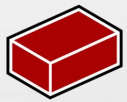
Deploying Highly Available Solutions with AWS

An introduction to cloud computing



Redbrick
DCU's Networking Society

Agenda

1. What is the Cloud?
2. Cloud providers
3. An introduction to the AWS cloud
    a. Services overview
    b. Regions, AZs and PoPs
    c. VPC - Virtual Private Cloud
4. **Build and deploy a highly available, highly scalable web-app on AWS**
    - EC2
    - DynamoDB
    - Load balancers
    - Auto Scaling Groups
    - S3

01

What is ‘Cloud Computing’?

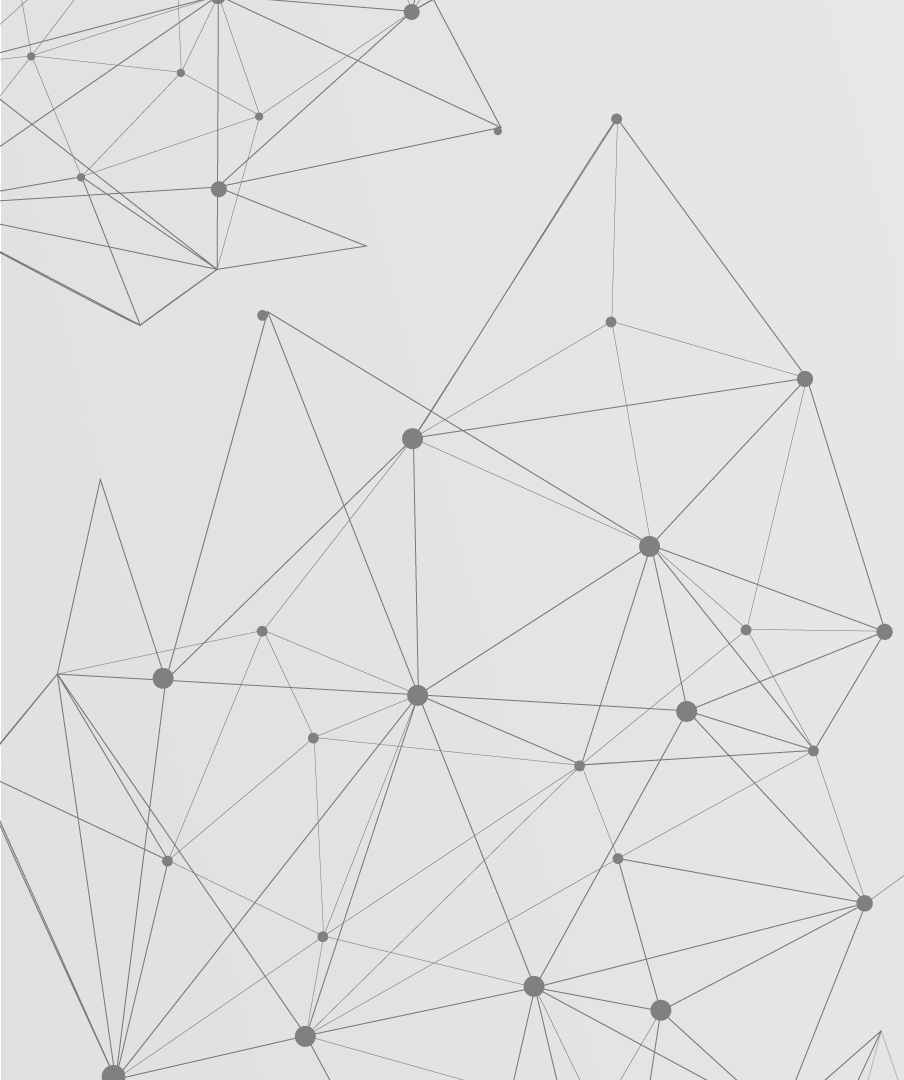
Cloud Computing

Type of computing that relies on shared computing resources.
Resources are paid for on an as-needed or paid per use business model.

