How AWS Pricing Works

March 2012

*(Please consult **http://aws.amazon.com/whitepapers/** for the latest version of this paper)*

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Abstract

While the number and types of services offered by AWS has increased dramatically, our 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.

Pricing information for each service on our website is available at http://aws.amazon.com/pricing/. Our strategy of pricing each service independently gives you tremendous flexibility to choose the services you need for each project and to pay only for what you use.

This whitepaper will help you understand how to effectively estimate the costs of running your specific project on AWS. We provide several examples that leverage the AWS Simple Monthly Calculator. For each example, this paper discusses its architecture, example usage of each service, cost breakdown for each service, and the total estimated monthly charge.

Introduction

AWS offers a range of cloud computing services. For each service, you pay for exactly the amount of resources you actually need. This utility-style pricing model is explained below:

- **Pay as you go**. No minimum commitments or long-term contracts required. You replace your upfront capital expense with low variable cost and pay only for what you use. There is no need to pay upfront for excess capacity or get penalized for under-planning. For compute resources, you pay on an hourly basis from the time you launch a resource until the time you terminate it. For data storage and transfer, you pay on a per gigabyte basis. We charge based on the underlying infrastructure and services that you consume. You can turn off your cloud resources and stop paying for them when you don't need them.

- **Pay less when you reserve**. For certain products, you can invest in reserved capacity. In that case, you pay a low upfront fee and get a significantly discounted hourly rate, which results in overall savings between 42% and 71% (depending on the type of instance you reserve) over equivalent on-demand capacity.

- **Pay even less per unit by using more.** You save more as you grow bigger. For storage and data transfer, pricing is tiered. The more you use, the less you pay per gigabyte. For compute, you get volume discounts up to 20% when you reserve more.

- **Pay even less as AWS grows**. Most importantly, we are constantly focused on reducing our data center hardware costs, improving our operational efficiencies, lowering our power consumption, and generally lowering the cost of doing business. These optimizations and AWS's substantial and growing economies of scale

AWS Free Tier

To help new AWS customers get started in the cloud, AWS offers a free usage tier. If you're a new AWS customer, you can run a free Amazon EC2 Micro Instance for a year while also leveraging a free usage tier for Amazon S3, Amazon Elastic Block Store, Amazon Elastic Load Balancing, and AWS data transfer. For more information, go to http://aws.amazon.com/free

result in passing savings back to you in the form of lower pricing. In the past six years, AWS has lowered pricing on 20 different occasions.

- **Custom pricing**. What if none of our pricing models work for your project? Custom pricing is available for high volume projects with unique requirements. For assistance, contact us to speak with a sales representative.

You save money by moving to on-demand pricing. You can save more by switching to reserved pricing. And because you pay only for what you use, you can save even more by optimizing and turning off your resources when you don't need them.

AWS also offers a variety of services for **no additional charge**:

- AWS Elastic Beanstalk. AWS Elastic Beanstalk is an even easier way for you to quickly deploy and manage applications in the AWS cloud.
- AWS CloudFormation. AWS CloudFormation gives developers and systems administrators an easy way to create a collection of related AWS resources and provision them in an orderly and predictable fashion.
- AWS Identity and Access Management (IAM). AWS IAM controls your users' access to AWS services and resources.
- Auto Scaling. Auto Scaling automatically adds or removes Amazon EC2 instances according to conditions you define. With Auto Scaling, the number of Amazon EC2 instances you're using increases seamlessly during demand spikes to maintain performance, and decreases automatically during demand lulls to minimize costs.

Moreover, you can consolidate all your accounts using Consolidated Billing and get tiering benefits.

Fundamental Pricing Characteristics

There are three fundamental characteristics you pay for with AWS: compute, storage, and data transfer out. These characteristics vary slightly depending on the AWS product you are using. However, fundamentally these are the core characteristics that have the greatest impact on cost.

Although you are charged for data transfer out, there is no charge for inbound data transfer or for data transfer between other Amazon Web Services within the same region. The outbound data transfer is aggregated across Amazon EC2, Amazon S3, Amazon RDS, Amazon SimpleDB, Amazon SQS, Amazon SNS, and Amazon VPC and then charged at the outbound data transfer rate. This charge appears on the monthly statement as AWS Data Transfer Out.

The rest of this section breaks down the pricing characteristics for four commonly used AWS products: Amazon Simple Storage Service (S3), Amazon CloudFront, Amazon Elastic Compute Cloud (Amazon EC2), and Amazon Relational Database Service (Amazon RDS). Pricing is available for each AWS product and its specific pricing characteristics at http://aws.amazon.com/pricing/.

Free Inbound Data Transfer

There is no charge for inbound data transfer across all Amazon Web Services in all regions. There are no outbound data transfer charges between Amazon Web Services within the same region.

Amazon Simple Storage Service (Amazon S3)

Amazon Simple Storage Service (Amazon S3) is storage for the Internet. It provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web.

When you begin to estimate the cost of Amazon S3, you need to consider the following:

- **Storage Class**. Standard Storage is designed to provide 99.999999999% durability. Reduced Redundancy Storage (RRS) is a storage option within Amazon S3 that you can use to reduce your costs by storing non-critical, reproducible data at lower levels of redundancy than Amazon S3's standard storage. Reduced Redundancy Storage is designed to provide 99.99% durability. Each class has different rates.
- **Storage.** The number and size of objects stored in your Amazon S3 buckets as well as type of storage.
- **Requests.** The number and type of requests. GET requests incur charges at different rates than other requests, such as PUT and COPY requests.
- **Data Transfer.** The amount of data transferred out of the Amazon S3 region.

For more information about Amazon S3 pricing, go to http://aws.amazon.com/pricing/s3/.

Amazon CloudFront

Amazon CloudFront is a web service for content delivery. It integrates with other Amazon Web Services to give you an easy way to distribute content to end users with low latency, high data transfer speeds, and no required minimum commitments.

When you begin to estimate the cost of Amazon CloudFront, you need to consider the following:

- **Traffic Distribution.** Data transfer and request pricing vary across geographic regions, and pricing is based on the edge location through which your content is served.
- **Requests.** The number and type of requests (HTTP or HTTPS) made and the geographic region in which the requests are made.
- **Data Transfer Out.** The amount of data transferred out of your Amazon CloudFront edge locations.

For more information about Amazon CloudFront pricing, go to http://aws.amazon.com/pricing/cloudfront/.

Amazon Elastic Compute Cloud (Amazon EC2)

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. Amazon EC2's simple web service interface allows you to obtain and configure capacity with minimal friction. It provides complete control of your computing resources on Amazon's proven computing environment. Amazon EC2 changes the economics of computing by charging you only for capacity that you actually use.

When you begin to estimate the cost of using Amazon EC2, you need to consider the following:

- Compute
    - **Clock Hours of Server Time.** Resources incur charges when they are running. For example, from the time Amazon EC2 instances are launched until they are terminated, or from the time Elastic IPs are allocated until the time they are de-allocated.

  - **Machine Configuration.** Consider the physical capacity of the Amazon EC2 instance you choose. Instance characteristics vary with OS, number of cores, memory, and local storage.
  - **Machine Purchase Type**. With On-Demand Instances, you pay for compute capacity by the hour with no required minimum commitments. Reserved Instances give you the option to make a low, one-time payment for each instance you want to reserve and in turn receive a significant discount on the hourly usage charge for that instance. With Spot Instances, you can bid for unused Amazon EC2 capacity. For more information how to further save costs using Reserved Instances and Spot Instances, see How to Further Save Costs.
  - **Number of Instances**. You can provision multiple instances of your Amazon EC2 and Amazon EBS resources to handle peak loads.

- Storage
  - **Additional Storage.** Amazon Elastic Block Store (EBS) provides block level storage volumes for use with Amazon EC2 instances. Amazon EBS volumes are off-instance storage that persists independently from the life of an instance. They are analogous to virtual disks in the cloud. If you opt for additional Amazon EBS devices, the added cost is per gigabyte per month and per 1 million requests per month.
  - **Backups.** Amazon EBS provides the ability to back up snapshots of your data to Amazon S3 for durable recovery. If you opt for EBS snapshots, the added cost is per GB-month of data stored.
  - **Data Transfer.** Take into account the amount of data transferred out of your application. Inbound data transfer is free, and outbound data transfer charges are tiered.

