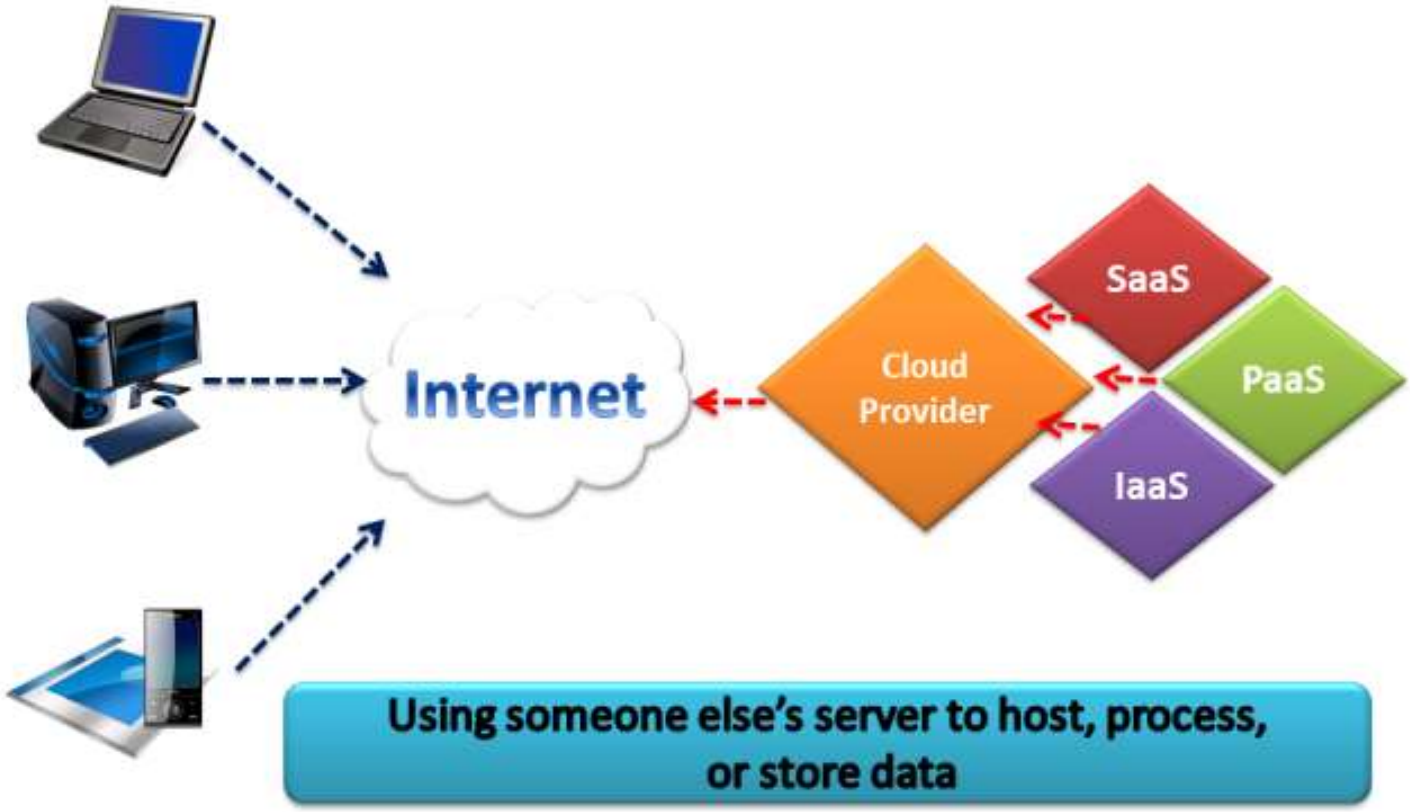
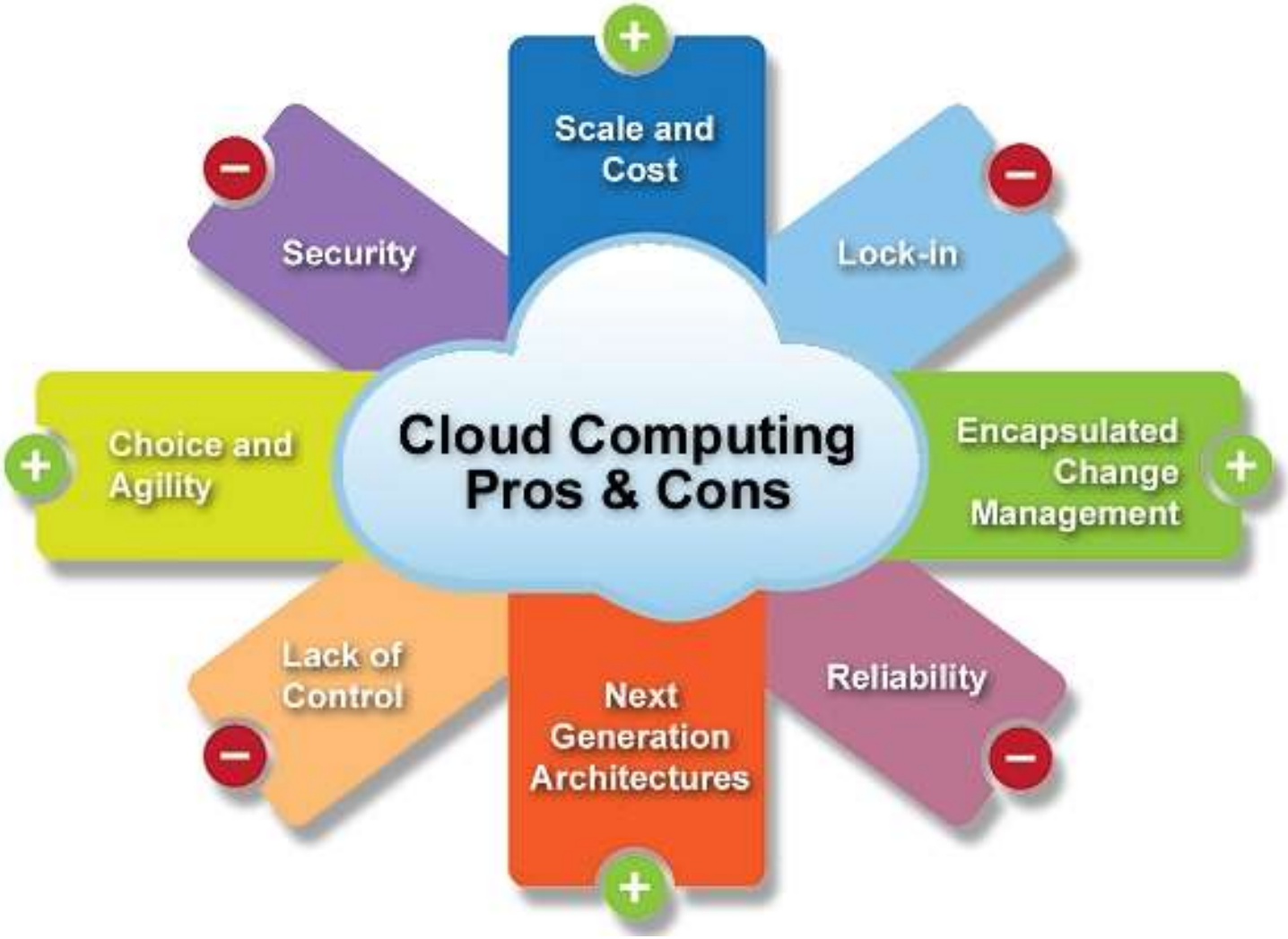
# Cloud Computing