02

Overview: Providers


aws
Azure
heroku
ORACLE
Cloud
Alibaba Cloud
DigitalOcean

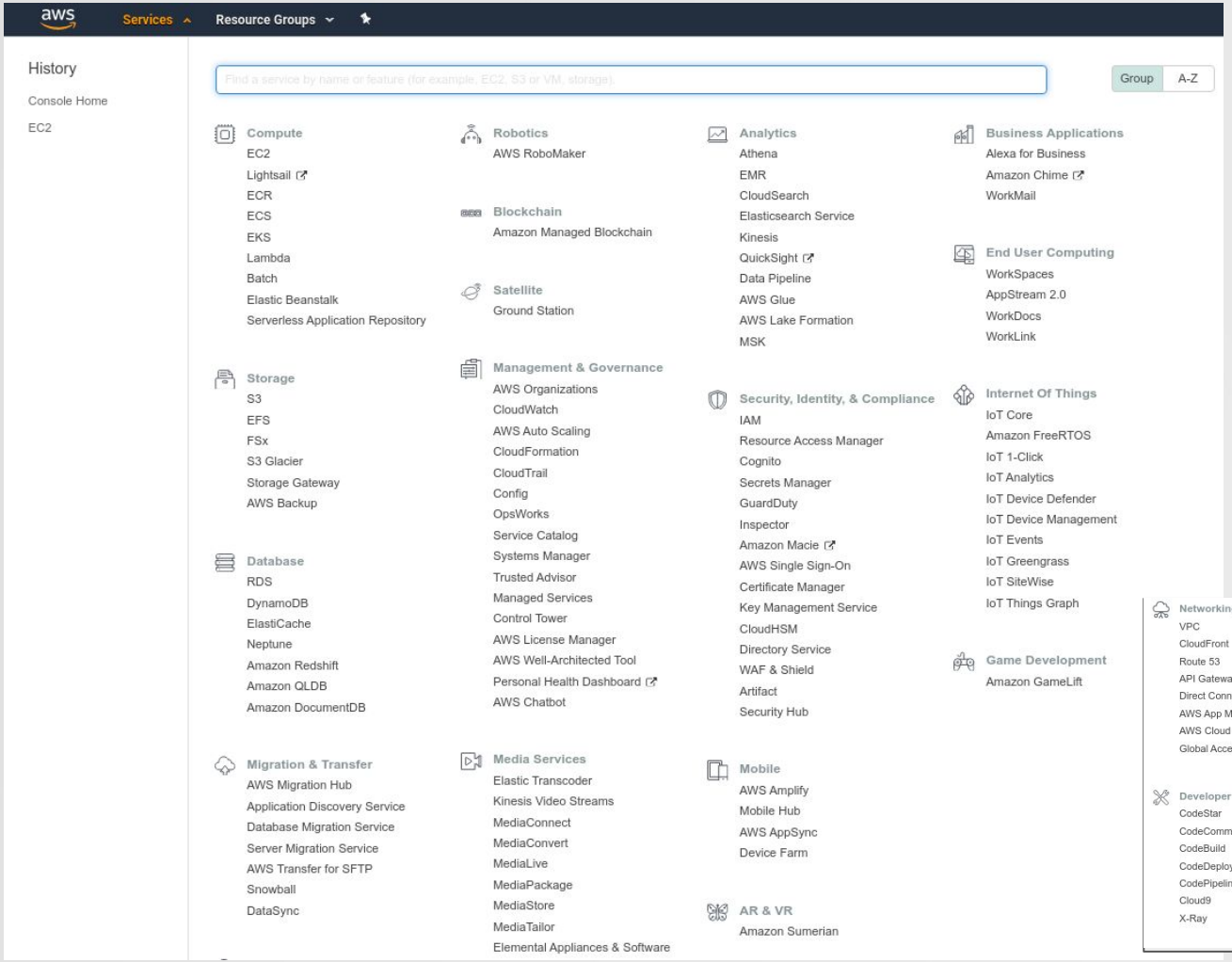


03

An introduction to the AWS cloud

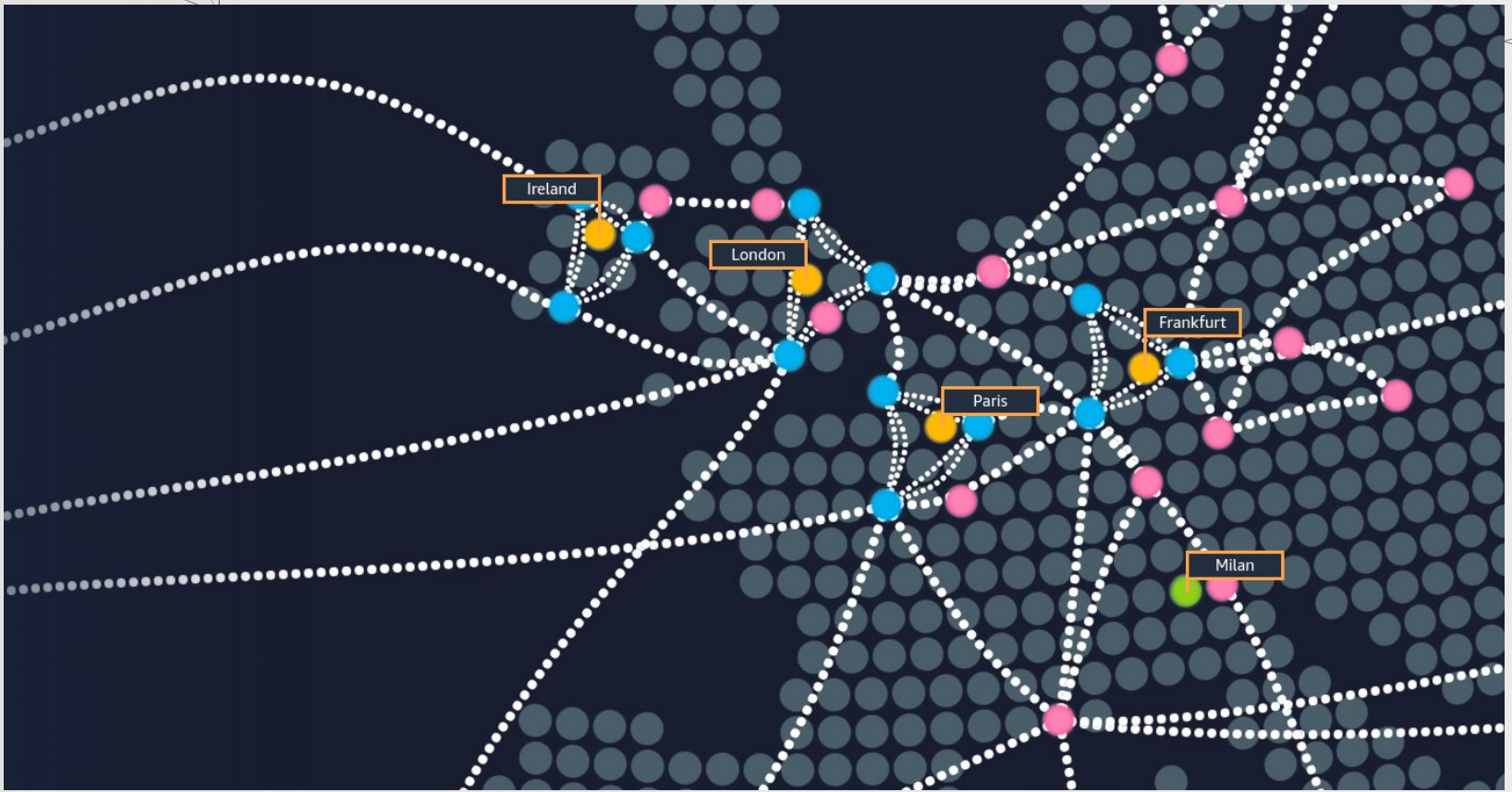
Services

- AWS is comprised of 165+ services.
- Services include: **Computing**, **Storage**, **Networking**, **Databases**, **Analytics**, **Deployment**, **Management**, **Dev Tools**, **IoT**, **Satellite communication**, and many more…
- Most services are not exposed directly to end users, but instead offer functionality through APIs for developers to use in their applications.


