

ĐIỆN TOÁN ĐÁM MÂY

Bài 3. Định giá

Nguyễn Thành Trung
trung.nguyenthanh@phenikaa-uni.edu.vn

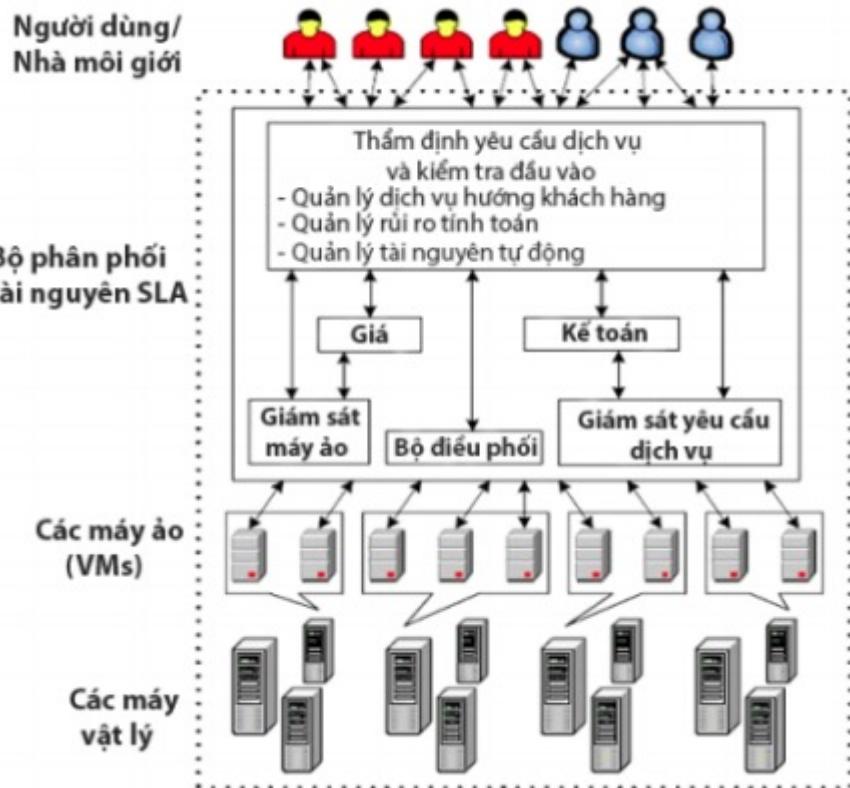
KTĐM HƯỚNG THỊ TRƯỜNG

- Một trong những bài toán quan trọng của ĐTĐM là định giá cho tài nguyên để cho thuê.
 - Định giá cố định: Nhà cung cấp sẽ xác định rõ đặc tả về khả năng tính toán cố định (dung lượng bộ nhớ được cấp phát, loại CPU và tốc độ...).
 - Định giá theo đơn vị sử dụng: được áp dụng phổ biến cho lượng dữ liệu truyền tải, dung lượng bộ nhớ được cấp phát và sử dụng,... => uyển chuyển hơn cách ĐGCĐ.
 - Định giá theo thuê bao: ứng dụng phần lớn trong mô hình dịch vụ phần mềm (SaaS); người dùng sẽ tiên đoán trước định mức sử dụng ứng dụng cloud (tuy nhiên cách này thường khó đạt được độ chính xác cao).

KTĐM HƯỚNG THỊ TRƯỜNG

Kiến trúc Market-oriented cloud:

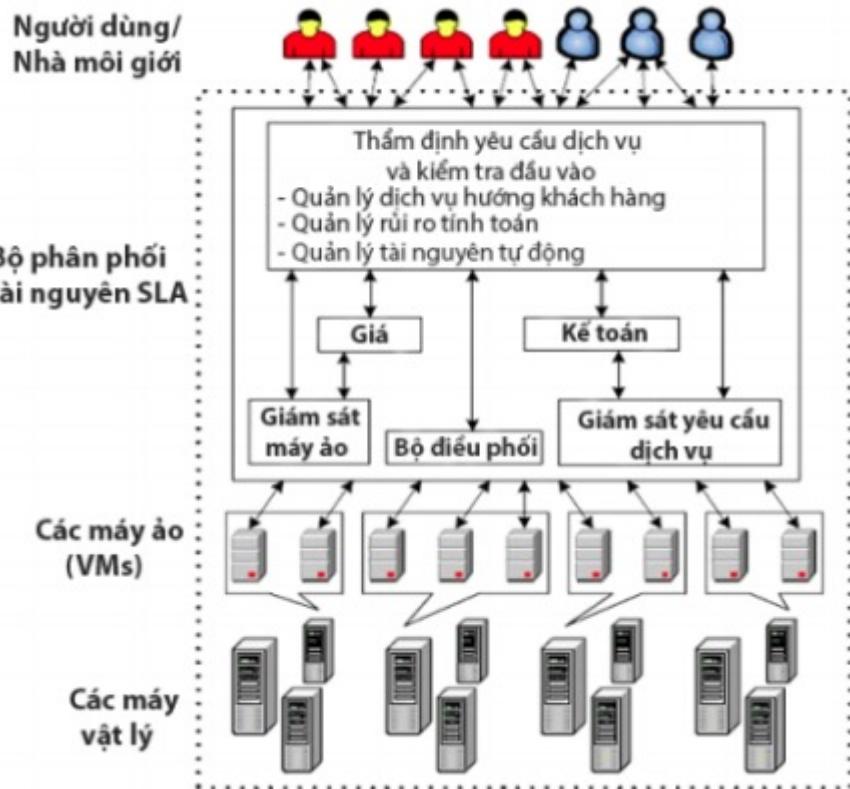
- User/Broker (Người dùng/Nhà môi giới): gửi yêu cầu dịch vụ từ bất kỳ đâu tới Cloud để được xử lý.
- SLA Resource Allocator (Bộ phân phối tài nguyên SLA): đóng vai trò như một trung gian giữa các nhà cung cấp Cloud với người dùng/nhà môi giới bên ngoài.



KTĐM HƯỚNG THỊ TRƯỜNG

Kiến trúc Market-oriented cloud:

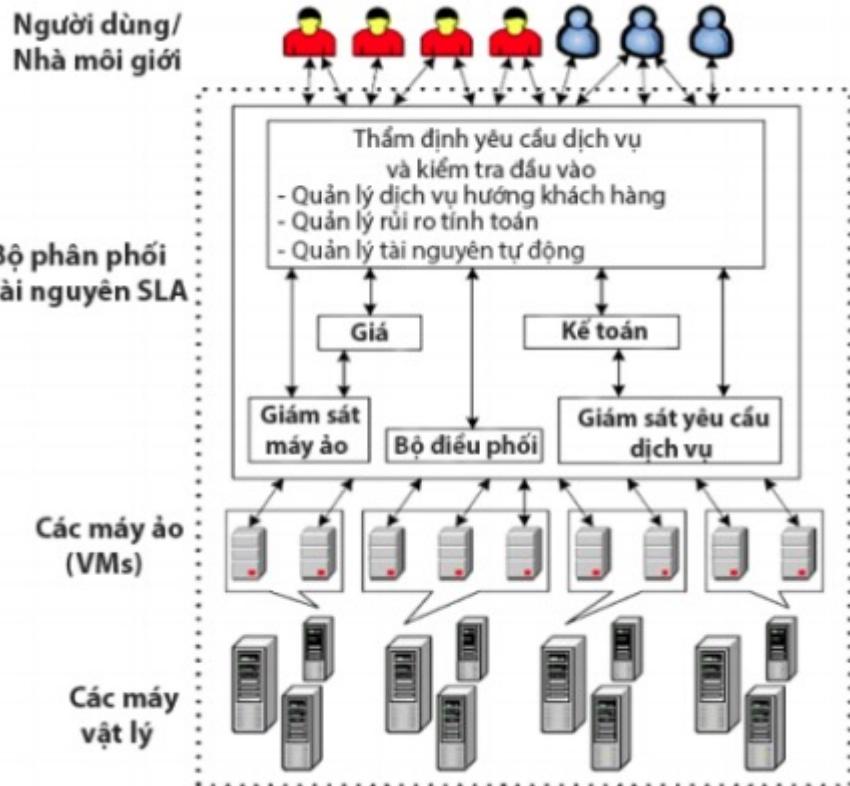
- VMs (các máy ảo virtual machine): Nhiều máy ảo có thể được mở và tắt tự động trên một máy vật lý để phù hợp với yêu cầu dịch vụ từ phía người dùng/nhà môi giới bên ngoài cũng như phù hợp với việc sử dụng hiệu quả tài nguyên từ phía nhà cung cấp cloud.
- Physical Machines (các máy vật lý): Các máy vật lý chính là tài nguyên hạ tầng của nhà cung cấp cloud. Các máy tính vật lý này chạy firmware hypervisor để cấp phát và chạy các máy ảo theo yêu cầu.



