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Fundamentals of AWS Pricing

Cloud Foundations

What you will learn

At the core of the lesson

You will learn how to do the following:
- Describe the Amazon Web Services (AWS) pricing model.
- Explain the advantages of the AWS pricing model.
- Describe the AWS Free Tier offer.
- Explain the concept of total cost of ownership (TCO).
- Identify the purpose of the AWS Pricing Calculator.

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AWS pricing model

Three fundamental drivers of cost with AWS

Compute

- Calculated either by the hour or the 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

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AWS has three fundamental drivers of cost: **compute**, **storage**, and **outbound data transfer**. These characteristics vary somewhat depending on the AWS offering and pricing model that you choose.

In most cases, you won't be charged for inbound data transfer or for data transfer between other AWS services in the same AWS Region. Some exceptions exist, so be sure to verify data transfer rates before you begin to use the AWS service.

Outbound data transfer is aggregated across services and then charged at the outbound data transfer rate. This charge appears on the monthly statement as *AWS Data Transfer Out*.

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**

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This philosophy is what underlies AWS pricing. Although the number and types of services that AWS offers have increased dramatically, the philosophy on pricing has not changed. At the end of each month, you pay for what you use. You can start or stop using a product at any time. No long-term contracts are required.

AWS offers a range of cloud computing services. For each service, you pay for exactly the amount of resources that you actually need. This utility-style pricing model includes:
- Pay for what you use.
- Pay less when you reserve.
- Pay less when you use more.
- Pay even less as AWS grows.

You now take a closer look at these core concepts of pricing.

For more information about AWS pricing, see *How AWS Pricing Works* at https://d0.awsstatic.com/whitepapers/aws_pricing_overview.pdf.

Pay for what you use

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

On premises

0   1/2   1

AWS

0   1/2   1

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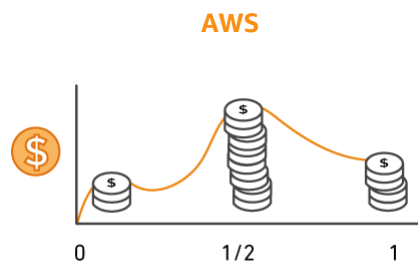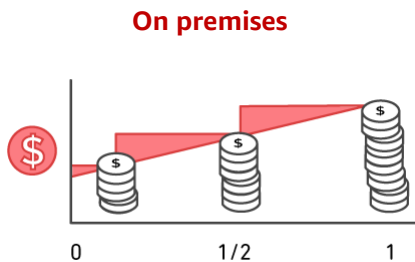
Unless you build data centers for a living, you might have spent too much time and money building them. With AWS, you pay only for the services that you consume with no large upfront expenses. You can lower variable costs. Thus, you no longer need to dedicate valuable resources to building costly infrastructure, including purchasing servers, software licenses, or leasing facilities.

Quickly adapt to changing business needs and redirect your focus on innovation and invention. Pay only for what you use and for as long as you need it. All AWS services are available on demand, require no long-term contracts, and have no complex licensing dependencies.

Pay less when you reserve

Reserved Instances are available in three options:

1. An All Upfront Reserved Instance (AURI) provides the **largest discount**.

2. A Partial Upfront Reserved Instance (PURI) provides **lower discounts**.

3. A No Upfront Payments Reserved Instance (NURI) provides **smaller discounts**.

EC2 instance

On-Demand Instance   NURI   PURI   AURI

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For certain services like Amazon Elastic Compute Cloud (Amazon EC2) and Amazon Relational Database Service (Amazon RDS), you can invest in reserved capacity. With Reserved Instances, you can save significantly over equivalent on-demand capacity.

