



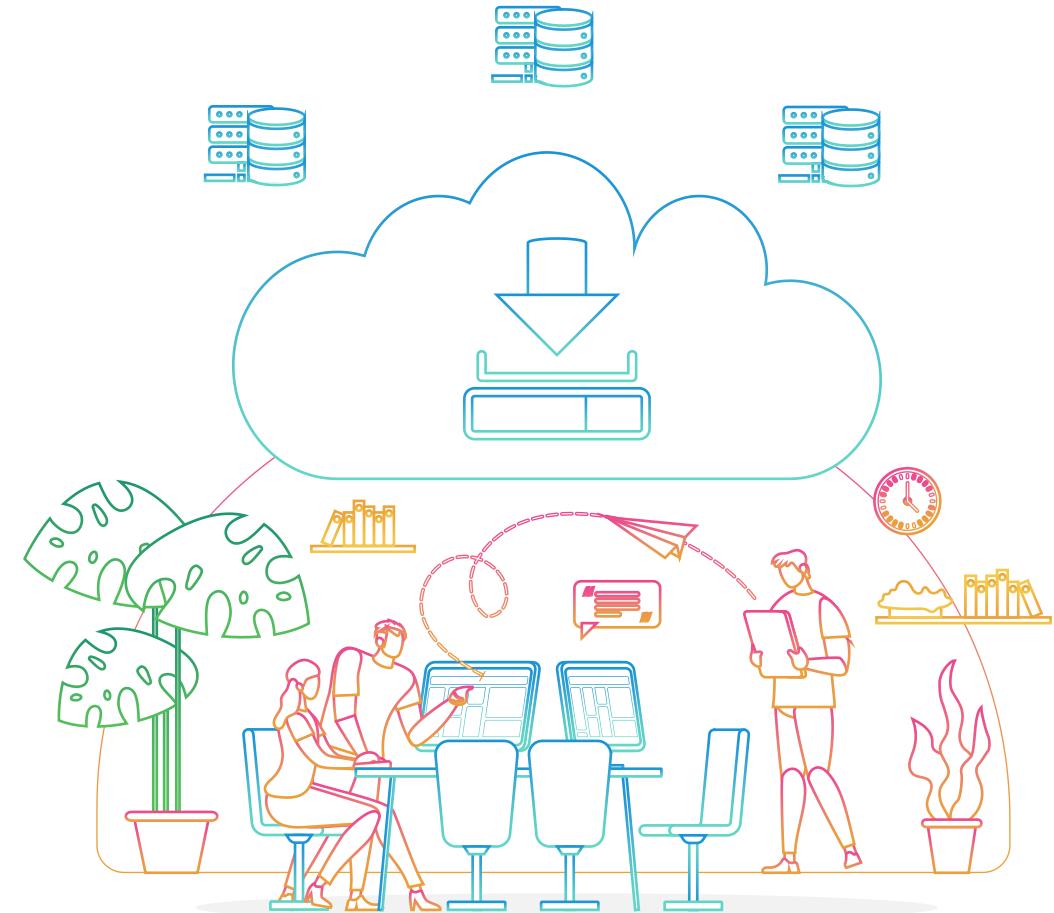
KodeKloud

What Is Cloud Computing?



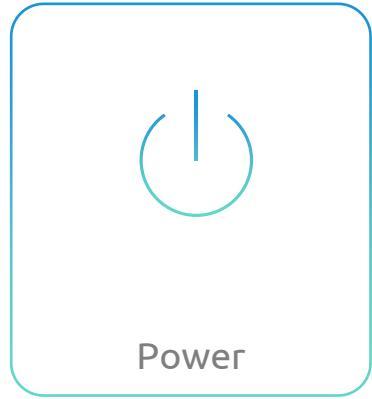
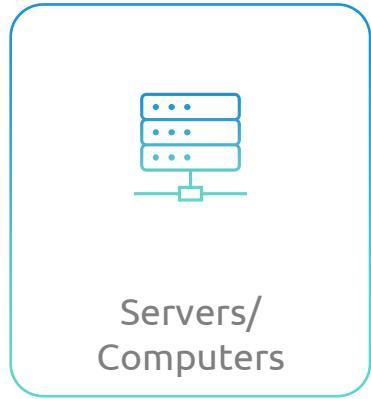
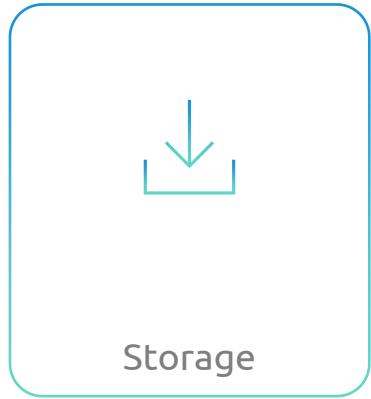
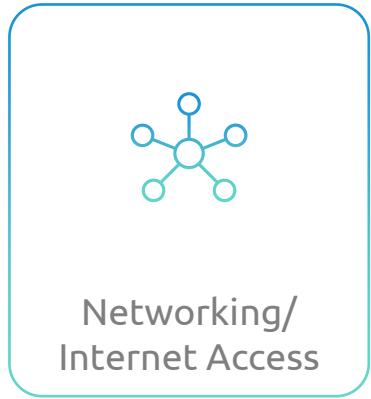
What Are Traditional IT Services Like?

- Imagine producing an idea with **new tech!**
- You request **three servers**
- This sparks an order for:
 - Hardware, Power, Cooling, Space
 - Operational and security installation
 - Access granted to the requestor
 - Software installation by the requestor





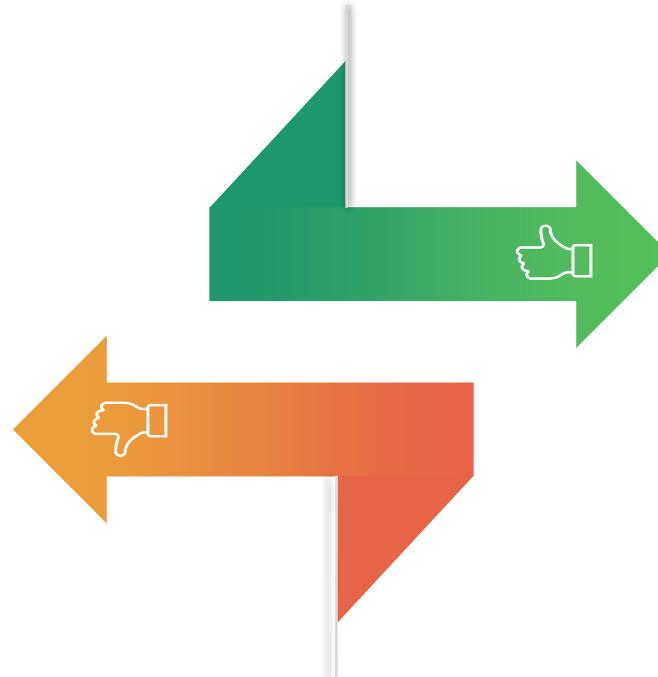
What Are Traditional IT Services Like?





Traditional IT – Pros and Cons

- Increased costs/Poor ROI
- Limited scalability
- Responsible for Everything
- Limited Locations
- More Personnel
- Long Provisioning Times