# What is Cloud?

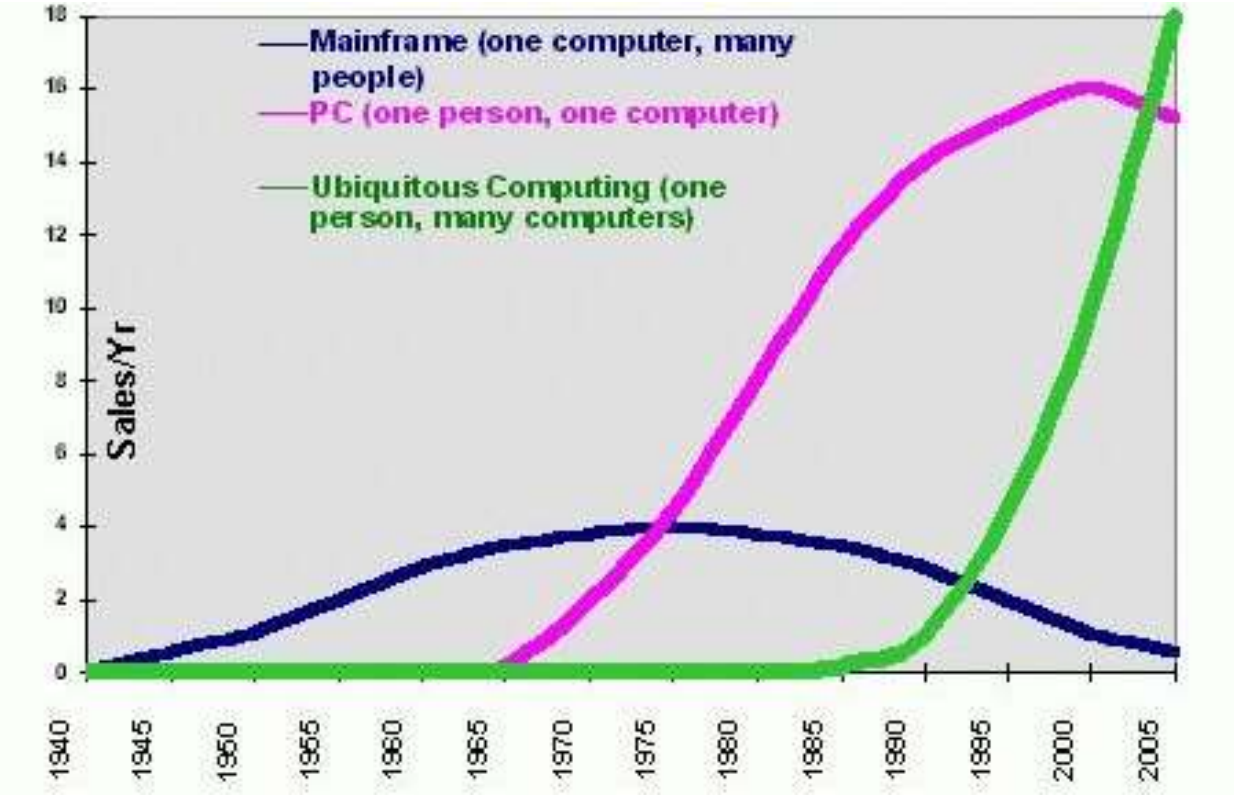


# Pros and Cons



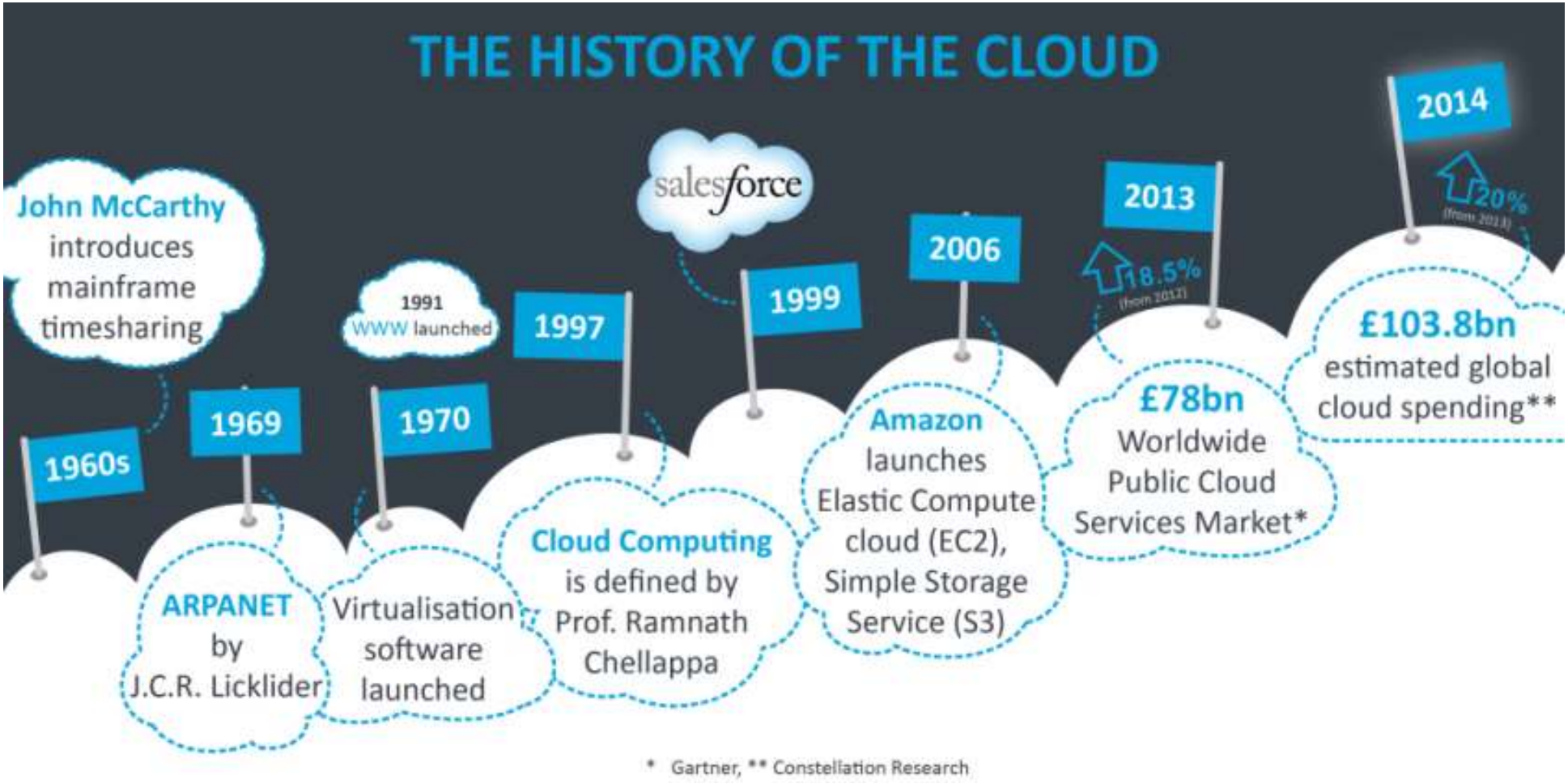
# Trends in Computing

- Centralized
- Distributed Computing
- Cloud Computing

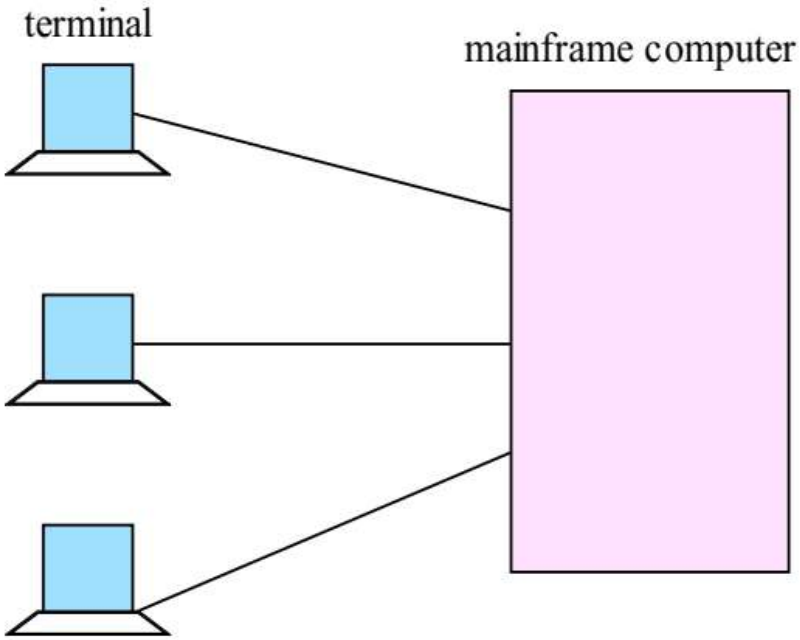


# Evolution of Cloud Computing

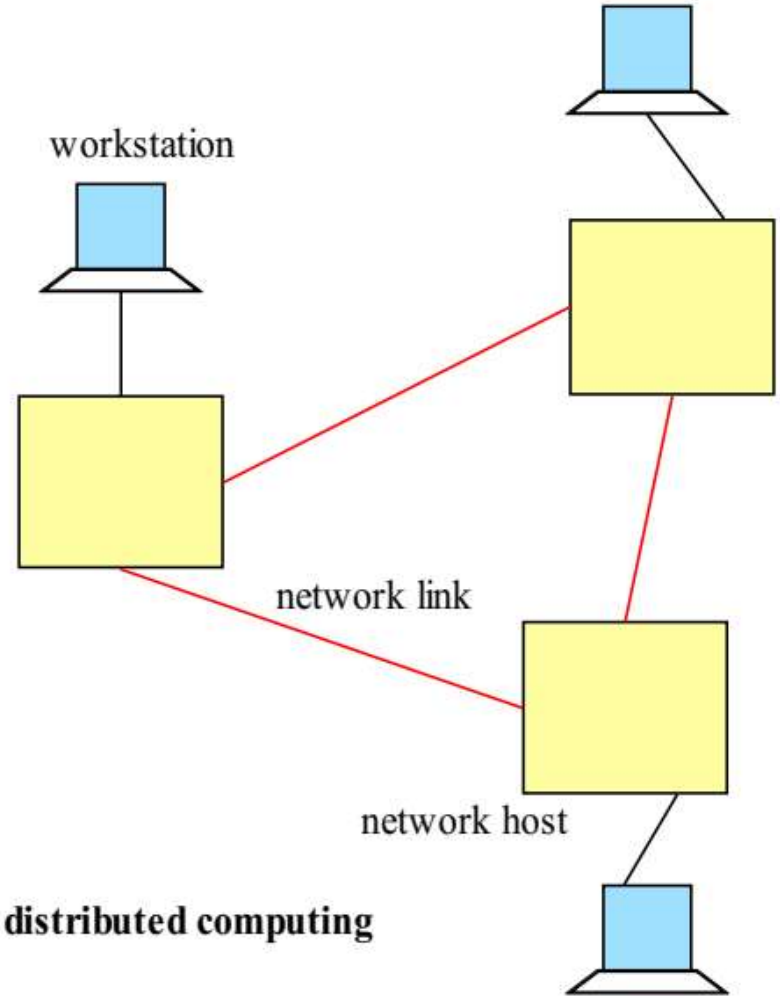
- Idea first came in the 1950s



# Centralized vs. Distributed Computing




**centralized computing**




**distributed computing**

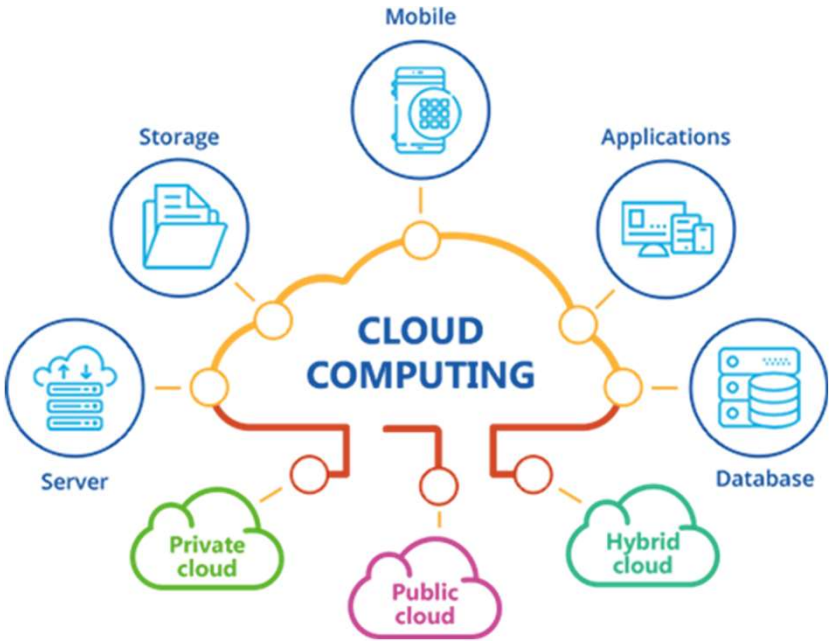
# Centralized vs. Distributed Computing

- In a centralized system, there is a
  - Single component
  - Single point of control
  - Single point of failure

- A distributed system is
  - A collection of independent computers, interconnected via a network,
  - Capable of collaborating on a tasks
  - Examples:
    - client-server
    - Peer to Peer

# Cloud Computing

- Model for enabling convenient and on-demand network access to a shared pool of computing resources e.g.
  - networks,
  - servers,
  - storage,
  - applications
  - Services




- These resources can be rapidly provisioned and released with minimal management effort or service provider interaction

# Essential Characteristics

- On-demand self-service
  - A consumer can provision computing capabilities, such as server and network storage, as needed automatically without requiring human interaction.
- Broad network access
  - Capabilities are available over the network
- Resource pooling
  - The provider’s computing resources are pooled to serve multiple consumers
- Measured Service
  - Resource usage can be monitored and controlled providing transparency.
  - Used for billing
- Rapid elasticity
  - Scale rapidly outward and inward

