What is AWS - IAM

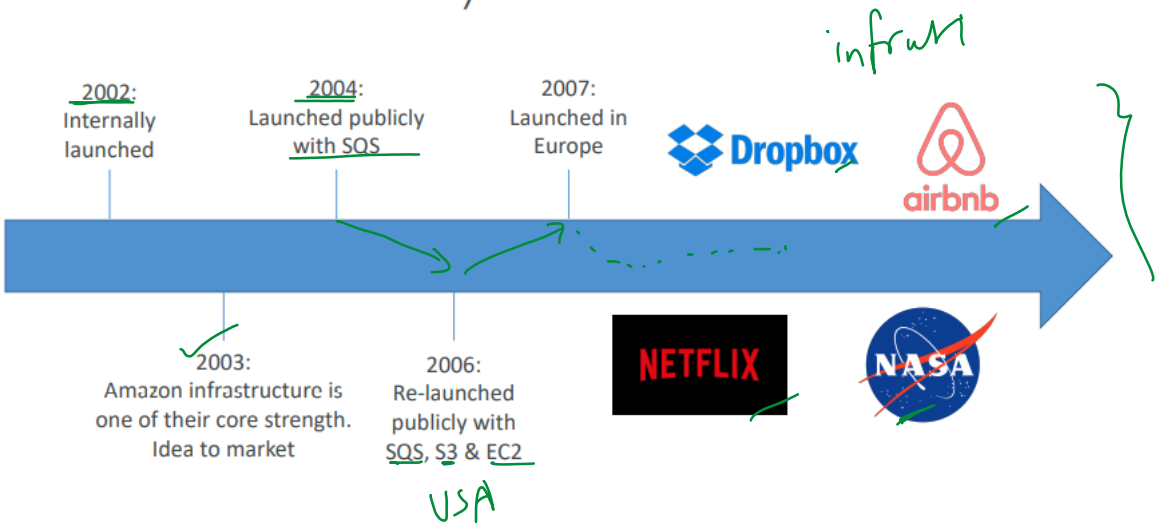
12:12 PM

What's AWS?

- AWS (Amazon Web Services) is a Cloud Provider
- They provide you with servers and services that you can use on demand and scale easily

- AWS has revolutionized IT over time
- AWS powers some of the biggest websites in the world
  - Amazon.com
  - Netflix

AWS Cloud History



AWS Cloud Number Facts

- In 2019, AWS had $35.02 billion in annual revenue
- AWS accounts for 47% of the market in 2019 (Microsoft is 2nd with 22%)
- Pioneer and Leader of the AWS Cloud Market for the 9th consecutive year
- Over 1,000,000 active users

Gartner Magic Quadrant

Gartner Magic Quadrant

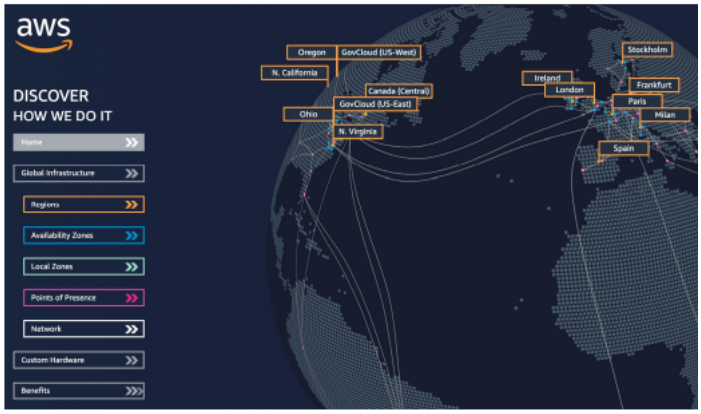
AWS Cloud Use Cases

- AWS enables you to build sophisticated, scalable applications
- Applicable to a diverse set of industries
- Use cases include
  - Enterprise IT, Backup & Storage, Big Data analytics
  - Website hosting, Mobile & Social Apps
  - Gaming


AWS Global Infrastructure

- AWS Regions
- AWS Availability Zones
- AWS Data Centers
- AWS Edge Locations / Points of Presence

- https://infrastructure.aws/



AWS Regions

- AWS has **Regions** all around the world
- Names can be us-east-1, eu-west-3…
- A region is a **cluster of data centers**
- Most AWS services are region-scoped

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

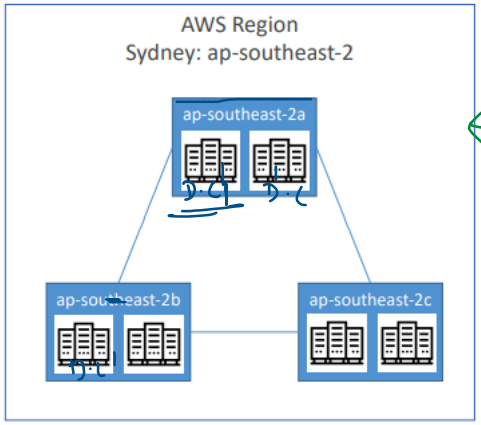
How to choose an AWS Region?