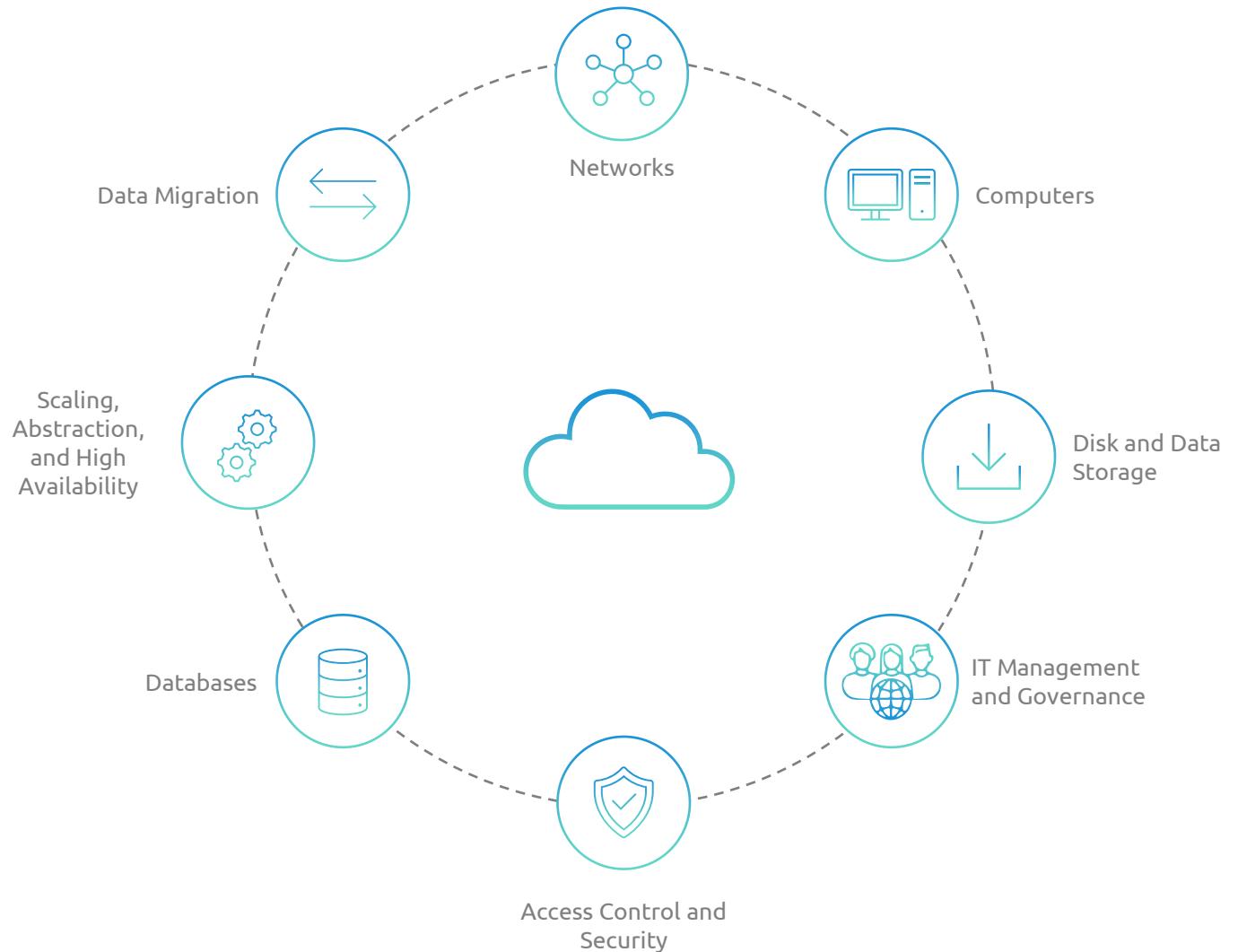


- Improved security
- Greater customization
- More control

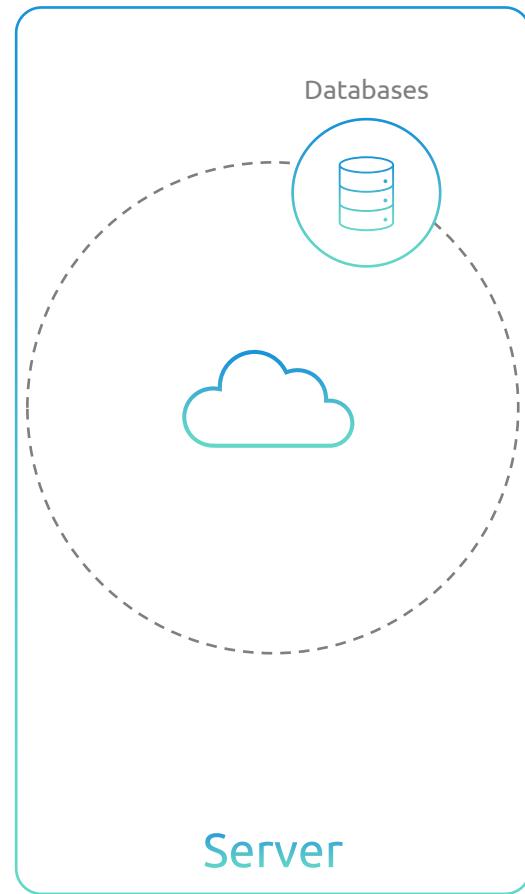
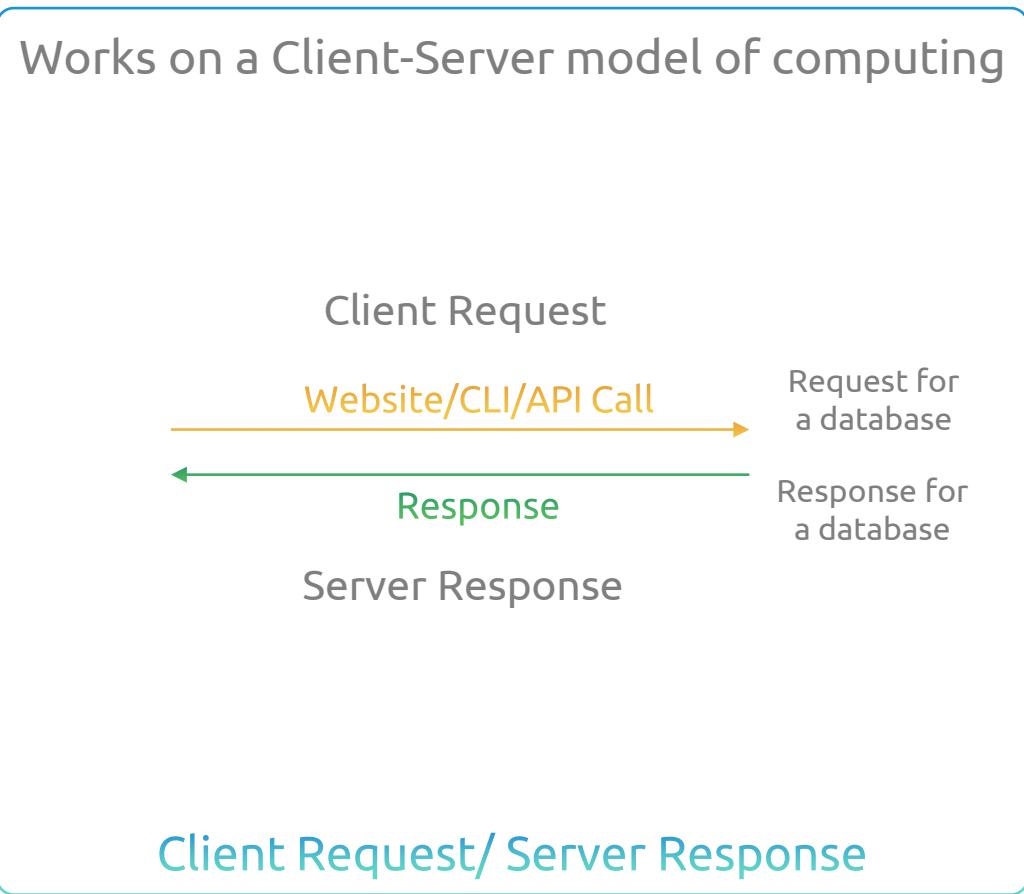
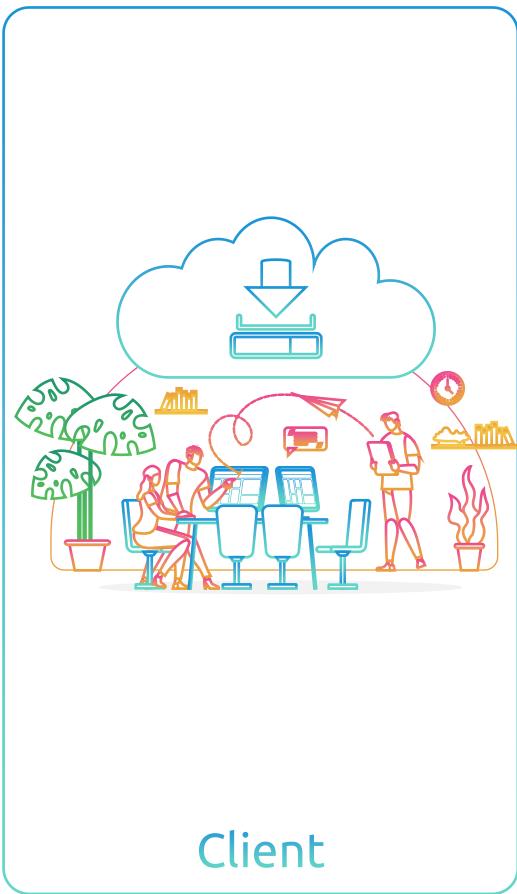


What Is Cloud Computing?

Cloud Computing is the on-demand delivery of IT resources, particularly compute power, application hosting, database application, networking, and more

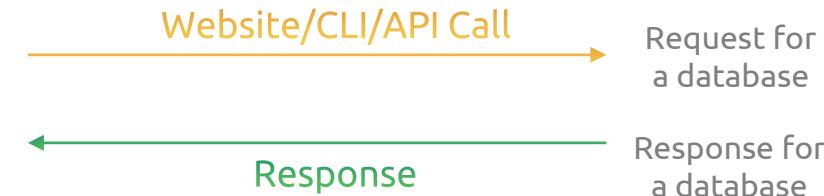


What Is Cloud Computing?



What Is Cloud Computing?

Pay only for what you request or use



I am a 1TB MySQL database
with 4 CPUs and 32 GB RAM



What Is Cloud Computing?

Access your **requested resources** in seconds or minutes, but sometimes instantly!

