AWS Module 2
Cloud Economics & Billing

Topics

→ Fundamentals of Pricing
→ Total cost of ownership
→ AWS Organizations
→ AWS Billing & Cost Management
→ Technical Support.

I) Fundamentals of Pricing

AWS Pricing Model

Three fundamentals of cost with AWS

Compute

- Charged per hr/sec*
- Varies by instance type

*- Linux Only

Storage

- Charged Typically per GB

i.e. Data you put in AWS, is free.

Data Transfer

- Outbound is aggregated & charged.
- Inbound has no charge (with some exceptions)
- Charged typically per GB.

Displayed monthly & based on data transfer rate.

How do you pay for AWS?

1.) At the End of each month, you pay for what you use. ~~Pay less~~

2.) Pay less when you reserve

3.) Pay less when you use more & as AWS grows.

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1) Pay for what you Use

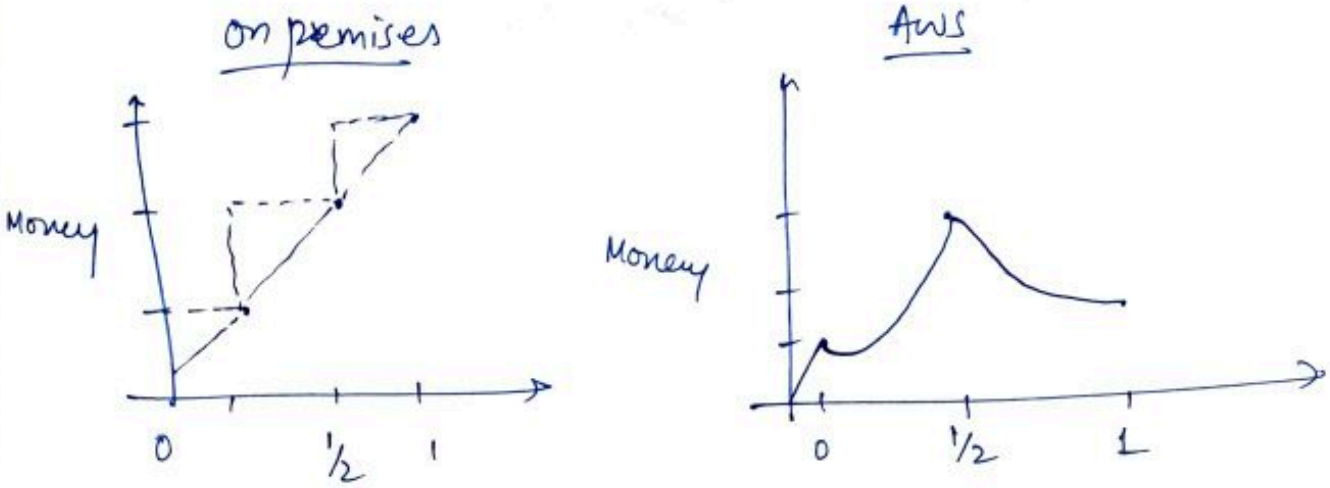
Core Concepts of data Pricing

→ Pay only for the services you consume, with no large upfront expenses.

→ Onpremises : pay alot for building them, then maintaining them.

AWS : Only pay for Services you consume

→ Amount paid on AWS reduces when more services are used:



(2) Pay less by using more

→ Volume based Discounts :

- ∴ Savings as usage increases
- Tiered pricing for services like Amazon Simple Storage Service (S3), Amazon EBS, or Amazon EFS
  - ↳ The more you use, the less you pay per GB.

** • Multiple storage services deliver lower storage costs, based on needs.

Ex Aws storage services offer options to lower prices based on how frequently you access your data.

(3.) Pay even less as AWS Grows

As AWS grows:

- AWS focuses on reducing costs by ~~&~~ doing business.
- This practice results in AWS passing savings from economies of scale to you
- Since 2006, AWS lowered pricing by ~75 times (as of Sept. 2019)
- Further high performing resources replace current resources for no extra charge.

AWS Free Tier (for beginners)

Enables you to gain free hands-on experience with AWS platform, products & services. Free for 1 year for new customers.

1. Sign up for an AWS Account
2. Learn with 10 min tutorials
3. Start building with AWS.

Services with No charge

1.) Amazon VPC
2.) Elastic Beanstalk*
3.) Auto Scaling*
4.) AWS Cloud Formation*
5.) AWS Identity and Access Management (IAM)

* → might have charges Associated with Other AWS Services that are used with these services. Ex when auto scaling EC2 instances, they will be charged, but the scaling will be free.