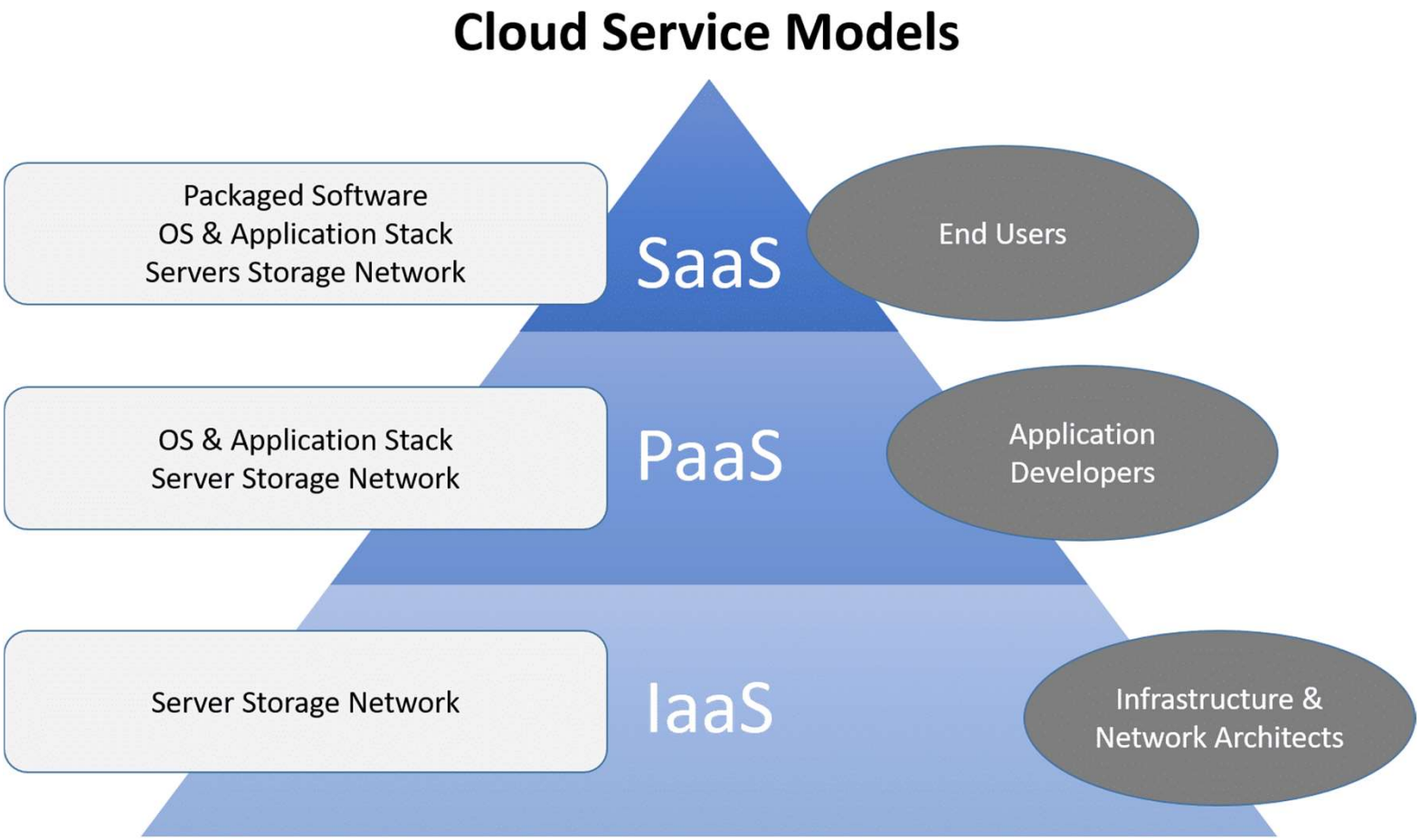
# Common Characteristics

- Massive Scale
- Resilient Computing
- Geographic Distribution
- Virtualization
- Service Orientation
- Low Cost Software
- Advanced Security

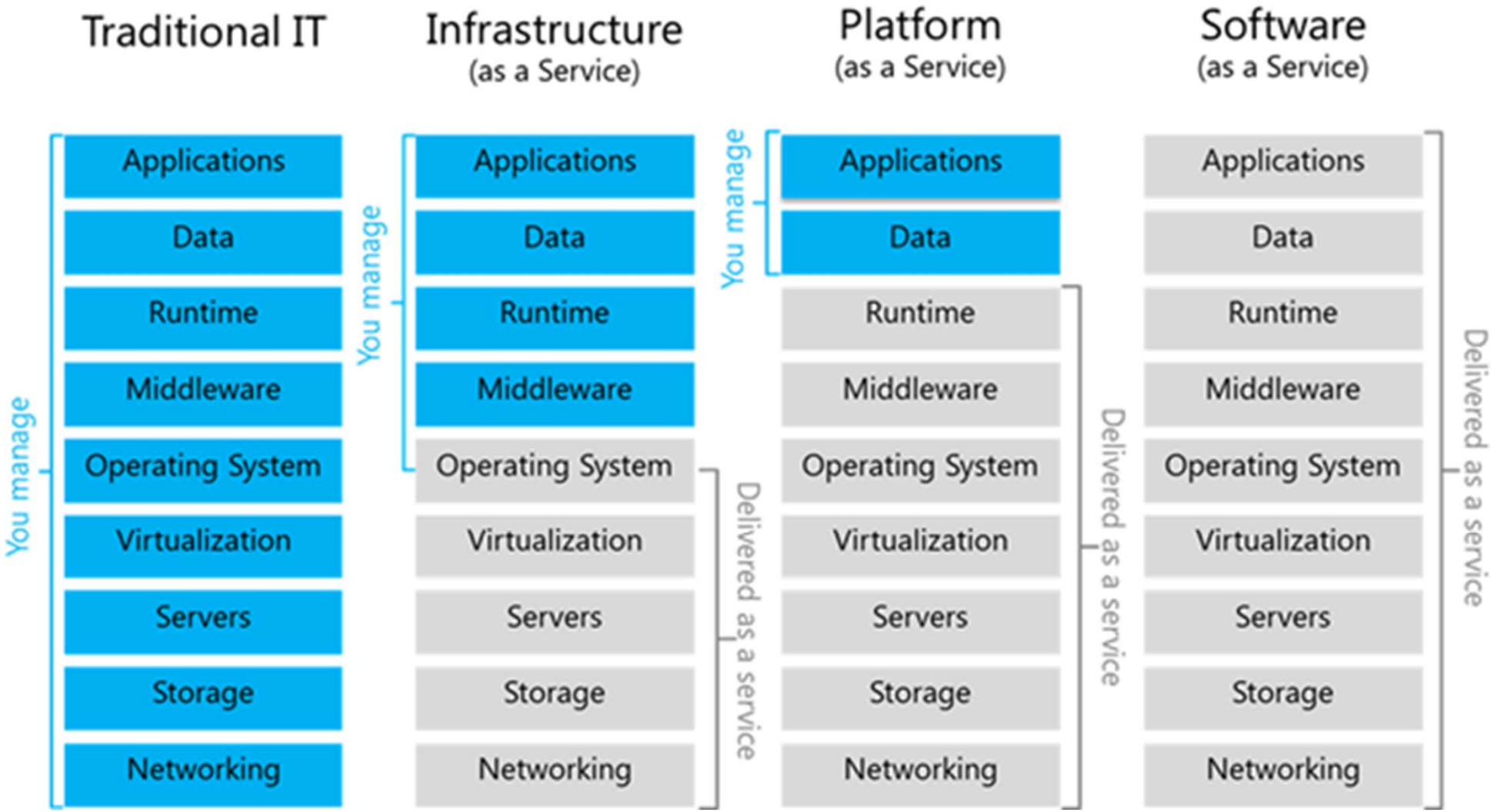
# Cloud Services Models

- Software as a Service (SaaS)
  - e.g: Google Spread Sheet
- Cloud Infrastructure as a Service (IaaS)
  - DigitalOcean
  - Azure
  - AWS
- Platform as a Service (PaaS)
  - The consumer does not manage or control the underlying cloud infrastructure:
    - network, servers,
    - operating systems, or storage
  - Has control over the deployed applications and
  - Configuration settings