KTĐM HƯỚNG THỊ TRƯỜNG

Service Level Agreement

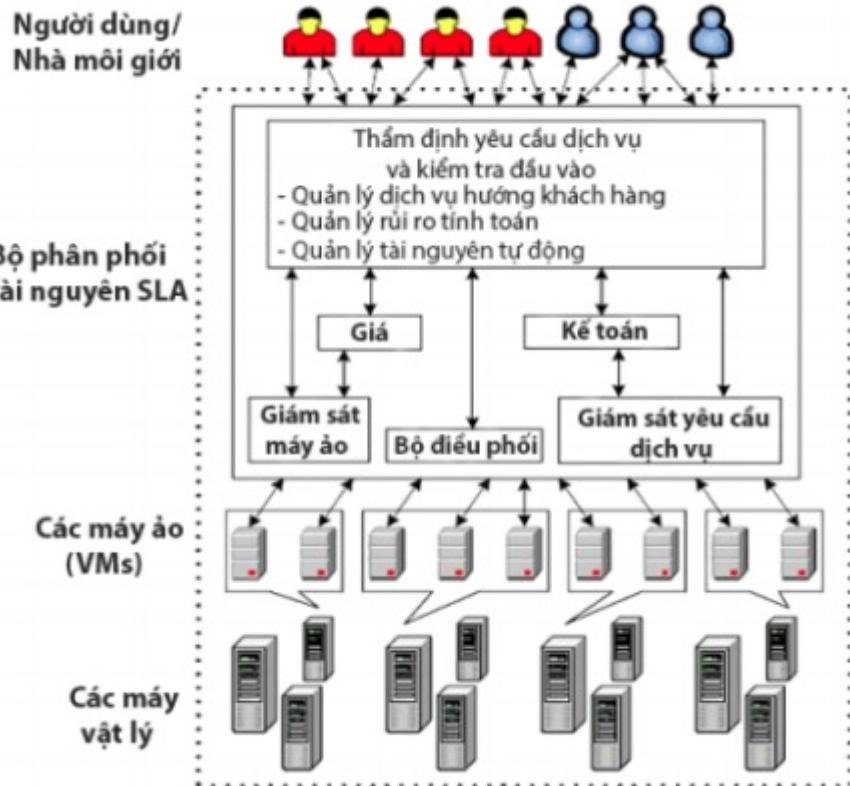
- Service Request Examiner and Admission Control:
Khi một yêu cầu dịch vụ được gửi lên lần đầu sẽ
được phiên dịch thành các yêu cầu về chất lượng
dịch vụ QoS trước khi xác định xem yêu cầu đó
được chấp nhận hay từ chối
- Pricing: Cung cấp cơ chế quyết định cách các yêu
cầu dịch vụ được tính phí sử dụng
- Accounting: Cung cấp cơ chế theo dõi lưu lượng
tài nguyên được sử dụng để tính chi phí cho
người dùng



KTĐM HƯỚNG THỊ TRƯỜNG

Service Level Agreement

- VM Monitor: Cung cấp cơ chế lưu vết, giám sát những máy ảo đang sử dụng và các thông tin về tài nguyên của chúng.
- Dispatcher: Cung cấp cơ chế bắt đầu thực thi việc cấp phát máy ảo cho những yêu cầu dịch vụ được chấp nhận.
- Service Request Monitor: Cung cấp cơ chế lưu vết tiến trình yêu cầu dịch vụ.



AWS Academy Cloud Foundations

Cloud Economics and Billing

Module overview

Topics

- Các nguyên tắc cơ bản về định giá
- Tổng chi phí sở hữu
- Quản lý chi phí và hoá đơn trên AWS
- Technical Support

Activities

- Tính toán chi phí AWS

Module objectives

After completing this module, you should be able to:

- Explain the AWS pricing philosophy
- Recognize fundamental pricing characteristics
- Indicate the elements of total cost of ownership
- Discuss the results of the AWS Pricing Calculator
- Identify how to set up an organizational structure that simplifies billing and account visibility to review cost data.
- Identify the functionality in the AWS Billing Dashboard
- Describe how to use AWS Bills, AWS Cost Explorer, AWS Budgets, and AWS Cost and Usage Reports
- Identify the various AWS technical support plans and features

AWS pricing model

Three fundamental drivers of cost with AWS

Compute

- Charged per hour/second*
- Varies by instance type

*Linux only

Storage

- Charged typically per GB

Data transfer

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

How do you pay for AWS?

Pay for what you use



Pay less when you reserve



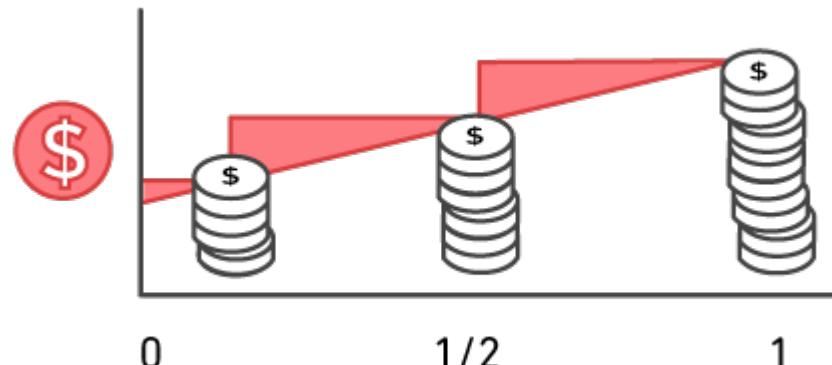
Pay less when you use more and as AWS grows