aws
Services
Resource Groups
History
Console Home
EC2
Find a service by name or feature (for example, EC2, S3 or VM, storage).
Group
A-Z
Compute
EC2
Lightsail
ECR
ECS
EKS
Lambda
Batch
Elastic Beanstalk
Serverless Application Repository
Storage
S3
EFS
FSx
S3 Glacier
Storage Gateway
AWS Backup
Database
RDS
DynamoDB
ElastiCache
Neptune
Amazon Redshift
Amazon QLDB
Amazon DocumentDB
Migration & Transfer
AWS Migration Hub
Application Discovery Service
Database Migration Service
Server Migration Service
AWS Transfer for SFTP
Snowball
DataSync
Robotics
AWS RoboMaker
Blockchain
Amazon Managed Blockchain
Satellite
Ground Station
Management & Governance
AWS Organizations
CloudWatch
AWS Auto Scaling
CloudFormation
CloudTrail
Config
OpsWorks
Service Catalog
Systems Manager
Trusted Advisor
Managed Services
Control Tower
AWS License Manager
AWS Well-Architected Tool
Personal Health Dashboard
AWS Chatbot
Media Services
Elastic Transcoder
Kinesis Video Streams
MediaConnect
MediaConvert
MediaLive
MediaPackage
MediaStore
MediaTailor
Elemental Appliances & Software
Analytics
Athena
EMR
CloudSearch
Elasticsearch Service
Kinesis
QuickSight
Data Pipeline
AWS Glue
AWS Lake Formation
MSK
Security, Identity, & Compliance
IAM
Resource Access Manager
Cognito
Secrets Manager
GuardDuty
Inspector
Amazon Macie
AWS Single Sign-On
Certificate Manager
Key Management Service
CloudHSM
Directory Service
WAF & Shield
Artifact
Security Hub
Mobile
AWS Amplify
Mobile Hub
AWS AppSync
Device Farm
AR & VR
Amazon Sumerian
Business Applications
Alexa for Business
Amazon Chime
WorkMail
End User Computing
WorkSpaces
AppStream 2.0
WorkDocs
WorkLink
Internet Of Things
IoT Core
Amazon FreeRTOS
IoT 1-Click
IoT Analytics
IoT Device Defender
IoT Device Management
IoT Events
IoT Greengrass
IoT SiteWise
IoT Things Graph
Game Development
Amazon GameLift
Networking & Content Delivery
VPC
CloudFront
Route 53
API Gateway
Direct Connect
AWS App Mesh
AWS Cloud Map
Global Accelerator
Developer Tools
CodeStar
CodeCommit
CodeBuild
CodeDeploy
CodePipeline
Cloud9
X-Ray
Machine Learning
Amazon SageMaker
Amazon Comprehend
AWS DeepLens
Amazon Lex
Machine Learning
Amazon Polly
Rekognition
Amazon Transcribe
Amazon Translate
Amazon Personalize
Amazon Forecast
Amazon Textract
AWS DeepRacer
Application Integration
Step Functions
Amazon EventBridge
Amazon MQ
Simple Notification Service
Simple Queue Service
SWF
AWS Cost Management
AWS Cost Explorer
AWS Budgets
AWS Marketplace Subscriptions
Customer Engagement
Amazon Connect
Pinpoint
Simple Email Service