# Cloud Services Models

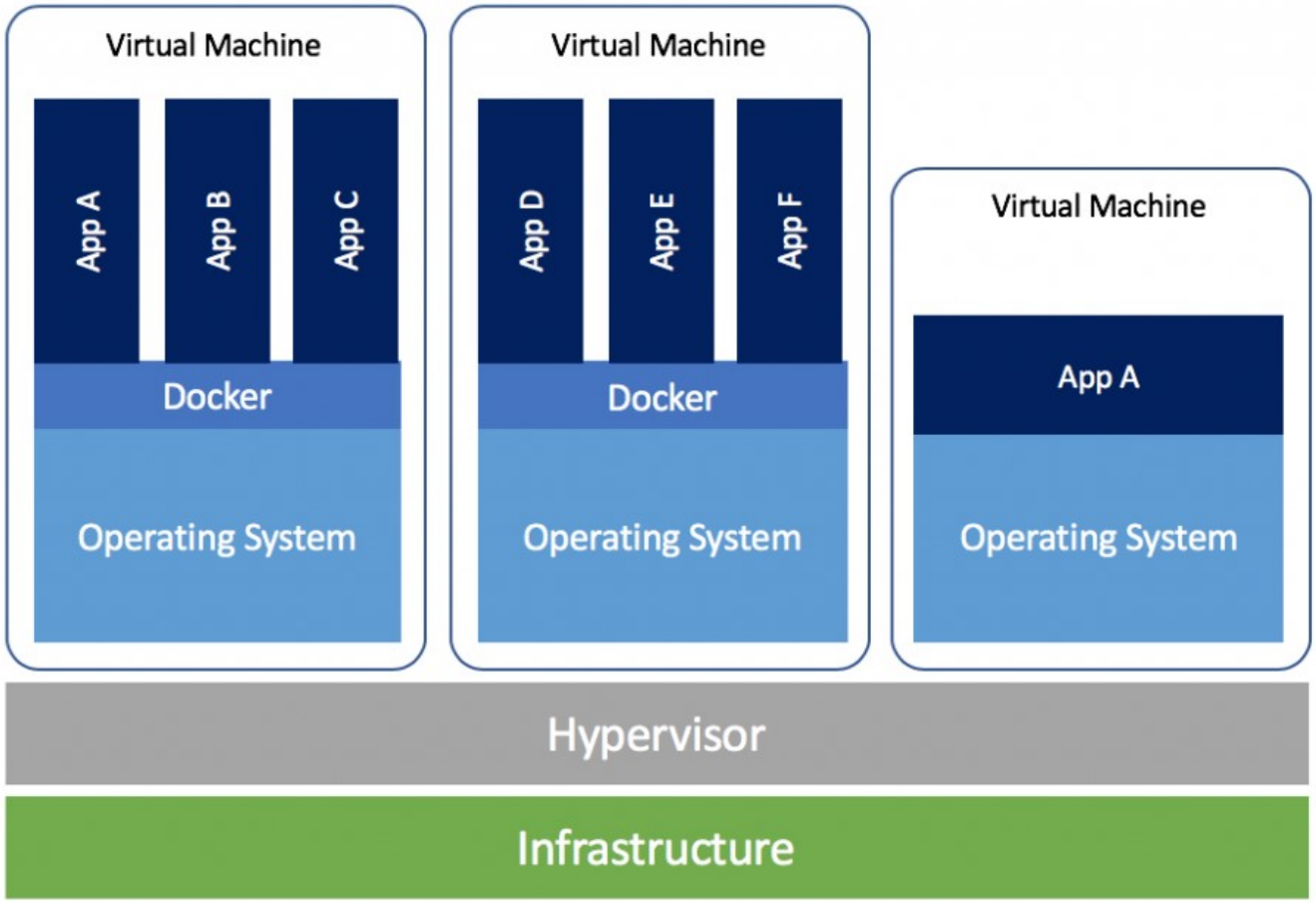


# Cloud Services Models



# Virtual Machines

- VM technology allows multiple virtual machines to run on a single physical machine



# Top cloud applications

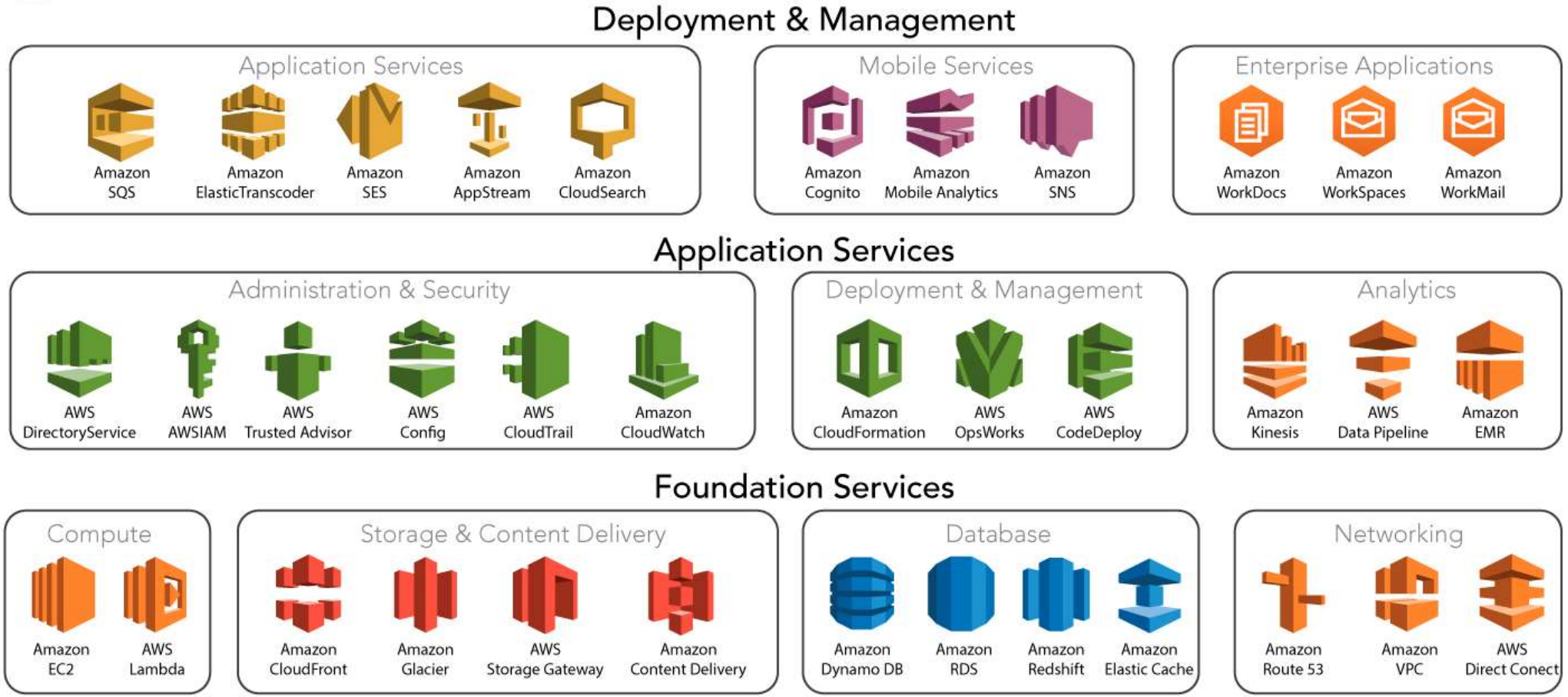
- Mail and Messaging
- Archiving
- Backup
- Storage
- Security
- Virtual Servers
- CRM (Customer Relationship Management)
- Collaboration across enterprises