- **Load Balancing.** An Elastic Load Balancer can be used to distribute traffic among Amazon EC2 instances. The number of hours the Elastic Load Balancer runs and the amount of data it processes contribute to the monthly cost.
- **Detailed Monitoring.** You can use Amazon CloudWatch to monitor your EC2 instances. By default, basic monitoring is enabled (and available at no additional cost); however, for a fixed monthly rate, you can opt for detailed monitoring, which includes seven preselected metrics recorded once a minute. Partial months are charged on an hourly pro rata basis, at a per instance-hour rate.
- **Auto Scaling.** Auto Scaling automatically adjusts the number of Amazon EC2 instances in your deployment according to conditions you define. This service is available at no additional charge beyond Amazon CloudWatch fees.
- **Elastic IP Addresses**. Elastic IP addresses are static IP addresses designed for dynamic cloud computing. If you use dynamic DNS to map an existing DNS name to a new instance's public IP address, it might take up to 24 hours for the IP address to propagate through the Internet, which may prevent new instances from receiving traffic while terminated instances continue to receive requests. Because elastic IP addresses are associated with your account and not a particular instance, propagating changes to the underlying device is not an issue. This is a free service as long as you use your elastic IP addresses. You are charged only if you do not use your elastic IP addresses.
- **Operating Systems and Software Packages.** Operating System prices are included in the instance prices. To view a list of currently available operating systems that you can use with your Amazon EC2 instances and their prices, go to Amazon Elastic Compute Cloud (Amazon EC2). There are no additional licensing costs to run the following commercial operating systems: Red Hat Enterprise Linux, SUSE Enterprise Linux, Windows Server, and Oracle Enterprise Linux. Additionally, AWS has made it easy for you and has partnered with Microsoft, IBM and several other vendors so you can run commercial software packages on your Amazon EC2 instances. For example, Microsoft SQL Server on Windows, IBM Software. For commercial software packages that AWS does not

provide, such as nonstandard operating systems, Oracle Applications, Windows Server applications such as Microsoft SharePoint and Microsoft Exchange, you need to obtain a license from the vendors. You can also bring your existing license to the cloud through specific vendor programs such as Microsoft License Mobility through Software Assurance Program.

For more information about Amazon EC2 pricing, go to http://aws.amazon.com/ec2/.

Amazon Relational Database Service (Amazon RDS)

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, so you can focus on your applications and business.

When you begin to estimate the cost of Amazon RDS, you need to consider the following:

- Compute
    - **Clock Hours of Server Time.** Resources incur charges when they are running. For example, from the time you launch a DB instances until you terminated the DB instance.
    - **Database Characteristics.** The physical capacity of the database you choose will affect how much you are charged. Database characteristics vary depending on the database engine, size, and memory class.
    - **Database Purchase Type**. When you use On-Demand DB Instances, you pay for compute capacity for each hour your DB Instance runs, with no required minimum commitments. With Reserved DB Instances, you can make a low, one-time, up-front payment for each DB Instance you wish to reserve for a 1-year or 3-year term.
    - **Number of Database Instances.** With Amazon RDS, you can provision multiple DB instances to handle peak loads. More instances multiply the application footprint and enable data transfer to happen at a higher total rate. You pay for these extra instances only as long as they are running.
- Storage
    - **Provisioned Storage.** There is no additional charge for backup storage of up to 100% of your provisioned database storage for an active DB Instance. After the DB Instance is terminated, backup storage is billed per gigabyte per month.
    - **Additional Storage.** The amount of backup storage in addition to the provisioned storage amount is billed per gigabyte per month.
    - **Requests.** The number of input and output requests to the database.
    - **Deployment Type.** You can deploy your DB instance to a single Availability Zone (analogous to a data center) or multiple Availability Zones. Storage and I/O charges vary, depending on the number of Availability Zones you deploy to.
    - **Data Transfer.** Inbound data transfer is free, and outbound data transfer costs are tiered.
- License Included
    - **Oracle Database 11g**. AWS currently supports Oracle Database 11g Standard Edition One for the "License Included" service model. With this service model, you do not need to separately purchase Oracle licenses. AWS also supports Oracle Database 11g Enterprise Edition, Standard Edition, Standard Edition One for the Bring Your Own License ("BYOL") service model. With the BYOL service model, you

can run Amazon RDS using your existing Oracle Database software licenses. You can also purchase Oracle Database 11g licenses directly from Oracle and run them on Amazon RDS. Prices vary depending on which license service model you choose. For more information, go to Amazon Relational Database Service (Amazon RDS).

Depending on the needs for your application, it's possible to optimize your costs for Amazon RDS database instances by purchasing reserved Amazon RDS database instances. To purchase Reserved Instances, you make a low, one-time payment for each instance you want to reserve and in turn receive a significant discount on the hourly usage charge for that instance.

For more information about Amazon RDS pricing, go to http://aws.amazon.com/pricing/rds/.

How to Further Save Costs

Depending on the needs of your application, you can optimize your costs for Amazon EC2 instances by purchasing EC2 Reserved Instances or Spot Instances. On-Demand Instances are a good option if you run your Amazon EC2 Instances less than 17% of the time; however, if you plan to run your Amazon EC2 Instances more than that, Reserved Instances can save you money. To obtain Reserved Instances, you make a low, one-time payment for each instance you want to reserve, and in turn you receive a significant discount on the hourly usage charge for that instance.

The following table shows an example of potential savings for Amazon EC2 Reserved Instances for a **3-year term** running four m1.small Linux instances at medium utilization (about 366 hours per month) in the US East Region.

Table 1: Savings Comparison of Reserved Instances over On-Demand Instances

Option (3 year term)	Usage Fee	One-time Fee	Total	Savings
Option 1 100% On-Demand Only	$4479.84	n/a	$4479.84	n/a
Option 2 50% On-Demand + 50% Reserved (Medium Utilization)	$3030.48	$700.00	$3730.48	~17%
Option 3 100% Reserved (Medium Utilization)	$1581.12	$1400.00	$2981.12	~34%

As our prices go down, we pass the savings on to you. As of March 5, 2012, AWS has lowered its prices for Amazon S3, Amazon EC2, and Amazon RDS, saving you even more money. The following table shows the same example as the previous table with the lowered Amazon EC2 prices for On-Demand and Reserved Instances.

Table 2: Savings Comparison of Reserved Instances over On-Demand Instances with the Lowered Amazon EC2 Prices

Option (3 year term)	Usage Fee	One-time Fee	Total	Savings
Option 1 100% On-Demand Only	$4216.32	n/a	$4216.32	n/a
Option 2 50% On-Demand + 50% Reserved (Medium Utilization)	$2608.92	$500	$3108.92	~27%
Option 3 100% Reserved (Medium Utilization)	$1000.52	$1000	$2000.52	~53%

Notice the bigger savings that you get with the lowered Amazon EC2 prices over the original Amazon EC2 prices.

If you know the utilization of your Amazon EC2 instances, you can save even more. AWS offers Light, Medium, and Heavy Utilization Reserved Instances. The Light Utilization Model is a great option if you might have periodic workloads that run only a couple of hours a day or a few days a week. Medium Utilization Reserved Instances are the same Reserved Instances that Amazon EC2 has offered these last several years. They are a great option if you don't plan to run your instances all the time and you want the option to shut down your instances when you no longer need them. If you need a consistent baseline of capacity or you run steady state workloads, the Heavy Utilization model is a good option. The following table shows how much you can potentially save compared to running On-Demand Instances.

Reserved Instance Offering Types	**Savings over On-demand Instances (up to)**	
Light Utilization Reserved Instances	42% 1-year	56% 3-year
Medium Utilization Reserved Instances	49% 1 -year	66% 3-year
Heavy Utilization Reserved Instances	54% 1-year	71% 3-year

Suppose you have deployed your web application on AWS, and you need to run six Amazon EC2 instances:

- Two Small Linux Instances for the web servers
- Two Small Linux Instances for the application servers
- Two Large Linux Instances for the database servers

You have a number of options for running these instances. For example, you can run On-Demand Instances only, On-Demand and Reserved Instances (Medium Utilization), or if you know the utilization of your Amazon EC2 instances, you can run On-Demand and a mixture of different Utilization Reserved Instances. There are a number of other options, but this table shows four different options using these three combinations.

Description	**Option 1**	**Option 2**	**Option 3**	**Option 4**
Web servers	2 On-Demand	2 On-Demand	1 On-Demand and 1 Reserved Medium Utilization	1 On-Demand and 1 Reserved Light Utilization
App servers	2 On-Demand	2 On-Demand	1 On-Demand and 1 Reserved Medium Utilization	1 On-Demand and 1 Reserved Light Utilization
Database servers	2 On-Demand	2 Reserved Medium Utilization	2 Reserved Medium Utilization	2 Reserved Heavy Utilization

The following table compares costs for each option and shows the total savings over on-demand instances for 1-year and 3-year terms. You save money when you use reserved instances (Medium Utilization), and then you save even more money when you use Light and Heavy Utilization Reserved Instances. Heavy Utilization Reserved Instances offer you the maximum savings over on-demand instances and you will be charged the lower hourly rate for every hour in the Reserved Instance term you purchase.

		Option 1	**Option 2**	**Option 3**	**Option 4**
		Calculator	Calculator	Calculator	Calculator
Monthly Cost		$702.72	$374.78	$256.20	$238.63
One-Time Cost	1 Year Term	-	$1280.00	$1600.00	$1698.00

	3 Years Term	-	$2000.00	$2500.00	$2612.60
Total Cost	1 Year Term (x12)	$8432.64	$5777.36	$4674.40	$4561.56
	3 Years Term (x36)	$25297.92	$15492.08	$11723.20	$11203.28
Savings (Over Option 1)	**1 Year Term**	**n/a**	**32%**	**44%**	**45%**
	3 Years Term	**n/a**	**39%**	**54%**	**54%**

Your Reserved Instance will be available for the operating system (Linux/UNIX or Windows) and Availability Zone in which you purchased it. For more information about Reserved Instances, go to Amazon EC2 Reserved Instance pages.