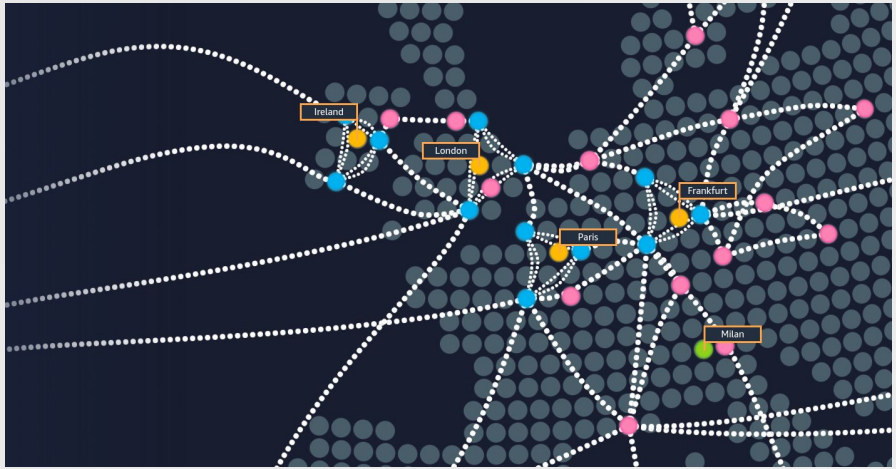
Regions, AZs, and PoPs

Regions, AZs, and PoPs



Regions, AZs, and PoPs

- Regions
  - AWS maintains multiple geographic regions across the world including North America, Europe, and Asia Pacific
  - Currently 22 regions
- Availability Zones
  - Data Centers
  - AZs give customers the ability to operate applications and databases that are more highly available, fault tolerant and scalable than would be possible from a single data center
  - Currently 69 AZs
- Points of Presence
  - Edge locations and Regional Edge Cache servers.
  - Supports CloudFront and Route 53



https://infrastructure.aws/

VPC - Virtual Private Cloud

- **VPC** lets you provision a logically isolated section of the AWS Cloud where you can launch AWS resources in a virtual network that you define. (You can view this as your own data center)

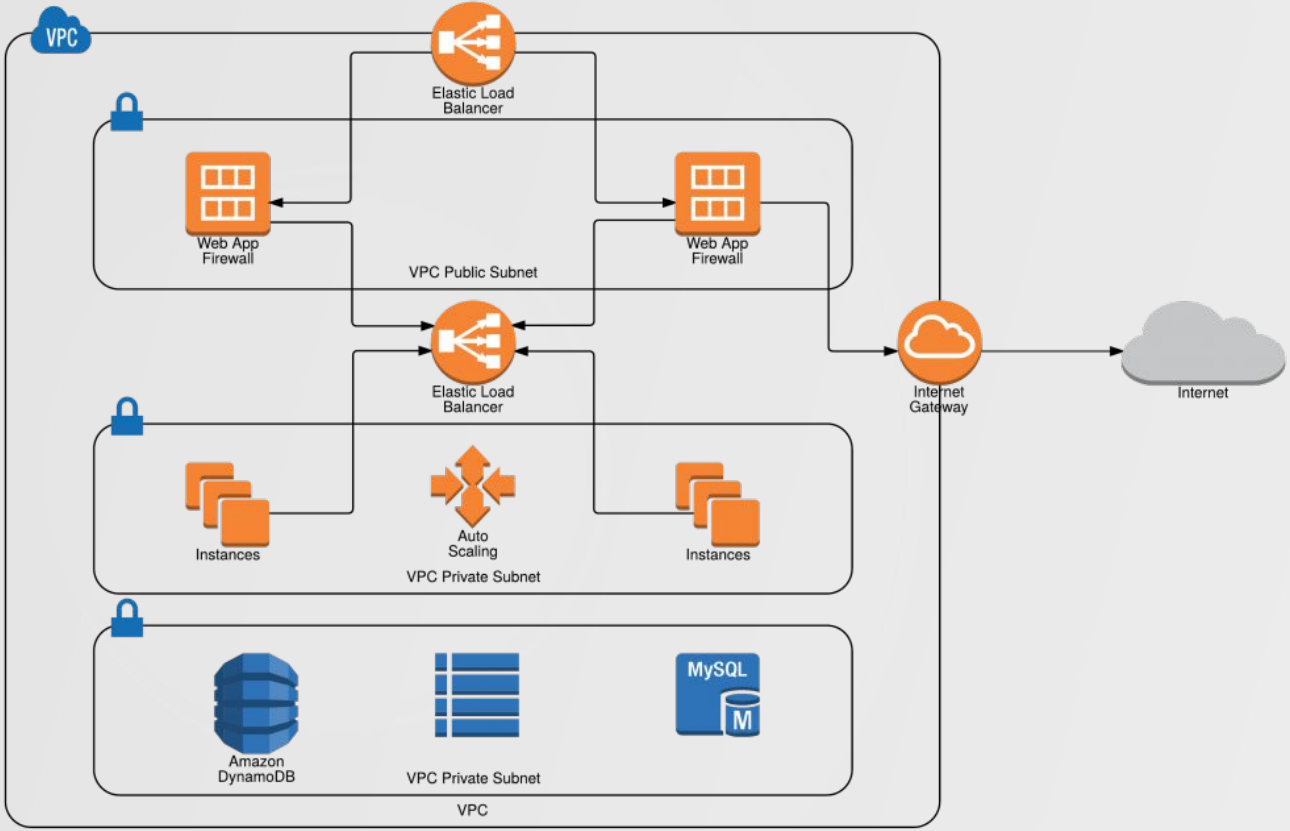
- You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets, and configuration of route tables and network gateways.