(II) Total cost of Ownership

§ How do you compare onpremises to cloud implementations?

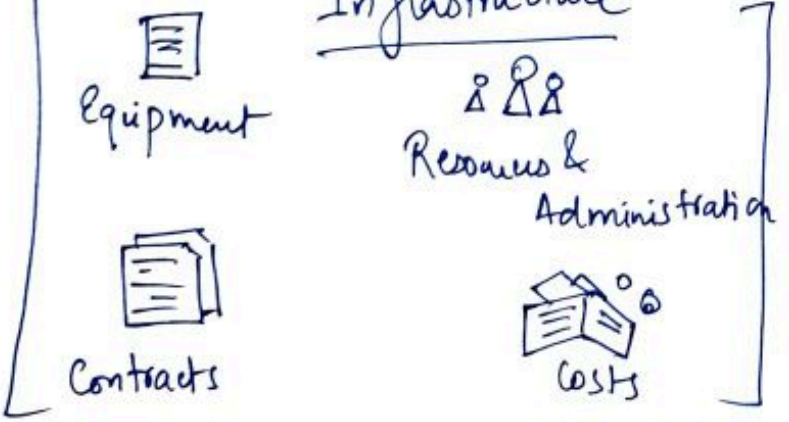
→ The difference b/w these two options is how they are deployed.

Onpremises

- Installed on companies own computers & ~~infrastructures~~ servers
- Has fixed costs like capital expenses (like facilities, hardware, licenses, & maintenance staff)
- Expensive in scaling up. ↑

  Doesn't reduce costs in Scaling down. ↓

Traditional Infrastructure



→ To estimate its costs, see in long-term & capital expenses

→ Owner has to ~~buy~~ buy, manage, ~~refresh~~ build & refresh resources over time.

AWS Cloud

- This infrastructure is purchased from a service provider.
- They maintain & builds everything
- Customer Pays for what is used.
- Simple to scale up/down.

AWS Cloud

→ Estimation of its cost is based on consumption

→ flexible, agile.

Q How to identify the best option?

→ Identify best option by comparing on premises soln to a cloud soln :-

Total Cost of Ownership (TCO)

Def: TCO is the financial estimate to help identify direct & indirect costs of a system.

It includes :-

$$TCO = \left[\begin{array}{c} \text{Cost of} \\ \text{a service} \end{array} + \begin{array}{l} \text{All costs} \\ \text{associated with} \\ \text{owning the service.} \end{array} \right]$$

→ Why use TCO?

- In cloud, TCO ~~instructs~~ is used to compare costs of running an ~~Entire~~ infrastructure environment or specific workload ~~&~~ on-premises v/s on AWS.
- To budget & build the business case for moving the cloud.

TCO Considerations

1.) Server Costs

- Hardware : Server, rack chassis, power distribution units (PDUs), top of rack (TOR), switches (and maintenance)
- Software : OS, Virtualization licenses (and maintenance)
- Facilities cost (Expanded below)

2.) Storage Costs

- Hardware : Storage disks, storage area networkes (SAN) or Fibre Channel (FC), switches.
- Storage Administration costs
- Facilities cost (Expanded below)

3.) Network Costs

- Network hardware : LAN, Load balancers ~~do~~ bandwidth costs.
- Network administration costs.
- facilities costs

Space	Power	Cooling

4.) IT Labor costs

- Server Admin costs.

Case Study — AWS

Delaware North — Food & Hospitality Company

Background:
- 200 + locations
- 500 mil. customers, $ 3 billion Annual revenue.

challenge:
- Meet demand to rapidly deploy new soln's
- Constant upgrade aging equipment

criteria:
- Have a broad soln to handle all workloads
- Be able to modify processes to improve efficiency & lower costs.
- Eliminate busy work (like patching software)
- Achieve a positive Return on Investment (ROI)

Soln:
- Moved their on premises data centre to AWS.
  - ↳ Eliminated 205 servers (90%.)
  - ↳ Moved almost all applications to AWS.
- Used 3-year Amazon EC2 Reserved Instances

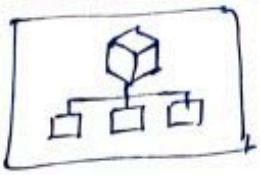
Results:

Resource Optimization
- → Robust security Compliance
- → Enhanced disaster recovery
- → Increased Computing Capacity

Speed to market
- → One day to provision new businesses
- → Only minutes to push out a service

Operational Efficiency
- → continuous cost optimization & reduction.