Reserved Instances are available in three options:
- All Upfront Reserved Instance (AURI)
- Partial Upfront Reserved Instance (PURI)
- No Upfront Payments Reserved Instance (NURI)

When you buy Reserved Instances, you receive a greater discount when you make a larger upfront payment. To maximize your savings, you can pay all upfront and receive the largest discount. PURIs offer lower discounts, but they give you the option to spend less upfront. Finally, you can choose to spend nothing upfront and receive a smaller discount, which means that you can have capital to spend on other projects.

By using reserved capacity, your organization can minimize risks, more predictably manage budgets, and comply with policies that require longer-term commitments.

Pay less by using more

Realize volume-based discounts:

- **Save more** as usage increases.

- Services like Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), or Amazon Elastic File System (Amazon EFS) have **tiered pricing.**
    - The more you use, the less you pay per GB.

- Multiple storage services deliver **lower** storage costs based on needs.

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With AWS, you can get volume-based discounts and realize important savings as your usage increases. For services like Amazon Simple Storage Service (Amazon S3), pricing is tiered, which means that you pay less per GB when you use more. In addition, data transfer in doesn't incur charges. Multiple storage services deliver lower storage costs based on your needs. Thus, as your AWS usage needs increase, you benefit from the economies of scale so that you can increase adoption and keep costs under control.

As your organization evolves, AWS also gives you options to acquire services that help you address your business needs. For example, the AWS storage services portfolio offers options to help you lower pricing. These options are based on how frequently you access data and the performance that you need to retrieve it. To optimize your savings, you can choose the right combination of storage solutions that help you reduce costs while preserving performance, security, and durability.

Pay less as AWS grows

- As AWS grows, AWS focuses on lowering the cost of doing business.

- This practice results in AWS passing savings from economies of scale to you.

- Since 2006, AWS has lowered pricing more than 75 times and continues to do so

- Future higher-performing resources replace current resources for no extra charge.

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AWS constantly focuses on reducing data center hardware costs, improving operational efficiencies, lowering power consumption, and generally lowering the cost of doing business.

These optimizations and the substantial and growing economies of scale of AWS result in passing savings back to you as lower pricing. Since 2006, AWS has lowered pricing more than 75 times and continues to do so.

Another benefit of AWS growth is that future, higher-performing resources replace current ones for no extra charge.

Custom pricing

- Meets varying needs through custom pricing

- Is available for high-volume projects with unique requirements

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AWS realizes that every customer has different needs. If none of the AWS pricing models work for your project, custom pricing is available for high-volume projects with unique requirements.

AWS Free Tier

You can use the AWS Free Tier to gain hands-on experience with the AWS Cloud, products, and services at no charge. This tier is available for 1 year to new customers.
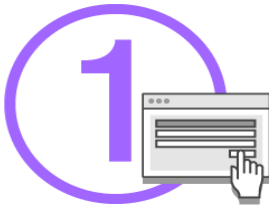
Sign up for an
AWS account

Learn with
10-minute tutorials

Start building
with AWS

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To help new AWS customers get started in the cloud, AWS offers a free usage tier (the AWS Free Tier) for new customers for up to 1 year. The AWS Free Tier applies to certain services and options. If you are a new AWS customer, you can run a free Amazon Elastic Compute Cloud (Amazon EC2) T2 micro instance for a year. You can also use a free usage tier for Amazon S3, Amazon EBS, Elastic Load Balancing, AWS data transfer, and other AWS services.

For more information, see the AWS Free Tier website at https://aws.amazon.com/free/?all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc&awsf.Free%20Tier%20Types=*all&awsf.Free%20Tier%20Categories=*all.