Spot Instances are unused Amazon EC2 capacity that you bid for. Instances are charged at Spot Price, which is set by Amazon EC2 and fluctuates periodically depending on the supply of, and demand for, Spot Instance capacity. If your maximum bid exceeds the current Spot Price, your bid request is fulfilled, and your instances will run until either you choose to terminate them or the Spot Price increases above your maximum bid, whichever is sooner. To learn more about Spot Instances, go to http://aws.amazon.com/ec2/spot-instances/.

Conclusion

While the number and types of services offered by AWS has increased dramatically, our philosophy on pricing has not changed. You pay as you go, pay for what you use, pay less as you use more, and pay even less when you reserve capacity. Projecting costs for a use case, such as web application hosting, can be challenging, because a solution typically uses multiple features across multiple AWS products, which in turn means there are more factors and purchase options to consider.

The best way to estimate costs is to examine the fundamental characteristics for each AWS product, estimate your usage for each characteristic, and then map that usage to the prices posted on the website. To help you understand how AWS pricing works in the context of real-world solutions, see Cost Calculation Scenarios later in this paper.

You can use the AWS Simple Monthly Calculator to estimate your monthly bill. The calculator provides per service cost breakdown, as well as an aggregate monthly estimate. You can also use the calculator to see an estimation and breakdown of costs for common solutions.

AWS has introduced a free usage tier to help you get started with AWS. Take advantage of the Free Usage Tier, and get started today!

Resources

Resource	Description
AWS Simple Monthly Calculator	The AWS Simple Monthly Calculator helps estimate your monthly bill.
AWS Architecture Center	The AWS Architecture Center provides you with the necessary guidance and best practices to build highly scalable and reliable applications in the AWS Cloud.
AWS Economics Center	The AWS Economics Center provides access to information, tools, and resources to compare the costs of Amazon Web Services with IT infrastructure alternatives.
AWS Account Activity Page	View your current charges and account activity, itemized by service and by usage type. Previous months' billing statements are also available.
AWS Usage Reports	Usage reports are available to download for each service. Reports can be customized by specifying usage types, timeframe, service operations, and more.

Cost Calculation Scenarios

This section of the document uses the AWS Simple Monthly Calculator to provide costing examples of three common use cases. For each example, this paper discusses a reference architecture, example usage of each service, cost breakdown for each service, and the total estimated monthly cost.

Calculating Costs for a Static Website Stored on Amazon S3 and Amazon CloudFront

In this example, we calculate the cost of a simple, static website hosted on AWS that uses Amazon S3 to store the static content and Amazon CloudFront to distribute the static content to cached edge locations.

Architecture

All static objects including images, HTML pages, CSS style sheets, and JavaScript files, are stored in an Amazon S3 bucket. An Amazon CloudFront distribution is created from the Amazon S3 bucket. The Amazon CloudFront distribution in this example serves 19 different edge locations.

The following illustration shows an architecture for a simple, static website using Amazon S3 and Amazon CloudFront.

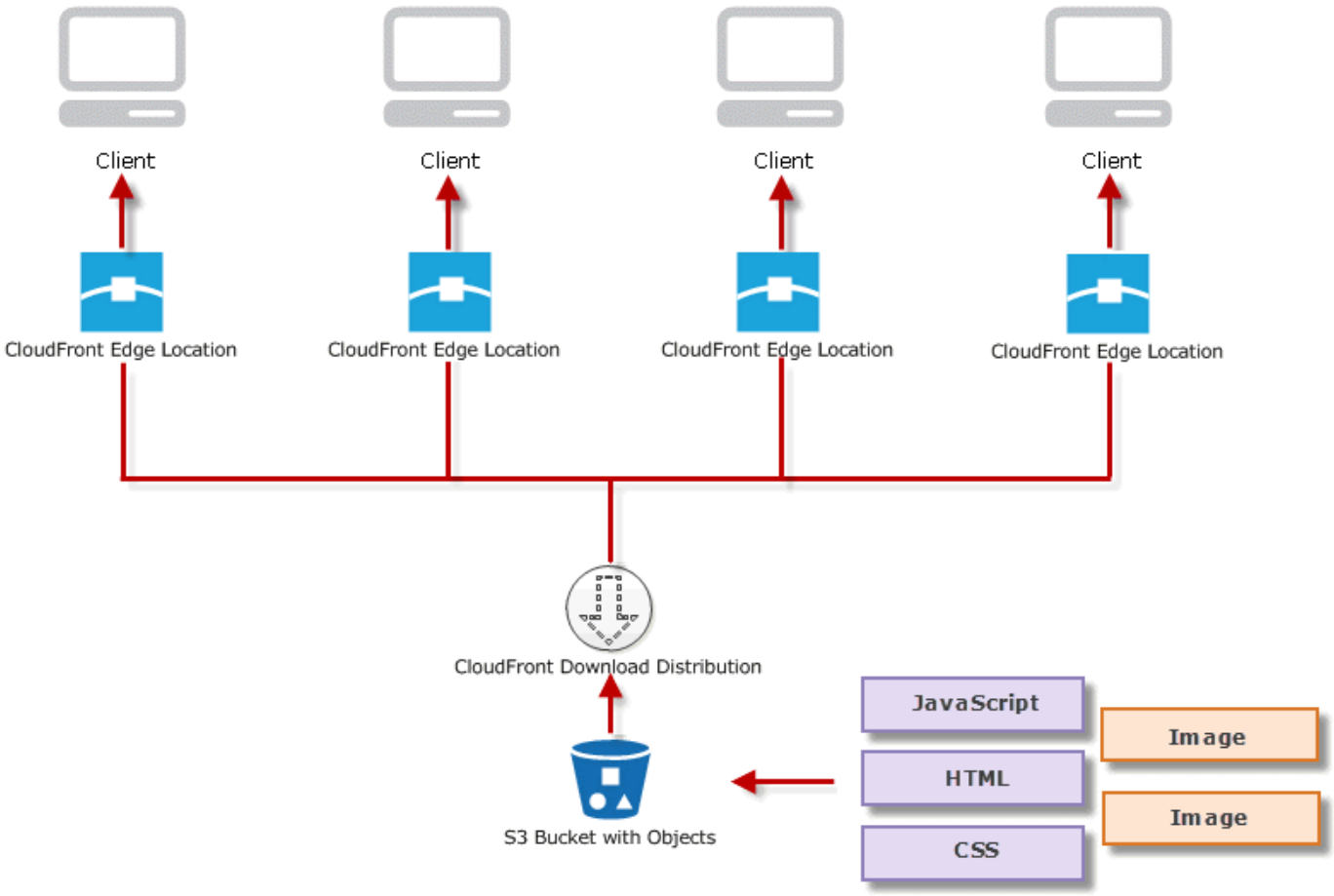


Figure 1: Static Website Architecture

Amazon S3 Cost Breakdown

The following table shows the characteristics for Amazon S3 we have identified for this simple static website.

Characteristic	Estimated Usage	Description
Storage	0.001 GB/month	1 HTML Page = 50 KB 1 CSS Style Sheet = 10 KB 1 JavaScript = 40 KB 50 JPG @ 20 KB = 1 MB Total of ~1.1 MB for 53 objects = 0.001 GB
Requests	PUT requests : 106/month GET requests: 10070/month	We will plan to update the objects twice a month. 2 PUT requests * 53 objects = 106 requests We will transfer the objects 10 times per month to each of the Amazon CloudFront edge locations. 10 GET requests * 19 CloudFront Nodes * 53 objects = 10070 requests
Data Transfer	Data out: 1 GB/month	If the average size object is 20KB, and we make about 10070 requests per month, than the average data transfer is approximately 0.1 GB. There is up to 1 GB free per month.

The following image shows the cost breakdown for Amazon S3 in the AWS Simple Monthly Calculator.

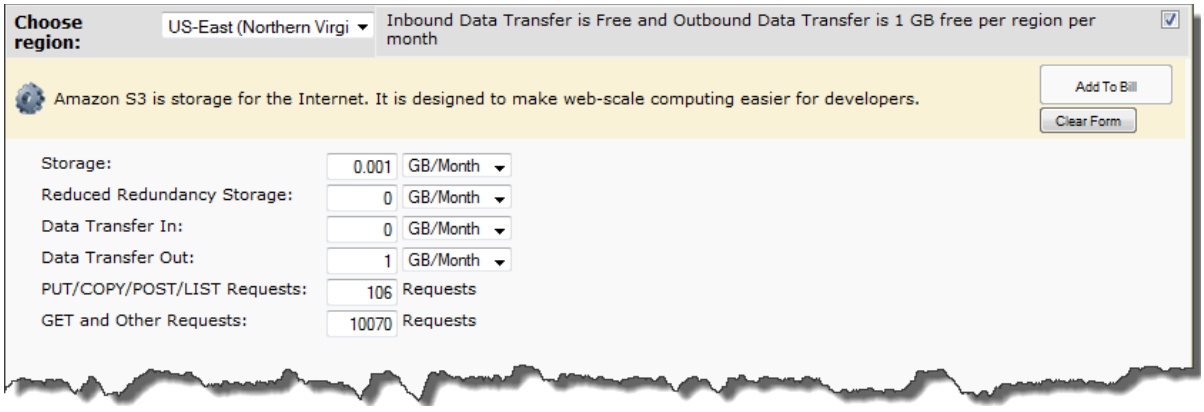


Figure 2: Amazon S3 Cost Breakdown

Because we have no redundancy storage, the total cost for one month is the sum of the cost for storing the objects, updating the objects, and transferring the objects to Amazon CloudFront.

