

DevOps

Introduction to Cloud Computing and

Amazon Web Services (AWS)

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Why Cloud Computing?

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- “70% of the budget to keep IT running, 30% available to create new value”
“...that needs to be inverted”
- “Weeks of planning, justification, and deployment and then we’re stuck with it for 5 years – even if our needs change in a month...”
“...or we could just buy it as a service – right now”
- “Most of our legacy applications are stable and predictable”
“...we need to incrementally improve efficiency without disruption”
- “but, new, more dynamic and fluid approaches to IT must also be leveraged for new applications and changing legacy applications”
“...new, revolutionary IT model is required”

IT Challenges

Globalization

Aging data centers

Storage growth

Application explosion

Cost of ownership

Acquisitions

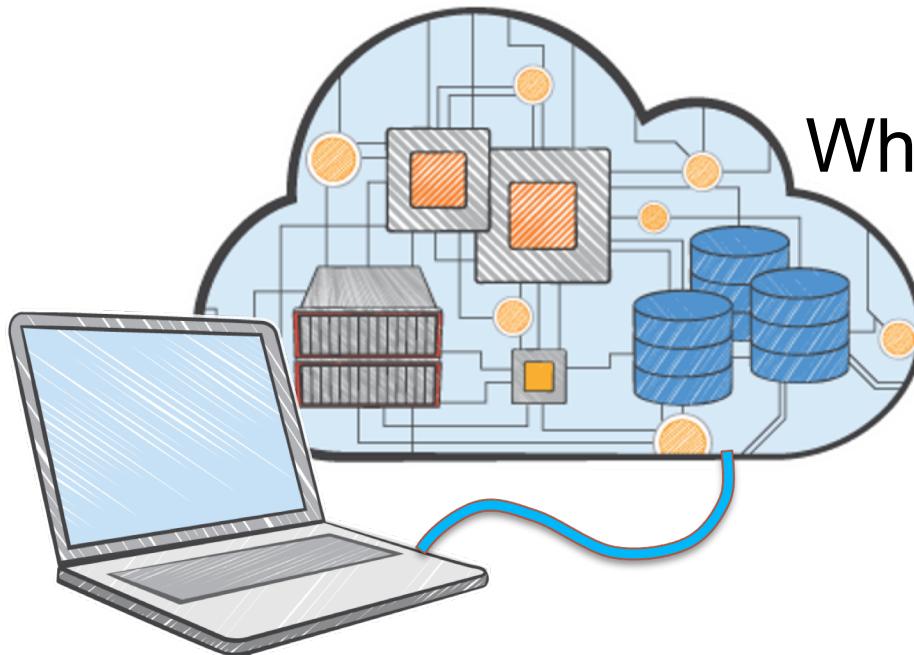
The 3 main resources of Cloud Computing

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- Compute
- Storage
- Network

What is Cloud Computing

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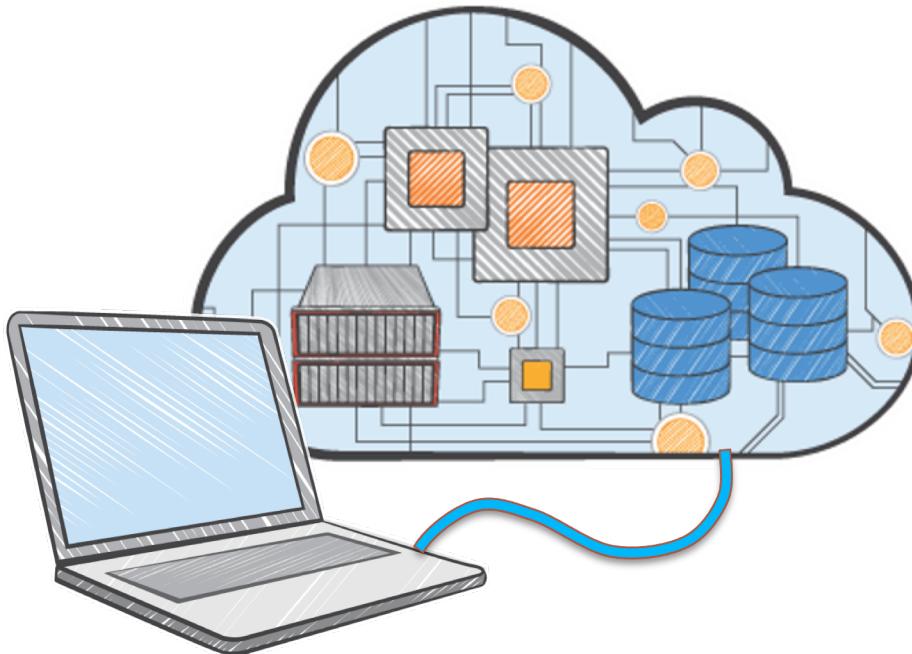


What does *cloud computing* mean to you?

