Linux on AWS

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Discussion

- What is AWS

- Linux flavors

- Storage

- Networking

- Monitoring

- Security

- Demo

What is AWS?

- On demand delivery of compute power, database storage, applications and other IT resources.

- Cost based on usage

- Announced the first service Nov 2004 (SQS).

- Elastic Compute Cloud (EC2) beta announced in Aug 2006

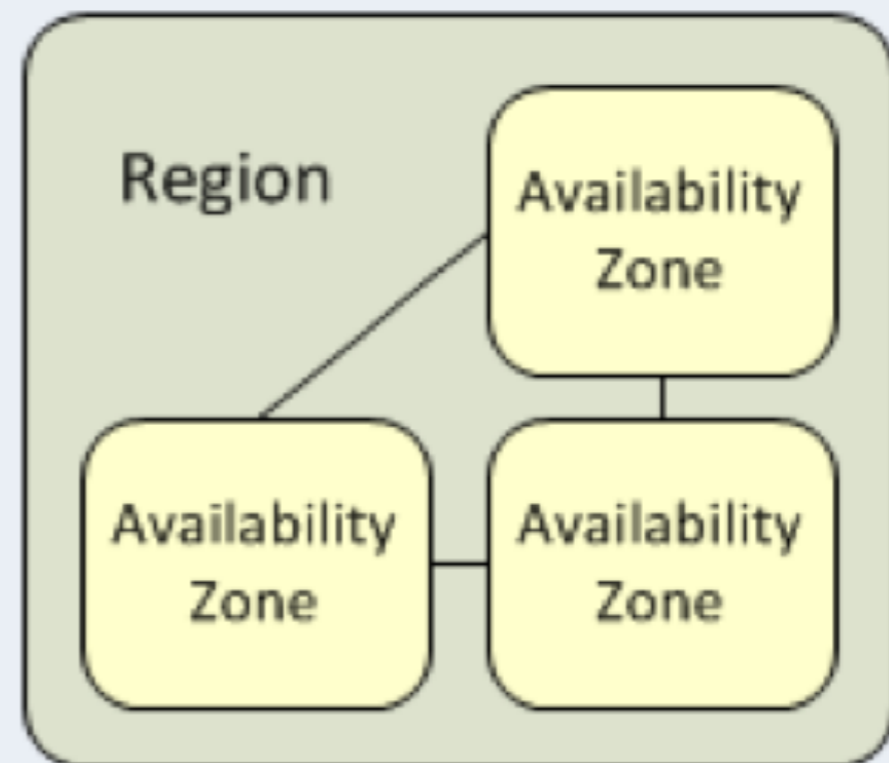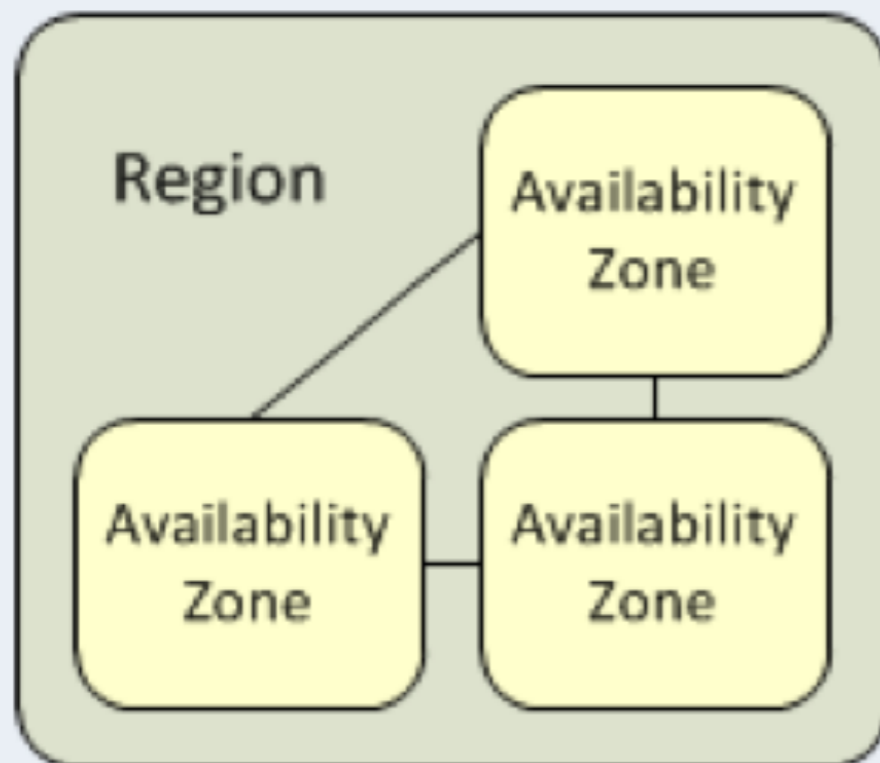- AWS Free Tier (https://aws.amazon.com/free