Variable	Formula	Calculation
Storage	Storage Rate X Storage Amount (GB)	$0.0125 X 0.001 $0.00[1]
AWS Data Transfer	(Data in (GB) X Data In Rate) +(Data out (GB) X Data Out Rate)	0 X $0.00 X 1 X $0.00[2] $0.00
PUT Requests	Request Rate X Number of requests (per 1000)	$0.01 X 1 $0.01
GET Requests	Request Rate X Number of requests (per 10000)	$0.01 X 2 $0.02
Estimated Monthly Cost for Amazon S3		$0.03

We use the AWS Simple Monthly Calculator to estimate the cost. The total cost for one month for Amazon S3 in this example is $0.03[3].

Amazon CloudFront Cost Breakdown

The following table shows the characteristics for Amazon CloudFront we have identified for this simple microsite.

Characteristic	Estimated Usage	Description
Traffic Distribution	50% US 50% HK	Distribution of traffic across regions
Request Type	HTTP	Type of requests that customers make to the cached locations
Data Transfer Out	32.25 GB/month	1.1 MB * 30 days *1,000 hits/day

The following image shows the cost breakdown for Amazon CloudFront.

[1] Since $0.014 * 0.001 is $0.000014, the total is rounded to $0.00.
[2] There is no cost for the first 1 GB of storage.
[3] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

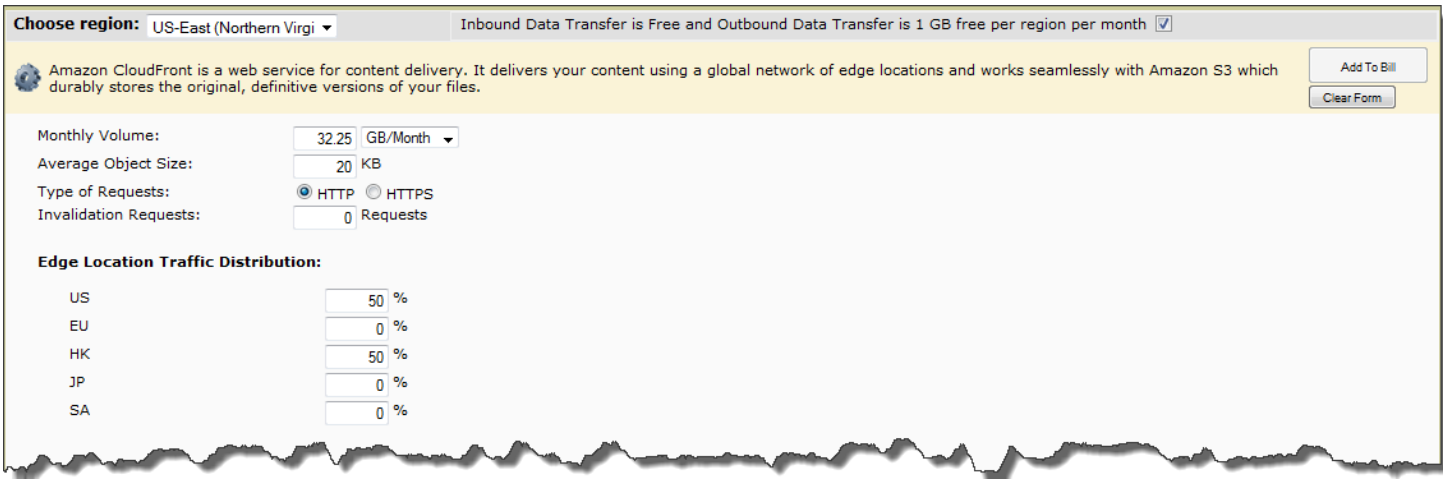


Figure 3: Amazon CloudFront Cost Breakdown

The cost for one month's usage is the sum of the data transfer out plus the requests costs for each of the regions.

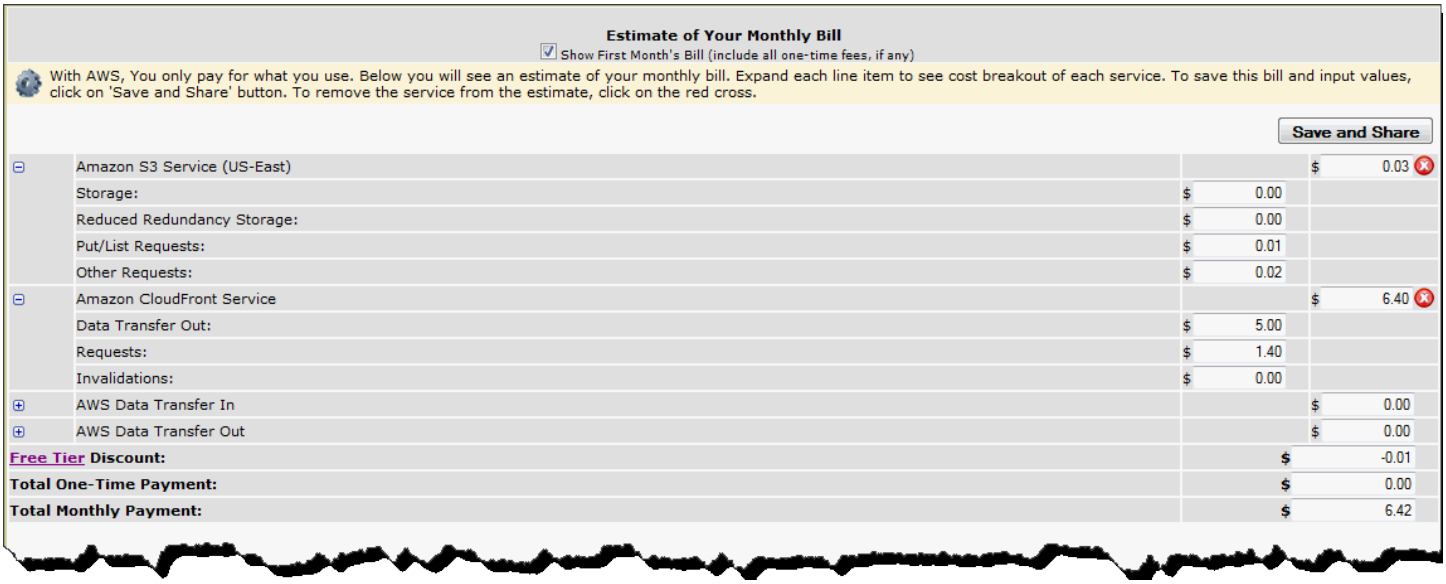
Variable	Formula	Calculation
Data Transfer Out for US	Monthly Volume (GB) X Traffic Distribution (%) X Data Out Rate)	32.25 0.50 X 0.12 $1.94
Data Transfer Out for Hong Kong/Singapore	Monthly Volume (GB) X Traffic Distribution (%) X Data Out Rate)	32.25 0.50 X 0.19 $3.06
Requests for US	Request Rate X Traffic Distribution (%) X (Monthly Volume/Object Size/10,000 requests)	$0.0075 0.50 X 32.25GB/20KB/10,000 $0.64
Requests for Hong Kong/Singapore	Request Rate X Traffic Distribution (%) X (Monthly Volume/Object Size/10,000 requests)	$0.009 0.50 X 32.25GB/20KB/10,000 $0.76
Estimated Monthly Cost for Amazon CloudFront		$6.40

We use the AWS Simple Monthly Calculator to estimate the cost. The total cost for one month for Amazon CloudFront in this example is $6.40[4].

[4] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

Total Cost

To calculate the total cost for one month's usage for this simple, static microsite, we add the cost for Amazon S3 and Amazon CloudFront and subtract any discount that falls into the AWS Free Usage Tier. The following image shows an example of your monthly estimate.



Estimate of Your Monthly Bill

Show First Month's Bill (include all one-time fees, if any)

With AWS, You only pay for what you use. Below you will see an estimate of your monthly bill. Expand each line item to see cost breakout of each service. To save this bill and input values, click on 'Save and Share' button. To remove the service from the estimate, click on the red cross.