# AWS Services

# Overview of Amazon Web Services

- AWS (Amazon Web Services) is a Cloud Provider
- In 2006, Amazon Web Services (AWS) began offering IT infrastructure services to businesses as web services
  - Now commonly known as cloud computing.
- Today, AWS provides a highly reliable, scalable, low-cost infrastructure platform in the cloud
- AWS powers hundreds of thousands of businesses in 190 countries around the world.
- AWS powers some of the biggest websites in the world
  - Amazon.com
  - Netflix

# AWS Services



# Hands-on: AWS Account Registration

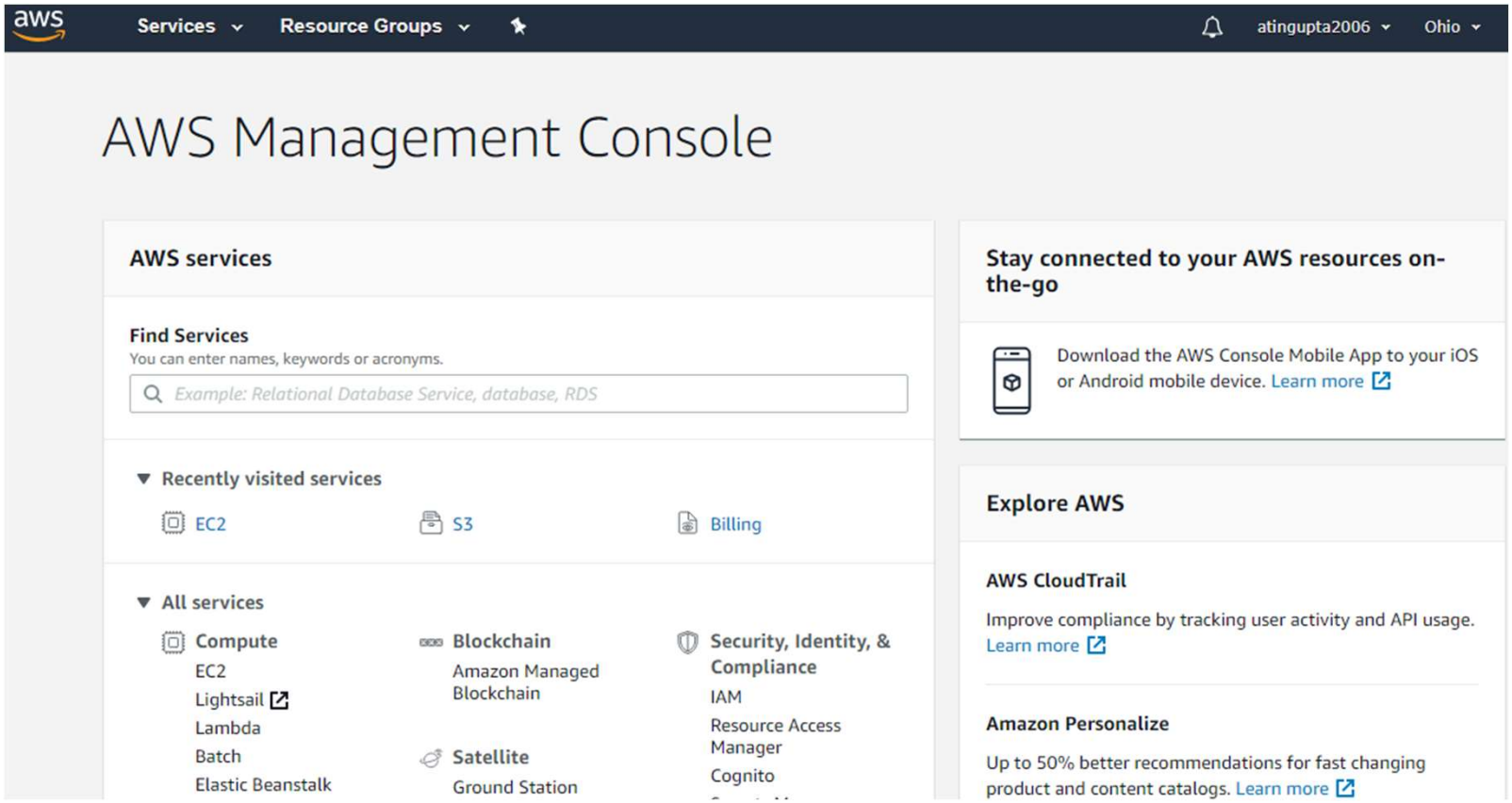
- Step 1 – Visiting the Signup Page:
  - https://aws.amazon.com/free/
- Step 2 – Entering User Details
- Step 3 – Filling up the Debit Card / Credit Card details
  - This will not charge anything from your account (except for a verification amount that will be refunded back)
- Step 4 – Identity Confirmation
  - Need to select a mode to confirm your identity
  - It could be a Text Message or a Voice call to your valid phone number.
- Step 5 – Selecting a Support Plan
  - Select Basic plan for free tier
- Wait 10-15 minutes before the account can be activated. You will get e-mail
- Login to the account

# Hands-on: Understand the AWS Free Tier

- Refer to below URL to understand what all services are free:
  - https://aws.amazon.com/free/?all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc

# Hands-on: AWS Management Console Overview

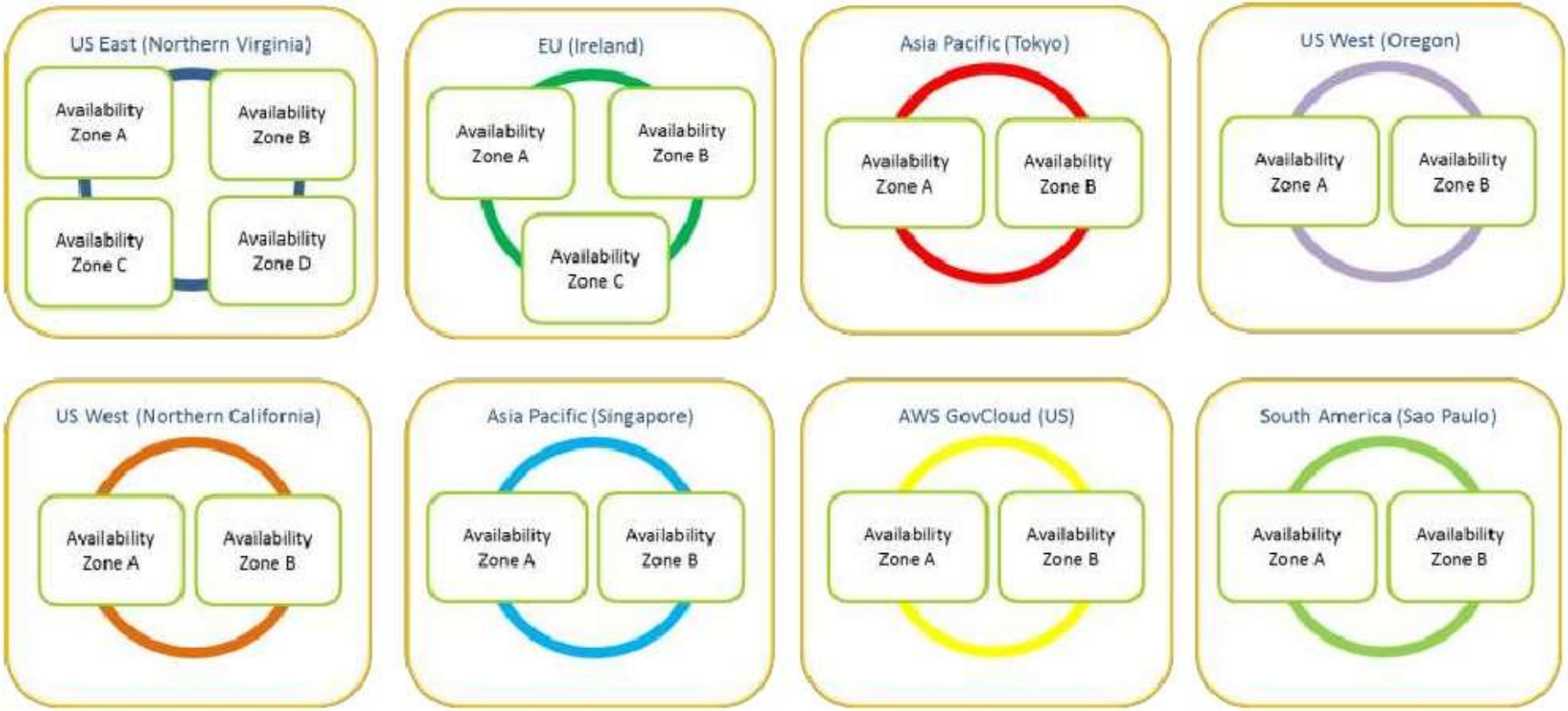
- A graphical interface used to interact with AWS services and features
- Can manage all aspects of AWS services, as well as AWS account.