- On-demand
- IT resources
- Accessible online
- Pay-as-you-go

What is Cloud Computing

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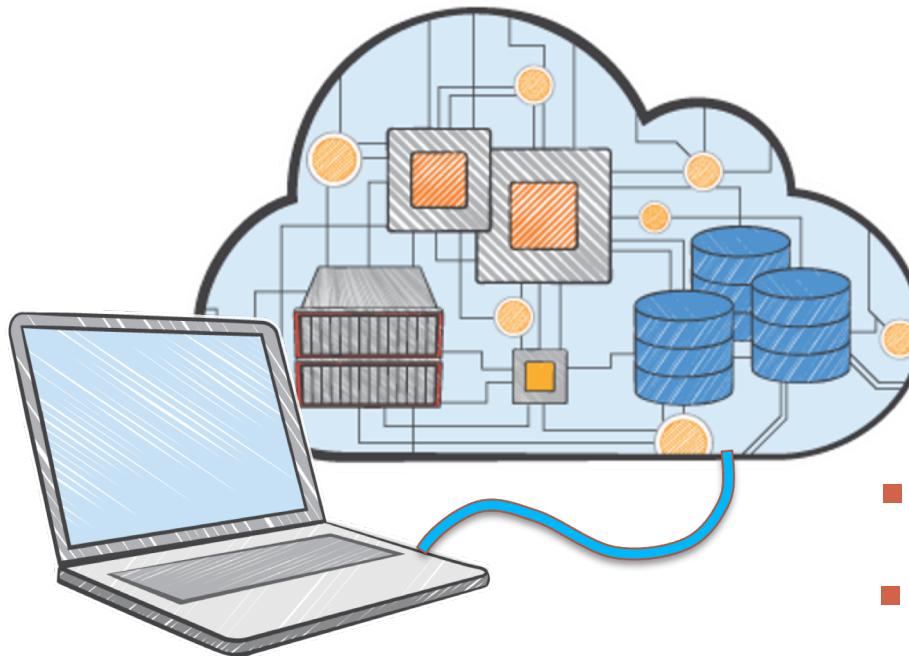


How might cloud computing address some of the issues in the *traditional computing* model?

- Low cost
- Elastic
- Flexible
- Secure

What is Cloud Computing

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Cloud Computing Models:

- Software as a service (**SaaS**)
- Platform as a service (**PaaS**)
- Infrastructure as a service (**IaaS**)
- X' as a service ('**X'aas**)

What is AWS ?

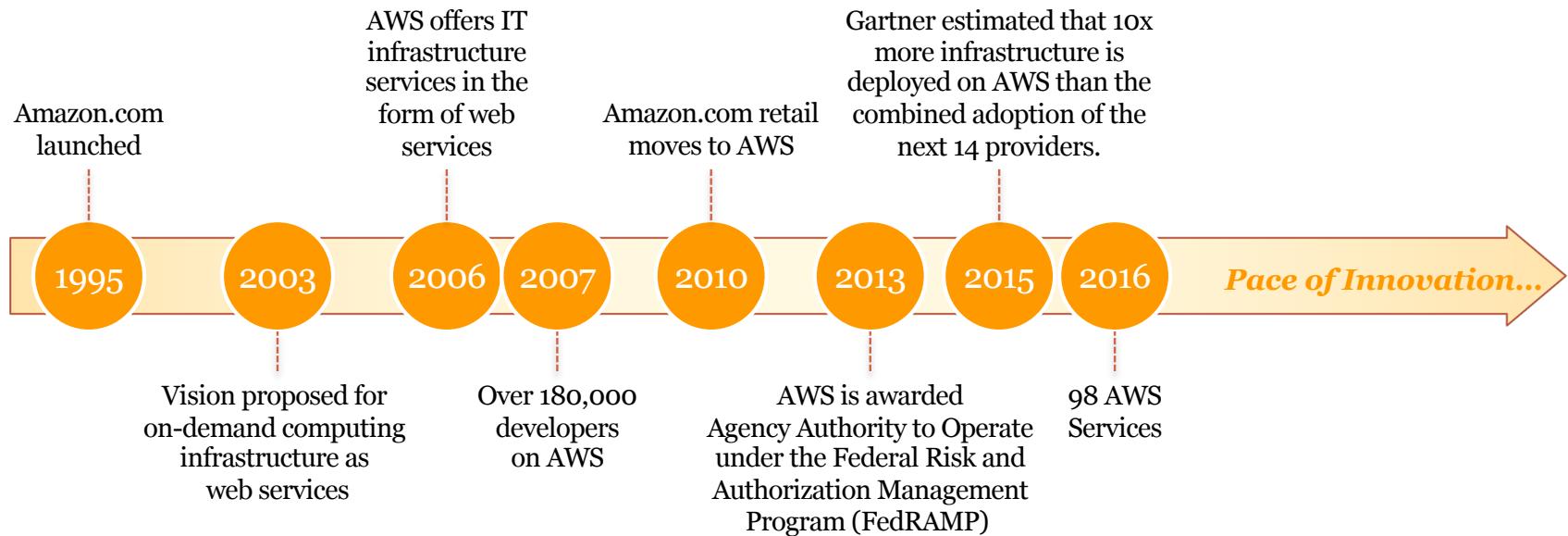
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Enable businesses and developers to use web services to build scalable, sophisticated applications.



