Q: What is AWS Lambda?

AWS Lambda lets you run code without provisioning or managing servers. You pay only for the compute time you consume - there is no charge when your code is not running. With Lambda, you can run code for virtually any type of application or backend service - all with zero administration. Just upload your code and Lambda takes care of everything required to run and scale your code with high availability. You can set up your code to automatically trigger from other AWS services or call it directly from any web or mobile app.

Show less

Q: What is serverless computing?

Serverless computing allows you to build and run applications and services without thinking about servers. With serverless computing, your application still runs on servers, but all the server management is done by AWS. At the core of serverless computing is AWS Lambda, which lets you run your code without provisioning or managing servers. Learn more about serverless computing by visiting here.

Show less

Q: What events can trigger an AWS Lambda function?

and allows you to easily run distributed applications on a managed cluster of Amazon EC2 instances.

AWS Lambda makes it easy to execute code in response to events, such as changes to Amazon S3 buckets, updates to an Amazon DynamoDB table, or custom events generated by your applications or devices. With Lambda you do not have to provision your own instances; Lambda performs all the operational and administrative activities on your behalf, including capacity provisioning, monitoring fleet health, applying security patches to the underlying compute resources, deploying your code, running a web service front end, and monitoring and logging your code. AWS Lambda provides easy scaling and high availability to your code without additional effort on your part.

Show less

Q: What kind of code can run on AWS Lambda?

AWS Lambda offers an easy way to accomplish many activities in the cloud. For example, you can use AWS Lambda to build mobile back-ends that retrieve and transform data from Amazon DynamoDB, handlers that compress or transform objects as they are uploaded to Amazon S3, auditing and reporting of API calls made to any Amazon Web Service, and server-less processing of streaming data using Amazon Kinesis.

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Q: How does AWS Lambda isolate my code?

Each AWS Lambda function runs in its own isolated environment, with its own resources and file system view. AWS Lambda uses the same techniques as Amazon EC2 to provide security and separation at the infrastructure and execution levels.

Show less

Q: How does AWS Lambda secure my code?

AWS Lambda stores code in Amazon S3 and encrypts it at rest. AWS Lambda performs additional integrity checks while your code is in use.

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Q: What AWS regions are available for AWS Lambda?

Please refer to the AWS Global Infrastructure Region Table.

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AWS Lambda functions

reuse it to serve a subsequent request, rather than creating a new copy. To learn more about how Lambda reuses function instances, visit our documentation. Your code should not assume that this will always happen.

Show less

Q: What if I need scratch space on disk for my AWS Lambda function?

Each Lambda function receives 500MB of non-persistent disk space in its own /tmp directory.

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Q: Why must AWS Lambda functions be stateless?

Keeping functions stateless enables AWS Lambda to rapidly launch as many copies of the function as needed to scale to the rate of incoming events. While AWS Lambda's programming model is stateless, your code can access stateful data by calling other web services, such as Amazon S3 or Amazon DynamoDB.

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Q: Can I use threads and processes in my AWS Lambda function code?

Q: How do I create an AWS Lambda function using the Lambda console?

If you are using Node.js or Python, you can author the code for your function using code editor in the AWS Lambda console which lets you author and test your functions, and view the results of function executions in a robust, IDE-like environment. Go to the console to get started.

You can also package the code (and any dependent libraries) as a ZIP and upload it using the AWS Lambda console from your local environment or specify an Amazon S3 location where the ZIP file is located. Uploads must be no larger than 50MB (compressed). You can use the AWS Eclipse plugin to author and deploy Lambda functions in Java. You can use the Visual Studio plugin to author and deploy Lambda functions in C#, and Node.js.

Show less

Q: How do I create an AWS Lambda function using the Lambda CLI?

You can package the code (and any dependent libraries) as a ZIP and upload it using the AWS CLI from your local environment, or specify an Amazon S3 location where the ZIP file is located. Uploads must be no larger than 50MB (compressed). Visit the Lambda Getting Started guide to get started.