Services with no charge

Amazon Virtual Private Cloud (Amazon VPC)

AWS Elastic Beanstalk**

Amazon EC2 Auto Scaling**

AWS CloudFormation**

AWS Identity and Access Management (IAM)

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

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AWS also offers a variety of services and features for no additional charge. This slide includes some of them:

- **Amazon Virtual Private Cloud (Amazon VPC)** – You can provision a logically isolated section of the AWS Cloud where you can launch AWS resources in a virtual network that you define.
- **AWS Identity and Access Management (IAM)** – You can use this service to control your users' access to AWS services and resources.
- **Consolidated Billing** – You can use this billing feature in the **AWS Organizations** service to consolidate payment for multiple AWS accounts. Consolidated Billing provides the following:
    - **One bill** for multiple accounts
    - The ability to **track** each account's charges
    - The opportunity to decrease charges because of volume pricing discounts from **combined usage**
    - The ability to consolidate all of your accounts by using Consolidated Billing and get tiered benefits
- **AWS Elastic Beanstalk – With this service, you can** quickly deploy and manage applications in the AWS Cloud.
- **AWS CloudFormation** – Developers and systems administrators can use this service to create a collection of related AWS resources and provision them in an

orderly and predictable fashion.
- **Amazon EC2 Auto Scaling** – This service automatically adds or removes resources according to conditions that you define. The resources that you are using increase seamlessly during demand spikes to maintain performance and decrease automatically during demand lulls to minimize costs.
- **AWS OpsWorks** – You can use this application management service to deploy and operate applications of all shapes and sizes.

Though these services do not incur any charge, other charges might be associated with other AWS services that are used with these services. For example, when you automatically scale additional EC2 instances, you will be charged for those instances.

AWS Pricing Calculator

You can use the AWS Pricing Calculator to do the following:

- Estimate monthly costs.
- Identify opportunities to reduce monthly costs.
- Use templates to compare services and deployment models.

Access the <u>AWS Pricing Calculator</u>.

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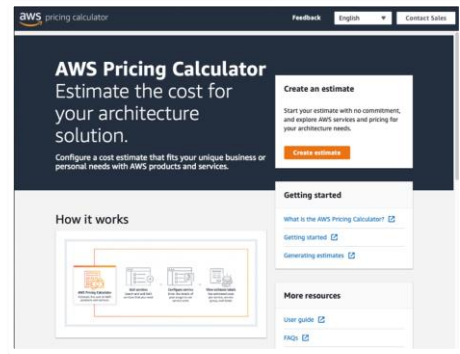
The AWS Pricing Calculator can help you estimate a monthly AWS bill. Using this tool, you can add, modify, and remove services from your bill. It will recalculate the estimated monthly charges automatically.

The calculator incorporates a wide array of pricing calculations across all services in all Regions. It also shows a breakdown of features for each service in each Region.

The AWS Pricing Calculator is a tool that helps you with the following:
- Estimate AWS monthly services costs.
- Identify opportunities for cost reduction.
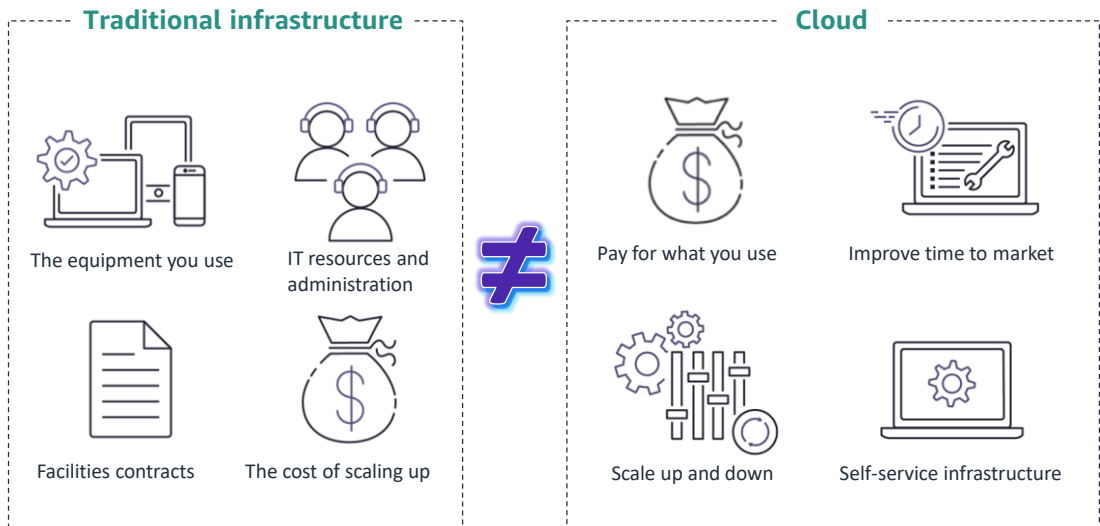- Use templates to model solutions to compare services and deployment models.