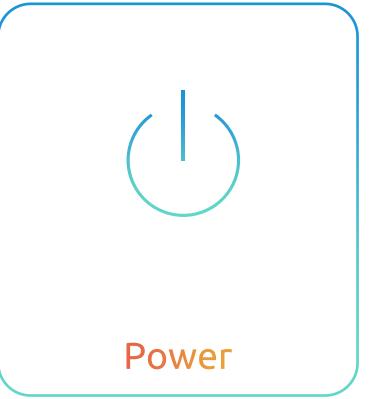
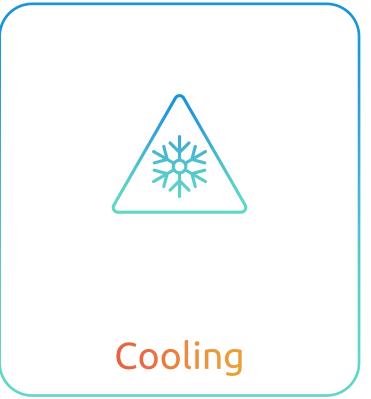
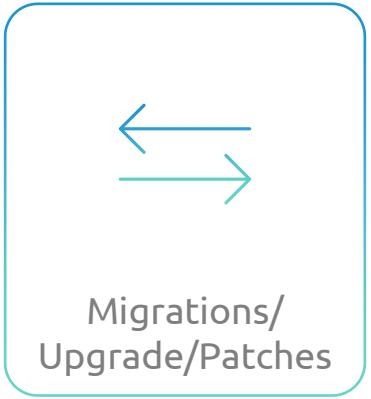
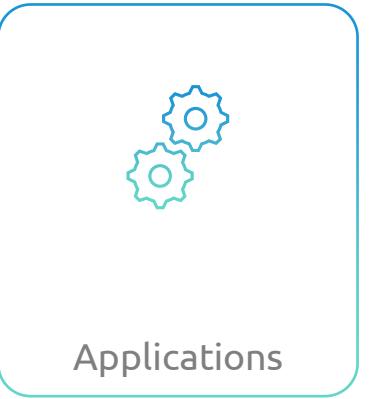
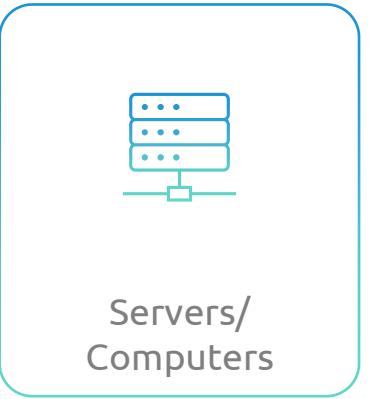
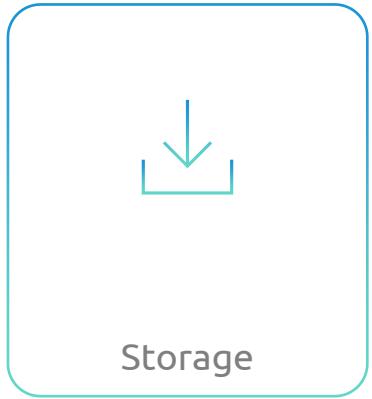


It took me 30 seconds to be available, but I am ready





How Does Cloud Computing Help You?



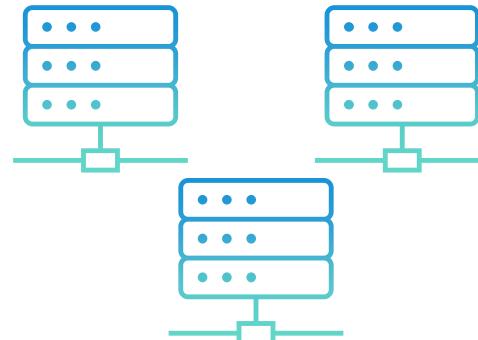
Cloud Computing Models

Cloud



All in cloud

On-Premises



Not in cloud

Hybrid



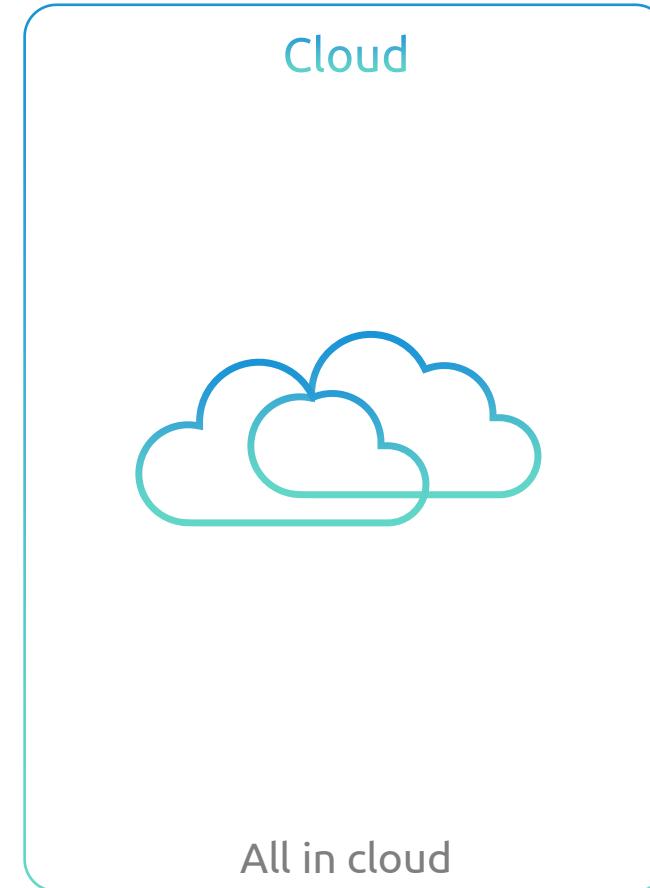
Some in cloud and
some not in cloud





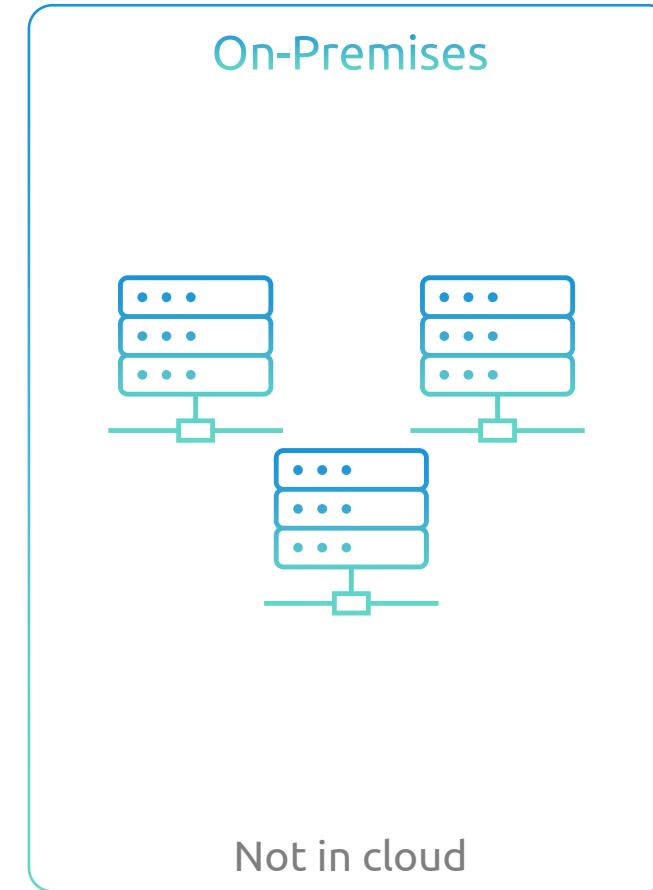
Cloud Computing Models – Cloud (only)

- Usually includes startups of all sizes; most businesses started after 2011
- Runs everything “in the cloud”
- Migrates existing projects to the cloud (if they exist)
- All new projects are in the cloud
- Shared Responsibility for Security and Operations



Cloud Computing Models – On-Premises

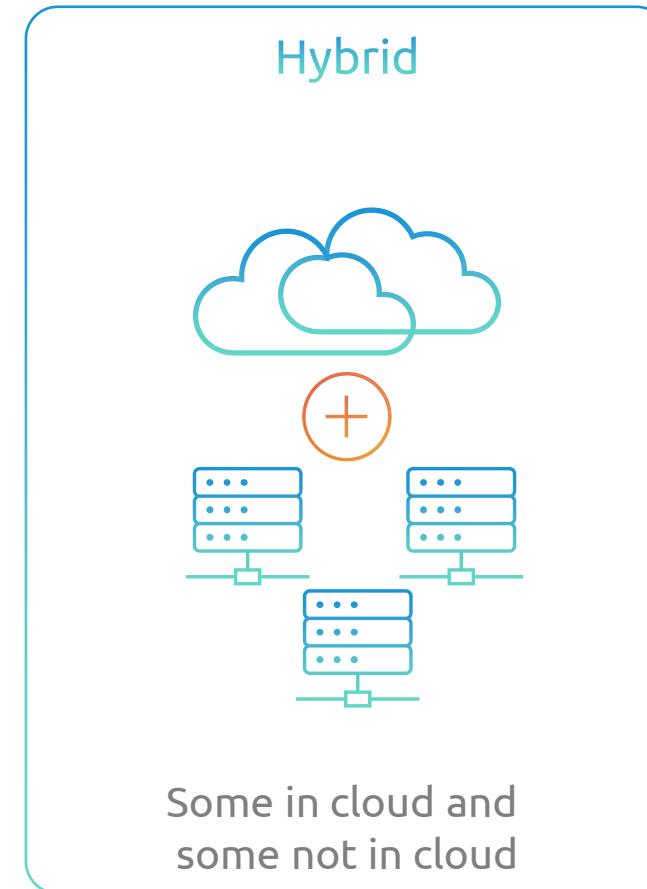
- Minimal to no Cloud Computing usage
- All Projects run in a owned data center or a rented data center
- Responsible for all security and operations
- Can be legacy companies that haven't had a reason to move to the cloud
- Can be companies that need strict control and security over the entire infrastructure