History of AWS

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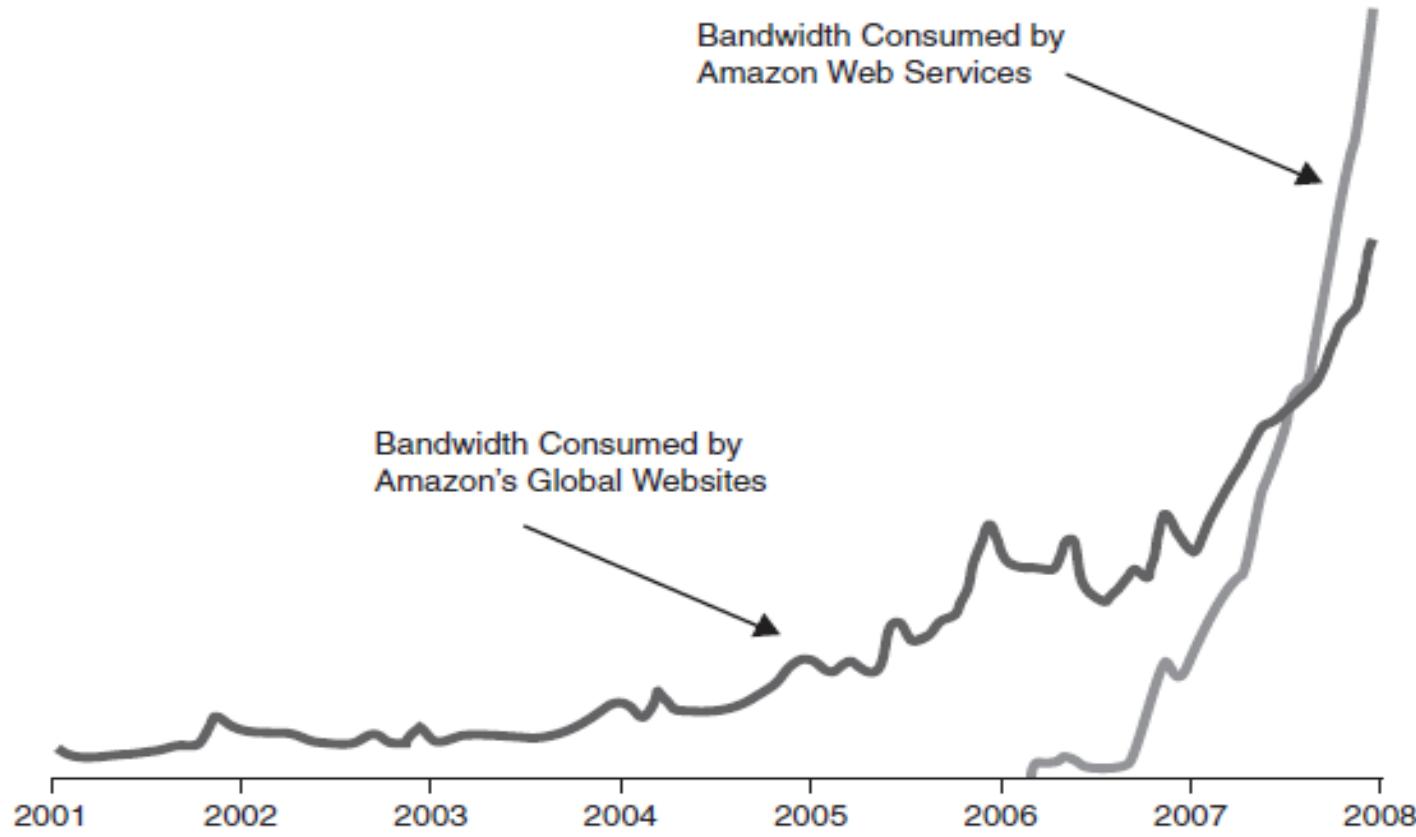