# AWS Regions

- AWS has Regions all around the world
- A geographical location with a collection of availability zones
- Mapped to physical data centers in that region.
- Every region is physically isolated and independent
- A region is a cluster of data centers

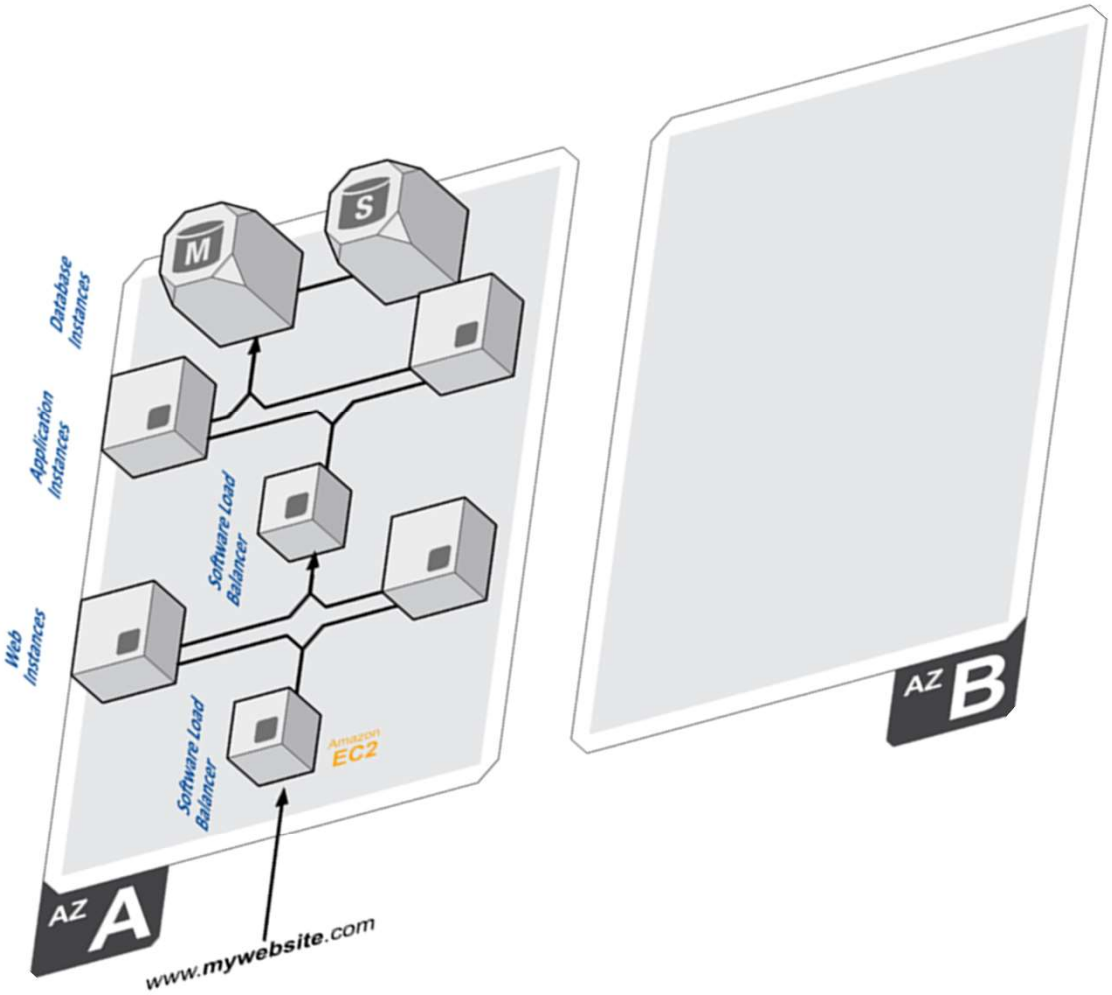
# Region and Availability Zones




Customer Decides Where Applications and Data Reside

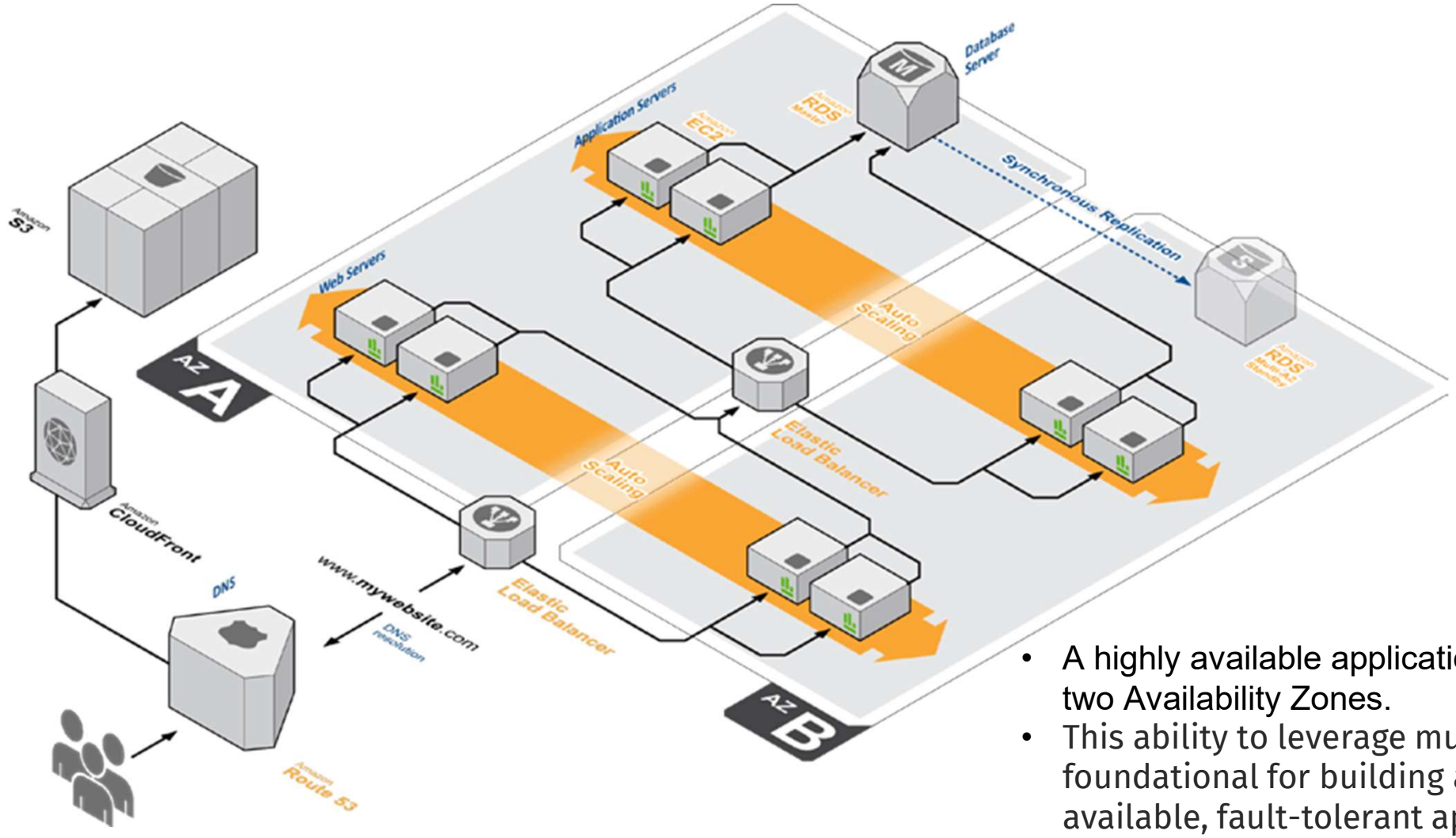
# Availability Zones

- Each region has many availability zones
  - (usually 3, min is 2, max is 6).
- Example:
  - ap-southeast-2a
  - ap-southeast-2b
  - ap-southeast-2c
- Inside each region, you will find two or more availability zones
- Each zone hosted in separate data centers from another zone.
- No two zones share a data center.




Underutilizing an AWS region with two availability zones.

# Availability Zones




- A highly available application leveraging two Availability Zones.
- This ability to leverage multiple zones is foundational for building a highly available, fault-tolerant application using AWS.

# Reference – Regions and Zones

- https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-regions-availability-zones.html

# AWS Pricing

- AWS Pricing offers the most amazing options
- You can rent a server for as low as 5$ a month!
- AWS offers incredible free tier option

# How does AWS pricing work?

- Pay as you Go
  - AWS offers, pay as you go model, that is you only pay what you use.
- Payless by using more
  - AWS bills you for the hour. The more AWS resources you use, the less the hourly rates become.

- Save when you reserve