Cloud Computing Models – Hybrid

- Runs some parts of the application in cloud; other parts are on-premise
- Migrates existing applications to the cloud; may leave legacy applications on-premise
- Most new applications are designed and built for the cloud
- Usually fast connection between on-premise and cloud resources





What Is Cloud Computing? - Summary



Cloud Computing is the on-demand delivery of IT resources, particularly compute power, application hosting, database application, networking, and more



Three models of deployment: Cloud, On-Premises, and Hybrid



Works on a Client-Server model



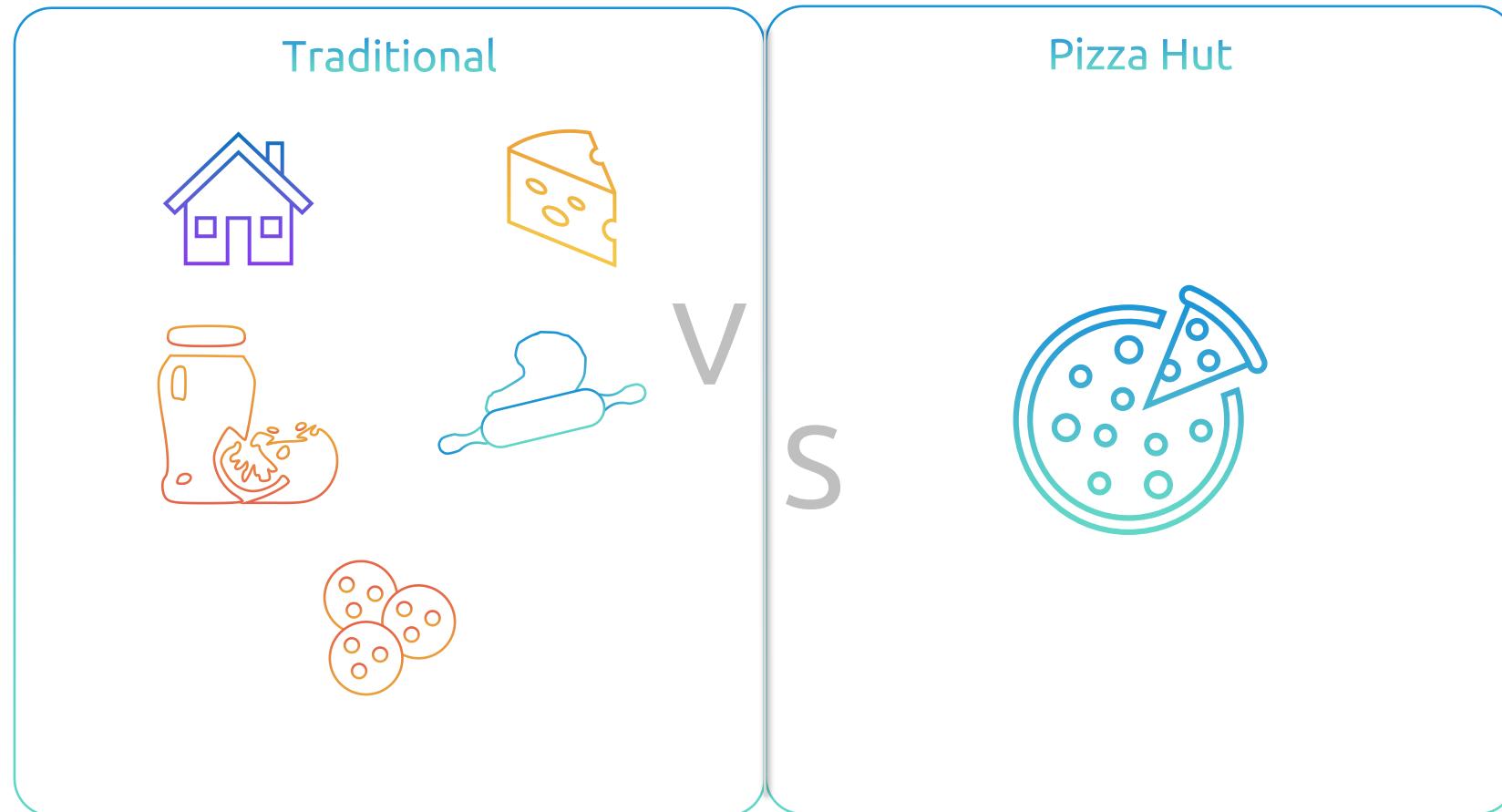
Provides almost instant pay-as-you-go access to compute resources/ app hosting



What Is Amazon Web Services?



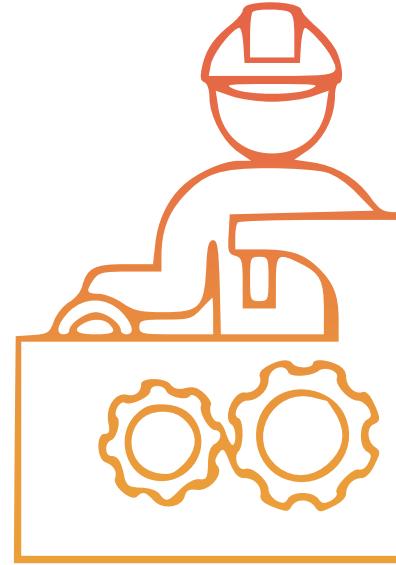
Amazon Web Services Versus Traditional IT





Amazon Web Services Versus Traditional IT

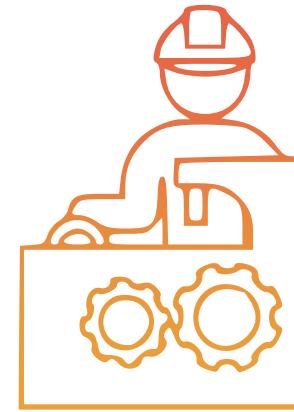
- Imagine producing an idea with new tech, but this time we are using AWS
- In our original Traditional IT request, you had to request for:
 - Hardware (optional)
 - Network cable (optional)
 - Power cable (optional)
 - Server placement with cooling (optional)
 - Operational and security installation (optional)
 - Access granted to requestor (3-6 weeks or 3 days)
 - Software installation by requestor (???)



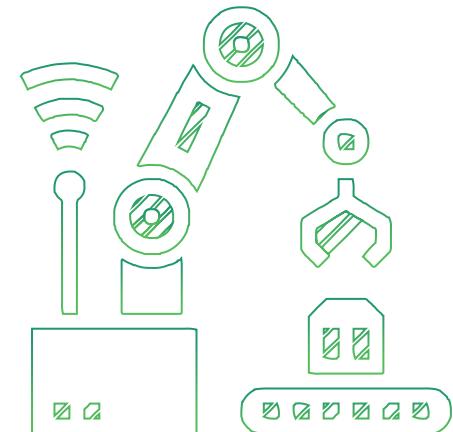


Amazon Web Services Versus Traditional IT

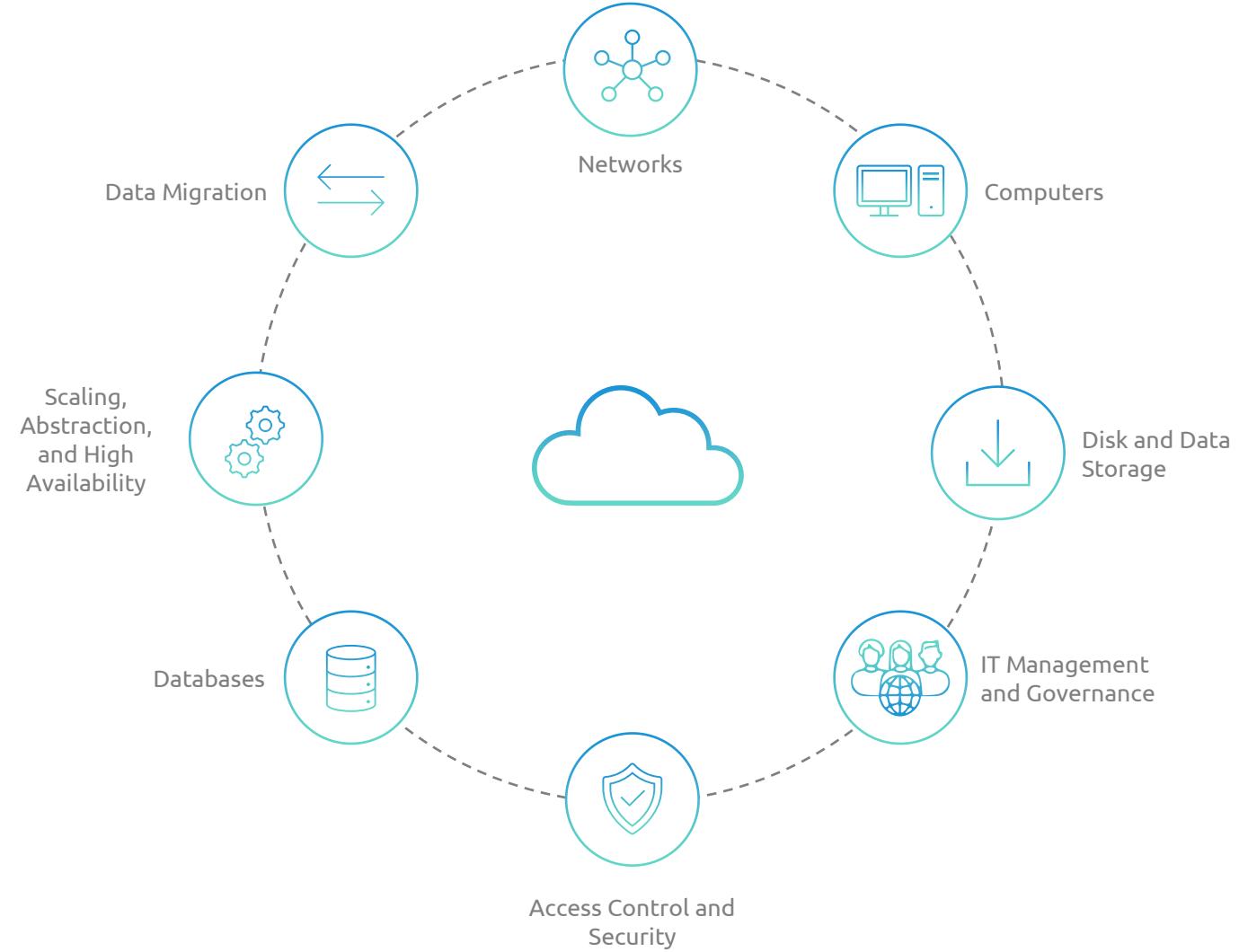
- Imagine if instead of provisioning hardware, you provisioned a hardware service that included networking and power
- Instead of managing physical objects, you get access to services that you can configure with ease