If you need to launch a new application, where should you do it?

- **Compliance with data governance and legal requirements:** data never leaves a region without your explicit permission
- **Proximity to customers:** reduced latency
- **Available services within a Region:** new services and new features aren't available in every Region
- **Pricing:** pricing varies region to region and is transparent in the service pricing page

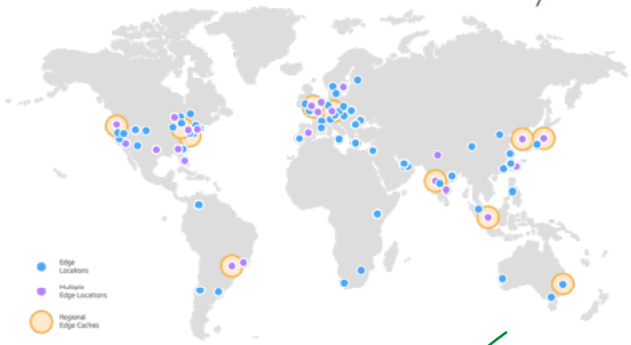
AWS Availability Zones

- Each region has many availability zones (usually 3, min is ~~2~~, max is ~~6~~). Example:
  - ap-southeast-2a
  - ap-southeast-2b
  - ap-southeast-2c
- Each availability zone (AZ) is one or more discrete data centers with redundant power, networking, and connectivity
- They're separate from each other, so that they're isolated from disasters
- They're connected with high bandwidth, ultra-low latency networking



AWS Points of Presence (Edge Locations)

- Amazon has ~~216~~ Points of Presence (~~205~~ Edge Locations & ~~11~~ Regional Caches) in ~~84~~ cities across ~~42 co~~untries
- Content is delivered to end users with lower latency



https://aws.amazon.com/cloudfront/features/

Tour of the AWS Console

- AWS has Global Services:
  - Identity and Access Management (IAM)
  - Route 53 (DNS service)
  - CloudFront (Content Delivery Network)
  - WAF (Web Application Firewall)
- Most AWS services are Region-scoped:
  - Amazon EC2 (Infrastructure as a Service)
  - Elastic Beanstalk (Platform as a Service)
  - Lambda (Function as a Service)
  - Rekognition (Software as a Service)
- Region Table: https://aws.amazon.com/about-aws/global-infrastructure/regional-product-services

IAM: Users & Groups

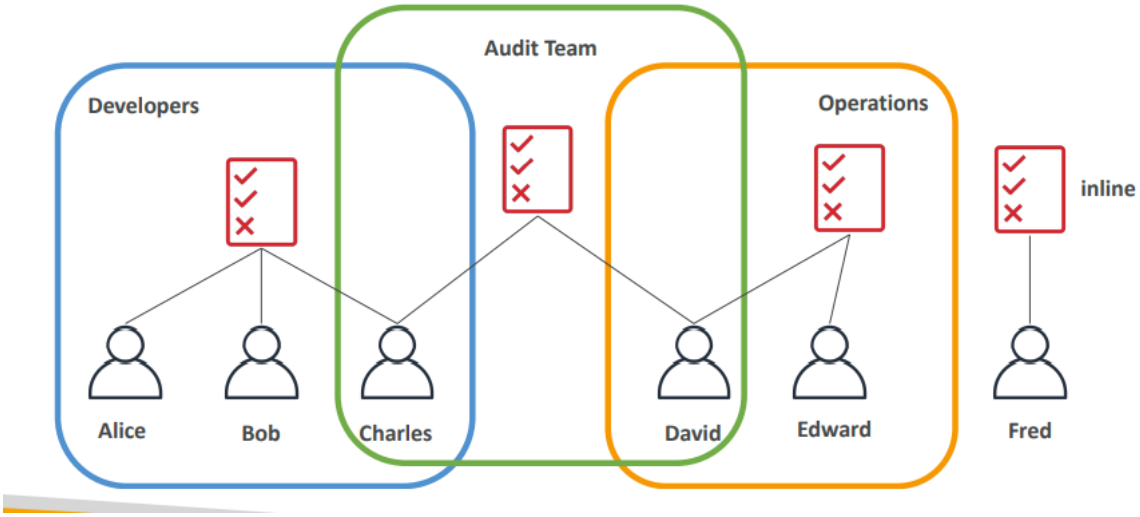
- IAM = Identity and Access Management, **Global** service
- **Root account** created by default, shouldn't be used or shared
- **Users** are people within your organization, and can be grouped
- **Groups** only contain users, not other groups
- Users don't have to belong to a group, and user can belong to multiple groups