Figure 1.1 Amazon originally deployed a large IT infrastructure to support its global e-commerce platform. In less than 18 months after making the platform available as a cloud service to external users, its usage, as measured by amount of bandwidth consumed, outstripped bandwidth used internally.

What you can do on AWS...

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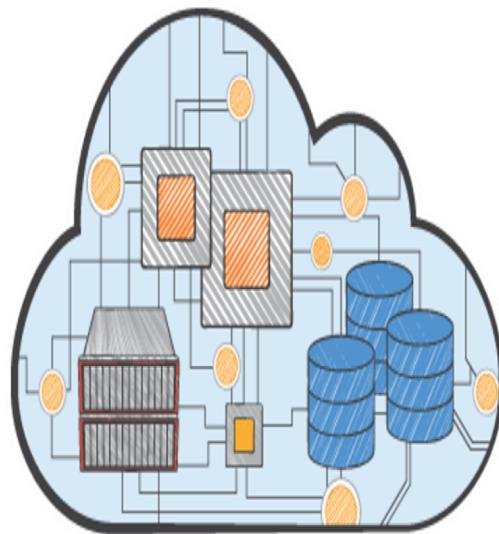
Some of the things you can use the AWS cloud computing platform to do include:

- Application Hosting
- Backup and Storage
- Content Delivery
- Websites
- Enterprise IT
- Databases

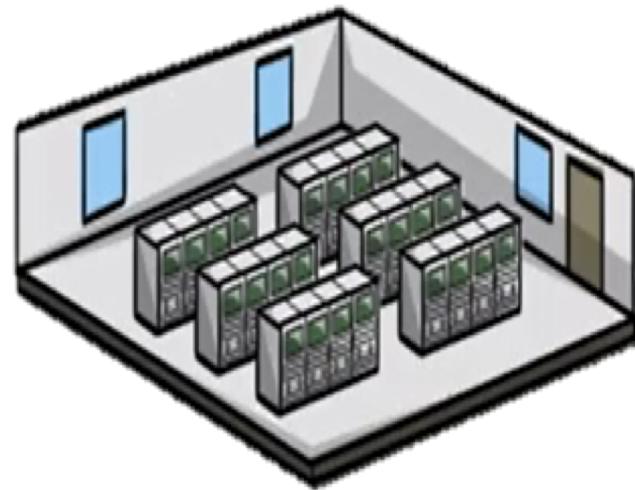
Cloud vs. On-Premises Comparison

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Cloud



On-Premises



Cloud vs. On-Premises Comparison

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Cloud

- No upfront investment
 - Click to order resources
 - Immediate access
 - Go!
- Low on-going costs
- Focus on innovation
- Flexible capacity
- Speed and agility
- Global reach on demand

