High Availability - Cloud



Cloud Environments Fail

Training & Development

Network kit failure causes AWS outage

By *Ry Crozier* on Aug 26, 2013 1:17 PM
Filed under *Networking*

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Investigation underway.

Amazon Web Services has attributed a one-hour outage in one of its US-EAST cloud compute availability zones to the "partial failure" of network equipment.

BUSINESS | the cloud

Lessons From a Cloud Failure: It's Not Amazon, It's You

BY SCOTT GILBERTSON 04.25.11 1:07 PM
 Follow @webmonkey

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Cloud Environments Fail

Amazon Web Services Outage Caused By Memory Leak And Failure In Monitoring Alarm



ALEX WILLIAMS

Saturday, October 27th, 2012



A memory leak and a failed
Services outage on Monday

According to a **post** Friday
after a simple replacement
server did not propagate its DNS address correctly

[CIO Report](#) | [Consumerization](#) | [Big Data](#) | [Cloud](#) | [Talent & Management](#) | [Security](#)

December 27, 2012, 4:48 PM ET

Netflix Amazon Outage Shows 'Any Company Can Fail'

Article

Comments (11)



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By Joel Schectman



Reporter

An outage Tuesday at Amazon Web Services, which sells computing and data storage services to businesses including [Netflix](#), should cause CIOs to look into new options to prevent mission critical functions running on public clouds from going dark,

Cloud Environments Fail

SiliconANGLE » Amazon Explains Their Public Cloud Failure – Outage Causes Outrage

Amazon Explains Their Public Cloud Failure – Outage Causes Outrage

JOHN FURRIER | JULY 2ND

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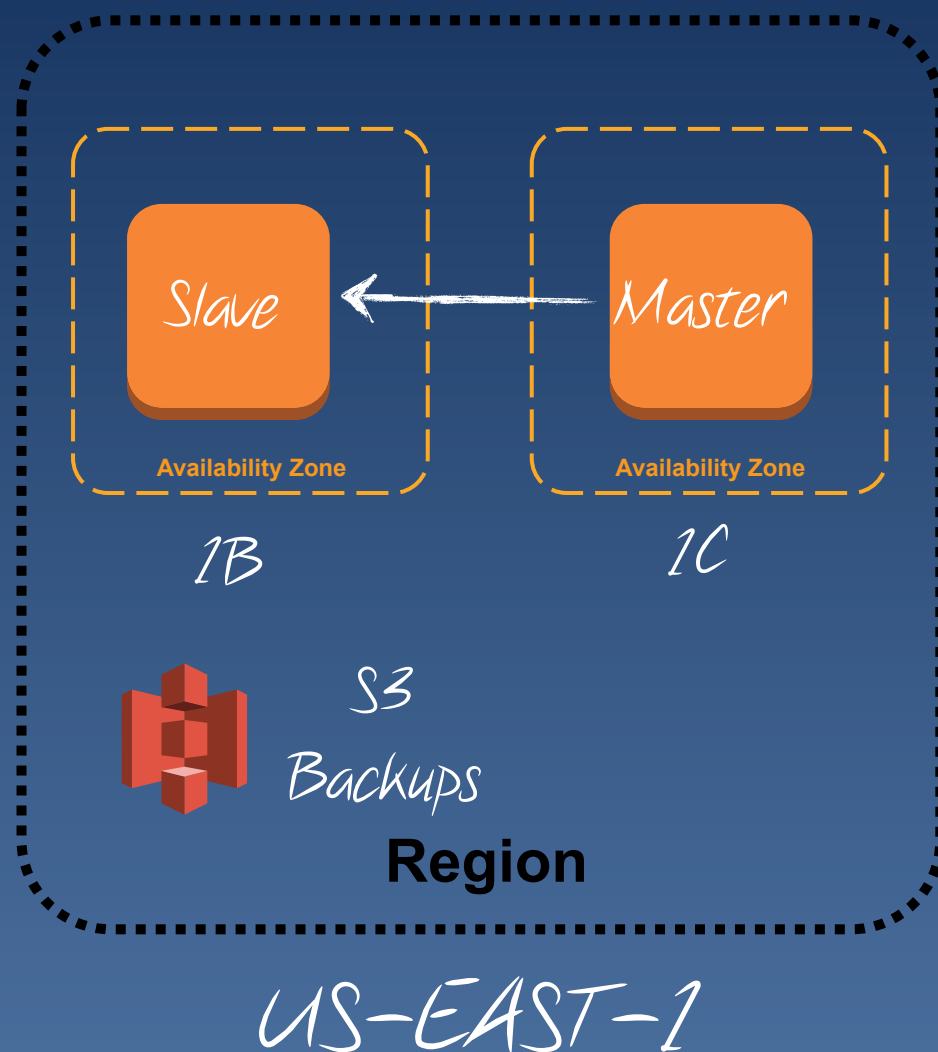
According to the Wall Street Journal late today, Amazon has come clean with a response to their severe outage of the AWS public cloud infrastructure fail that crippled and took out Netflix, Instagram, Pinterest, and other top Internet sites that relied on Amazon for critical infrastructure.