16 geographic Regions
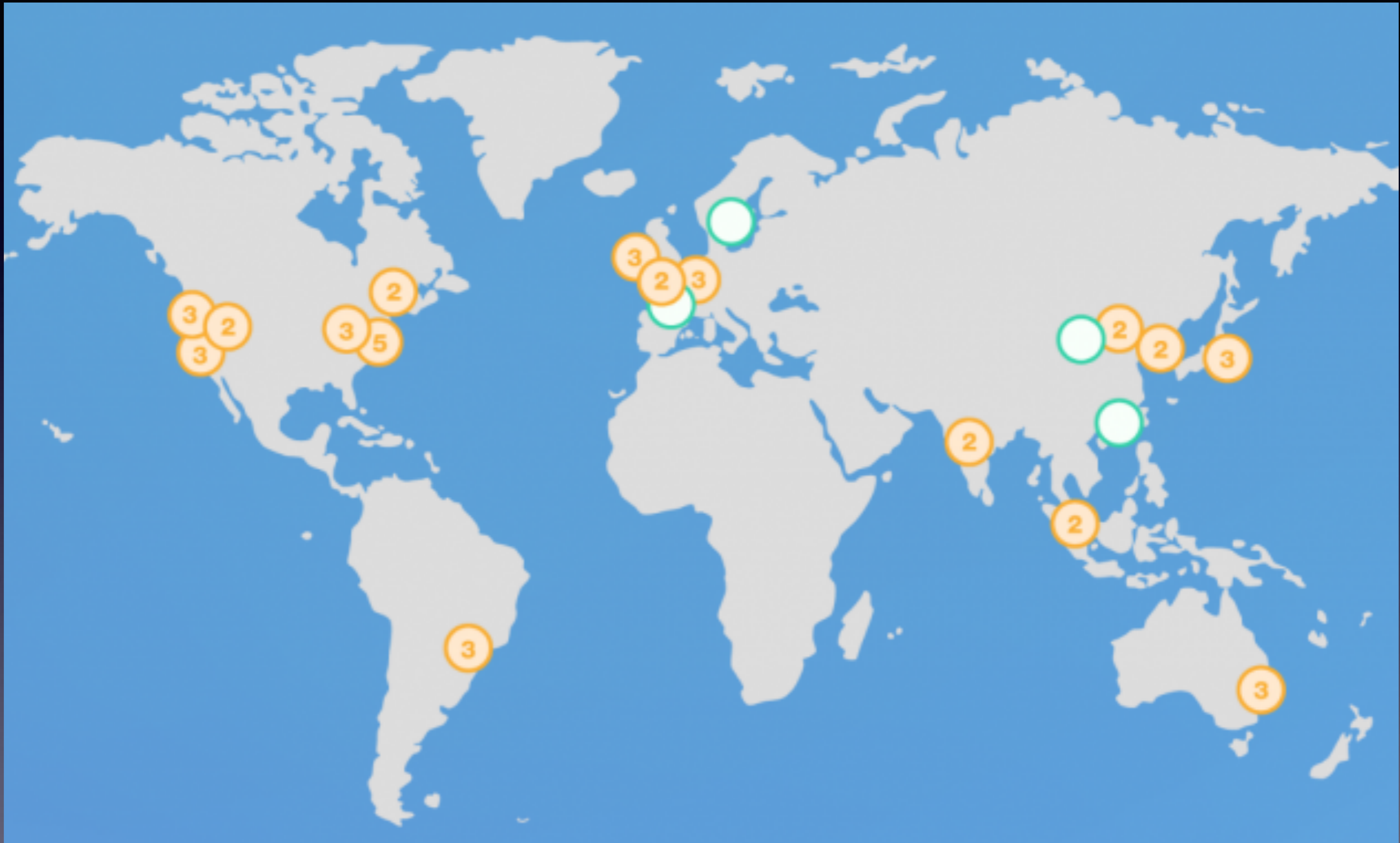
43 Availability Zones

(computer rooms)