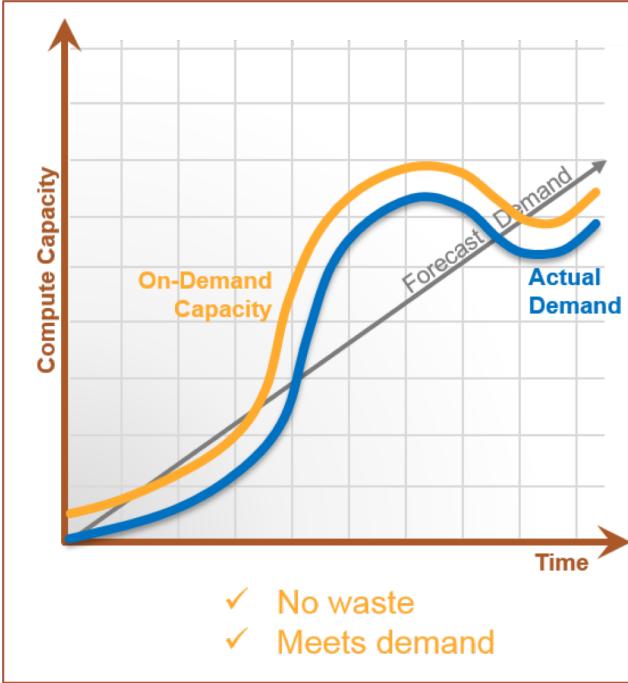
On-Premises

- Large initial purchases
 - Install and configure
 - Physical space, cooling, power
 - Cabling, networking, racks, servers, storage
 - Labor, certification...
- Labor, patches and upgrade cycles
- Systems administration
- Fixed capacity
- Procurement and setup
- Limited geographic regions