Show less

Q: How can I manage my AWS Lambda functions?

You can easily list, delete, update, and monitor your Lambda functions using the dashboard in the AWS Lambda console. You can also use the AWS CLI and AWS SDK to manage your Lambda functions. Visit the Lambda Developers Guide to learn more.

Show less

Q: How do I monitor an AWS Lambda function?

AWS Lambda automatically monitors Lambda functions on your behalf, reporting real-time metrics through Amazon CloudWatch, including total requests, account-level and function-level concurrency usage, latency, error rates, and throttled requests. You can view statistics for each of your Lambda functions via the Amazon CloudWatch console or through the AWS Lambda console. You can also call third-party monitoring APIs in your Lambda function.

Visit Troubleshooting CloudWatch metrics to learn more. Standard charges for AWS Lambda apply to use Lambda's built-in metrics.

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Q: How do I troubleshoot failures in an AWS Lambda function?

configuration delays. There are no fundamental limits to scaling a function. AWS Lambda will dynamically allocate capacity to match the rate of incoming events.

Show less

Q: How are compute resources assigned to an AWS Lambda function?

In the AWS Lambda resource model, you choose the amount of memory you want for your function, and are allocated proportional CPU power and other resources. For example, choosing 256MB of memory allocates approximately twice as much CPU power to your Lambda function as requesting 128MB of memory and half as much CPU power as choosing 512MB of memory. You can set your memory in 64MB increments from 128MB to 3GB.

Show less

Q: How long can an AWS Lambda function execute?

AWS Lambda functions can be configured to run up to 15 minutes per execution. You can set the timeout to any value between 1 second and 15 minutes.

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Q: How will I be charged for using AWS Lambda functions?

Deployment times may vary with the size of your code, but AWS Lambda functions are typically ready to call within seconds of upload.

Show less

Q: Can I use my own version of a supported library?

Yes. you can include your own copy of a library (including the AWS SDK) in order to use a different version than the default one provided by AWS Lambda.

Show less

Using AWS Lambda to process AWS events

Q: What is an event source?

An event source is an AWS service or developer-created application that produces events that trigger an AWS Lambda function to run. Some services publish these events to Lambda by invoking the cloud function directly (for example, Amazon S3). Lambda can also poll resources in other services that do not publish events to Lambda. For example, Lambda can pull records from an Amazon Kinesis stream or an Amazon SQS queue and execute a Lambda function for each fetched message.

events arrive in batches, such as Amazon SQS, Amazon Kinesis, and Amazon DynamoDB Streams, the event parameter may contain multiple events in a single call, based on the batch size you request.To learn more about Amazon S3 event notifications visit Configuring Notifications for Amazon S3 Events. To learn more about Amazon DynamoDB Streams visit the DynamoDB Stream Developers Guide. To learn more about invoking Lambda functions using Amazon SNS, visit the Amazon SNS Developers Guide. For more information on Amazon Cognito events, visit Amazon Cognito. For more information on AWS CloudTrail logs and auditing API calls across AWS services, see AWS CloudTrail.

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Q: How do I make an AWS Lambda function respond to changes in an Amazon S3 bucket?

From the AWS Lambda console, you can select a function and associate it with notifications from an Amazon S3 bucket. Alternatively, you can use the Amazon S3 console and configure the bucket's notifications to send to your AWS Lambda function. This same functionality is also available through the AWS SDK and CLI.

Show less

Q: How do I make an AWS Lambda function respond to updates in an Amazon DynamoDB table?

Q: How does AWS Lambda process data from Amazon Kinesis streams and Amazon DynamoDB Streams?

The Amazon Kinesis and DynamoDB Streams records sent to your AWS Lambda function are strictly serialized, per shard. This means that if you put two records in the same shard, Lambda guarantees that your Lambda function will be successfully invoked with the first record before it is invoked with the second record. If the invocation for one record times out, is throttled, or encounters any other error, Lambda will retry until it succeeds (or the record reaches its 24-hour expiration) before moving on to the next record. The ordering of records across different shards is not guaranteed, and processing of each shard happens in parallel.