The calculator also shows common customer samples and usage. For example, you can choose **Disaster Recovery and Backup** or **Web Application** to access sample data and uses for each service.

For more information about the AWS Pricing Calculator and to start using it, see the AWS Pricing Calculator website at https://calculator.aws/#/.

Total cost of ownership

On-premises infrastructure versus the cloud

Traditional infrastructure

The equipment you use

IT resources and administration

Facilities contracts

The cost of scaling up

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Cloud

Pay for what you use

Improve time to market

Scale up and down

Self-service infrastructure

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Many businesses choose between an on-premises (traditional) and a cloud infrastructure. The difference between these two options is how they are deployed.

On-premises infrastructure is installed on a company's computers and servers. Several fixed costs are associated with traditional infrastructure, including facilities, hardware, licenses, and maintenance staff. Scaling up can be expensive and time-consuming. Scaling down does not reduce fixed costs.

Cloud infrastructure is purchased from a service provider. Customers pay for what they use. Costs are easy to estimate.

It is difficult to compare an on-premises IT delivery model with the AWS Cloud. The two infrastructures are so different that they use other terms:
• An on-premises IT discussion is based on fixed costs, long planning cycles, and multiple components to buy, build, manage, and refresh over time.
• AWS involves a discussion about flexibility, agility, and consumption-based costs.

How can you identify the best option?

Total cost of ownership (TCO) defined

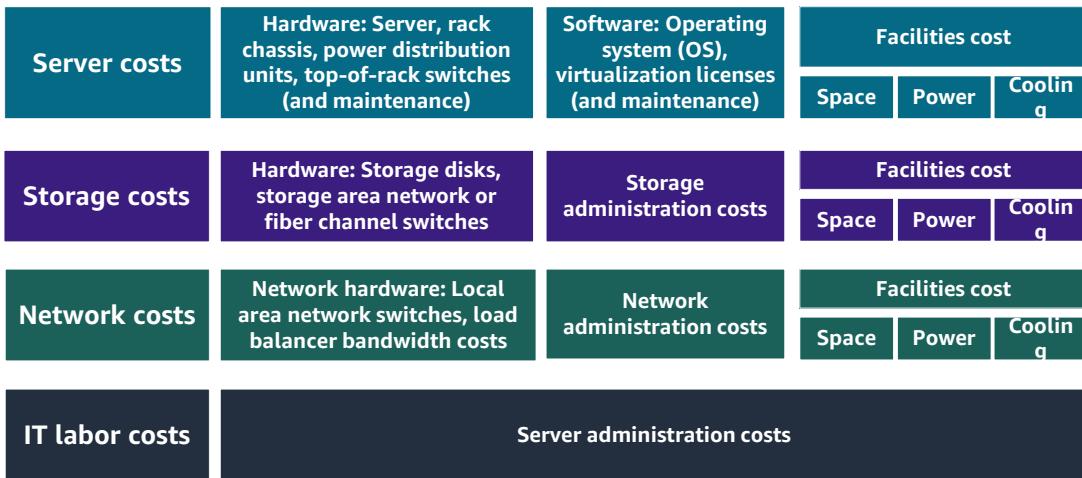TCO is a financial estimate to help identify **direct and indirect costs of a system**.

Use TCO to do the following:

- **Compare the costs** of running an entire infrastructure environment or specific workload **on premises as compared to the AWS Cloud.**
- Budget and **build the business case** for moving to the cloud.

