DS 4300

AWS Introduction

Mark Fontenot, PhD
Northeastern University

Amazon Web Services

- Leading Cloud Platform with over 200 different services available
- Globally available via its massive networks of regions and availability zones with their massive data centers
- Based on a pay-as-you-use cost model.
  - Theoretically cheaper than renting rackspace/servers in a data center… *Theoretically*.

History of AWS

- Originally launched in 2006 with only 2 services: S3 & EC2.
- By 2010, services had expanded to include SimpleDB, Elastic Block Store, Relational Database Service, DynamoDB, CloudWatch, Simple Workflow, CloudFront, Availability Zones, and others.
- Amazon had competitions with big prizes to spur the adoption of AWS in its early days
- They’ve continuously innovated, always introducing new services for ops, dev, analytics, etc… (200+ services now)

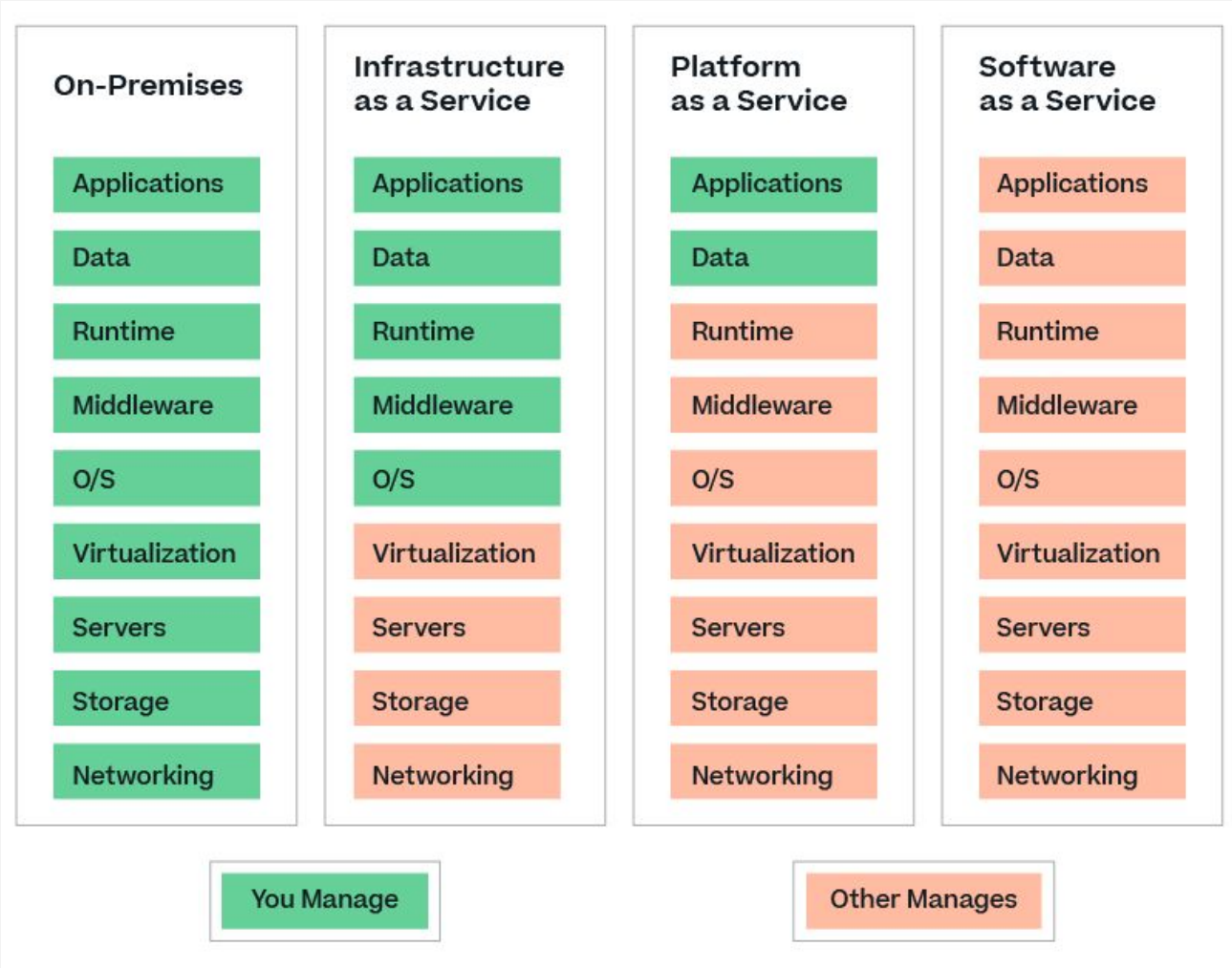
AWS Service Categories

 Analytics	 Application integration	 Blockchain	 Business applications	 Cloud Financial Management	 Compute
 Customer enablement	 Containers	 Databases	 Developer tools	 End user computing	 Front-end web and mobile
 Game tech	 Internet of Things (IoT)	 Machine Learning (ML) and Artificial Intelligence (AI)	 Management and governance	 Media	 Migration and transfer
 Networking and content delivery	 Quantum technologies	 Robotics	 Satellite	 Security, identity, and compliance	 Storage