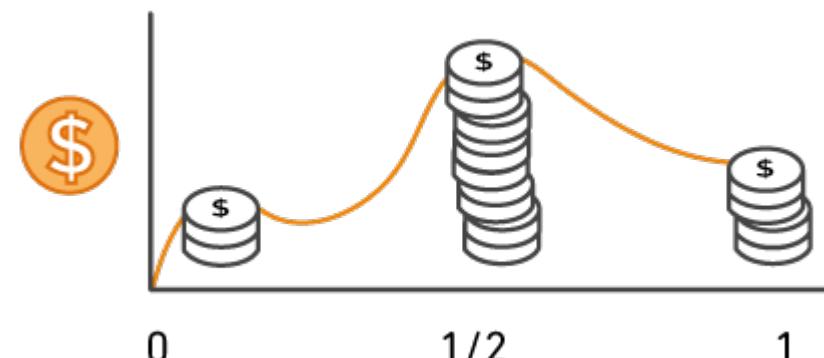
Pay for what you use

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

On premises



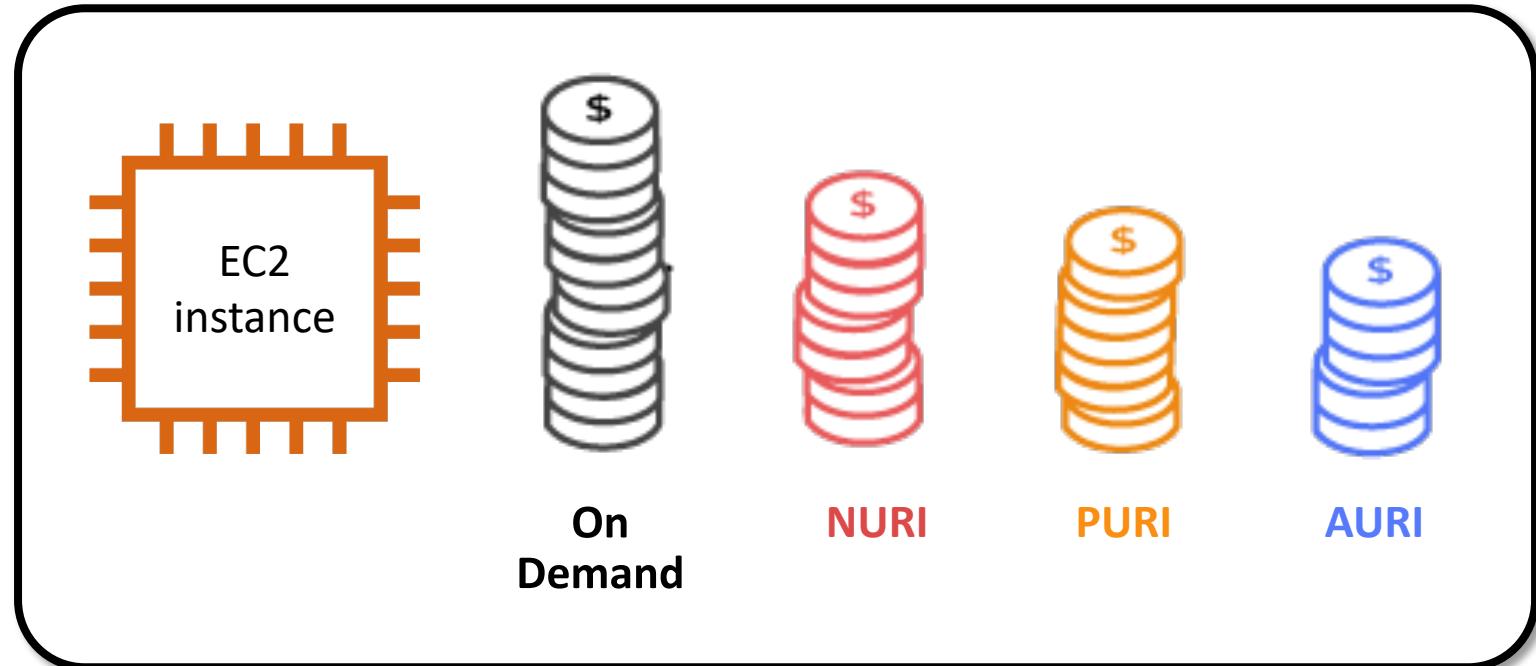
AWS



Pay less when you reserve

Invest in Reserved Instances (RIs):

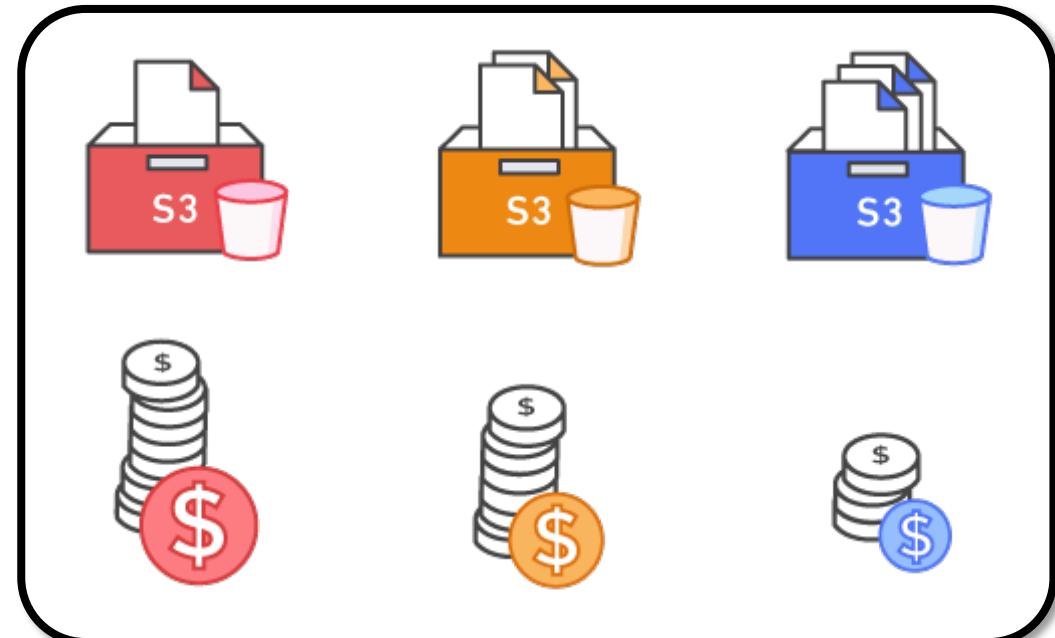
- Save up to 75 percent
- Options:
 - All Upfront Reserved Instance (**AURI**) → largest discount
 - Partial Upfront Reserved Instance (**PURI**) → lower discounts
 - No Upfront Payments Reserved Instance (**NURI**) → smaller discount



Pay less by using more

Realize volume-based discounts:

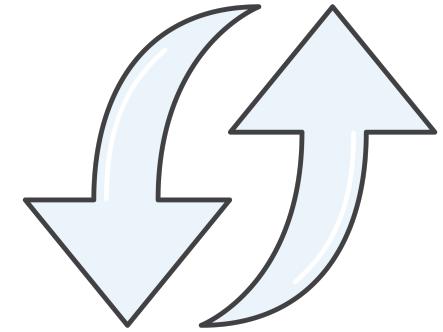
- **Savings** as usage increases.
- **Tiered pricing** for services like Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), or Amazon Elastic File System (Amazon EFS) → the more you use, the less you pay per GB.
- Multiple storage services deliver **lower** storage costs based on needs.



Pay even less as AWS grows

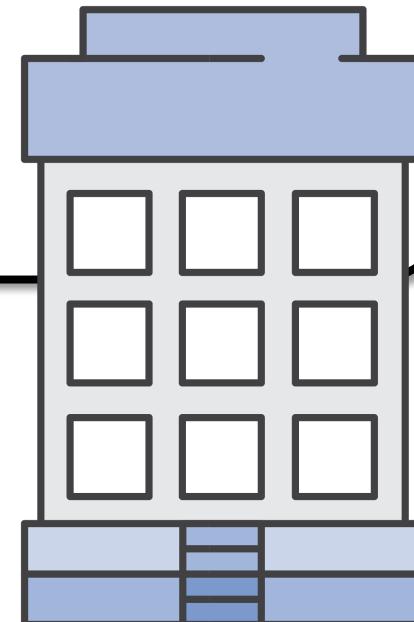
As AWS grows:

- AWS focuses on lowering cost of doing business.
- This practice results in AWS passing savings from economies of scale to you.
- Since 2006, AWS has **lowered pricing 75 times** (as of September 2019).
- Future higher-performing resources replace current resources for no extra charge.



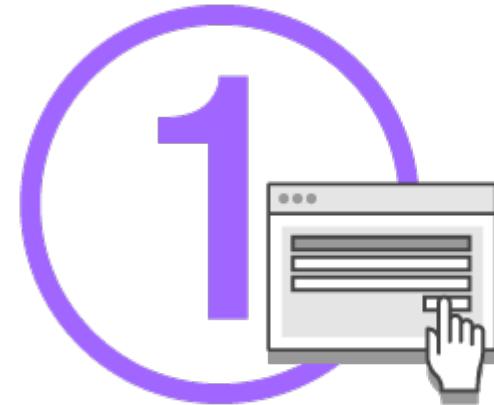
Custom pricing

- Meet varying needs through custom pricing.
- Available for high-volume projects with unique requirements.



AWS Free Tier

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



Sign up for an AWS account



Learn with 10-minute tutorials



Start building with AWS

Services with no charge



Amazon VPC



Elastic Beanstalk**



Auto Scaling**



AWS CloudFormation**



AWS Identity and Access Management (IAM)

****Note:** There might be charges associated with other AWS services that are used with these services.

Key takeaways



- There is no charge (with some exceptions) for:
 - Inbound data transfer.
 - Data transfer between services within the same AWS Region.
- Pay for what you use.
- Start and stop anytime.
- No long-term contracts are required.
- Some services are free, but the other AWS services that they provision might not be free.