V
S



What Is Cloud Computing?



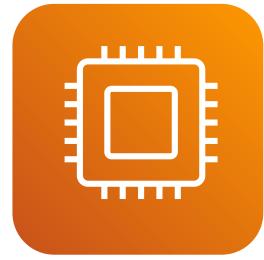


What Is Amazon Web Services?





AWS Core Service Categories



Compute



Networking and
Content Delivery



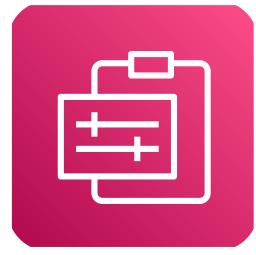
Storage



Database



Security, Identity,
and Compliance



Management
and Governance

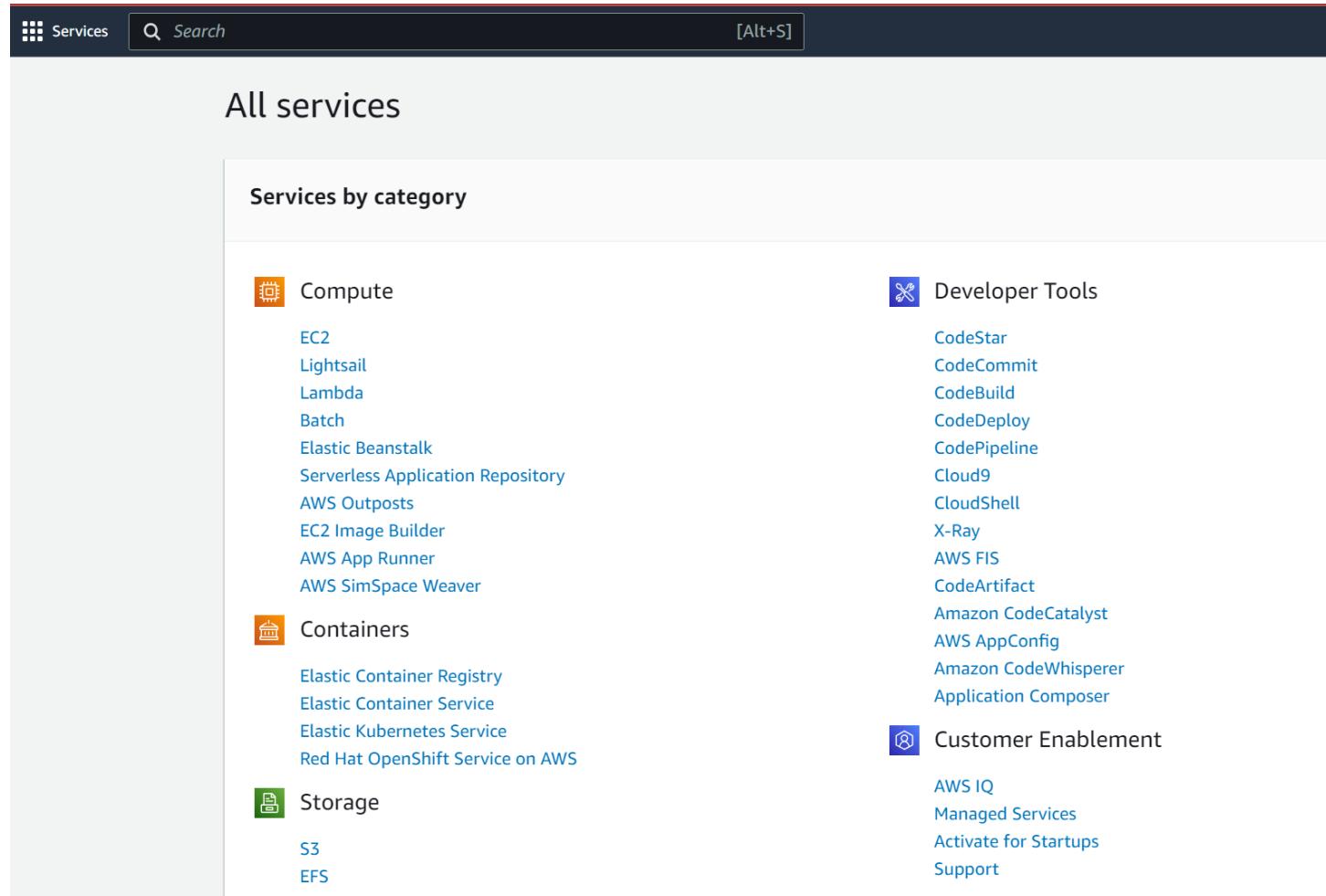


Three Ways to Interact With AWS

1

Console

Great to learn and confirm

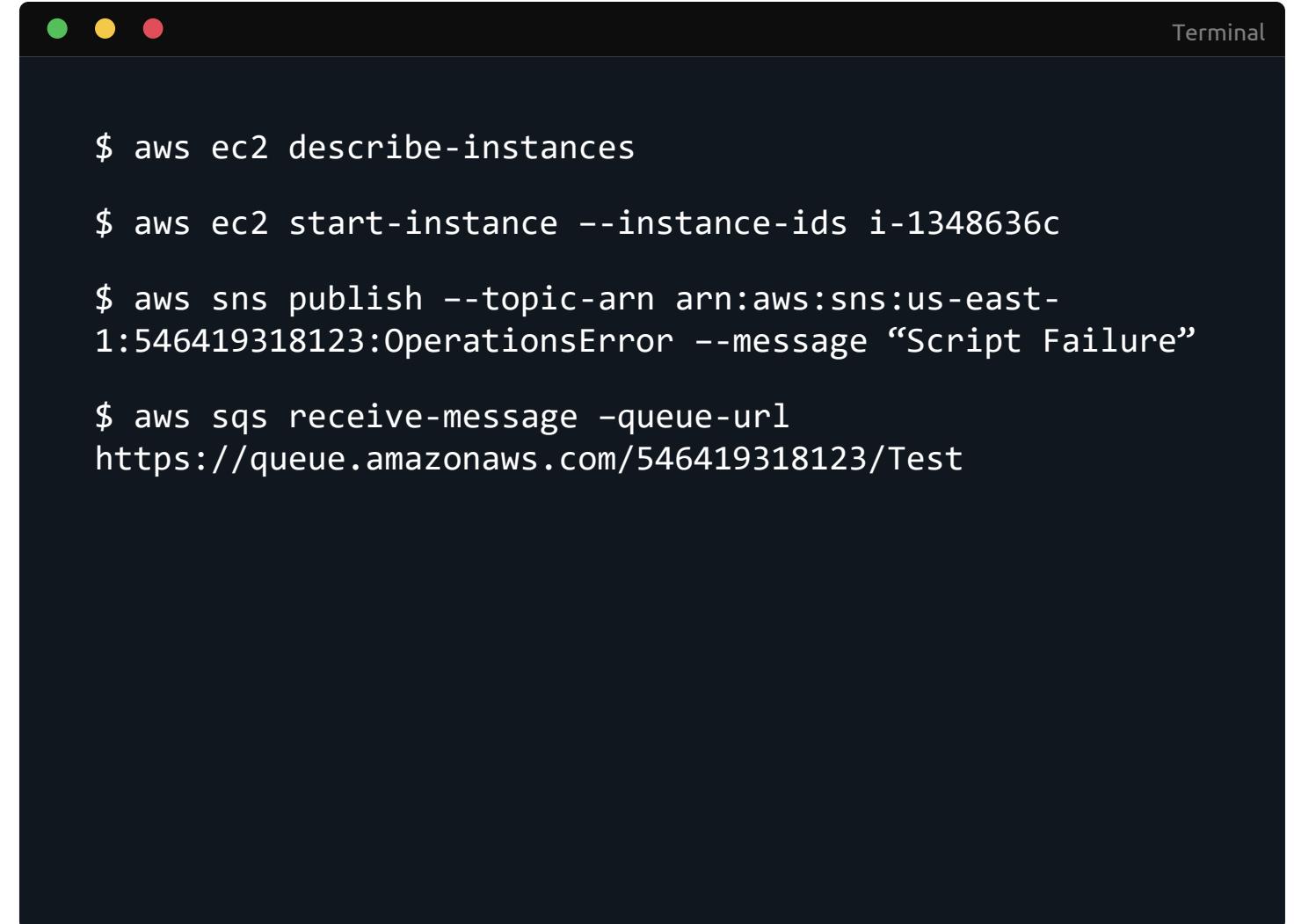


Three Ways to Interact With AWS

2

AWS CLI

Great for engineers

A screenshot of a macOS Terminal window titled "Terminal". The window has three colored window control buttons (green, yellow, red) at the top left. The main area contains five lines of AWS CLI command text.

```
$ aws ec2 describe-instances
$ aws ec2 start-instance --instance-ids i-1348636c
$ aws sns publish --topic-arn arn:aws:sns:us-east-1:546419318123:OperationsError --message "Script Failure"
$ aws sqs receive-message --queue-url
https://queue.amazonaws.com/546419318123/Test
```



