



AWS Lambda

AWS Lambda is a serverless compute service that automatically runs code in response to events and manages the underlying compute resources. It allows developers to execute code without provisioning or managing servers.

Key Features

- **Event-driven Execution:** Lambda runs functions in response to triggers from AWS services, HTTP requests, or scheduled events.
- **Automatic Scaling:** Scales automatically by running code in parallel.
- **Pay-per-use Pricing:** Charges only for compute time consumed (measured in milliseconds).
- **Security and Compliance:** Provides IAM-based access control and supports encryption.

How AWS Lambda Works

1. **Event Trigger:** An event from AWS services (S3, DynamoDB, API Gateway, etc.) or external sources triggers the Lambda function.
2. **Execution Environment:** AWS provisions compute resources and runs the function in a secure environment.
3. **Function Execution:** The code executes within the defined runtime (Python, Node.js, Java, Go, etc.).
4. **Response Handling:** The output is sent back to the calling service or stored in a designated location.
5. **Auto-scaling:** AWS handles scaling automatically based on the number of incoming requests.

Supported Languages

AWS Lambda supports multiple languages, including:

AWS Lambda Language Support

- 1 Java
- 2 Go
- 3 PowerShell
- 4 Node.js
- 5 C#
- 6 Python
- 7 Ruby
- 8 Provides a Runtime API which allows you to use any additional programming languages to author your functions

AWS Lambda Architecture

Lambda consists of:

- **Function Code:** The actual code that runs.
- **Event Source:** Services that trigger the function.
- **Execution Role:** IAM role defining permissions.
- **Environment Variables:** Configurable settings for functions.

File Processing Example



Web applications Example



Triggers and Event Sources

AWS Lambda integrates with various AWS services, including:

- **Amazon S3** (process file uploads)
- **DynamoDB Streams** (react to database changes)
- **Amazon API Gateway** (create RESTful APIs)
- **AWS Step Functions** (workflow automation)
- **Amazon SNS & SQS** (message-driven functions)
- **CloudWatch Events** (scheduled tasks)

Deployment and Versioning

- **Deployment Packages:** Functions are deployed as .zip files or container images.
- **Versions:** AWS Lambda supports versioning to manage different function versions.
- **Aliases:** Point to specific function versions for easier management.

Monitoring and Logging

- **Amazon CloudWatch Logs:** Stores execution logs.
- **AWS X-Ray:** Traces function execution for debugging.
- **Metrics:** Monitor function invocations, durations, errors, and throttles.

Security and Permissions

- **IAM Roles & Policies:** Grant permissions to access AWS services.
- **VPC Integration:** Run Lambda functions within a VPC for enhanced security.
- **Encryption:** AWS KMS encrypts function environment variables.

Pricing Model

- **Requests Pricing:** \$0.20 per 1M requests.
- **Compute Time:** \$0.00001667 per GB-second.
- **Free Tier:** 1M requests and 400,000 GB-seconds per month.

Use Cases

1. **Data Processing:** Real-time file processing from Amazon S3.
2. **API Backend:** Serve requests via Amazon API Gateway.
3. **IoT Processing:** Handle messages from AWS IoT Core.
4. **Chatbot & AI:** Process chatbot interactions.
5. **Automated Backups:** Create backups in Amazon RDS and S3.

Lambda Integrations

1. Amazon Alexa
2. Amazon Managed Streaming for Apache Kafka
3. Self-managed Apache Kafka
4. Amazon API Gateway
5. AWS CloudFormation
6. Amazon CloudFront (Lambda@Edge)
7. Amazon EventBridge (CloudWatch Events)
8. Amazon CloudWatch Logs
9. AWS CodeCommit
10. AWS CodePipeline
11. Amazon Cognito
12. AWS Config
13. Amazon Connect
14. Amazon DynamoDB
15. Amazon Elastic File System
16. Elastic Load Balancing (Application Load Balancer)
17. AWS IoT
18. AWS IoT Events
19. Amazon Kinesis
20. Amazon Data Firehose
21. Amazon Lex
22. Amazon MQ
23. Amazon Simple Email Service
24. Amazon Simple Notification Service
25. Amazon Simple Queue Service
26. Amazon Simple Storage Service (Amazon S3)
27. Amazon Simple Storage Service Batch
28. Secrets Manager
29. Amazon VPC Lattice
30. AWS X-Ray



Conclusion

AWS Lambda is a powerful serverless computing service that enables developers to build highly scalable, event-driven applications without managing infrastructure. Its seamless integration with AWS services and pay-as-you-go pricing make it an ideal choice for modern cloud-native applications.