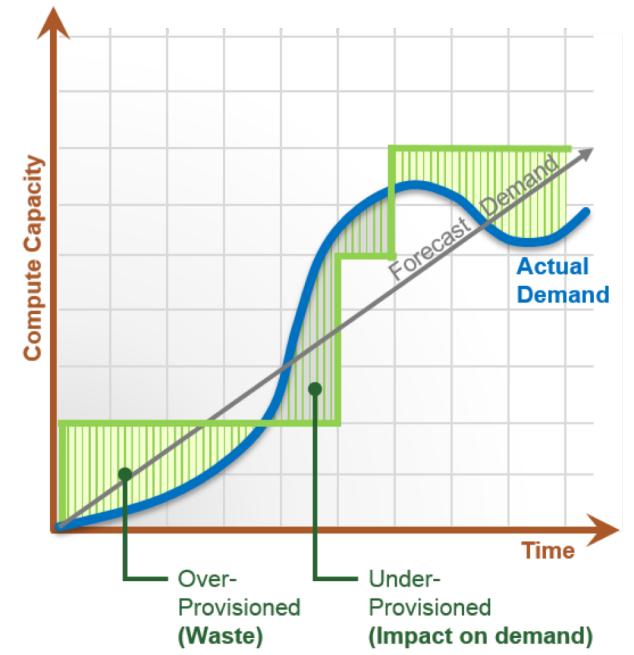
Cloud vs. On-Premises Comparison

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Cloud



On-Premises



On-demand Services Through AWS

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Traditional Infrastructure



Firewalls



ACLs

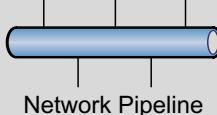


Administrators

Security



Router



Network Pipeline



Switch

Networking

On-Premises Servers



Servers



DAS



SAN



NAS



RDBMS

Storage and Database

Amazon Web Services



Security Groups



NACLs



Identity Access Management



Elastic Load
Balancing



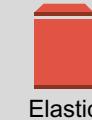
VPC



Amazon
Machine Image



EC2
Instances



Elastic
Block Store



Elastic
File System



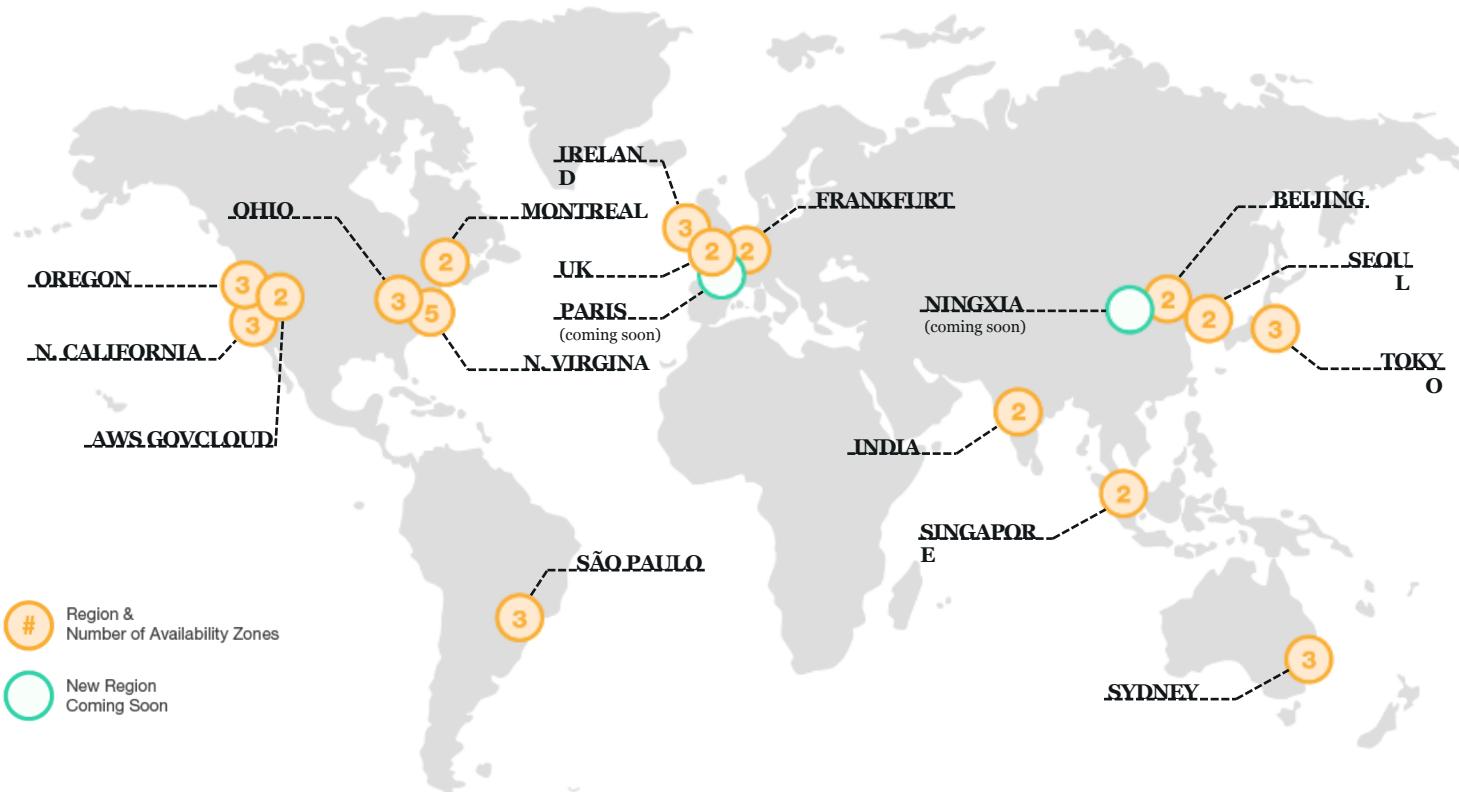
S3



RDS

Regions and Availability Zones

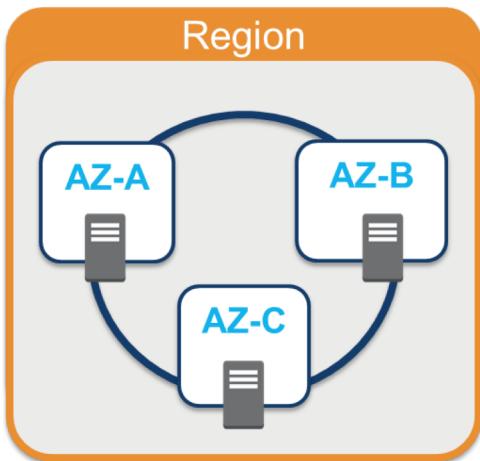
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<https://aws.amazon.com/about-aws/global-infrastructure/>

Regions and Availability Zones

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Note: Conceptual drawing only. The number of Availability Zones (AZ) may vary.

Regions

- ❖ Geographic locations
- ❖ Consists of **at least two** Availability Zones(AZs)

Availability Zones

- ❖ Clusters of data centers
- ❖ **Isolated from failures** in other Availability Zones
- ❖ Connected through low-latency links

AWS Cloud Computing

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Applications



Virtual Desktops



Collaboration and Sharing

Platform Services

Databases

Relational
No SQL
Caching

Analytics

Cluster Computing
Real-time Data Warehouse
Data Workflows

App Services

Queuing
Orchestration
App Streaming
Transcoding
Email
Search

Deployment and Management

Containers
Dev/ops Tools
Resource Templates
Usage Tracking
Monitoring and Logs

Mobile Services

Identity
Sync
Mobile Analytics
Notifications

Foundation Services



Compute
(Virtual, Auto-scaling
and Load Balancing)



Networking



Storage
(Object, Block and
Archive)