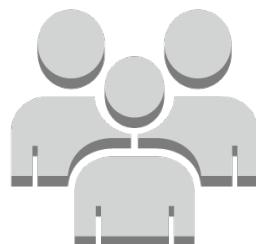
Module 2: Cloud Economics and Billing

On-premises versus cloud

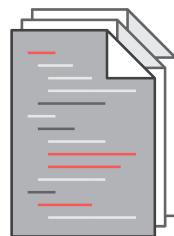
Traditional Infrastructure



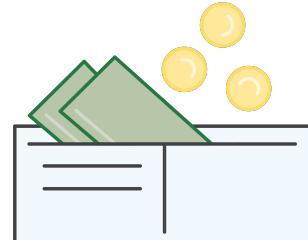
Equipment



Resources and administration



Contracts



Cost



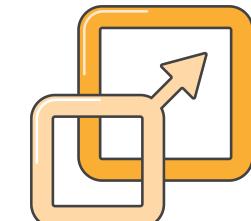
AWS Cloud



No upfront expense—pay for what you use



Improve time to market and agility



Scale up and down



Self-service infrastructure

What is Total Cost of Ownership (TCO)?

Total Cost of Ownership (TCO) is the financial estimate to help identify direct and indirect costs of a system.

Why use TCO?

- To compare the costs of running an **entire infrastructure environment or specific workload** on-premises versus on AWS
- To budget and **build the business case** for moving to the cloud



TCO considerations

1

Server Costs

Hardware: Server, rack chassis power distribution units (PDUs), top-of-rack (TOR) switches (and maintenance)

Software: Operating system (OS), virtualization licenses (and maintenance)

Facilities cost

Space

Power

Cooling

2

Storage Costs

Hardware: Storage disks, storage area network (SAN) or Fibre Channel (FC) switches

Storage administration costs

Facilities cost

Space

Power

Cooling

3

Network Costs

Network hardware: Local area network (LAN) switches, load balancer bandwidth costs

Network administration costs

Facilities cost

Space

Power

Cooling

4

IT Labor Costs

Server administration costs

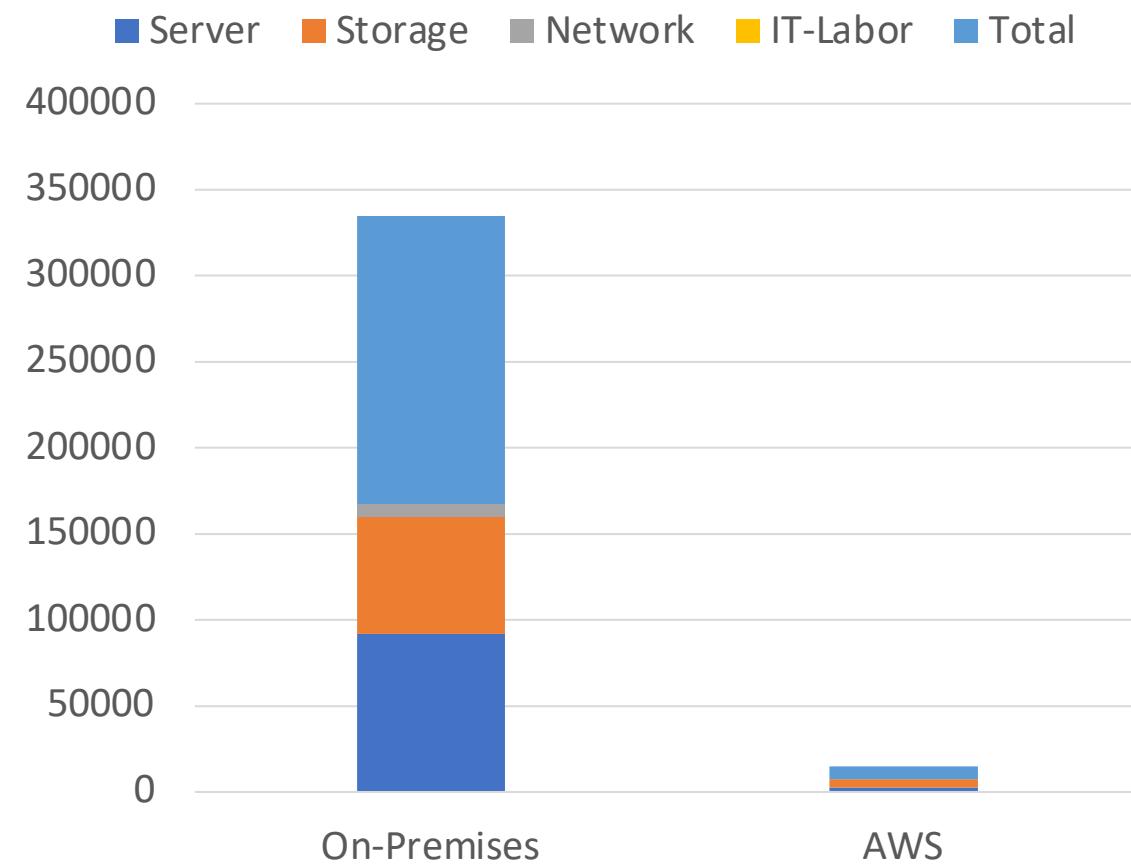
On-premises versus all-in-cloud

You could save up to **96 percent** a year by moving your infrastructure to AWS.

Your 3-year total savings would be **\$159,913**.

3-Year Total Cost of Ownership		
	On-Premises	AWS
Server	\$91,922	\$2,547
Storage	\$67,840	\$4,963
Network	\$7,660	\$-----
IT – Labor	\$ ----- --	\$-----
Total	\$167,422	\$7,509

AWS cost includes business-level support and
a 3-year PURI EC2 instance



AWS Pricing Calculator

Use the AWS Pricing Calculator to:

- Estimate monthly costs
- Identify opportunities to reduce monthly costs
- Model your solutions before building them
- Explore price points and calculations behind your estimate
- Find the available instance types and contract terms that meet your needs
- Name your estimate and create and name **groups** of services

The screenshot shows the AWS Pricing Calculator homepage. At the top, there's a dark header with the title "AWS Pricing Calculator" and a subtext "Estimate the cost for your architecture solution." Below this is a section titled "How it works" with four steps: 1. "AWS Pricing Calculator" (with a brief description: "Estimate the cost of AWS products and services"), 2. "Add services" (with a brief description: "Search and add AWS services that you need"), 3. "Configure service" (with a brief description: "Enter the details of your usage to see service costs"), and 4. "View estimate totals" (with a brief description: "See estimated costs per service, service group, and totals"). To the right of the main content area are several sidebar sections: "Create an estimate" (with a button "Create estimate" and a subtext about starting with no commitment), "Getting started" (with links to "What is the AWS Pricing Calculator?", "Getting started", and "Generating estimates"), and "More resources" (with links to "User guide", "FAQs", "Pricing assumptions and variations", and "Need help with estimation? Connect with AWS certified expert on AWS IQ").

Access the [AWS Pricing Calculator](#)

Reading an estimate

Your estimate is broken into: first 12 months total, total upfront, and total monthly.