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You can use the total cost of ownership (TCO) to compare on-premises and cloud solutions and identify the best option. TCO is a financial estimate that helps buyers and owners determine the direct and indirect costs of a product or system. It includes the cost of a service and associated expenses.

For example, suppose that you run a specific workload in an on-premises facility. You want to run the same workload in the cloud. You can use TCO to compare the costs of running the workload on a cloud infrastructure against running it on an on-premises (or colocation) infrastructure. You can then use the comparison for budgeting purposes or to build a business case for the optimal deployment solution.

TCO considerations

Server costs	Hardware: Server, rack chassis, power distribution units, top-of-rack switches (and maintenance)	Software: Operating system (OS), virtualization licenses (and maintenance)	Facilities cost		
			Space	Power	Cooling

Storage costs	Hardware: Storage disks, storage area network or fiber channel switches	Storage administration costs	Facilities cost		
			Space	Power	Cooling

Network costs	Network hardware: Local area network switches, load balancer bandwidth costs	Network administration costs	Facilities cost		
			Space	Power	Cooling

IT labor costs	Server administration costs

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When you compare an on-premises solution and a cloud solution, it's essential to assess the actual costs of both options. With the cloud, most costs are upfront and can be calculated. Cloud providers give transparent pricing based on different usage metrics such as RAM, storage, and bandwidth. Pricing is frequently fixed per unit of time.

After you understand how pricing works, you can calculate costs based on several different usage estimates.

With on-premises technology, in-house costs of running a server include the following:
•Direct costs, such as power, floor space, storage, and IT operations to manage those resources
•Indirect costs, such as network and storage infrastructure

The diagram is an abbreviated list that demonstrates the type of costs involved in data center maintenance. It doesn't include every cost item. Depending on the solution, software costs can also include database, management, and middle-tier fees. Facilities costs can consist of upgrades, maintenance, building security, and taxes. IT labor costs can include security and application administration costs.

Some of the costs that are associated with data center management include the following:
• Server costs for both hardware and software, and facilities expenses for equipment
• Storage costs for hardware, administration, and facilities
• Network costs, which include costs for hardware, administration, and facilities
• IT labor costs that are required to administer the solution

Key takeaways

- You are not charged for the following:
  - Inbound data transfer
  - Data transfer between services in the same AWS Region

- You pay for what you use.

- You can start and stop anytime.

- No long-term contracts are required.

- Some services are free, but other AWS services that are used with these services might not be free.

- The total cost of ownership (TCO) is a financial estimate to help identify the direct and indirect costs of a system.

- AWS provides a pricing calculator.

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In summary, though the number and types of services that AWS offers have increased, the AWS philosophy on pricing has not changed. At the end of each month, you pay only for what you use, and you can start or stop using a product at any time. No long-term contracts are required.

The best way to estimate costs is to examine the fundamental characteristics for each AWS service and estimate your usage for each characteristic. Then, map that usage to the prices that are posted on the website. The service pricing strategy offers the flexibility to choose the services that you need for each project and to pay for only what you use. You can use the AWS Pricing Calculator to get AWS service cost estimates and evaluate the total of an AWS solution, respectively.

Some AWS services and features, including the following, don't incur charges:
- Amazon VPC
- AWS Elastic Beanstalk
- AWS CloudFormation
- IAM
- Amazon EC2 Auto Scaling
- AWS OpsWorks
- Consolidated Billing

Though the services themselves don't incur charges, the resources that they

provision are not free. Additionally, you are not charged for inbound data or data transfer between services in the same Region, but outbound data transfer costs are tiered.

For more information about pricing, see the following links:
- AWS Pricing at https://aws.amazon.com/pricing/
- AWS Pricing Overview at https://d0.awsstatic.com/whitepapers/aws_pricing_overview.pdf

Thank you

Thank you for completing this module.