Show less

Q: How do I use an AWS Lambda function to respond to notifications sent by Amazon Simple Notification Service (SNS)?

From the AWS Lambda console, you can select a Lambda function and associate it with an Amazon SNS topic. This same functionality is also available through the AWS SDK and CLI.

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Q: How do I use an AWS Lambda function to respond to changes in user or device data managed by Amazon Cognito?

From the AWS Lambda console, you can select a function to trigger when any datasets associated with an Amazon Cognito identity pool are synchronized. This same functionality is also available through the AWS SDK and CLI. Visit Amazon Cognito for more information on using Amazon Cognito to share and synchronize data across a user's devices.

Show less

Q: How can my application trigger an AWS Lambda function directly?

You can invoke a Lambda function using a custom event through AWS Lambda's invoke API. Only the function's owner or another AWS account that the owner has granted permission can invoke the function. Visit the Lambda Developers Guide to learn more.

Show less

Q: What is the latency of invoking an AWS Lambda function in response to an event?

Q: How do I invoke an AWS Lambda function over HTTPS?

You can invoke a Lambda function over HTTPS by defining a custom RESTful API using Amazon API Gateway. This gives you an endpoint for your function which can respond to REST calls like GET, PUT and POST. Read more about using AWS Lambda with Amazon API Gateway.

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Q: How can my AWS Lambda function customize its behavior to the device and app making the request?

When called through the AWS Mobile SDK, AWS Lambda functions automatically gain insight into the device and application that made the call through the 'context' object.

Show less

Q: How can my AWS Lambda function personalize their behavior based on the identity of the end user of an application?

When your app uses the Amazon Cognito identity, end users can authenticate themselves using a variety of public login providers such as Amazon, Facebook, Google, and other OpenID Connect-

Q: What happens if my function fails while processing an event?

For Amazon S3 bucket notifications and custom events, AWS Lambda will attempt execution of your function three times in the event of an error condition in your code or if you exceed a service or resource limit.

For ordered event sources that AWS Lambda polls on your behalf, such as Amazon DynamoDB Streams and Amazon Kinesis streams, Lambda will continue attempting execution in the event of a developer code error until the data expires. You can monitor progress through the Amazon Kinesis and Amazon DynamoDB consoles and through the Amazon CloudWatch metrics that AWS Lambda generates for your function. You can also set Amazon CloudWatch alarms based on error or execution throttling rates.

Show less

Using AWS Lambda to build applications

Q: What is a serverless application?

"serverless resources"). These resources make it easier for AWS customers to use CloudFormation to configure and deploy serverless applications, using existing CloudFormation APIs.

Show less

Q: How can I discover existing serverless applications developed by the AWS community?

You can choose from a collection of serverless applications published by developers, companies, and partners in the AWS community with the AWS Serverless Application Repository. After finding an application, you can configure and deploy it straight from the Lambda console.

Show less

Q: How do I automate deployment for a serverless application?

You can automate your serverless application's release process using AWS CodePipeline and AWS CodeDeploy. CodePipeline is a continuous delivery service that enables you to model, visualize and automate the steps required to release your serverless application. CodeDeploy provides a deployment automation engine for your Lambda-based applications. CodeDeploy lets you orchestrate deployments according to established best-practice methodologies such as canary and linear deployments, and helps you establish the necessary guardrails to verify that newly-deployed code is safe, stable, and ready to be fully released to production.

To learn more about serverless CI/CD, visit our documentation.

You can use AWS Step Functions to coordinate a series of AWS Lambda functions in a specific order. You can invoke multiple Lambda functions sequentially, passing the output of one to the other, and/or in parallel, and Step Functions will maintain state during executions for you.