Infrastructure

Regions

Availability Zones



Edge
Locations

AWS Foundation Services

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Compute	Network	Storage	Security & Identity	Applications
 Amazon EC2	 Amazon CloudFront	 Amazon EFS	 Amazon Inspector	 Amazon WorkDocs
 Amazon EC2 Container Registry	 Amazon Route 53	 Amazon Glacier	 AWS Artifact	 Amazon WorkMail
 Amazon EC2 Container Service	 Amazon VPC	 Amazon S3	 AWS Certificate Manager	 Amazon AppStream
 Amazon Lightsail	 AWS Direct Connect	 AWS Snowball	 AWS CloudHSM	 Amazon WorkSpaces
 Amazon VPC	 Elastic Load Balancing	 AWS Storage Gateway	 AWS Directory Service	
 AWS Batch			 IAM	
 AWS Elastic Beanstalk			 AWS KMS	
 AWS Lambda			 AWS Organizations	
 Elastic Load Balancing			 AWS Shield	
			 AWS WAF	

AWS Platform Services

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Databases	Analytics	App Services	Management Tools	Developer Tools	Mobile Services	Internet of Things
 Amazon DynamoDB  Amazon ElastiCache  Amazon RDS  Amazon Redshift	 Amazon Athena  Amazon CloudSearch  Amazon EMR  Amazon Kinesis  Amazon QuickSight  Amazon Redshift	 Amazon API Gateway  Amazon AppStream 2.0  Amazon Elastic Transcoder  Amazon SWF  AWS Step Functions	 Amazon CloudWatch  AWS CloudFormation  AWS CloudTrail  AWS Config  AWS Managed Services  AWS OpsWorks  AWS Service Catalog  AWS Trusted Advisor	 AWS CodeBuild  AWS CodeCommit  AWS CodeDeploy  AWS CodePipeline  AWS X-Ray	 Amazon API Gateway  Amazon Cognito  Amazon Mobile Analytics  Amazon Pinpoint  AWS Device Farm  AWS Mobile Hub	 AWS IoT 