Save and Share

⊖	Amazon S3 Service (US-East)		$ 0.03
	Storage:	$ 0.00	
	Reduced Redundancy Storage:	$ 0.00	
	Put/List Requests:	$ 0.01	
	Other Requests:	$ 0.02	
⊖	Amazon CloudFront Service		$ 6.40
	Data Transfer Out:	$ 5.00	
	Requests:	$ 1.40	
	Invalidations:	$ 0.00	
⊕	AWS Data Transfer In		$ 0.00
⊕	AWS Data Transfer Out		$ 0.00
Free Tier Discount:		**$**	-0.01
Total One-Time Payment:		**$**	0.00
Total Monthly Payment:		**$**	6.42

Figure 4: Monthly Cost for a Simple Microsite

The total cost of the simple dynamic site for one month is estimated at $6.42[5]. You can view this in your web browser at http://calculator.s3.amazonaws.com/calc5.html?key=calc-F98BB8B8-CA40-4CE3-9425-11EE0971B1C4&s=s3.

Calculating Costs for a Simple Dynamic Site Using Amazon EC2 and Amazon RDS

In this example, we calculate the cost for a simple, dynamic website hosted on AWS using Amazon EC2 and Amazon Relational Database Service (RDS). The Amazon EC2 instance is used to run the web and application tiers. Amazon RDS uses one DB instance for its primary storage. The Amazon EC2 instance and the Amazon RDS are located in one Availability Zone.

Architecture

The application and web tiers run on the Amazon EC2 instance. The Amazon EC2 instance pulls data from the Amazon RDS database. The Amazon RDS database has 50 GB of provisioned storage attached to it.

The following illustration shows an example architecture for a simple, dynamic website using one Amazon EC2 instance and one Amazon RDS database instance.

[5] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

Figure 5: Simple Dynamic Site Architecture

Amazon EC2 Cost Breakdown

The following table shows the characteristics for Amazon EC2 we have identified for this simple dynamic site.

Characteristic	Estimated Usage	Description
Clock Hours of Server Time	24 hours per day	At an average of 30.5 days in a month, the instance runs 732 hours per month
Machine Characteristics	M1.small instance, ephemeral storage	32-bit OS, 1 virtual core, 1 EC2 compute unit, 1.7GB core memory, 160GB local storage
Additional Storage	No EBS volumes	For this application, we need only the local storage that is packaged with the AMI.
Data Transfer	Data Out: ~15 GB /month	There are approximately 100,000 hits per day, and each response is about 5 KB.
Instance Scale	1	One instance is sufficient to handle the current traffic.
Elastic IP Address	1	One Elastic IP address is used for our instance. Since it is always in use, it is free of charge.
Elastic Load Balancing	None	We have only one instance, so no load balancer is needed.
Detailed Monitoring	None	Detailed monitoring is not enabled, so we get basic monitoring free of charge.

The following image shows the cost breakdown for Amazon EC2 in the AWS Simple Monthly Calculator.

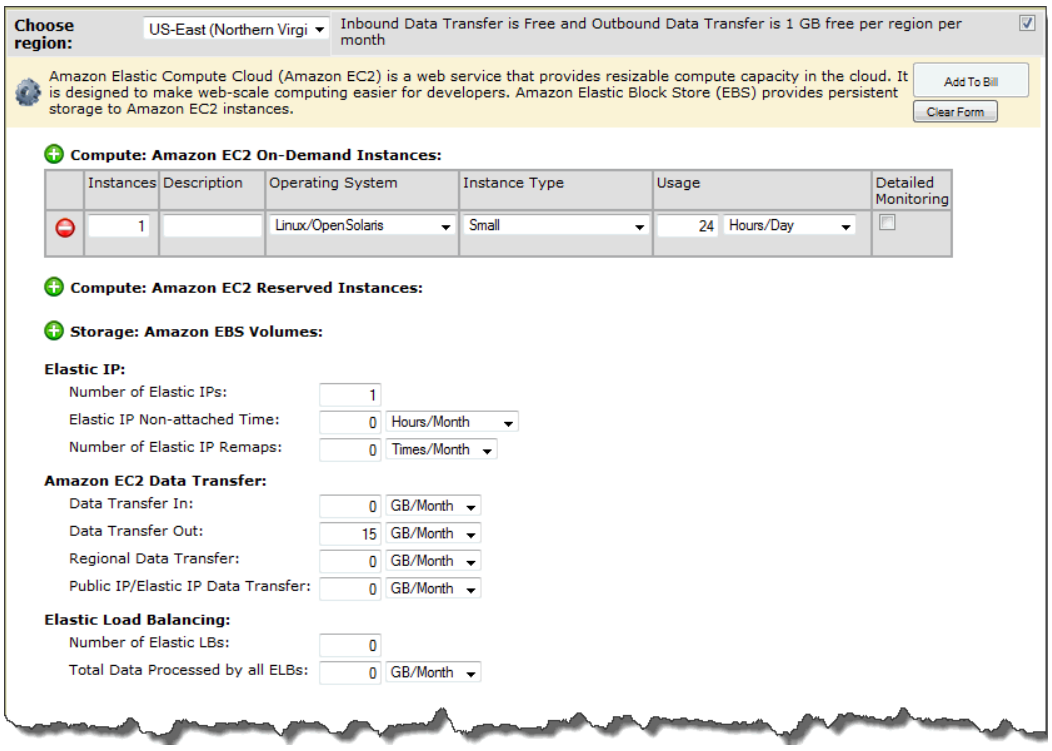


Figure 6: Amazon EC2 Cost Breakdown

Because we have no EBS volumes, the total cost for one month is the cost of the running instances plus the overall AWS data transfer.

Variable	Formula	Calculation
Instance Cost	Instance cost per hour Number of instances X Uptime in hours	$0.080 1 X 732 $58.56
AWS Data Transfer	(Data in (GB) X Data In Rate) +(Data out (GB) X Data Out Rate)	0 X $0.00 X 14 X $0.12 $1.68
Estimated Cost for Amazon EC2		$60.24

We use the AWS Simple Monthly Calculator to estimate the cost. With the calculator, you can see that by choosing an AMI with different characteristics, your monthly cost changes accordingly. The total cost for one month for Amazon EC2 in this example is $60.24[6].

Amazon RDS Cost Breakdown

The following table shows the characteristics for Amazon RDS we have identified for this simple dynamic site.

[6] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

Characteristic	Estimated Usage	Description
Clock Hours of Server Time	24 hrs/day	24*30.5 = 732 hrs/month
Database Characteristics	Small RDS instance	1.7 GB memory, 1 ECU (1 virtual core with 1 ECU), 64-bit platform, Moderate I/O Capacity
Provisioned Storage	50 GB/month	Amazon provides 5 GB to 1 TB of associated storage capacity for your primary data set.
Requests	15M I/O requests/month	We have 100,000 hits per day at a rate of 5 I/O requests per hit on site for 30.5 days.
Deployment Type	Standard Availability Zone	We will run our database instance in one Availability Zone.
Additional Backup Storage	40 GB/month	Amazon provides free backup storage up to the amount of your provisioned storage. The additional backup storage charge is for the amount of storage in addition to the already included backup storage.
Data Transfer	Data in: 0 GB Data out: 0 GB	There is no data transfer from RDS to the Internet.
Database Instance Scale	1	We need one database instance.

The following image shows the cost breakdown for Amazon RDS.

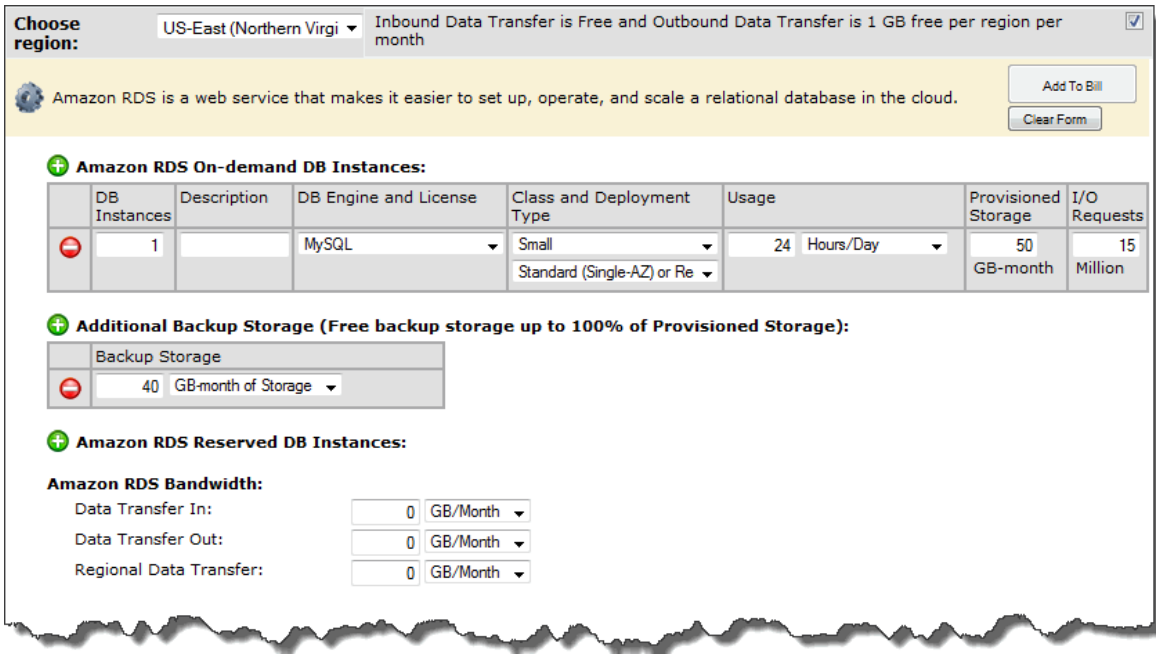


Figure 7: Amazon RDS Cost Breakdown

Because we have no data transfer in or out or reserved DB instances, the total cost for one month is the sum of the cost of the running instances, provisioned storage, I/O requests, and additional backup storage.