Show less

Q: How do I troubleshoot a serverless application?

You can enable your Lambda function for tracing with AWS X-Ray by adding X-Ray permissions to your Lambda function's execution role and changing your function's "tracing mode" to "active. " When X-Ray is enabled for your Lambda function, AWS Lambda will emit tracing information to X-Ray regarding the Lambda service overhead incurred when invoking your function. This will provide you with insights such as Lambda service overhead, function init time, and function execution time. In addition, you can include the X-Ray SDK in your Lambda deployment package to create your own trace segments, annotate your traces, or view trace segments for downstream calls made from your Lambda function. X-Ray SDKs are currently available for Node.js and Java. Visit Troubleshooting Lambda-based applications to learn more. AWS X-Ray rates will apply.

Show less

Q: How is AWS SAM licensed?

The specification is open sourced under Apache 2.0, which allows you and others to adopt and incorporate AWS SAM into build, deployment, monitoring and management tools with a

back from the origin, and right before responding back to the end user). The code is then ready to execute across AWS locations globally when a request for content is received, and scales with the volume of CloudFront requests globally. Learn more in our documentation.

Show less

Q: How do I use Lambda@Edge?

To use Lambda@Edge, you just upload your code to AWS Lambda and associate a function version to be triggered in response to Amazon CloudFront requests. Your code must satisfy the Lambda@Edge service limits. Lambda@Edge only supports Node.js for global invocation by CloudFront events at this time. Learn more in our documentation.

Show less

Q: When should I use Lambda@Edge?

Lambda@Edge is optimized for latency sensitive use cases where your end viewers are distributed globally. All the information you need to make a decision should be available at the CloudFront edge, within the function and the request. This means that use cases where you are looking to make decisions on how to serve content based on user characteristics (e.g., location, client device, etc) can now be executed and served close to your users without having to be routed back to a centralized server.

Show less

to the end user or the device that made the request.

- Origin Request - This event occurs when the CloudFront edge server does not already have the requested object in its cache, and the viewer request is ready to be sent to your backend origin webserver (e.g. Amazon EC2, or Application Load Balancer, or Amazon S3).
- Origin Response - This event occurs when the CloudFront server at the edge receives a response from your backend origin webserver.

Show less

Q: How is AWS Lambda@Edge different from using AWS Lambda behind Amazon API Gateway?

The difference is that API Gateway and Lambda are regional services. Using Lambda@Edge and Amazon CloudFront allows you to execute logic across multiple AWS locations based on where your end viewers are located.

Show less

Scalability and availability

Q: How available are AWS Lambda functions?

No. AWS Lambda is designed to run many instances of your functions in parallel. However, AWS Lambda has a default safety throttle for number of concurrent executions per account per region (visit here for info on default safety throttle limits). You can also control the maximum concurrent executions for individual AWS Lambda functions which you can use to reserve a subset of your account concurrency limit for critical functions, or cap traffic rates to downstream resources.

If you wish to submit a request to increase the throttle limit you can visit our Support Center, click "Open a new case," and file a service limit increase request.

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Q: What happens if my account exceeds the default throttle limit on concurrent executions?

On exceeding the throttle limit, AWS Lambda functions being invoked synchronously will return a throttling error (429 error code). Lambda functions being invoked asynchronously can absorb reasonable bursts of traffic for approximately 15-30 minutes, after which incoming events will be rejected as throttled. In case the Lambda function is being invoked in response to Amazon S3 events, events rejected by AWS Lambda may be retained and retried by S3 for 24 hours. Events from Amazon Kinesis streams and Amazon DynamoDB streams are retried until the Lambda function succeeds or the data expires. Amazon Kinesis and Amazon DynamoDB Streams retain data for 24 hours.

Show less

Q: What happens if my Lambda function invocations exhaust the available policy?

On exceeding the retry policy for asynchronous invocations, you can configure a “dead letter queue” (DLQ) into which the event will be placed; in the absence of a configured DLQ the event may be rejected. On exceeding the retry policy for stream based invocations, the data would have already expired and therefore rejected.