Operating Systems

- Linux

  - Amazon Linux

  - Redhat, CentOS, Fedora

  - SUSE Linux

  - Debian, Ubuntu

  - Gentoo

- Microsoft

Hardware

- General Purpose

- Compute Optimized

- Memory Optimized

- Accelerated Computing

- Storage Optimized

Hardware

Names

c4.xlarge

General Purpose

- T2*, M4, M3

- 1 - 64 CPU's

- 500 MB - 256 GB RAM

- *Burstable CPU

Compute Optimized

- C3 / C4

- 2 - 36 processors

- 3.75 GiB - 60 GiB of memory

- High performance front-end fleets, web-servers, batch processing, distributed analytics, high performance science and engineering applications, MMO gaming, and video-encoding

Memory Optimized

- X1, R4 and R3

- 2 - 128 CPU's

- 16 GiB - 2 TiB of memory

- High performance databases, distributed web scale in-memory caches, Hadoop/Spark clusters

Storage Optimized

- I3 and D2

- I3 are instances backed by Non-Volatile Memory Express (NVMe) SSD storage.

  - 500 MB - 16 TB NVMe SSD

  - 2 - 64 CPU's, 16 GB RAM, 10/20 Gigabit networking

- D2 - Dense storage instances.

  - Up to 48 TB of *local* HDD storage.

  - 4 - 36 CPU's, up to 244 GB RAM

Accelerated Computing

- P2, G3 and F1

- P2: GPU compute applications. Up to 16, NVIDIA K80 GPU's with 12 GiB GPU memory

- G3: graphics-intensive applications. Up to 4 GPU's with 8GiB of memory, 64 CPU's and 488 GiB system memory.

- F1: Field programmable gate arrays.

Storage

- Instance Store

- Elastic Block Storage

Instance Store

- An *instance store* provides temporary block-level storage for your instance.

- The storage is located on disks that are physically attached to the host computer.

- Data only survives during the lifetime of the instance.

- Data does survive reboots but will be lost under the following circumstances:

  - The underlying disk drive fails

  - The instance stops

  - The instance terminates

EBS Storage

- Networked, block storage volumes

- EBS volumes are placed in a specific Availability Zone and automatically replicated to different hardware.

- SSD and HDD backed storage

- Designed for 99.999% availability

- Offers point in time snapshots

- https://aws.amazon.com/ebs/details/

Networking - VPC

- Amazon Virtual Private Cloud

- Your very own data-center network

- You have control over IP address range, subnets, route tables and gateways.