Three Ways to Interact With AWS

3

AWS SDK

For developers and different types of coders

SDKs

SDKs take the complexity out of coding by providing language-specific APIs for AWS services



Let's Take a Brief yet Informative Tour!

The screenshot shows the AWS Console Home page. At the top, there is a navigation bar with the AWS logo, a 'Services' dropdown, a search bar containing 'Search [Alt+S]', and account information for 'N. Virginia' and 'Sampleuser'. Below the navigation bar, a banner displays 'Console Home' with an 'Info' link, a 'Reset to default layout' button, and an orange '+ Add widgets' button. A large 'Recently visited' section follows, listing services with their icons: S3, CloudShell; EC2, CloudSearch; Route 53, AWS Well-Architected Tool; CloudFront, Trusted Advisor; RDS, Lambda; IAM, Amazon AppFlow; and CloudWatch, AWS Cost Explorer. At the bottom of the page, there are links for 'Privacy', 'Terms', and 'Cookie preferences', and a copyright notice: '© 2022, Amazon Web Services, Inc. or its affiliates.'



What Is AWS? - Summary

-  Amazon Web Services or AWS was the first large-scale cloud provider
-  AWS was launched in 2006, with S3 as the first service
-  Since then, AWS has grown to 300+ services
-  Signing up is free; all services usually are pay-to-use
-  AWS has one of the largest communities, market positioning, and growth in the industry



Benefits of Cloud

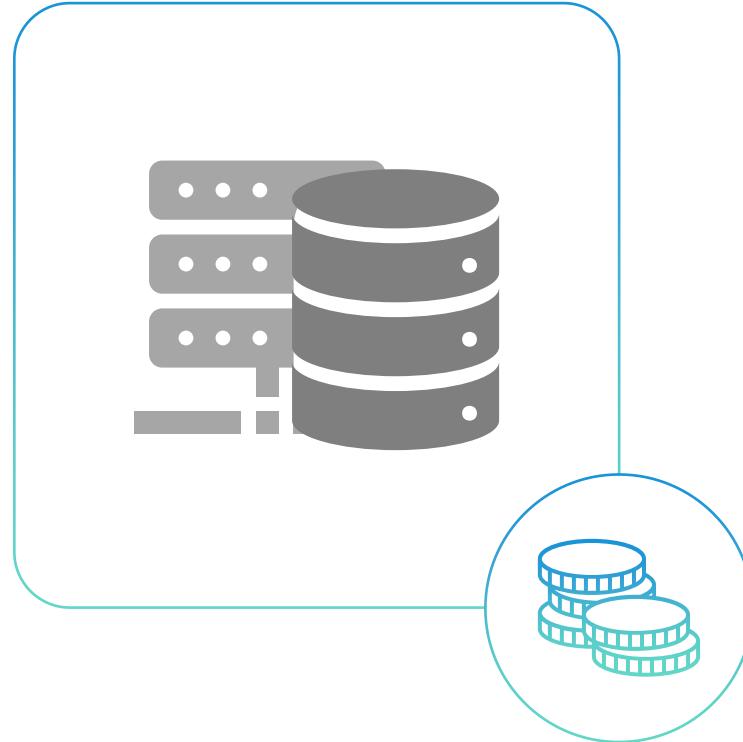




Trade Upfront Expense for Variable Expense

Upfront Expenses (CAPEX)

Large upfront investment in hardware before use





Trade Upfront Expense for Variable Expense

Variable Expenses (OPEX)

Pay for usage and requests

Give back what you don't need

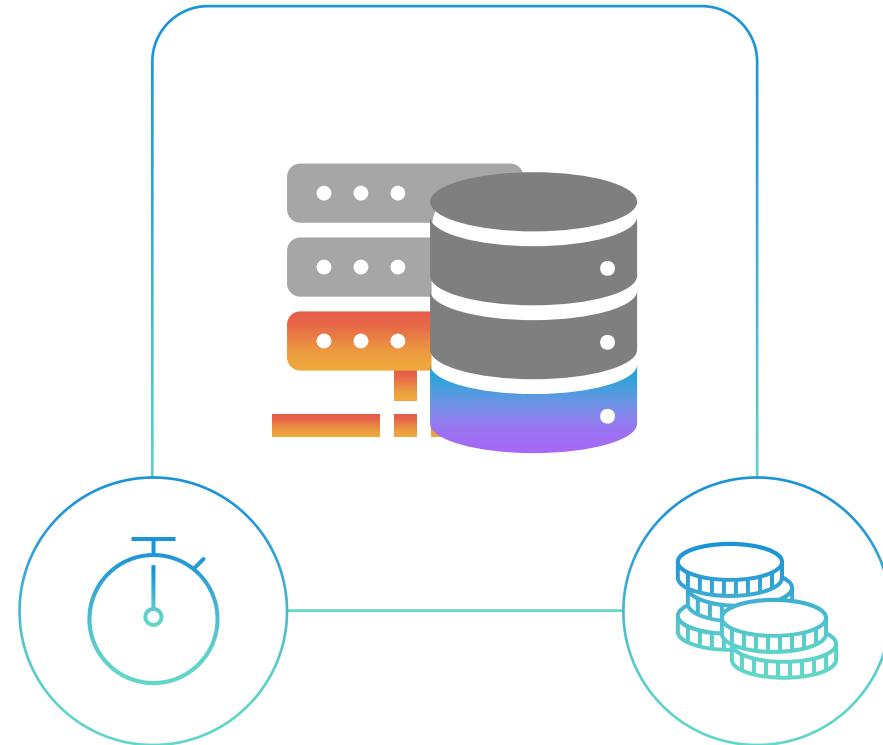




Stop Focusing on Data Centers

Focus on **Data Centers**

Invest time and money; focus
on data centers

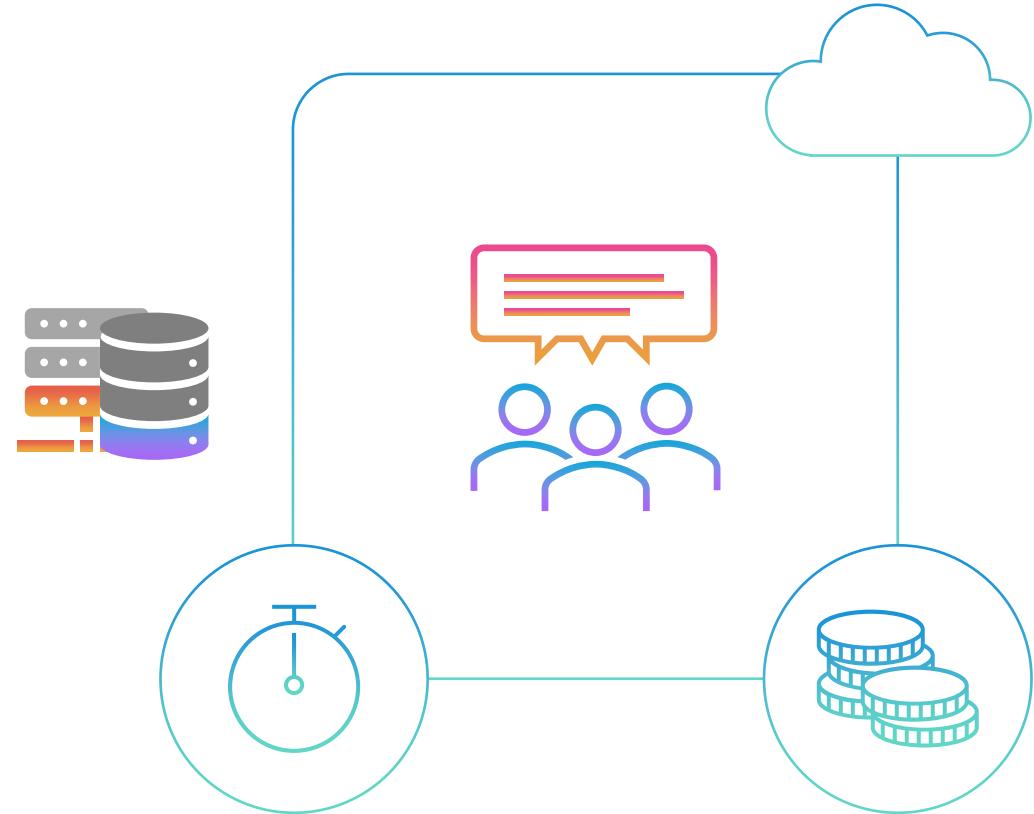




Stop Focusing on Data Centers

Focus on *Customers*

Invest time and money; focus
on customers and applications





Stop Guessing Capacity (or easily fix bad guesses)