- For example, you can create a public-facing subnet for your web servers that has access to the Internet, and place your backend systems such as databases or application servers in a private-facing subnet with no Internet access.

- Leverage multiple layers of security, including **security groups** and **network access control lists**, to help control access to your EC2 instances in each subnet.

- You don’t have to worry about setting up a VPC if you’re just playing around, AWS already provide you with one in every region - called the Default VPC. This also provides you with default subnets

VPC - Virtual Private Cloud



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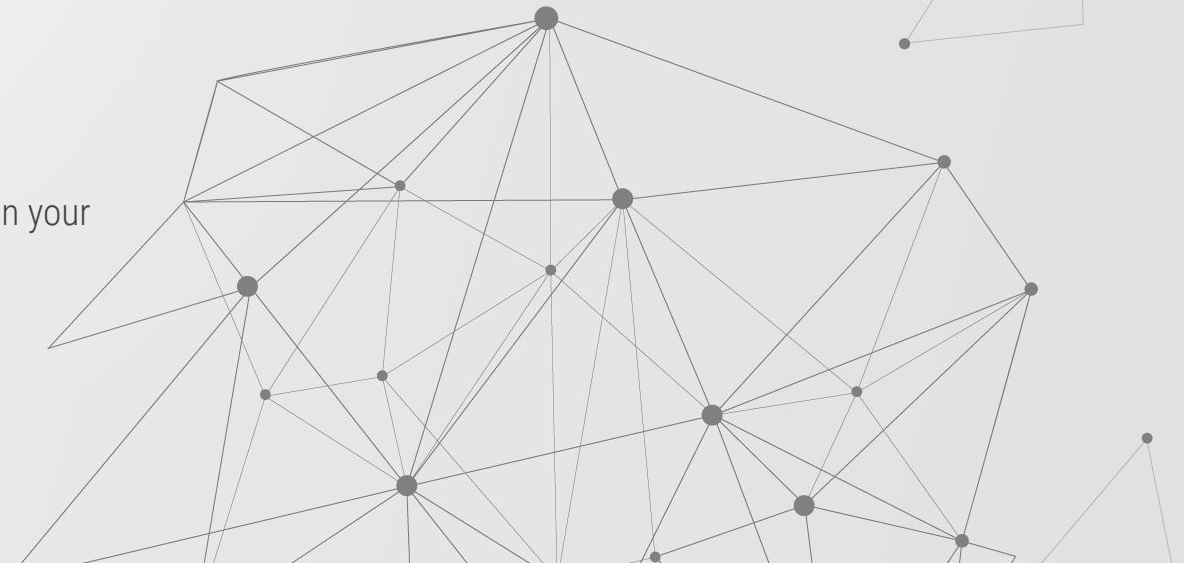
Build & Deploy a HA Todo list

This section is interactive so turn on your computers!



Instructions

- **YOU WILL NEED AN AWS ACCOUNT TO FOLLOW ALONG**
- At the command line - `git clone https://github.com/r-dog/RedbrickTalks`
- Open the AWS console - `console.aws.amazon.com`

Other Commands (We'll get to these later):

- `curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.34.0/install.sh | bash`
- `. ~/.nvm/nvm.sh`
- `nvm install node`

Services Required

EC2

- Elastic Compute Cloud.
- Secure and flexible compute capacity.

S3

- Simple Storage Service.
- Object Storage
- Offers scalability, availability, security and performance
- 11 9's data durability

DynamoDB

- Amazons NoSQL key value DB
- Extremely fast (<10ms latency)
- No Overhead

Elastic Load Balancer

- Even distribution among servers
- Provides scalability
- Provides fault tolerance

IAM

- Policies
- Roles allow AWS services to access other AWS services

Auto-Scaling Groups

- Even distribution among servers
- Provides scalability
- Provides fault tolerance

Thanks

Does anyone have any questions?

Code and slides are available at: https://bit.ly/2owIqJQ