  - You can reduce your costs up to 75 percent when you use reserved instances compared to On Demand instances.

# AWS Pricing Models

- No Upfront
  - Don’t pay anything before you reserve the instance
  - But since there is no advance payment, the costs are higher than the other two options.
- Partial Upfront
  - Pay a partial amount when you are reserving the instance
  - The costs in this model are lesser as compared to No upfront
  - Nut is still more expensive than full upfront
- Full Upfront
  - Pay the whole amount when you are reserving the instance
  - The pricing is least in this case, since you are paying the full payment.

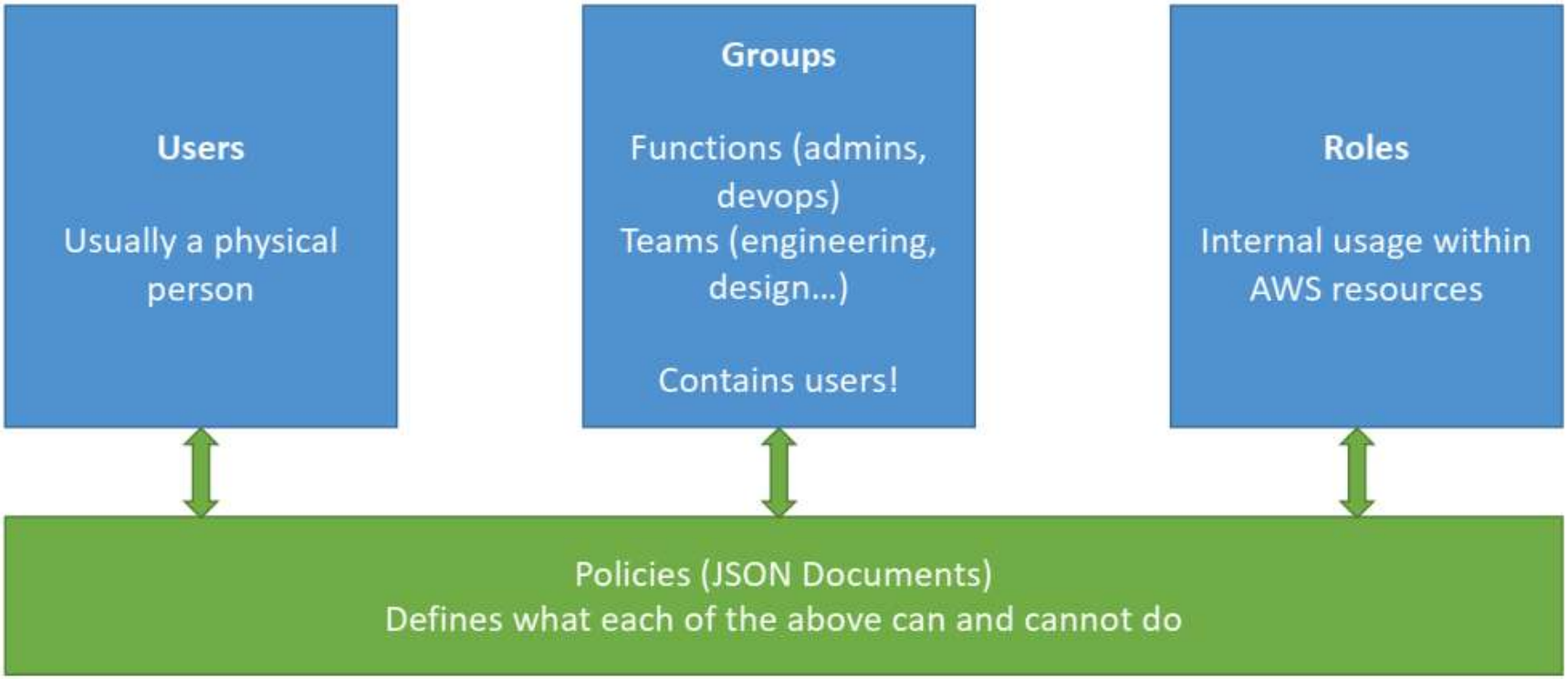
# Hands-on: Calculate your savings

- AWS offers two types of calculators for you to foresee what will be your expenses:
  - AWS Calculator
    - To calculate your monthly expenses
    - Can be used to foresee, what will be your expenditure if you use a certain set of resources
    - Provides templates
    - https://calculator.aws/
  - TCO (Total Cost of Ownership) Calculator
    - Used to compare one service's price to another, or one infrastructure solution to the other
    - It matches your current infrastructure to the most cost-efficient AWS offerings.
    - https://aws.amazon.com/tco-calculator/

# IAM Introduction

- IAM (Identity and Access Management)
- Your whole AWS security is there:
  - Users
  - Groups
  - Roles
- Root account should never be used (and shared)
- Users must be created with proper permissions
- IAM is at the center of AWS
- Policies are written in JSON (JavaScript Object Notation)

# IAM Introduction



# Thanks