Limited Scalability

Bound by hardware limitations or vendor supply limits





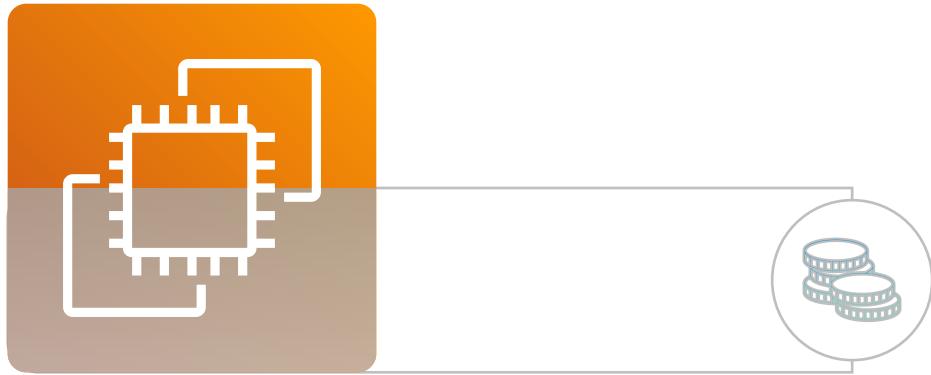
Stop Guessing Capacity (or easily fix bad guesses)

Extreme Scalability

Scales in and out as needed;
experiments with load and
performance as needed



Stop Guessing Capacity (or easily fix bad guesses)

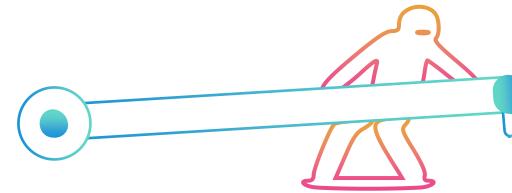




Benefit From Massive Economies of Scale

Smaller Scale

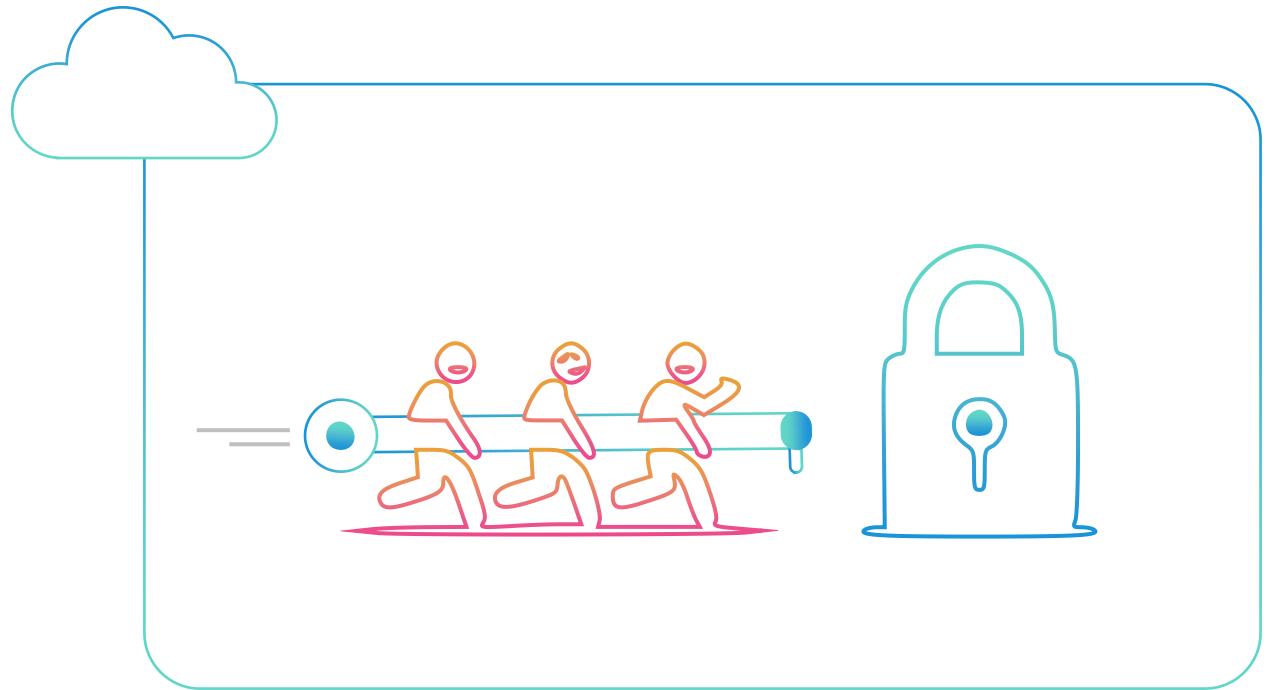
Pay higher prices based on only your own usage, with no price drops per unit



Benefit From Massive Economies of Scale

Economies of **Scale**

Benefit from customers' aggregated usage, with price drops per unit used

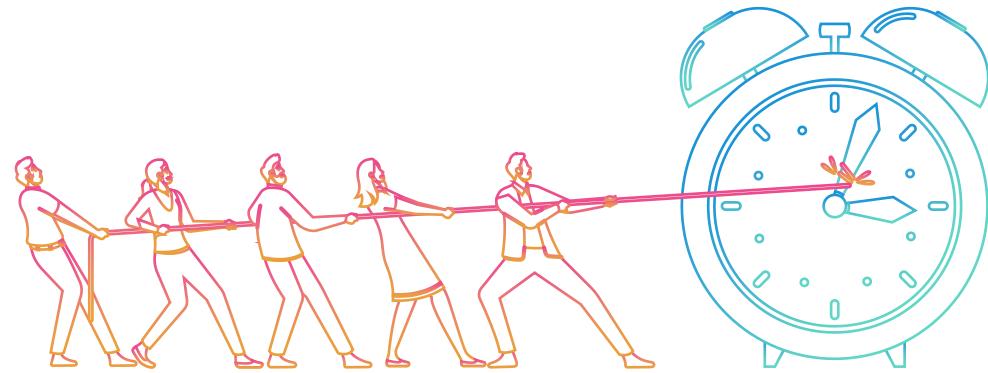




Increase Provision Speed and Business Agility

Data Center Requests

Often provision in days or weeks or months





Increase Provision Speed and Business Agility

Cloud Computing Requests

Always provision in seconds or minutes

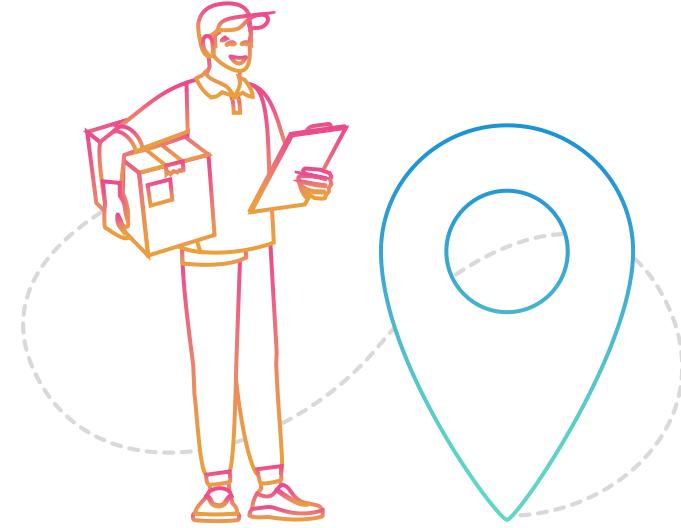




Go Global (with your app) in Minutes!

Limited Deployment Options

Limited to places where data centers are available

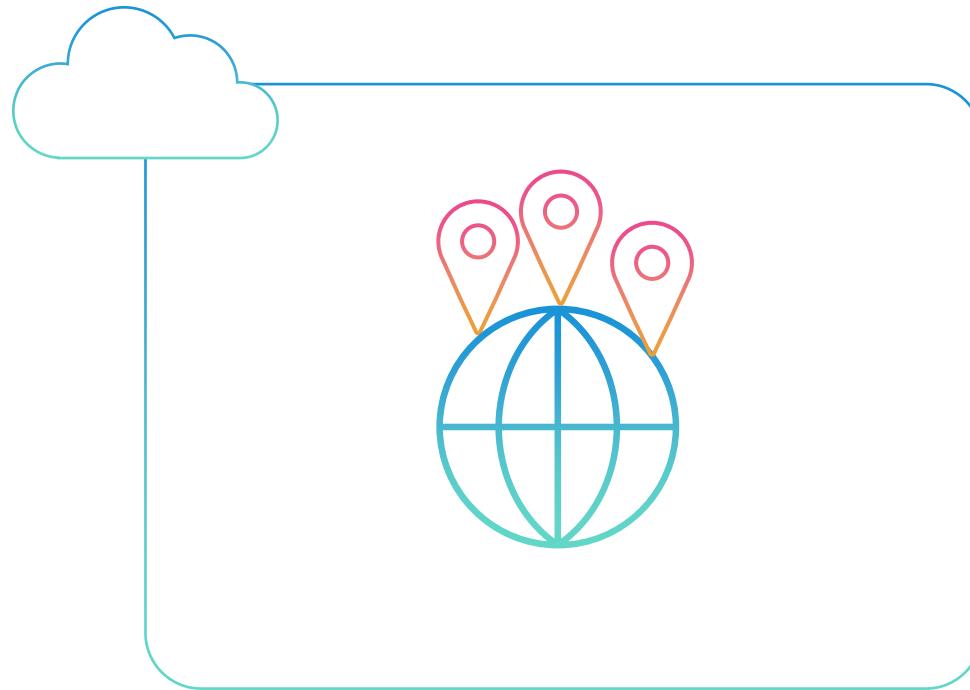




Go Global (with your app) in Minutes!