IAM: Permissions

- **Users or Groups** can be assigned JSON documents called policies
- These policies define the **permissions** of the users
- In AWS you apply the **least privilege principle**: don't give more permissions than a user needs

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "ec2:Describe*",
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action": "elasticloadbalancing:Describe*",
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "cloudwatch:ListMetrics",
                "cloudwatch:GetMetricStatistics",
                "cloudwatch:Describe*"
            ],
            "Resource": "*"
        }
    ]
}
```

IAM Policies inheritance



IAM Policies Structure

- Consists of
  - **Version:** policy language version, always include "2012-10-17"
  - **Id:** an identifier for the policy (optional)
  - **Statement:** one or more individual statements (required)
- Statements consists of
  - **Sid:** an identifier for the statement (optional)
  - **Effect:** whether the statement allows or denies access (Allow, Deny)
  - **Principal:** account/user/role to which this policy applied to
  - **Action:** list of actions this policy allows or denies
  - **Resource:** list of resources to which the actions applied to
  - **Condition:** conditions for when this policy is in effect (optional)

```
{
    "Version": "2012-10-17",
    "Id": "S3-Account-Permissions",
    "Statement": [
        {
            "Sid": "1",
            "Effect": "Allow",
            "Principal": {
                "AWS": ["arn:aws:iam::123456789012:root"]
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject"
            ],
            "Resource": ["arn:aws:s3:::mybucket/*"]
        }
    ]
}
```

IAM – Password Policy

- Strong passwords = higher security for your account
- In AWS, you can setup a password policy:
  - Set a minimum password length
  - Require specific character types:
    - including uppercase letters
    - lowercase letters
    - numbers
    - non-alphanumeric characters
  - Allow all IAM users to change their own passwords
  - Require users to change their password after some time (password expiration)
  - Prevent password re-use

Multi Factor Authentication - MFA

- Users have access to your account and can possibly change

configurations or delete resources in your AWS account

- You want to protect your Root Accounts and IAM users
- MFA = password *you know* + security device *you own*

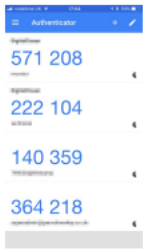
Alice

Password + MFA => Successful login

- Main benefit of MFA:
  if a password is stolen or hacked, the account is not compromised

MFA devices options in AWS

Virtual MFA device



Google Authenticator
(phone only)

Authy
(multi-device)

Support for multiple tokens on a single device.

Universal 2nd Factor (U2F) Security Key

YubiKey by Yubico (3rd party)

Support for multiple root and IAM users using a single security key

MFA devices options in AWS

Hardware Key Fob MFA Device

Provided by Gemalto (3rd party)

Hardware Key Fob MFA Device for AWS GovCloud (US)

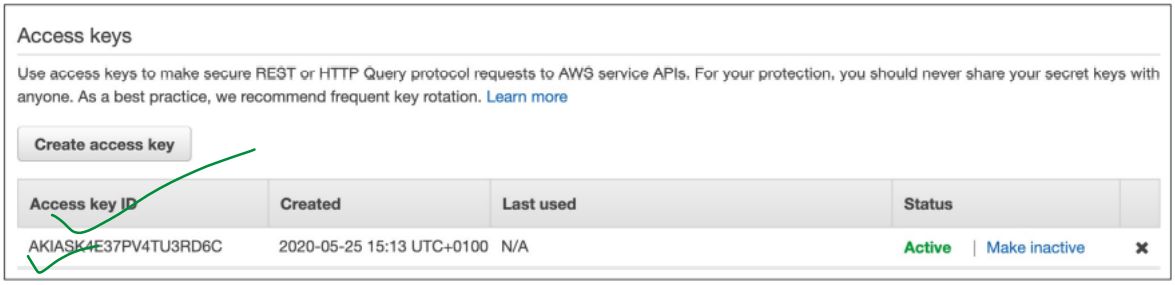
Provided by SurePassID (3rd party)

How can users access AWS ?

- To access AWS, you have three options:
  - AWS Management Console (protected by password + MFA)
  - AWS Command Line Interface (CLI): protected by access keys
  - AWS Software Developer Kit (SDK) - for code: protected by access keys

- Access Keys are generated through the AWS Console
- Users manage their own access keys
- Access Keys are secret, just like a password. Don't share them
- Access Key ID ~= username
- Secret Access Key ~= password

Example (Fake) Access Keys



- Access key ID: AKIASK4E37PV4983d6C
- Secret Access Key: AZPN3zojWozWCndIjhB0Unh8239a1bzbzO5fqqkZq
- Remember: don't share your access keys