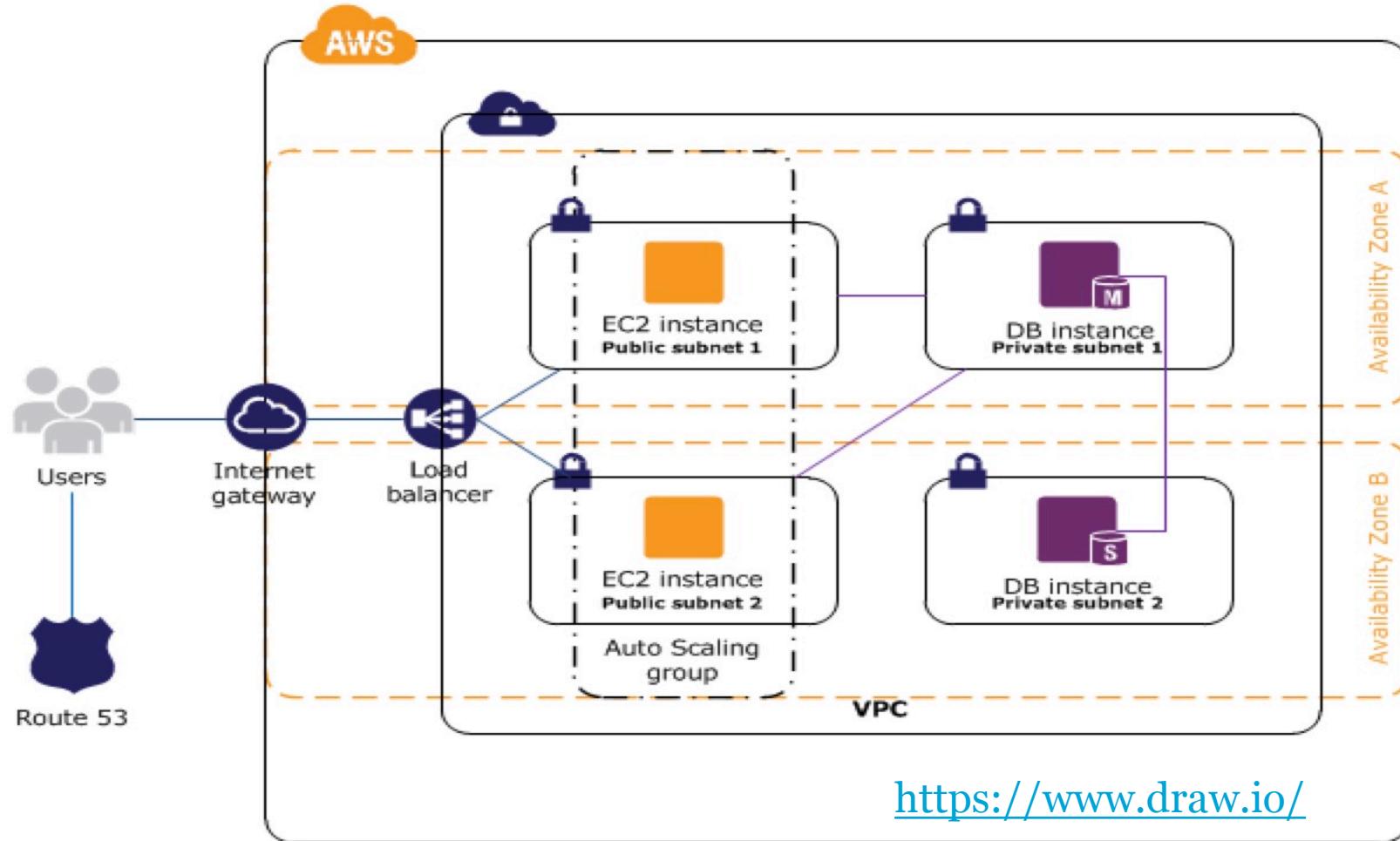
AWS

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- Set of services that provide access to Amazon's ready-to-use computing infrastructure
- Available to anyone over the Internet
- Provides for some of the core needs of distributed systems
 - Scalability, Reliability, Availability, etc....
- Provides a 'virtual' infrastructure
- Can get a scalable web service up, running and publicly available in minutes
 - How long would that take traditionally? (Contact ISP to provision server, perhaps buy infrastructure hardware?)
- Analogy: Power supply
 - Plug into grid managed by experts to get low cost power
 - Pay for what you use. Have an account and metered usage.
 - Or you could generate your own ...

AWS Web App Hosting Architecture

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AWS Management Console/ Dashboard

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AWS Services Edit rfrisby @ witdev Ireland Support

EC2 Dashboard

- Events
- Tags
- Reports
- Limits

INSTANCES

- Instances
- Spot Requests
- Reserved Instances

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK & SECURITY

- Security Groups
- Elastic IPs
- Placement Groups
- Key Pairs
- Network Interfaces

Resources

You are using the following Amazon EC2 resources in the EU West (Ireland) region:

2 Running Instances	0 Elastic IPs
5 Volumes	7 Snapshots
6 Key Pairs	0 Load Balancers
0 Placement Groups	8 Security Groups

Easily deploy and operate applications - use Chef recipes, manage SSH users, and more. [Try OpsWorks now.](#) Hide

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Launch Instance

Note: Your instances will launch in the EU West (Ireland) region

Service Health

Service Status:

- EU West (Ireland): This service is operating normally

Availability Zone Status:

- eu-west-1a: Availability zone is operating normally

Account Attributes

Supported Platforms
VPC

Default VPC
vpc-71602a1a

Additional Information

Getting Started Guide
Documentation
All EC2 Resources
Forums
Pricing
Contact Us

AWS Marketplace

Find **free software trial** products in the AWS Marketplace from the [EC2 Launch Wizard](#). Or try these popular AMIs: [Wowza Streaming Engine 4: Pro Edition \(HVM\)](#)

Provided by Wowza Media Systems, Inc. Rating ★★★★☆ Pay by the hour for software and AWS

AWS Services - Advantages

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- No up front expenditure
- Pay as you go
- Scale up/down automatically
- Quick production time
- Focus on business/application rather than infrastructure
- We'll look scalability in more detail in later classes

Amazon Elastic Compute Cloud (EC2)

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- Way of creating “Virtual Machines”
- Easily scale your capacity up or down based on demand
 - quickly launch virtual instances and then terminate them once your demand decreases
 - Can be automated using Auto Scaling.
- Can create Amazon machine images (AMIs) that are templates for your instances.
 - E.g. Linux server with Tomcat and MySQL.
- Support for Windows/Linux
- All major web and application platforms(Java EE, PHP)
- Can chose deployment location (Dublin)
 - Can introduce redundancy/QoS through load balancing
- Status and usage can be monitored

Amazon Simple Storage Service (S3)

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- Storage and retrieval of data
 - any kind of data from anywhere on the Internet (object based)
- Unlimited number of objects, each object must be less than 5GB
- Objects stored in *buckets* (not unlike folders in regular operating systems)
- 99.9 percent uptime