Global Deployment Options

AWS global infrastructure available
at 31 locations globally





Benefits of Cloud Computing - Summary



Trade upfront expense for variable expense



Stop focusing on data centers



Stop guessing capacity



Benefit from economies of scale



Increase your speed and agility



Go global in minutes



Cloud Computing – The Economics





Economic Models of AWS – Overview

Free Tier

Volume Discounts

On-demand

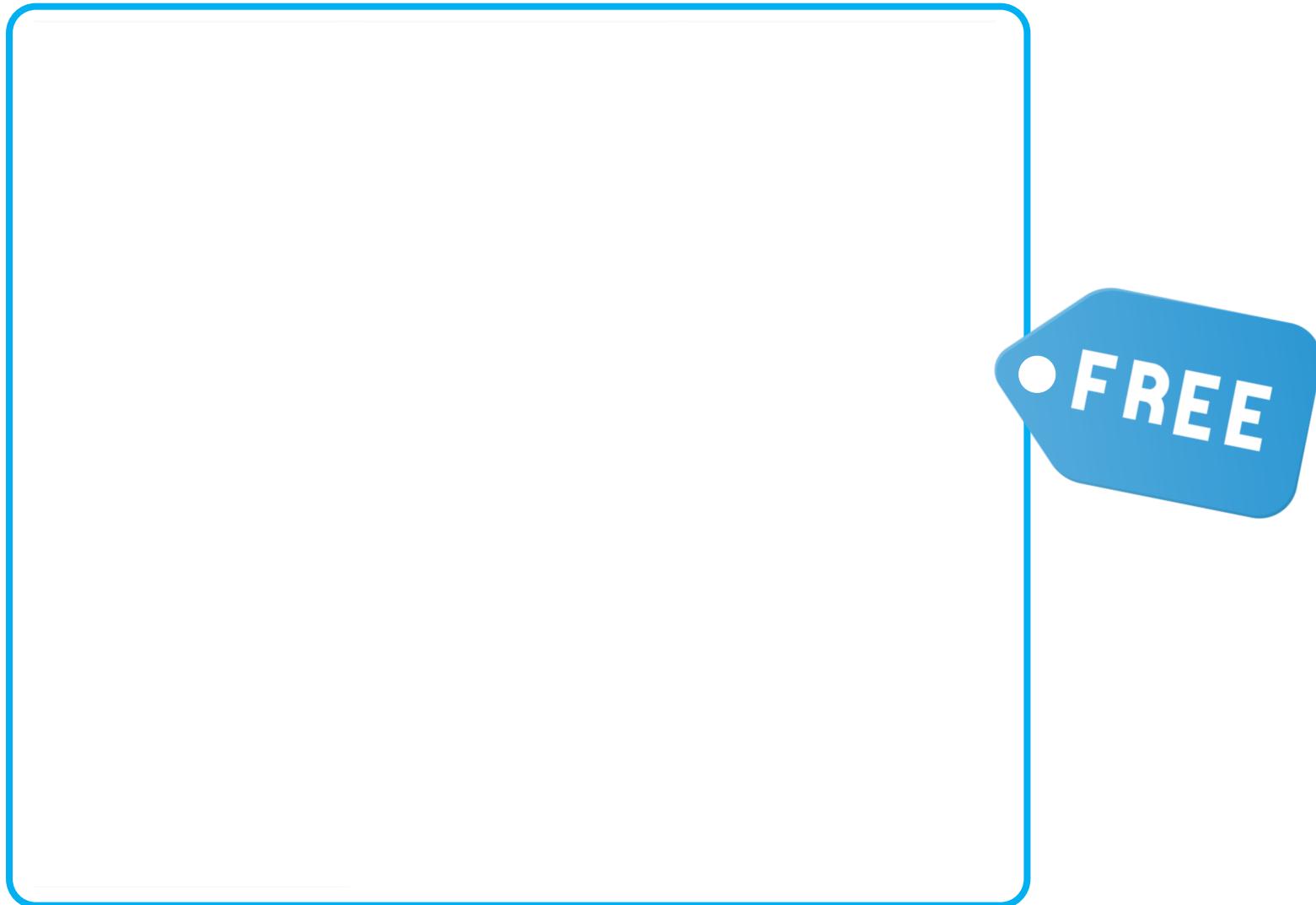
Price Drops



Reservations



Free Tier





On-Demand



= Size





On-Demand



=

Size





On-Demand

2.1 GB = 2.1 GB





On-Demand

2 Processor
16 Gigabyte
10 Hours





Reservations

1 Year



3 Years





Reservations



Reservations



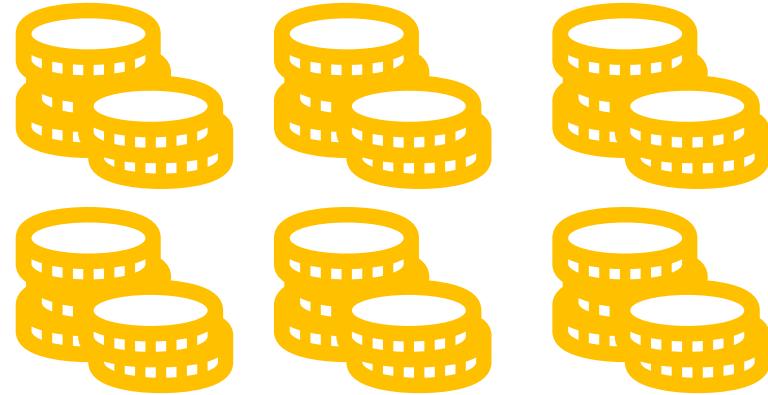


Volume Discounts





Volume Discounts



Volume Discounts (S3 Standard)





Volume Discounts (S3 Standard)



1 cent per GB at:

First 50 TB per month

Next 450 TB per month

Greater than 500 TB per month





Price Drops





Price Drops





Price Drops





Price Drops



2006



129 Price
Drops

2023





Price Drops



0.15 USD
per GB

2006

0.023-0.026 USD
per GB

2023

us-east-1





Cloud Computing Economics - Summary



Free Tier means that certain services are always free, and some are free for 12 months after new account creation



On-Demand is full pricing and pay-as-you-go, but no contract and very flexible



Reservations are contracts that you enter with Amazon for 1-3 years



Volume Discounts are pay less per unit as you use more



Price Drops are random price cuts that AWS does every few years on its services

Cloud Design Principles



Principles of Cloud Native Design for AWS – Where We Are Headed!

- Design for failure
- Decouple components
- Implement elasticity
- Think parallel



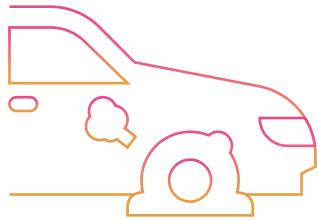
Principles of Cloud Native Design for AWS – Before We Dive in....

- There is a **deeper framework** for AWS Architecture, but it is **not needed** at the Cloud Practitioner level
- It is called the [AWS Well Architected Framework](#)



Design for Failure

Single Points of Failure



What should happen **when**
my component fails?

Increased Resiliency

Resiliency and Auto-Recovery



Be intentional about failure
and add redundancy



Decouple Components

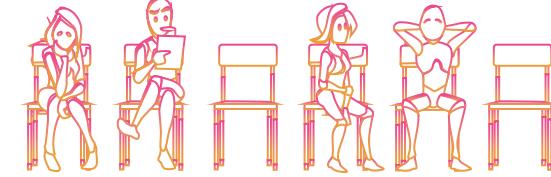
Tight Coupling



What happens in case of a surge in customer requests?

No Data Loss

Loosely Coupled With Queue



Put a queue or scaling layer in between components



Implement Elasticity

Limited Expansion and Contraction



Hardware boundaries are small

Better Costs;
Better Performance

Large Expansion and Contraction



Hardware boundaries are large

"The ability to acquire resources as you need them and release resources when you no longer need them. In the cloud, you want to do this automatically." – AWS Docs



Think Parallel

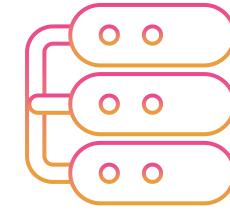
Do Things in Series



Do you want 1 server to do it
in 36 hours?

Increased Concurrency

Do Things in Parallel



Do you want 3 servers to do
it in 12 hours?



Cloud Design Principles - Summary



Design for failure



Decouple components



Implement elasticity



Think parallel



KodeKloud