(III) AWS Organizations



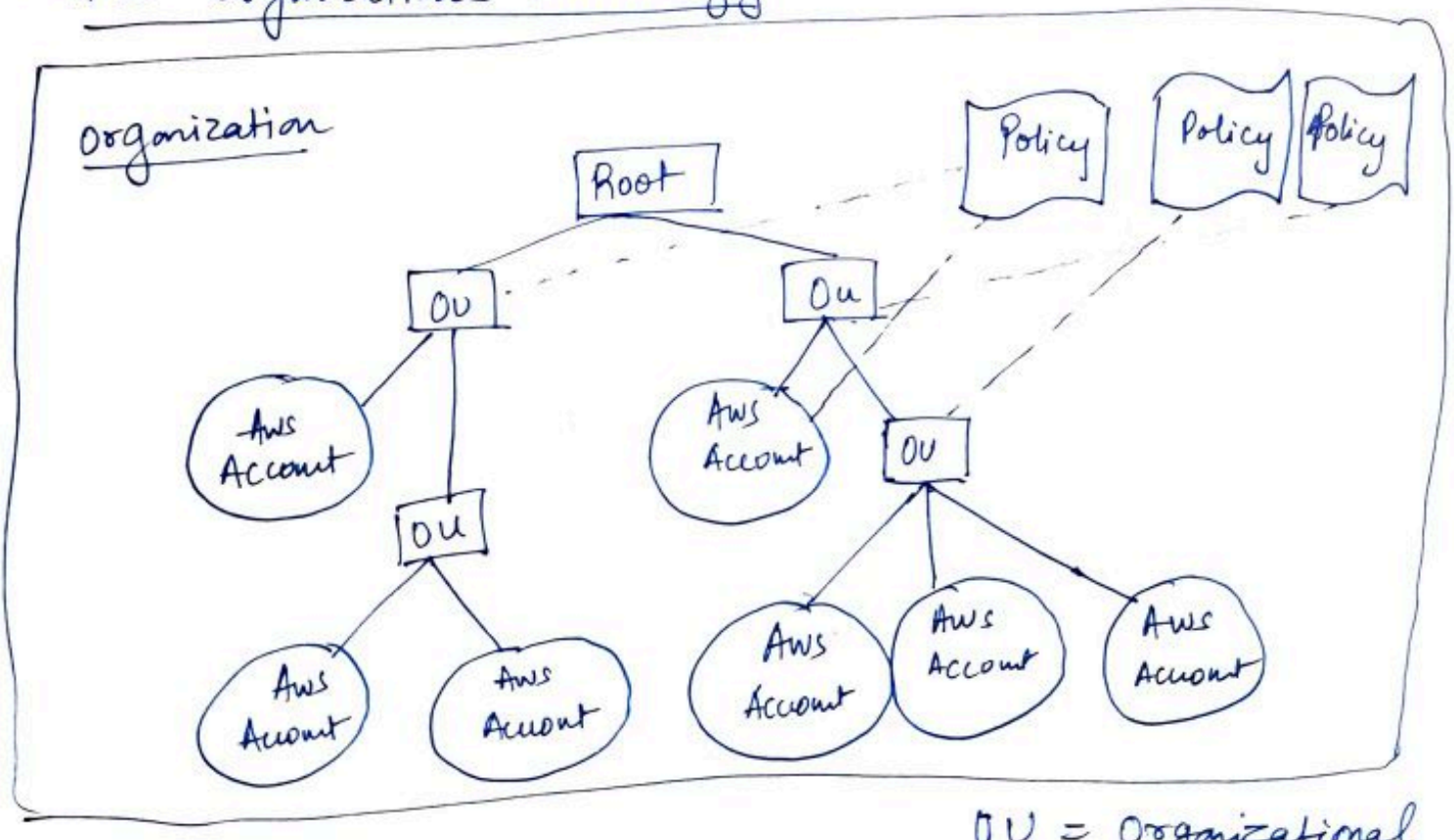
Sometimes, it is preferred to have seperate AWS accounts for each team/department. To manage all the Accounts together, we use AWS organisations. It helps with consolidated billing of multiple accounts.