- Public networks

- Private networks

- IPv4 and IPv6

- Create a VPN to extend your corporate datacenter

Networking - VPC
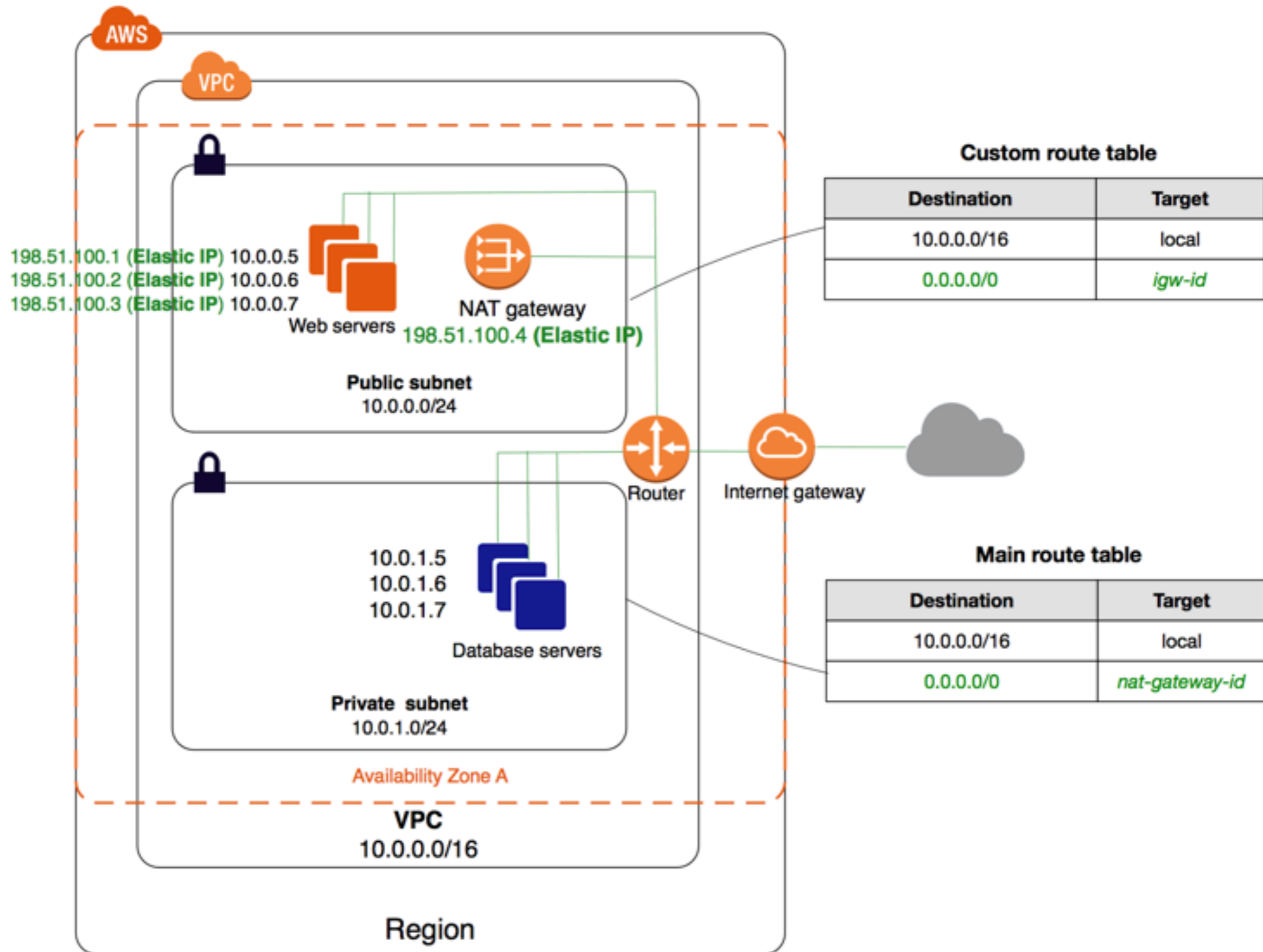
Networking - VPC

- IP addressing

  - private

  - public

- Network interfaces

  - Default

  - Up to 15 additional interfaces and up to 50 IP's on largest instances

- Jumbo frames supported on some instances

- Enhanced networking uses "Single Root I/O virtualization (SR-IOV)"

- Placement groups

Amazon Machine Image (AMI's)

- An AMI provides the information required to launch an instance.

  - A template for the root volume (for example, OS, application server and applications)

  - Block device mapping that specifies the volumes to attach when launched

  - Launch permissions

Monitoring

- Cloudwatch

- Collect and track metrics

- Collect and monitor log files (agent req)

- Set alarms and automatically react to changes

- Monitors not just instances but databases and application and services

- Memory and Disk Metrics (http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/mon-scripts.html)

Security

- Instance access is with ssh key pairs

- Command line tools use Access key ID and Secret access key combination.

- Instance Security Groups

- Network ACL's are stateless access control mechanism to the VPC

- Users, Groups and Roles

Demo!

```
[<ffffffff813d059a>] ? 0xffffffff813d059a
[<ffffffff813d155b>] ? 0xffffffff813d155b
[<ffffffff813d21ea>] ? 0xffffffff813d21ea
[<ffffffff82317c2d>] ? 0xffffffff82317c2d
[<ffffffff81000296>] ? 0xffffffff81000296
[<ffffffff8104a19f>] ? 0xffffffff8104a19f
[<ffffffff822e5e81>] ? 0xffffffff822e5e81
[<ffffffff822e5647>] ? 0xffffffff822e5647
[<ffffffff81a8e853>] ? 0xffffffff81a8e853
[<ffffffff81a8e859>] ? 0xffffffff81a8e859
[<ffffffff81a9d198>] ? 0xffffffff81a9d198
[<ffffffff81a8e853>] ? 0xffffffff81a8e853
Code: 10 d6 ff ff 8b 92 00 b6 00 00 89 d2 48 8b 8f 10 d6 ff ff 8b 89 04 b6 00 00
 48 c1 e1 20 48 09 d1 31 d2 49 89 c8 49 29 c0 4c 89 c0 <49> f7 f1 48 89 c8 48 85
 d2 75 05 4d 39 d0 76 05 ff ce 75 be c3
RIP  [<ffffffff817484bf>] 0xffffffff817484bf
 RSP <ffff88014c8ffc90>
---[ end trace c384d3e911d6a1b6 ]---
Kernel panic - not syncing: Attempted to kill init! exitcode=0x0000000b

Kernel Offset: 0x0 from 0xffffffff81000000 (relocation range: 0xffffffff80000000
-0xffffffff9fffffff)
---[ end Kernel panic - not syncing: Attempted to kill init! exitcode=0x0000000b
```