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Q: What resources can I configure as a dead letter queue for a Lambda function?

You can configure an Amazon SQS queue or an Amazon SNS topic as your dead letter queue.

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Security and access control

Q: How do I allow my AWS Lambda function access to other AWS resources?

You grant permissions to your Lambda function to access other resources using an IAM role. AWS Lambda assumes the role while executing your Lambda function, so you always retain full, secure

Q: How do I control which Amazon DynamoDB table or Amazon Kinesis stream an AWS Lambda function can poll?

Access controls are managed through the Lambda function's role. The role you assign to your Lambda function also determines which resource(s) AWS Lambda can poll on its behalf. Visit the Lambda Developer's Guide to learn more.

Show less

Q: How do I control which Amazon SQS queue an AWS Lambda function can poll?

Access controls can be managed by the Lambda function's role or a resource policy setting on the queue itself. If both policies are present, the more restrictive of the two permissions will be applied.

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Q: Can I access resources behind Amazon VPC with my AWS Lambda function?

Yes. You can access resources behind Amazon VPC.

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Q: How do I enable and disable the VPC support for my Lambda function?

Q: Can Lambda functions in a VPC also be able to access the internet and AWS Service endpoints?

Lambda functions configured to access resources in a particular VPC will not have access to the internet as a default configuration. If you need access to external endpoints, you will need to create a NAT in your VPC to forward this traffic and configure your security group to allow this outbound traffic.

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AWS Lambda functions in Java

Q: How do I compile my AWS Lambda function Java code?

You can use standard tools like Maven or Gradle to compile your Lambda function. Your build process should mimic the same build process you would use to compile any Java code that depends on the AWS SDK. Run your Java compiler tool on your source files and include the AWS SDK 1.9 or later with transitive dependencies on your classpath. For more details, see our documentation.

Show less

Q: What is the JVM environment Lambda uses for execution of my function?

Q: Can I execute other programs from within my AWS Lambda function written in Node.js?

Yes. Lambda's built-in sandbox lets you run batch ("shell") scripts, other language runtimes, utility routines, and executables. Learn more here.

Show less

Q: Is it possible to use native modules with AWS Lambda functions written in Node.js?

Yes. Any statically linked native module can be included in the ZIP file you upload, as well as dynamically linked modules compiled with an rpath pointing to your Lambda function root directory. Learn more here.

Show less

Q: Can I execute binaries with AWS Lambda written in Node.js?

Yes. You can use Node.js' child_process command to execute a binary that you've included in your function or any executable from Amazon Linux that is visible to your function. Alternatively several NPM packages exist that wrap command line binaries such as node-ffmpeg. Learn more here.

Show less

Q: How do I deploy AWS Lambda function code written in Node.js?

AWS Lambda functions in C#

Q: How do I package and deploy an AWS Lambda function in C#?

You can create a C# Lambda function using the Visual Studio IDE by selecting "Publish to AWS Lambda" in the Solution Explorer. Alternatively, you can directly run the "dotnet lambda publish" command from the dotnet CLI which has the [# Lambda CLI tools patch] installed, which creates a ZIP of your C# source code along with all NuGet dependencies as well as your own published DLL assemblies, and automatically uploads it to AWS Lambda using the runtime parameter “dotnetcore1.0”

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Other topics

Q: Which versions of Amazon Linux, Node.js, Python, JDK, .NET Core, SDKs, and additional libraries does AWS Lambda support?

your Amazon S3 bucket describing the API usage of your account.

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Q: How do I coordinate calls between multiple Lambda functions?

You can use Amazon Step Functions to coordinate multiple invoking Lambda functions. You can invoke multiple Lambda functions serially, passing the output of one to the other, or in parallel. See our documentation for more details.

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Learn more about AWS Lambda pricing

Visit the pricing page

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AWS Lambda

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