Amazon.com had a fail over the weekend that I wrote about in my



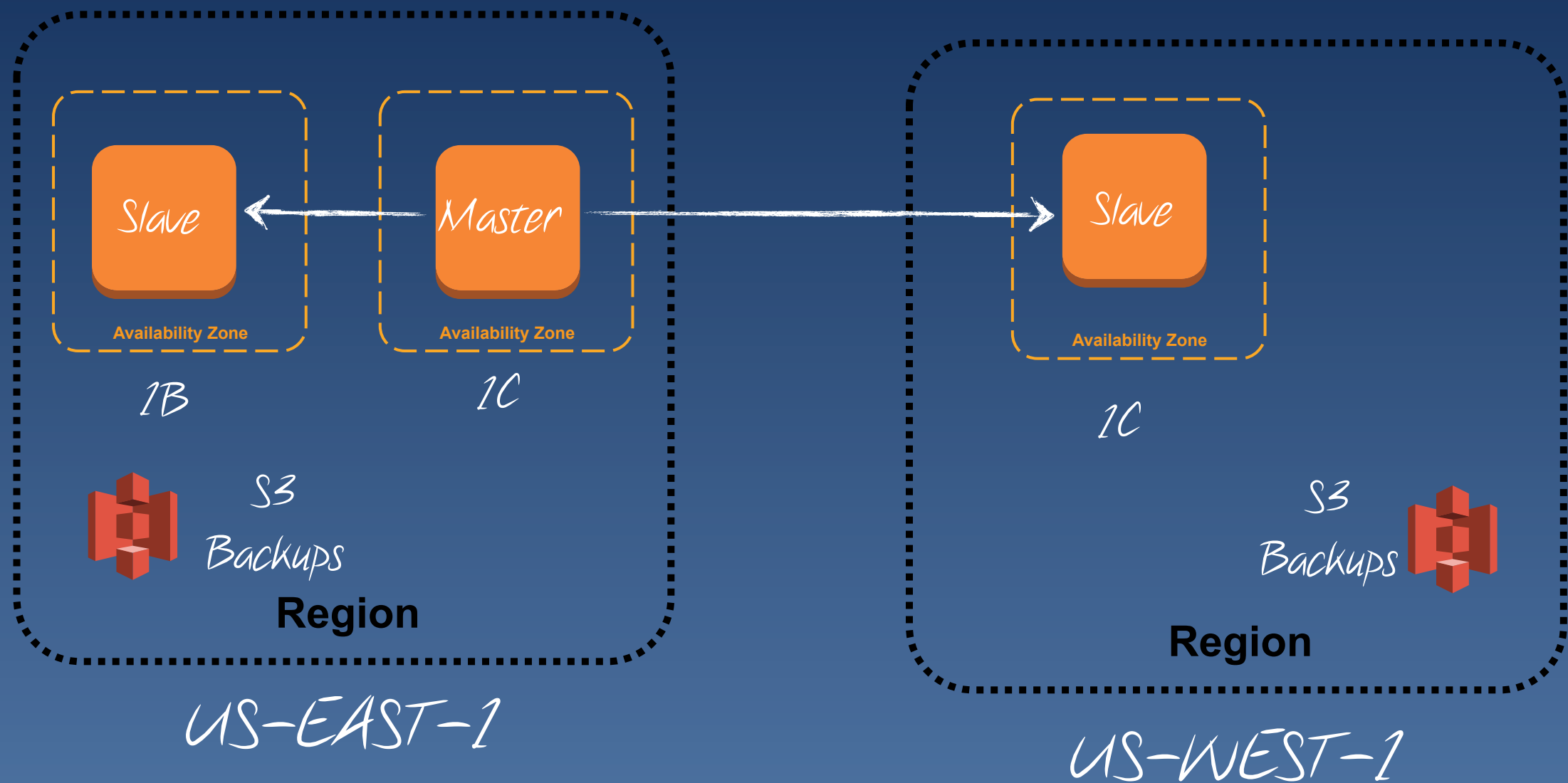
Simple

Separate Nodes across AZ's



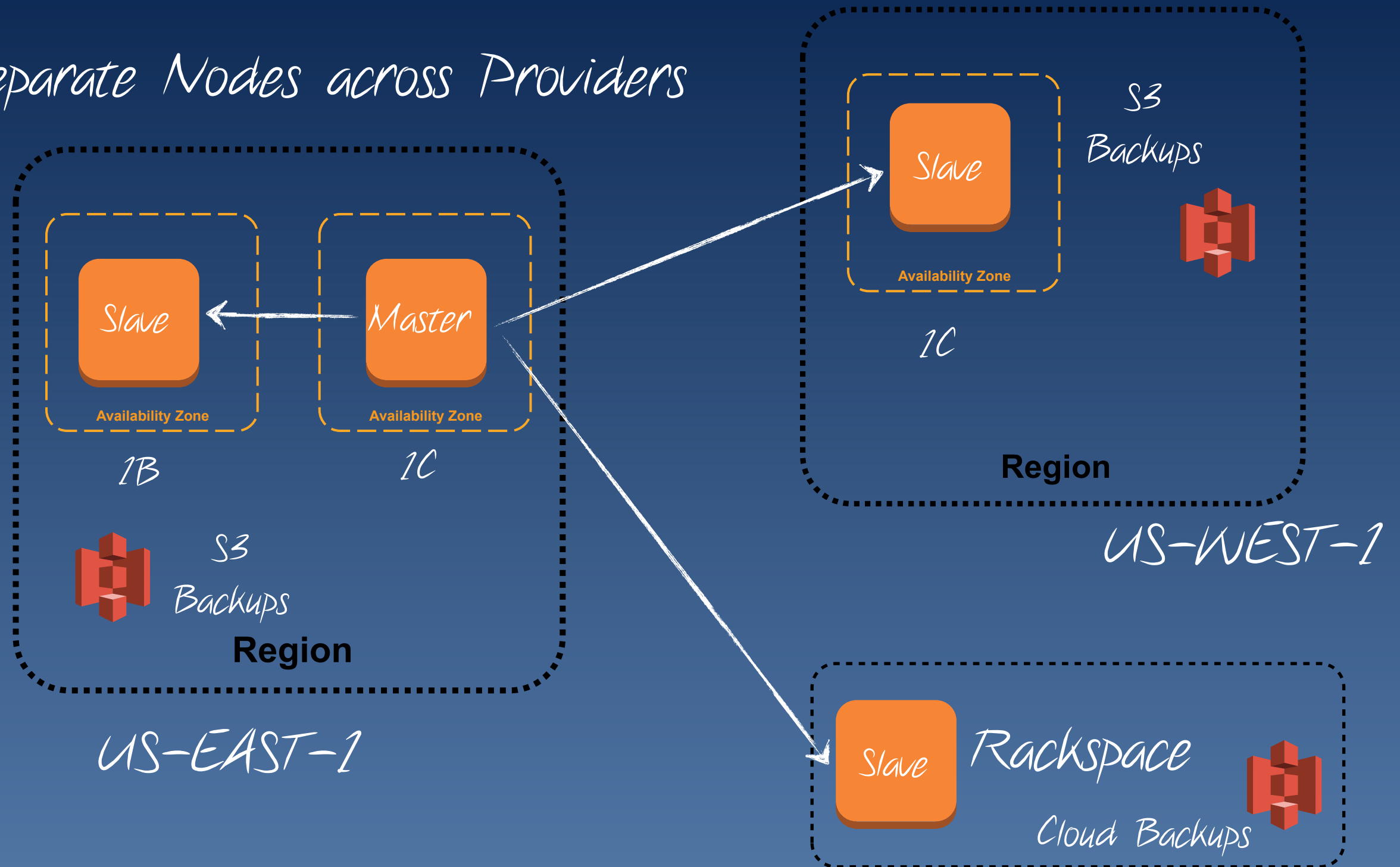
Better

Separate Nodes across AZ's and Regions



Even Better

Separate Nodes across Providers



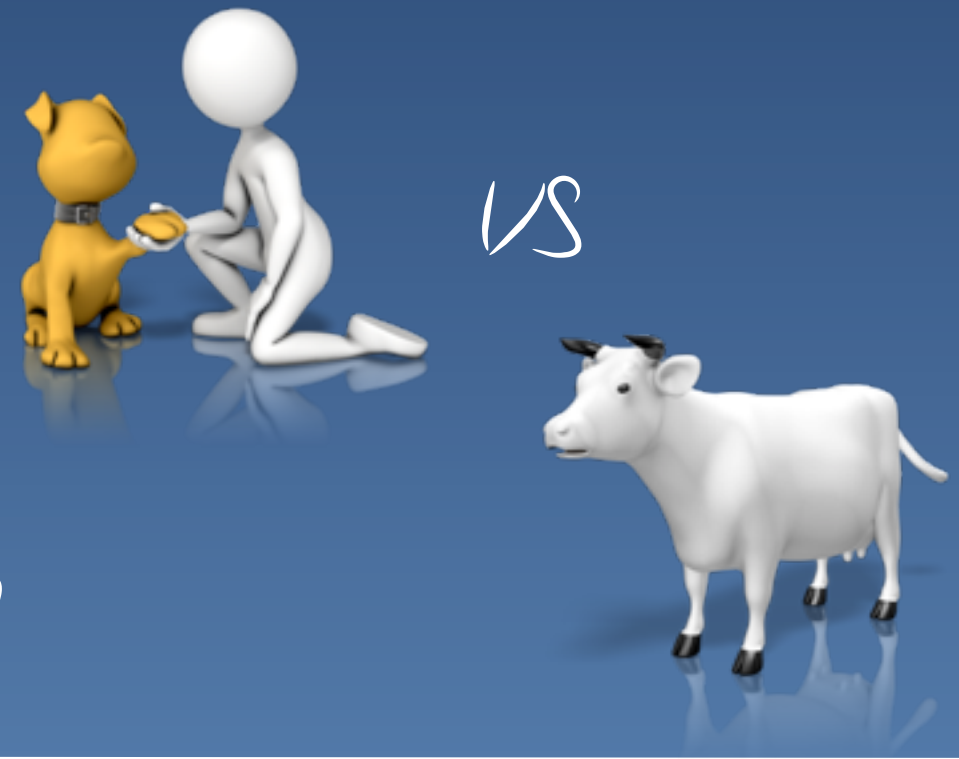
High Availability in the Cloud

- Need to consider locations
- Have more nodes than you would with on premise
- Nodes can just disappear or stop functioning

“Spain cluster has had an issue this afternoon - the current master DB has dropped off the network/out of AWS”

High Availability in the Cloud

- Plan for and expect node failures
- Don't assume that you will be able to quickly provision new nodes.