AWS Pricing Calculator > My Estimate

My Estimate Info Add service Add support Add group Clear estimate Action ▾ Save and share

First 12 months total	Total upfront	Total monthly
886.92 USD	0.00 USD	73.91 USD

Services (2)

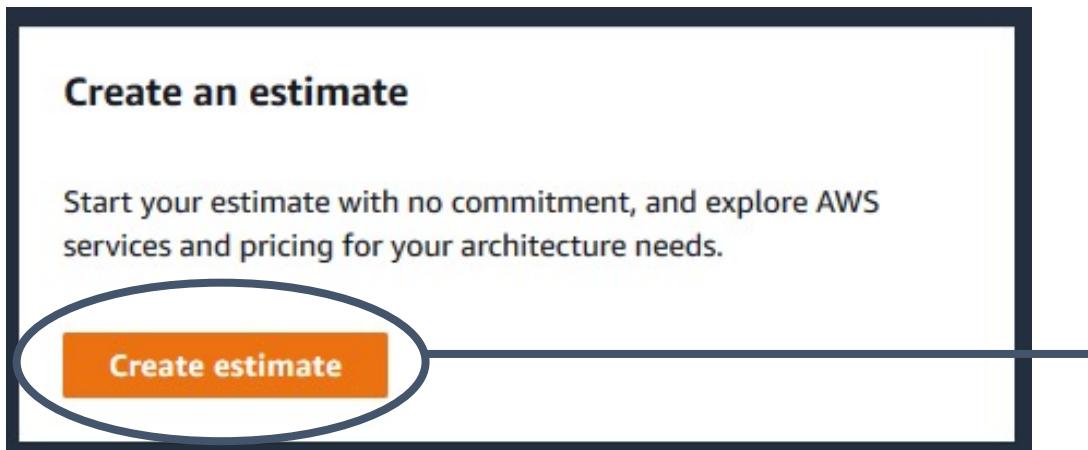
Amazon Simple Storage Service (S3) Region: US East (Ohio)	Edit	Action ▾
S3 Standard storage (100 GB per month)	Monthly:	2.37 USD

Amazon EC2
Region: US East (Ohio)

Quick estimate <small>Operating system (Linux), Quantity (1), Pricing strategy (EC2 Instance Savings Plans 1 Year No Upfront), Storage for each EC2 instance (General Purpose SSD (gp2)), Storage amount (100 GB), Instance type (t4g.xlarge)</small>	Monthly:	71.54 USD
---	----------	-----------

Activity: AWS Pricing Calculator activity

- Break up into groups of four or five and use the [AWS Pricing Calculator](#) and specifications provided to develop a cost estimate.
- Be prepared to report your findings back to the class.



[AWS Pricing calculator website](#)

The screenshot shows the 'Select service' step of the AWS Pricing calculator. It displays a search bar for 'AWS services (63)' and a list of services. The 'Amazon API Gateway' service is selected and expanded, showing its description, a 'Product page' link, and a 'Configure' button. Other services like 'Amazon Athena' and 'Amazon Aurora PostgreSQL-Compatible DB' are also partially visible.

Additional benefit considerations

Hard benefits

- Reduced spending on compute, storage, networking, security
- Reductions in hardware and software purchases (capex)
- Reductions in operational costs, backup, and disaster recovery
- Reduction in operations personnel



Soft Benefits

- Reuse of service and applications that enable you to define (and redefine solutions) by using the same cloud service
- Increased developer productivity
- Improved customer satisfaction
- Agile business processes that can quickly respond to new and emerging opportunities
- Increase in global reach

Case study: Total Cost Of Ownership (1 of 6)



Background:

- Growing global company with over 200 locations
- 500 million customers, \$3 billion annual revenue

Case study: Total Cost of Ownership (2 of 6)



Background:

- Growing global company with over 200 locations
- 500 million customers, \$3 billion annual revenue

Challenge:

- Meet demand to rapidly deploy new solutions
- Constantly upgrade aging equipment

Case study: Total Cost of Ownership (3 of 6)



Background:

- Growing global company with over 200 locations
- 500 million customers, \$3 billion annual revenue

Challenge:

- Meet demand to rapidly deploy new solutions
- Constantly upgrade aging equipment

Criteria:

- Broad solution to handle all workloads
- Ability to modify processes to improve efficiency and lower costs
- Eliminate busy work (such as patching software)
- Achieve a positive return on investment (ROI)

Case study: Total Cost of Ownership (4 of 6)



Background:

- Is a growing global company with over 200 locations
- Have 500 million customers, \$3 billion (USD) annual revenue

Challenge:

- Meet demand to rapidly deploy new solutions
- Constantly upgrade aging equipment

Criteria:

- Have a broad solution to handle all workloads
- Be able to modify processes to improve efficiency and lower costs
- Eliminate busy work (such as patching software)
- Achieve a positive return on investment (ROI)

Solution:

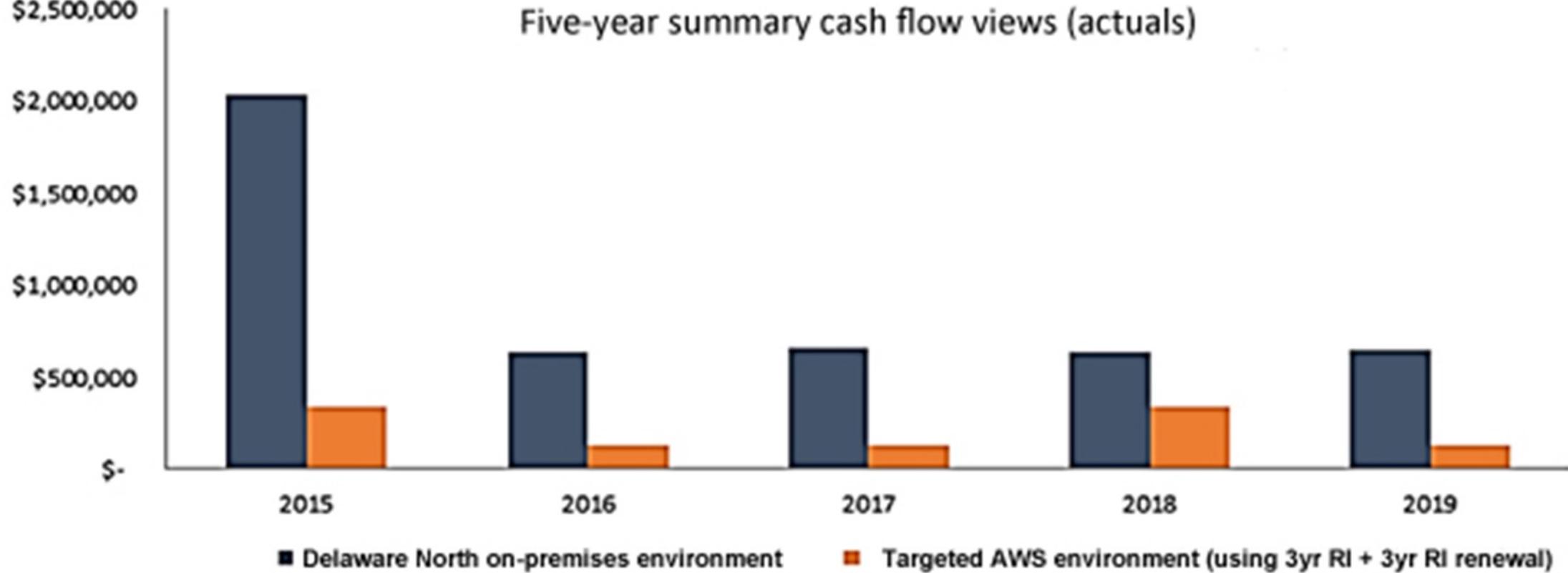
- Moved their on-premises data center to AWS
 - Eliminated 205 servers (90 percent)
 - Moved nearly all applications to AWS
 - Used 3-year Amazon EC2 Reserved Instances

Case study: Total Cost of Ownership (5 of 6)



Cost comparison: On-premises data center vs. AWS

Five-year summary cash flow views (actuals)



Case study: Total Cost of Ownership (6 of 6)



Results:



Resource optimization

- Robust security compliance
- Enhanced disaster recovery
- Increased computing capacity

Speed to market

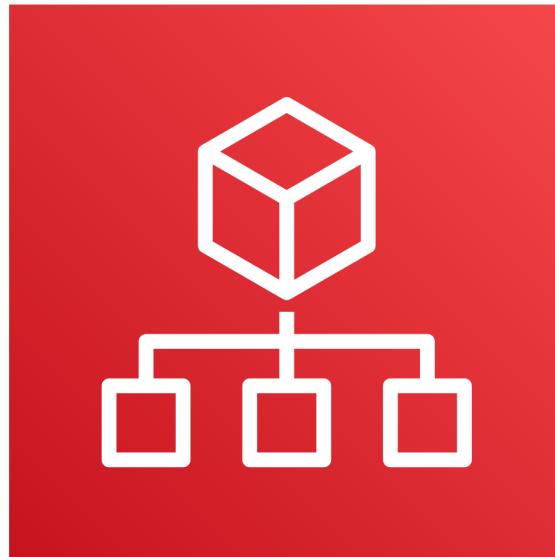
- One day to provision new businesses
- Just minutes to push out a service