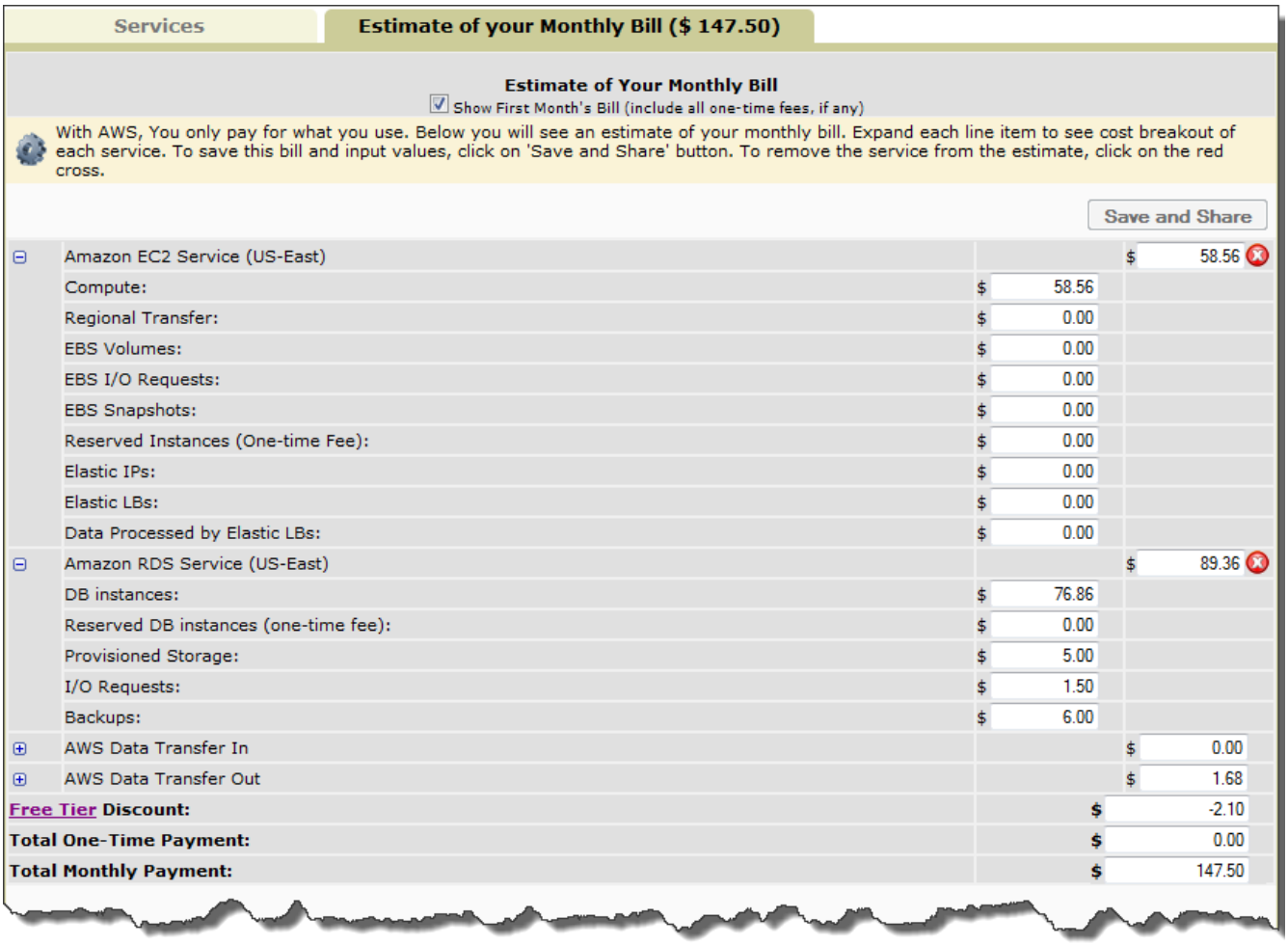
Variable	Formula	Calculation
Instance Cost	Instance cost per hour Number of instances X Uptime in hours	$0.105 1 X 732 $76.86
Provisioned Storage	Storage rate X Storage Amount (GB)	$0.10 X 50 $5.00
I/O Requests	I/O rate X Number of requests	$0.10 X 15 $1.50
Backups	Backup rate X Backup storage amount (GB)	$0.15 X 40 $6.00
Estimated Cost for Amazon RDS		$89.36

We use the AWS Simple Monthly Calculator to estimate this cost. The cost for one month for the Amazon RDS portion of this scenario is $89.36[7].

[7] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

Total Cost

To calculate the total cost for this example, we add the cost for Amazon EC2, Amazon RDS, and AWS Data Transfer Out and subtract any discount that falls into the AWS Free Usage Tier. The following image shows an example of your monthly estimate.



Services | Estimate of your Monthly Bill ($ 147.50)

Estimate of Your Monthly Bill

Show First Month's Bill (include all one-time fees, if any)

With AWS, You only pay for what you use. Below you will see an estimate of your monthly bill. Expand each line item to see cost breakout of each service. To save this bill and input values, click on 'Save and Share' button. To remove the service from the estimate, click on the red cross.

Save and Share

⊖ Amazon EC2 Service (US-East)		$ 58.56
Compute:	$ 58.56	
Regional Transfer:	$ 0.00	
EBS Volumes:	$ 0.00	
EBS I/O Requests:	$ 0.00	
EBS Snapshots:	$ 0.00	
Reserved Instances (One-time Fee):	$ 0.00	
Elastic IPs:	$ 0.00	
Elastic LBs:	$ 0.00	
Data Processed by Elastic LBs:	$ 0.00	
⊖ Amazon RDS Service (US-East)		$ 89.36
DB instances:	$ 76.86	
Reserved DB instances (one-time fee):	$ 0.00	
Provisioned Storage:	$ 5.00	
I/O Requests:	$ 1.50	
Backups:	$ 6.00	
⊕ AWS Data Transfer In		$ 0.00
⊕ AWS Data Transfer Out		$ 1.68
Free Tier Discount:		$ -2.10
Total One-Time Payment:		$ 0.00
Total Monthly Payment:		$ 147.50

Figure 8: Monthly Estimate for a Simple, Dynamic Web Site

The total cost of the simple dynamic site in this example is estimated at $147.50 per month[8]. You can view this in your web browser at http://calculator.s3.amazonaws.com/calc5.html?key=calc-C47B4D3A-F4C9-4A67-A2D7-25F346669C21.

Calculating Costs for a Complex Dynamic Site Using Amazon EC2, Auto Scaling, and Amazon RDS

In this example, we calculate costs for a complex, dynamic website hosted on AWS using Amazon EC2, Auto Scaling, and Amazon RDS. The Amazon EC2 instance runs the web and application tiers, and we use Auto Scaling to match the number of instances to the traffic load. Amazon RDS uses one DB instance for its primary storage. This DB instance is deployed across multiple Availability Zones.

[8] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

Architecture

Elastic Load Balancing balances traffic across one or more Amazon EC2 instances. The Amazon EC2 instances belong to an Auto Scaling group, and the Auto Scaling group either adds or subtracts Amazon EC2 instances, depending on variations in the traffic load. Deploying Amazon RDS across multiple Availability Zones enhances data durability and availability. Amazon RDS provisions and maintains a standby in a different Availability Zone for automatic failover in the event of planned or unplanned outages.

The following illustration shows an example architecture for a complex, dynamic website using Amazon EC2, Auto Scaling, and one Amazon RDS database instance across multiple Availability Zones.