- Take plenty of backups (S3 costs only \$100/month to store 1TB)
- Expect a few 'bad' nodes
 - poor cpu performance
 - poor disk performance
 - *throw them away - shoot them*



Running Databases in the Cloud

AWS Relational Database Service (RDS)

- MySQL, Oracle, SQL Service
- Read Slaves
- Multi-AZ deployments
- Simple to set up and use

AWS Relational Database Service (RDS)



AWS Relational Database Service (RDS)

- AWS Only
- Can not replicate data out
- Very limited options for replicating in *
- No Multi-Region
- Slow failover with AZ's (10 mins +)

Rackspace Databases

- MySQL Only
- Single Node?
- Replication?
- No Backups



Others

- Google Cloud
 - Google only
- HP Cloud
 - trove ? (private beta)
- OpenStack
 - trove ?



How we deploy clusters (in the cloud)

What our customers want

- All on-premise
- All in AWS
- Main Site on-premise - backup/DR in AWS
- Main Site in AWS - backup in Rackspace
- Flexibility and no vendor lock in
- Most on-premise clouds are VMWare

What our customers don't want



Deploying in the Cloud

- Automate everything
 - Puppet allows us to work across clouds
 - No need to maintain AMI's/Images just use a standard o/s images
 - 'masterless' puppet to ensure we don't have a SPOF
- Our install tools work across multi-nodes in parallel
- Prototype GUI/CLI launcher to deploy and scale clusters automatically

Need to setup secure connections

- OpenVPN
 - Need multiple servers to avoid a SPOF
- Software
 - We now support secure connections
 - Between DB's
 - Between Apps and DB's