Operational efficiency

- Continuous cost optimization and reduction

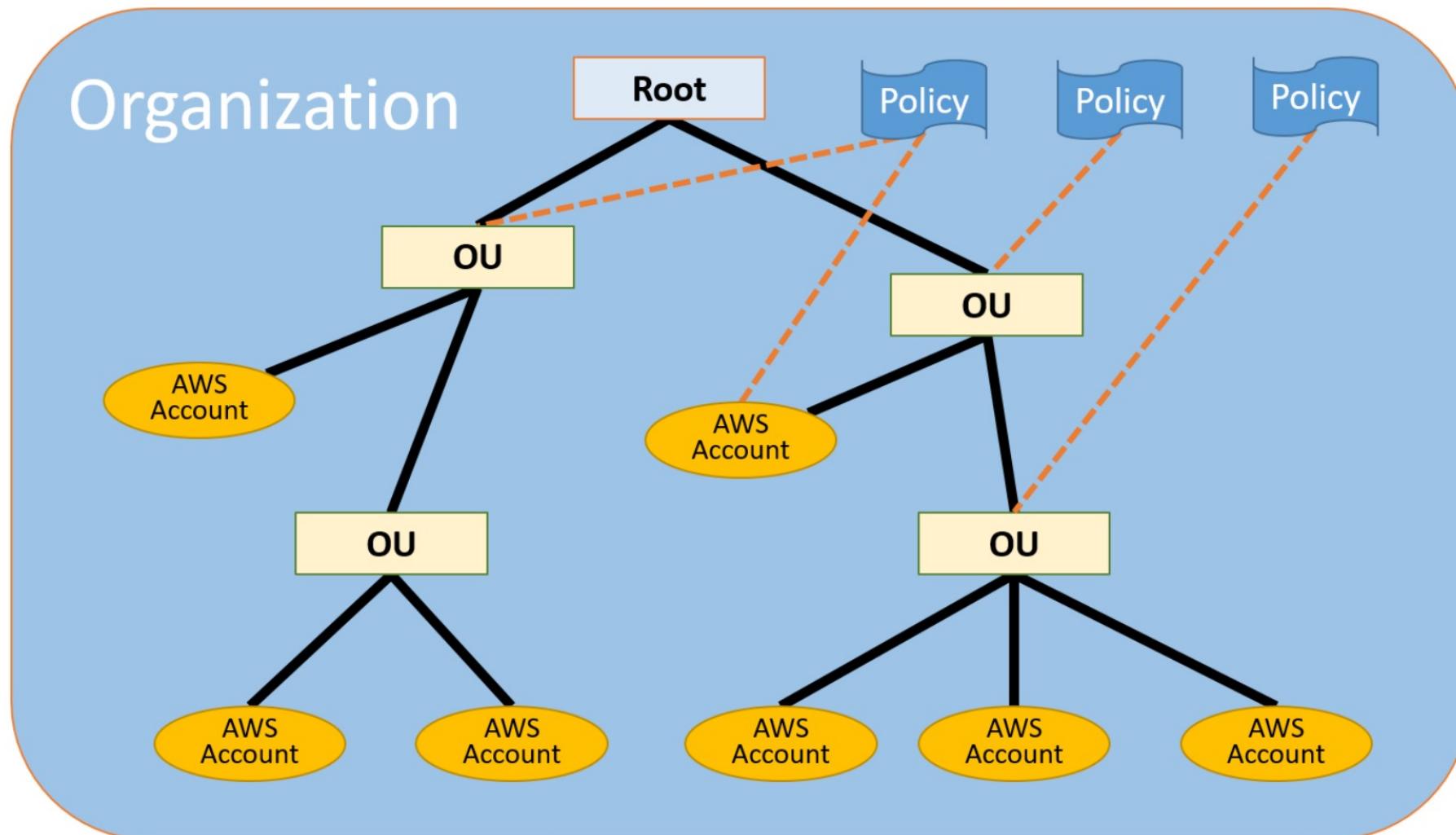
Module 2: Cloud Economics and Billing

Introduction to AWS Organizations



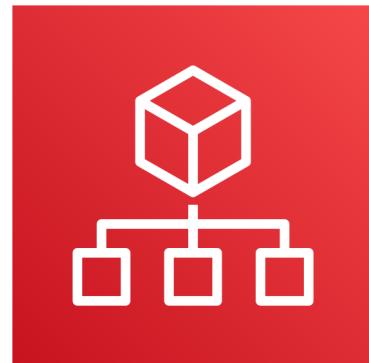
AWS Organizations

AWS Organizations terminology



*Organizational Units (OUs)

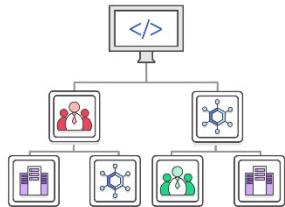
Key features and benefits



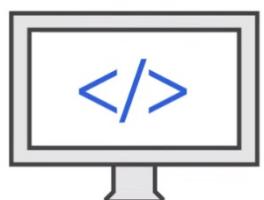
AWS
Organizations



Policy-based account management



Group based account management

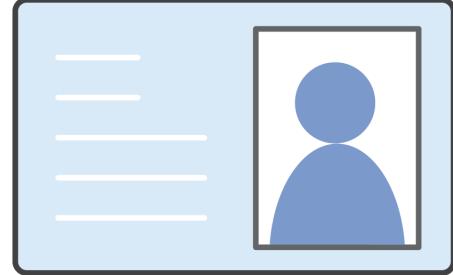


Application programming interfaces (APIs)
that automate account management



Consolidated billing

Security with AWS Organizations



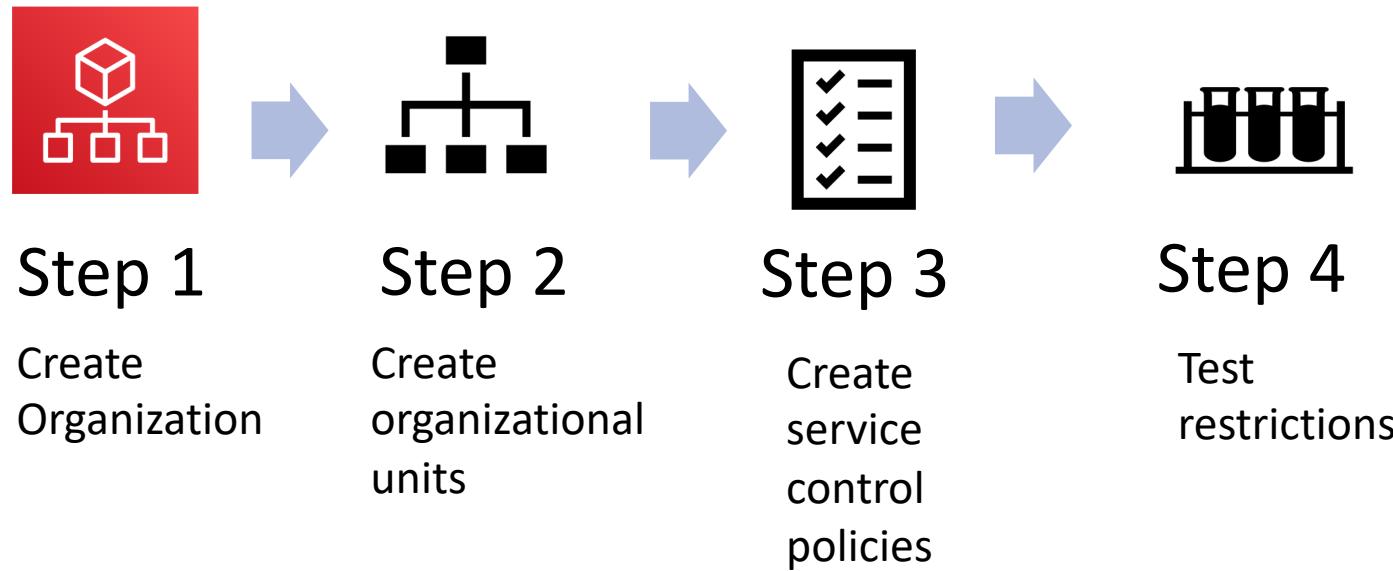
Control access with AWS Identity and Access Management (IAM).

IAM policies enable you to allow or deny access to AWS services for users, groups, and roles.