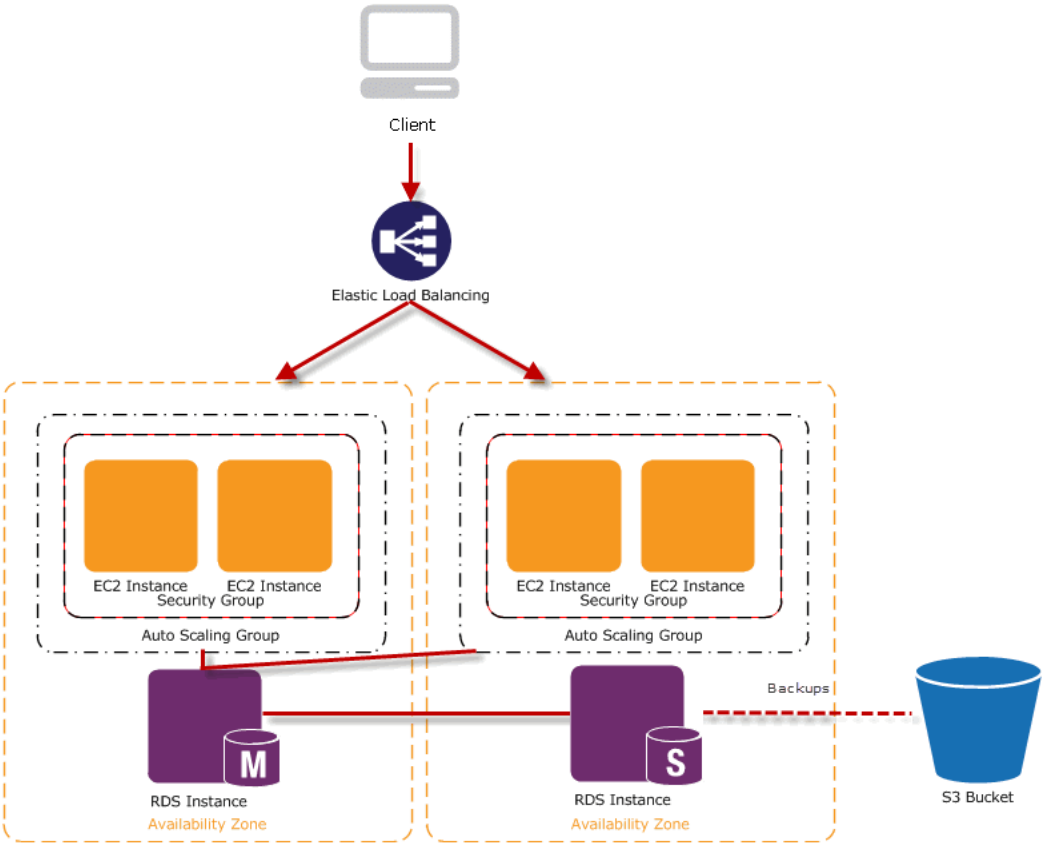


Figure 9: Complex Dynamic Site Architecture

Daily Usage Profile

You can monitor daily usage for your application so that you can better estimate your costs. For instance, you can look at the daily pattern to figure out how your application handles traffic. For each hour, track how many hits you get at your website. Then track how many instances are running. Add up the total number of hits for that day. Examine the number of Amazon EC2 instances that run each hour, and then take the average. You can use the number of hits per day and the average number of instances for your calculations.

Amazon EC2 Cost Breakdown

The following table shows the characteristics for Amazon EC2 we have identified for this complex dynamic site.

Characteristic	Estimated Usage	Description
Clock Hours of Server Time	24 hrs/day	At an average of 30.5 days in a month, the instance runs 732 hours/month
Machine Characteristics	T1.micro instance, ephemeral storage	613 MB of memory, up to 2 EC2 compute units (ECUs) for short periodic bursts, Amazon EBS storage only, 32-bit or 64-bit platform
Additional Storage	No EBS volumes	For this application, we need only the local storage which is packaged with the AMI.
Data Transfer	Data In: 5 GB/day Data Out: 50 GB /day	There are approximately 1,000,000 hits per day. Each response transfers out about 50 KB, and each request transfers in about 5 KB.
Instance Scale	4	On average in a given day, there are 4 instances running.
Elastic Load Balancing	Hourly usage: 732 hrs/month Data processed: 1677.5 GB/month	Elastic Load Balancing is used 24 hours/day, 7 days/week. Elastic Load Balancing processes a total of 55 GB/day (data in + data out)
Elastic IP Address	None	We use Elastic Load Balancing to balance traffic across instances.
Detailed Monitoring	None	Detailed monitoring is not enabled, so we get basic monitoring free of charge.

The following image shows the cost breakdown for Amazon EC2 in the AWS Simple Monthly Calculator.

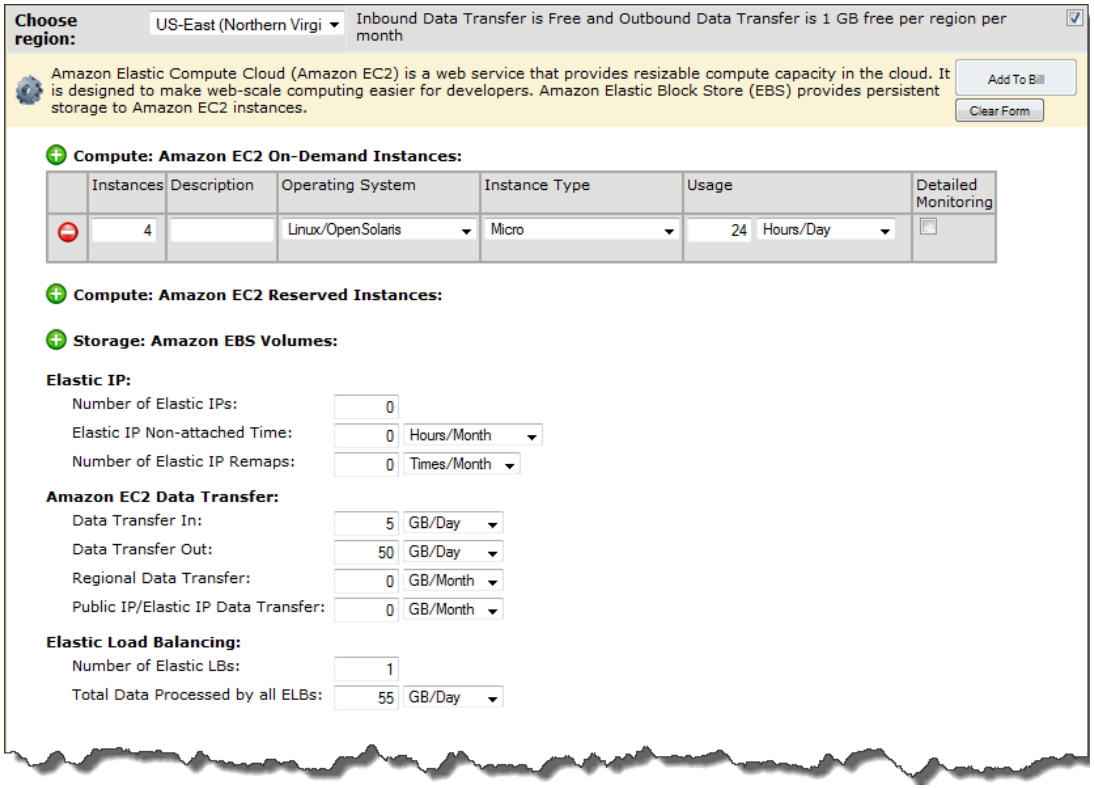


Figure 10: Amazon EC2 Cost Breakdown

Because we have no Amazon EBS volumes and we are using Elastic Load Balancing, the total cost for one month is the sum of the cost of the running instances, overall AWS data transfer, Elastic Load Balancers, and the data processed by the Elastic Load Balancers.

Variable	Formula	Calculation
Instance Cost	Instance cost per hour Number of instances X Uptime in hours	$0.02 4 X 732 $58.56
Elastic Load Balancing	(Hours used X Hourly Rate) +(Data processed (GB) X Process Rate)	732 X $0.025 X 1677.5 X $0.008 $31.72
AWS Data Transfer	(Data in (GB) X Data In Rate) +(Data out (GB) X Data Out Rate)	152.5 X $0.00 + (1525-1)[9] X $0.12 $182.88
Estimated Cost for Amazon EC2		$273.16

[9] Since up to one gigabyte is free per month, we subtract one.

We use the AWS Simple Monthly Calculator to estimate this cost. Using the calculator, we arrive at the total cost for one month's usage for Amazon EC2 of $273.16[10] for this example.

Amazon RDS Cost Breakdown

The following table shows the characteristics for Amazon RDS we have identified for this complex dynamic site.

Characteristic	Estimated Usage	Description
Clock Hours of Server Time	24 hrs/day	24*30.5 = 732 hours per month
Database Characteristics	Small RDS instance	1.7 GB memory, 1 ECU (1 virtual core with 1 ECU), 64-bit platform, Moderate I/O Capacity
Provisioned Storage	100 GB/month	Amazon provides 5 GB to 1 TB of associated storage capacity for your primary data set.
Requests	300M I/O requests/month	We have 1,000,000 hits per day at a rate of 5 I/O requests per hit on site with 30.5 days in a month on average. This is a total of 150M I/O requests per month, but since the write I/O request will double because data is also replicated to the standby instance, we have a total of 300M.
Deployment Type	Multiple Availability Zones	We will run our database instance across multiple Availability Zones.
Additional Backup Storage	None	We'll use up to the provisioned amount, which is 100 GB.
Data Transfer	Data in: 0 GB Data out: 0 GB	There is no data transfer from RDS to the Internet.
Database Instance Scale	1	We need one database instance.
Special Features	None	There are no reserved database instances.

[10] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.