Cloud Models

- IaaS (more) - Infrastructure as a Service
  - Contains the basic services that are needed to build an IT infrastructure
- PaaS (more) - Platform as a Service
  - Remove the need for having to manage infrastructure
  - You can get right to deploying your app
- SaaS (more) - Software as a Service
  - Provide full software apps that are run and managed by another party/vendor

Cloud Models



The Shared Responsibility Model - AWS

- AWS Responsibilities (Security OF the cloud):
  - Security of physical infrastructure (*infra*) and network
    - keep the data centers secure, control access to them
    - maintain power availability, HVAC, etc.
    - monitor and maintain physical networking equipment and global infra/connectivity
  - Hypervisor & Host OSs
    - manage the virtualization layer used in AWS compute services
    - maintaining underlying host OSs for other services
  - Maintaining managed services
    - keep infra up to date and functional
    - maintain server software (patching, etc)

The Shared Responsibility Model - Client

- Client Responsibilities (Security IN the cloud):
  - Control of Data/Content
    - client controls how its data is classified, encrypted, and shared
    - implement and enforce appropriate data-handling policies
  - Access Management & IAM
    - properly configure IAM users, roles, and policies.
    - enforce the *Principle of Least Privilege*
      - Only as you need access to things services are added to your account
  - Manage self-hosted Apps and associated OSs
  - Ensure network security to its VPC
  - Handle compliance and governance policies and procedures

The AWS Global Infrastructure

- Regions - distinct geographical areas
  - us-east-1, us-west 1, etc
- Availability Zones (AZs)
  - each region has multiple AZs
  - roughly equiv to isolated data centers
- Edge Locations
  - locations for CDN and other types of caching services
  - allows content to be closer to end user.


Regions
Coming soon
36 launched Regions
each with multiple Availability Zones
114 Availability Zones
700+ CloudFront POPs
and 13 Regional edge caches

Compute Services

- VM-based:
  - EC2 & EC2 Spot - Elastic Cloud Compute

- Container-based:
  - ECS - Elastic Container Service
  - ECR - Elastic Container Registry
  - EKS - Elastic Kubernetes Service
  - *Fargate* - Serverless container service

- Serverless: AWS Lambda
  - Starts up fast, shuts down fast, limit for compute power

https://aws.amazon.com/products/compute/

Storage Services

- Amazon S3 - Simple Storage Service
  - Object storage in buckets; highly scalable; different storage classes
- Amazon EFS - Elastic File System

  - Simple, serverless, elastic, “set-and-forget” file system
- Amazon EBS - Elastic Block Storage

  - High-Performance block storage service
- Amazon File Cache
  - High-speed cache for datasets stored anywhere
- AWS Backup
  - Fully managed, policy-based service to automate data protection and compliance of apps on AWS

Database Services

- Relational - Amazon RDS, Amazon Aurora  
- Key-Value - Amazon DynamoDB 
- In-Memory - Amazon MemoryDB, Amazon ElastiCache  
- Document - Amazon DocumentDB (Compat with MongoDB) 
- Graph - Amazon Neptune 

Analytics Services

- Amazon Athena - Analyze petabyte scale data where it lives (S3, for example)
- Amazon EMR - Elastic MapReduce - Access Apache Spark, Hive, Presto, etc.
- AWS Glue - Discover, prepare, and integrate all your data
- Amazon Redshift - Data warehousing service
- Amazon Kinesis - real-time data streaming
- Amazon QuickSight - cloud-native BI/reporting tool






ML and AI Services

- Amazon SageMaker
  - fully-managed ML platform, including Jupyter NBs
  - build, train, deploy ML models
- AWS AI Services w/ Pre-trained Models
  - Amazon Comprehend - NLP
  - Amazon Rekognition - Image/Video analysis
  - Amazon Textract - Text extraction
  - Amazon Translate - Machine translation





Important Services for Data Analytics/Engineering

- EC2 and Lambda
- Amazon S3
- Amazon RDS and DynamoDB
- AWS Glue
- Amazon Athena
- Amazon EMR
- Amazon Redshift

AWS Free Tier

- Allows you to gain hands-on experience with a subset of the services for 12 months (service limitations apply as well)
  - Amazon EC2 - 750 hours/month (specific OSs and Instance Sizes)
  - Amazon S3 - 5GB (20K GETs, 2K Puts)
  - Amazon RDS - 750 hours/month of DB use (within certain limits)
  - ….. So many free services

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