Service control policies (SCPs) enable you to allow or deny access to AWS services for individuals or group accounts in an organizational unit (OU).

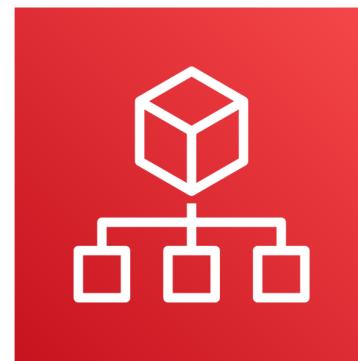
Organizations setup



Limits of AWS Organizations

Limits		
Limits on Names	Names must be composed of Unicode characters. Names must not exceed 250 characters in length.	
Maximum and Minimum Values	Number of AWS accounts	Varies. Note: An invitation sent to an account counts against this limit.
	Number of roots	1
	Number of OUs	1,000
	Number of policies	1,000
	Maximum size of a service control policy document	5,120 bytes
	Maximum nesting of OUs in a root	5 levels of OUs under a root
	Invitations sent per day	20
	Number of member accounts you can create concurrently	Only five can be in progress at one time
	Number of entities to which you can attach a policy	Unlimited

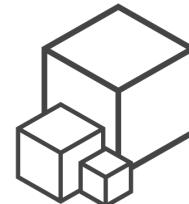
Accessing AWS Organizations



AWS
Organizations



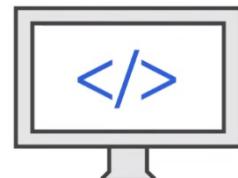
AWS Management Console



AWS Command Line
Interface (AWS CLI) tools



Software development kits
(SDKs)



HTTPS Query application
programming interfaces (API)

Module 2: Cloud Economics and Billing

Introducing AWS Billing and Cost Management



AWS Billing Dashboard

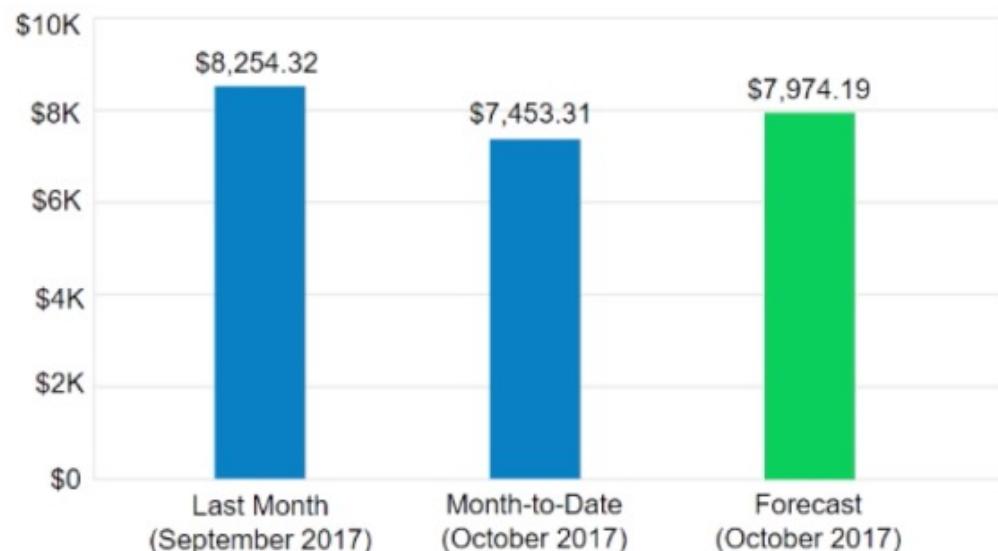
Billing & Cost Management Dashboard

Spend Summary

Welcome to the AWS Account Billing console. Your last month, month-to-date, and month-end forecasted costs appear below.

Current month-to-date balance for October 2017

\$7,453.41

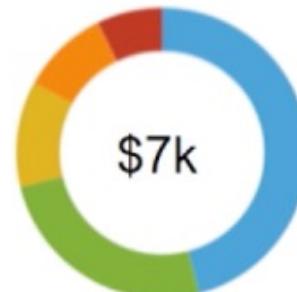


Cost Explorer

Monthly-to-Date Spend by Service

Bill Details

The chart below shows the proportion of costs spent for each service you use.



EC2	\$3,700.71
RDS	\$1,876.36
ElastiCache	\$938.18
DynamoDB	\$625.44
Other Services	\$312.57
Tax	\$0.16

Tools



AWS Budgets



AWS Cost and Usage Report



AWS Cost Explorer

Monthly bills

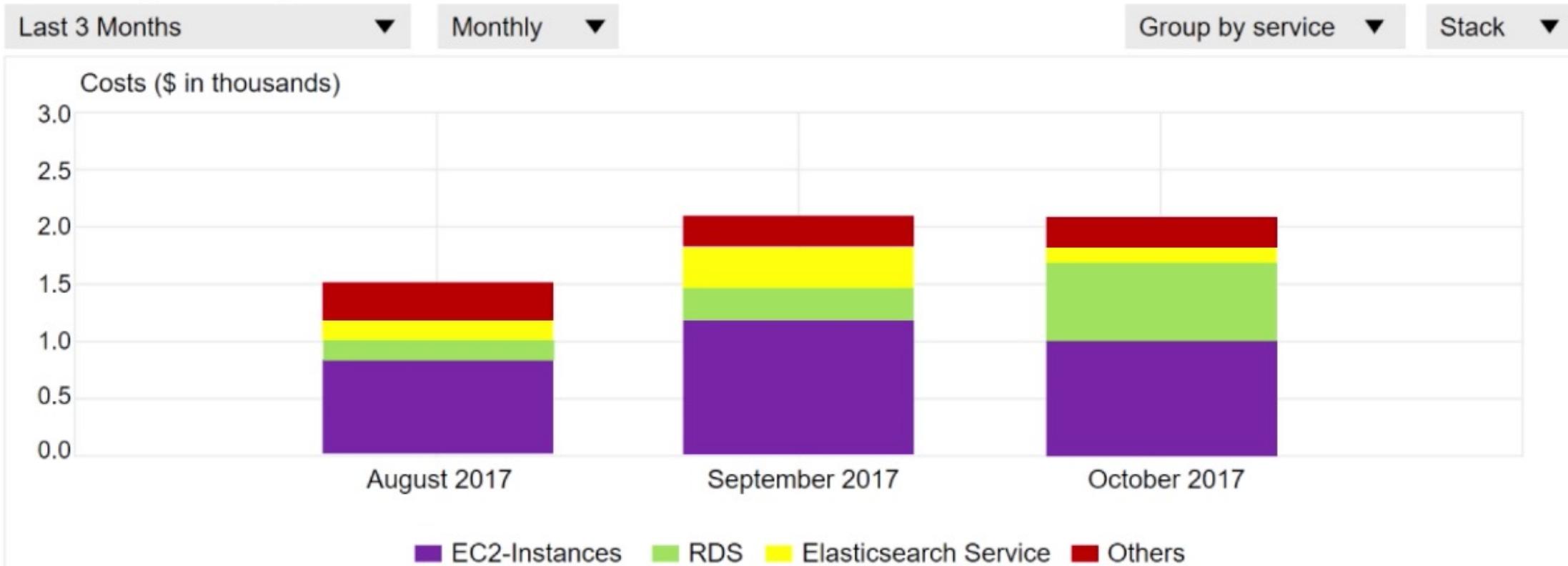
BILLS | COST EXPLORER | BUDGETS | REPORTS

Total	\$7,453.41 USD
AWS Marketplace Charges	\$15.00
▼ Usage Charges and Recurring Fees	\$15.00
Invoice 32342548 – AWS Service Charges: Usage charge for this statement period	2017-10-10
AWS Service Charges	\$7,438.41
▼ Usage Charges and Recurring Fees	\$7,414.41
Invoice 32342513 – AWS Service Charges: Usage charge for this statement period	2017-10-10
▼ Usage Charges and Recurring Fees	\$24.00
Invoice 32342507 – AWS Service Charges: Subscription charge	2017-10-10