The following image shows the cost breakdown for Amazon RDS:

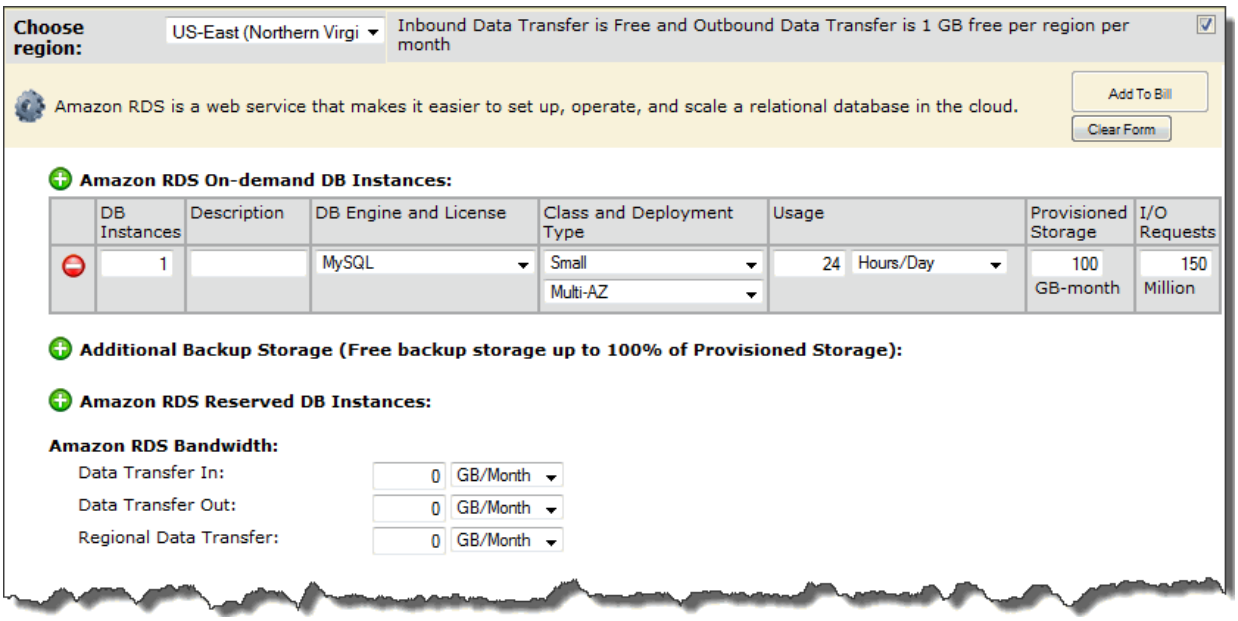


Figure 11: Amazon RDS Cost Breakdown

Because we do not have data transfer in or out, and we do not have additional backup storage, the total cost for one month is the sum of the cost of the running instances, provisioned storage, and I/O requests.

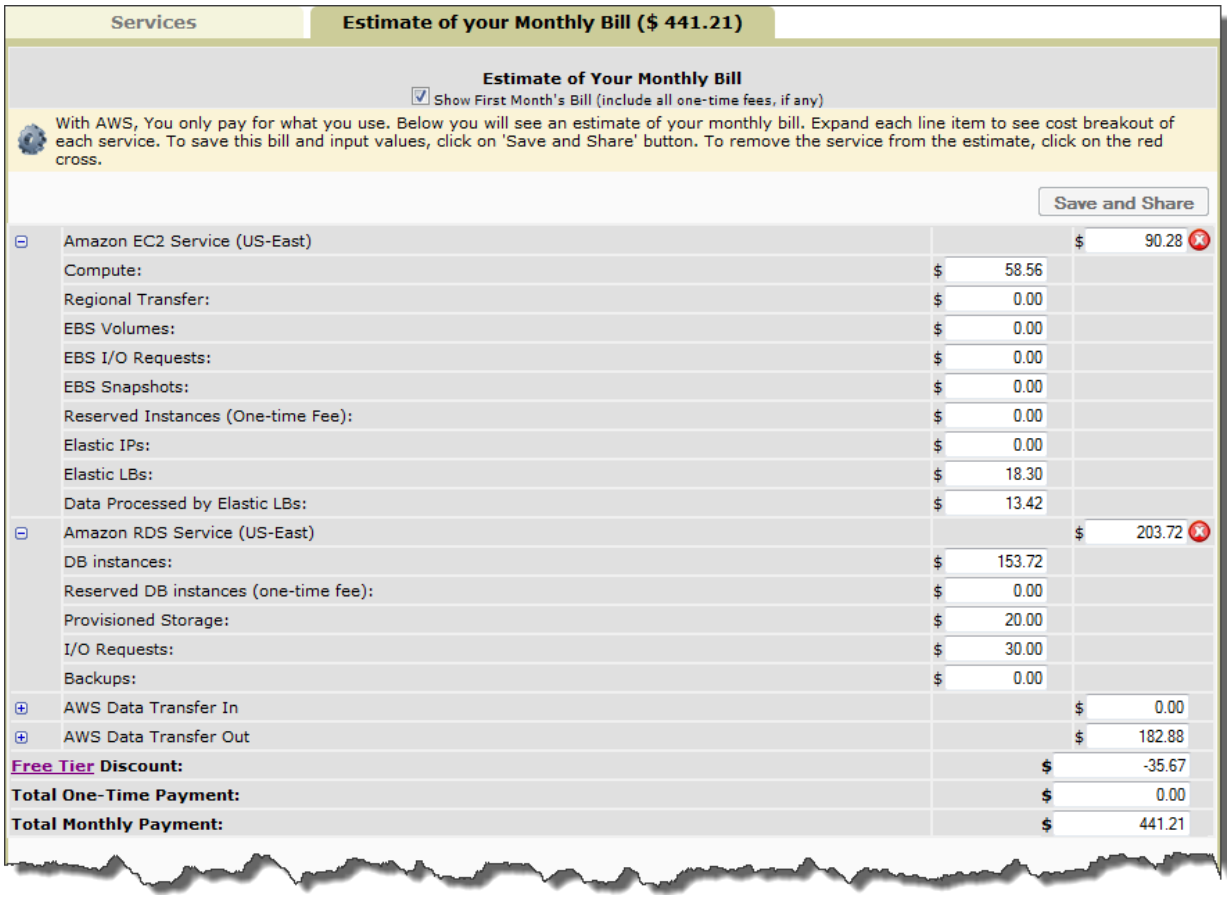
Variable	Formula	Calculation
Instance Cost	Instance cost per hour Number of instances X Uptime in hours	$0.21 1 X 732 $153.72
Provisioned Storage	Storage rate X Storage Amount (GB)	$0.20 X 100 $20.00
I/O Requests	I/O rate X Number of requests	$0.10 X 300 $30.00
Estimated cost for Amazon RDS		$203.72

We use the AWS Simple Monthly Calculator to estimate this cost. The total cost for one month's usage for Amazon RDS portion of this scenario is $203.72[11].

[11] Depending on regional factors and special offers, the cost you get from the AWS Simple Monthly Calculator will be slightly different.

Total Cost

To calculate the total cost for this example, we add the cost for Amazon EC2, Amazon RDS, and AWS Data Transfer Out and subtract any discount that falls into the AWS Free Usage Tier. The following image shows an example of your monthly estimate.



Services | Estimate of your Monthly Bill ($ 441.21)

Estimate of Your Monthly Bill

Show First Month's Bill (include all one-time fees, if any)

With AWS, You only pay for what you use. Below you will see an estimate of your monthly bill. Expand each line item to see cost breakout of each service. To save this bill and input values, click on 'Save and Share' button. To remove the service from the estimate, click on the red cross.

Save and Share

⊖	Amazon EC2 Service (US-East)		$ 90.28
	Compute:	$ 58.56	
	Regional Transfer:	$ 0.00	
	EBS Volumes:	$ 0.00	
	EBS I/O Requests:	$ 0.00	
	EBS Snapshots:	$ 0.00	
	Reserved Instances (One-time Fee):	$ 0.00	
	Elastic IPs:	$ 0.00	
	Elastic LBs:	$ 18.30	
	Data Processed by Elastic LBs:	$ 13.42	
⊖	Amazon RDS Service (US-East)		$ 203.72
	DB instances:	$ 153.72	
	Reserved DB instances (one-time fee):	$ 0.00	
	Provisioned Storage:	$ 20.00	
	I/O Requests:	$ 30.00	
	Backups:	$ 0.00	
⊕	AWS Data Transfer In		$ 0.00
⊕	AWS Data Transfer Out		$ 182.88
Free Tier Discount:		**$**	-35.67
Total One-Time Payment:		**$**	0.00
Total Monthly Payment:		**$**	441.21

Figure 12: Monthly Estimate

The total cost of the complex dynamic site in this scenario is estimated at $441.21[12] per month including the Free Tier discount. You can view this example in your web browser at http://calculator.s3.amazonaws.com/calc5.html?key=calc-54A9E954-115E-45E4-9FA3-EC69971EBB5A. We recommend that you use Mozilla Firefox.

[12] Depending on regional factors and special offers, the cost you get from the calculator will be slightly different.