Def: AWS Organizations is a free account management service that enables you to consolidate multiple AWS accounts into an organizational tree, with each branch representing a department/team.

→ Consolidated billing

→ organizational security management capabilities

→ AWS Organizations Terminology



OU = Organizational Units

- OU : A branch for accounts
- Upside down tree
- A & branch can have only one parent & each member can be a part of only one branch

→ Key Benefits

- Policy - based Account Management
- Group based Account Mangement
- Application Programming interfaces (APIs) that automate account mangement
- Consolidated billing.

→ Security with AWS Organizations

- Control Access with AWS IAM
  - ↳ IAM Policies enable you to Allow/deny access to AWS services ~~from~~ for users/groups/roles.
- Service Control Policies (SCPs) enable you to Allow/deny access to AWS services for Individual/Group accounts in an organizational unit (OU).

(*) IAM cannot restrict the AWS Account itself.

∴ In organizations, we use SCPs for Allowing/denying access to AWS services for AWS accounts directly or group of accounts in an OU.

→ Organizations Setup

Step1 → Step2 → Step3 → Step4

Create Organization

Create organizational Units

create Servile Control Policies (SCPs)

Test restrictions

→ How to manage/Access AWS organizations?

- AWS management Console (browser based Interface)
- AWS Command Line Interface (AWS CLI) tools
- Software development Kits (SDKs)
- HTTPs Query ~~Application~~ APIs.

(IV) AWS Billing & Cost management

Def: It is a service that you use to pay your AWS bill, monitor your usage & budget your expenses.

Features:

→ Forcast & obtain a better idea of what your costs & usage might be in the future, so that you can plan ahead.

→ Set custom time period, to views your data monthly/annually/daily.

→ filter & Grouping to analyze data further.

→ AWS cost & Usage report tool: Helps identify opportunities for optimization, by understanding cost & Usage data trends & How you are using AWS implementation.

→ AWS billing Dashboard: Helps view status of AWS expenses & see services that account for overall monthly bill.

↳ Spend Summary Graph: Previous Spending, ~~Estimates~~ Estimated cost for month-to-date & forecast for how much you'll spend this month

↳ month-to-date Spend by Service Graph:

- Top services used & proportion of costs attributed to that service.

↳ Tools :

(1.) Aws Budgets :

(2.) Aws Cost & Usage Report

(3.) Aws Cost Explorer.

→ Aws Bills Page : lists the costs that incurred over the past month with each Aws service with a further breakdown by Aws region & linked account.

Monthly Bill

- Bills : Detailed costs
- Cost Explorer : Visualize spending
- Budgets : Notify when budget is crossed. using email / Amazon SNS (Simple Notification Service)
- Reports : Comprehensive information of Aws costs & Usage.

(V) Technical Support Models

→ Provide Unique combination of tools & expertise:

- Aws Support
- Aws Support plans

→ Support is provided for:

- Experimenting with Aws
- Production use of Aws
- Business critical use of Aws.

→ Support Provides the right tools to help the user succeed.

→ Proactive Guidance:

- Technical Account Manger (TAM) (POC, helps ready in whole process of- plan, deploy, execute)

→ * Best Practices:

- Aws Trusted Advisor (Automated Sevice, like a customized cloud Expert, Tells whats right/not)

→ Account Assistance:

- Aws Support Concierge (Billing & Account Expert) non technical billing enquiries

→ Support Plans

1. Basic Support (Free):
   - Resource Center access
   - Service Health Dashboard
   - Product FAQs
   - Discussia forums
   - Support for health checks
2. DeveloperSupport:
   - Support for early development on Aws.

3. Business Support : Customers that run production workloads

4. Enterprise Support : Customers that run business & mission critical workloads.

↳ (TAM only available here)

→ Case Security & Response times

	Critical (Business at risk)	Urgent (Imp Apps not functioning)	High (Impaired Imp apps)	Normal (Abnormal Activity)	Low (General Queries / Feature)
Basic	— None —				
Dev Plan (Business Hrs)				12hr or less	24 hr or less
Business Plan (24/7)		1hr/less	4 hr/less	12 hr/less	24 hr/less
Enterprise Plan (24/7)	15 min/. less	1hr/ less	4 hr/ less	12hr/ less	24 hr/ less