Cost Explorer

BILLS | COST EXPLORER | BUDGETS | REPORTS

Monthly costs by service



Forecast and track costs

BILLS | COST EXPLORER | **BUDGETS** | REPORTS

Create budget							Copy	Edit	Delete	Download CSV	
Filter by budget name											
	Budget name	Current	Forecasted	Budgeted	Current vs. budgeted	Forecasted vs. budgeted					
<input type="checkbox"/>	▶ Total Monthly Cost	\$760.27	\$787.44	\$1,000.00							
<input type="checkbox"/>	▼ S3 Usage Bucket	2978.00 Req	3650.16 Req	3000.00 Req							

Budget details

Start date 10/01/17

End date -

Budget Period Monthly

Variance analysis

Cost and usage reporting

BILLS | COST EXPLORER | BUDGETS | REPORTS

Product Code	Usage Type	Operation	Availability Zone	Usage Amount	Currency Code	Line Item Description
Amazon S3	Requests – Tier 1	ListAllMyBuckets		2	USD	\$0.00 per request – PUT, COPY, POST, LIST under the global free tier
Amazon EC2	USW2-Boxusage:t2.micro	Runinstnaces:0002	us-west-2a	1	USD	\$0.00 per Windows t2.micro instance-hour under monthly free tier
Amazon S3	Requests – Tier 1	ListAllMyBuckets		2	USD	\$0.00 per request – PUT, COPY, POST, LIST under the global free tier
Amazon EC2	USW2-Boxusage:t2.micro	Runinstnaces:0002	us-west-2a	1	USD	\$0.00 per Windows t2.micro instance-hour under monthly free tier
Amazon S3	Requests – Tier 1	ListAllMyBuckets		2	USD	\$0.00 per request – PUT, COPY, POST, LIST under the global free tier
Amazon S3	Requests – Tier 1	ListAllMyBuckets		2	USD	\$0.00 per request – PUT, COPY, POST, LIST under the global free tier

Recorded demo: Amazon Billing dashboard



Billing dashboard demonstration

i Getting Started with AWS Billing & Cost Management

- Manage your costs and usage using [AWS Budgets](#)
- Visualize your cost drivers and usage trends via [Cost Explorer](#)
- Dive deeper into your costs using the [Cost and Usage Reports with Athena integration](#)
- **Learn more:** Check out the [AWS What's New webpage](#)

Do you have Reserved Instances (RIs)?

- Access the RI Utilization & Coverage reports—and RI purchase recommendations—via [Cost Explorer](#).

Spend Summary

Welcome to the AWS Billing & Cost Management console. Your last month, month-to-date, and month-end forecasted costs appear below.

Current month-to-date balance for September 2019

\$168.20

A bar chart titled "Spend Summary" showing costs for three periods: Last Month, Month-to-Date, and Forecast. The Y-axis ranges from \$0 to \$320. The bars are blue. The "Last Month" bar reaches \$304.69. The "Month-to-Date" bar reaches \$168.2. The "Forecast" bar reaches \$284.01.

Period	Cost
Last Month	\$304.69
Month-to-Date	\$168.2
Forecast	\$284.01

Month-to-Date Spend by Service

The chart below shows the proportion of costs spent for each service you use.

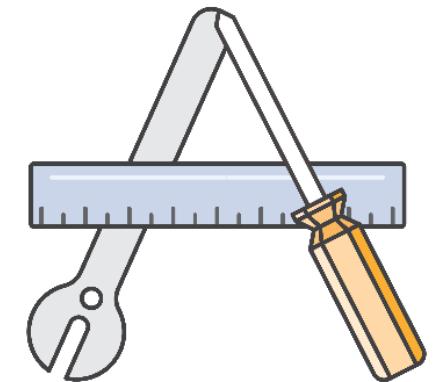
A donut chart titled "Month-to-Date Spend by Service" showing the distribution of \$168.2 across six services. The chart is divided into segments: ES (blue), DatabaseMigrationSvc (green), SageMaker (yellow), EC2 (orange), Other Services (red), and Tax (grey). The total value "\$168.2" is displayed in the center of the chart.

Service	Cost
ES	\$74.52
DatabaseMigrationSvc	\$32.12
SageMaker	\$29.99
EC2	\$16.59
Other Services	\$14.98
Tax	\$0.00
Total	\$168.20

Module 2: Cloud Economics and Billing

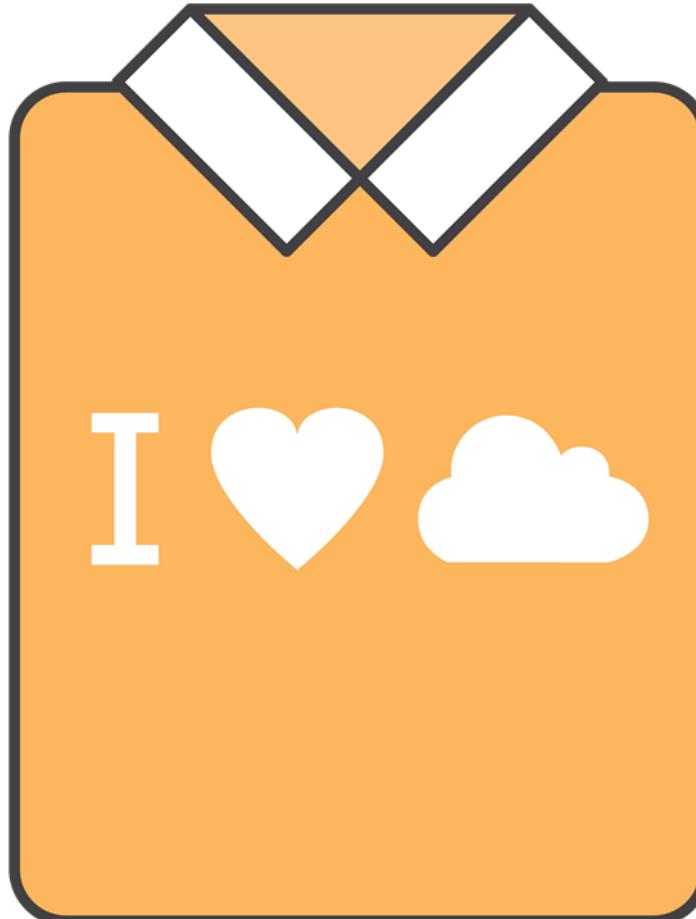
AWS support (1 of 2)

- Provide unique combination of tools and expertise:
 - AWS Support
 - AWS Support Plans
- Support is provided for:
 - Experimenting with AWS
 - Production use of AWS
 - Business-critical use of AWS



AWS support (2 of 2)

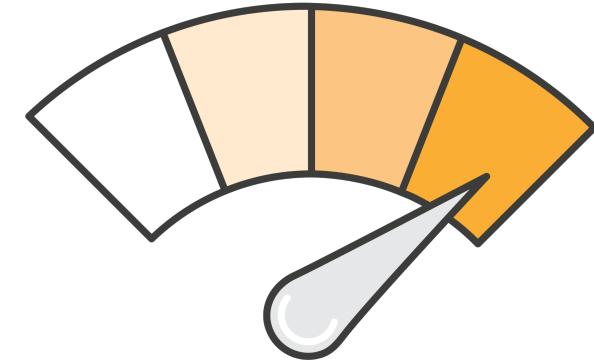
- Proactive guidance :
 - Technical Account Manager (TAM)
- Best practices :
 - AWS Trusted Advisor
- Account assistance :
 - AWS Support Concierge



Support plans

AWS Support offers four support plans:

- **Basic Support** – Resource Center access, Service Health Dashboard, product FAQs, discussion forums, and support for health checks
- **Developer Support**: Support for early development on AWS
- **Business Support**: Customers that run production workloads
- **Enterprise Support**: Customers that run business and mission-critical workloads



Case severity and response times

	Critical	Urgent	High	Normal	Low
Basic	No Case Support				
Developer Plan (Business hours)				12 hours or less	24 hours or less
Business Plan (24/7)		1 hour or less	4 hours or less	12 hours or less	24 hours or less
Enterprise Plan (24/7)	15 minutes or less	1 hour or less	4 hours or less	12 hours or less	24 hours or less

Activity: Support plan scavenger hunt

- Break up into groups of four or five and develop a recommendation for the best support plan for one of the business cases that are provided.
- Be prepared to report your findings back to the class.