Best Practices

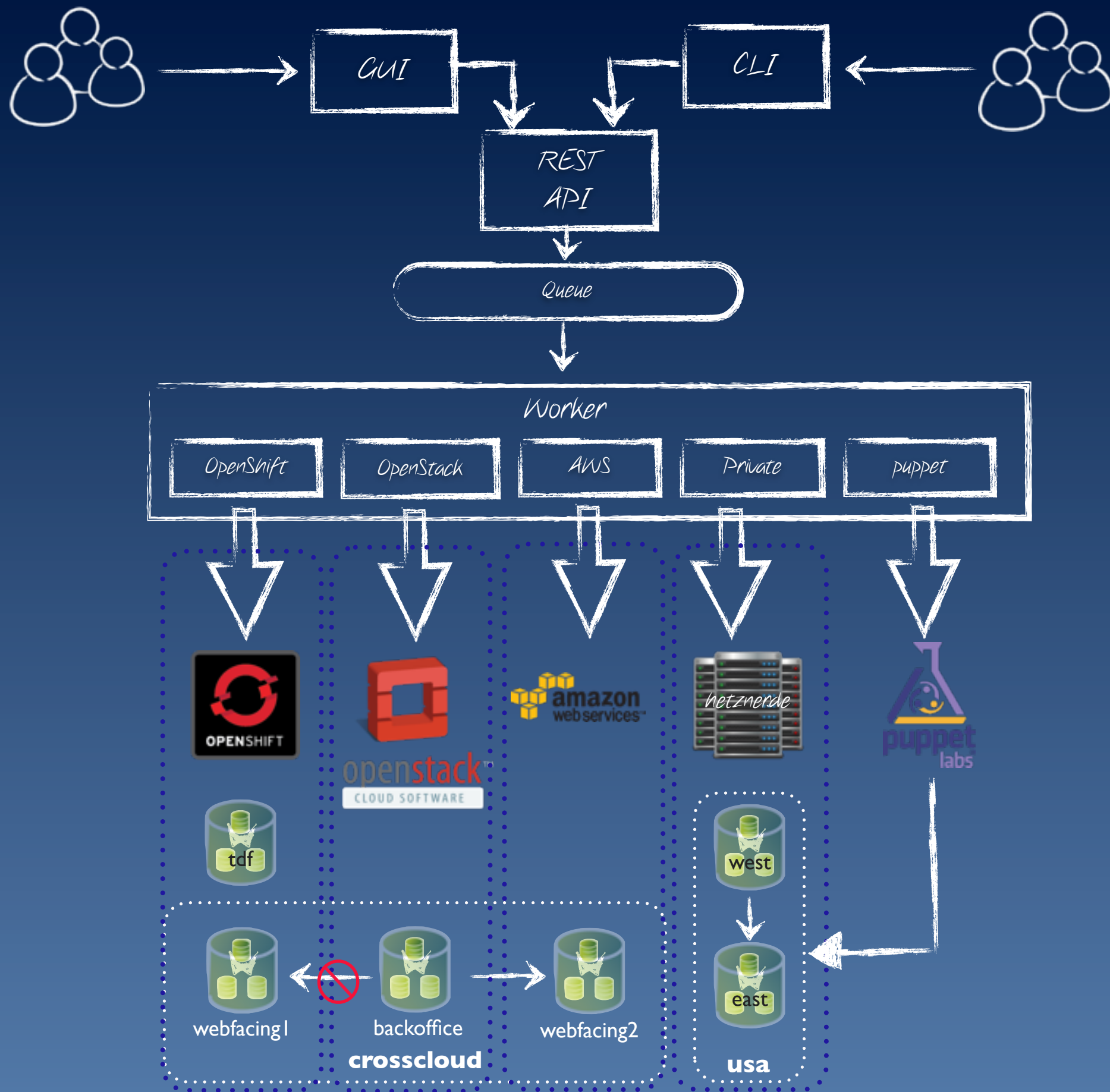
- RAID EBS Volumes (RAID1)
- Backups
 - xtrabackup (backed up into S3)
 - EBS Snapshot
 - `ec2-consistent-snapshot \`
`--mysql --freeze-filesystem /vol \`
`--region eu-west-1 \`
`--description "$(hostname) RAID snapshot $(date +%Y-%m-`
`%d %H:%M:%S)" \`
`vol-1f9a6446 vol-649a643d`

Best Practices

- Monitoring
 - Nagios
 - Zabbix
 - Email Alerts
 - New Relic



The future / Coming Soon



Demo

Whats next

- Instance Autoscaling
- MongoDB
- Oracle
- Postgres
- Better support for VMWare and On-Premise installs

Lesson Learnt

- EC2 Instances fail
- One of anything is never enough
- Don't assume you can spin up more resources instantly
- Think multi-cloud, public/private
- Resources are disposable - throw away and rebuild if needed

Lesson Learnt

- Monitor everything
- Automate as much as possible
- Backup everything (twice)

Questions



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<http://scale-out-blog.blogspot.com>

<http://datacharmer.blogspot.com>

<http://flyingclusters.blogspot.com>

Continuent Website:

<http://www.continuent.com>

Tungsten Replicator 2.0:

<http://code.google.com/p/tungsten-replicator>