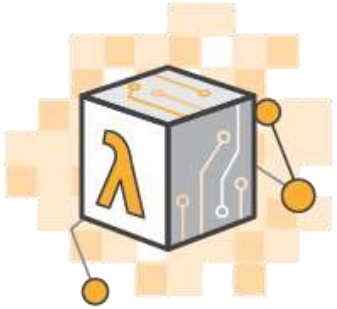
AWS Lambda & API Gateway Overview

The new paradigm in web scale application development



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http://www.R2AD.com

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This briefing is: **UNCLASSIFIED**

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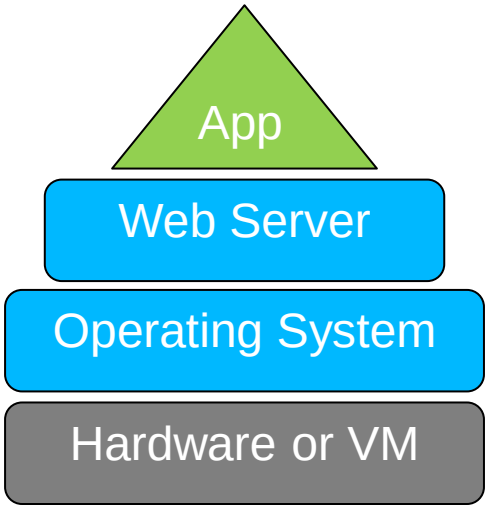
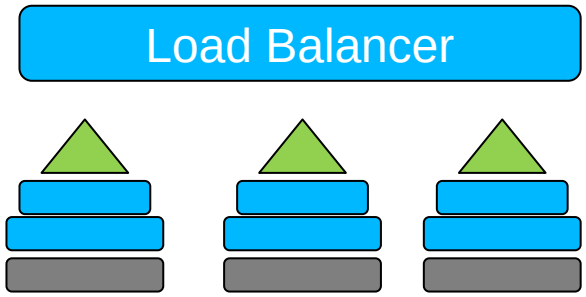
The traditional web deployment model

- **Build/Deploy a machine, or more recently a VM**
  - Pay for the OS license, maintenance, and security
- **Deploy a web server**
  - Pay for the OS license, maintenance, and security
- **Deploy application code that runs on top of that web stack**
  - Code gets executed (i.e. Java, JavaScript)
- **Implement ways to make it scalable**
  - Scale up, or
  - Add a load balancer and scale out by adding more VMs (either statically or dynamically)
  - Pay for the additional costs (OSs, VMs) and integration/test





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AWS API Gateway Details

- **API Gateway** introduced July 2015
  - "makes it easy for developers to publish, maintain, monitor, and secure APIs at any scale"
    - HTML or ReSTful services

  Ref: https://aws.amazon.com/releasenotes/Amazon-API-Gateway/5820792193066785

- **Event Driven**
  - Web based management
  - Dashboard – visualization
  - Throttling rules
  - Authorization model
- **Scalable**

Amazon Lambda

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AWS Lambda Details

- **Lambda** introduced November 2014
  - "A compute service that runs your code in response to events and automatically manages the compute resources for you, making it easy to build applications that respond quickly to new information"
    - Support for additional languages are on the roadmap
    - Unknown performance characteristics
      - Need more experiences, studies, proof-of-concepts

  Ref: https://aws.amazon.com/releasenotes/AWS-Lambda/8269001345899110

- Triggered by Events
  - **Periodic**
  - **Items added to an S3 bucket**
  - **API Gateway call**

- Java, JavaScript, Python supported

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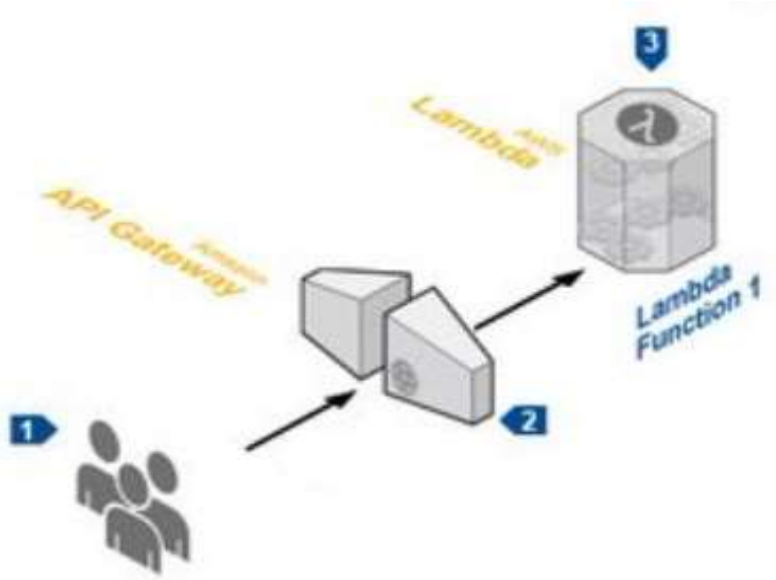
Together: a new paradigm for applications

- **Configure an AWS API gateway**
  - Acts as web point of presence
- **Deploy Lambda functions**
  - Code gets executed (i.e. Java, JavaScript)
  - Dashboard Monitor/Log Execution
  - Control Authorization
  - Command line or via the console



- **The entire mechanism is fully scalable by default.**
  - **Additional AWS APIs provide support for database services, messaging (i.e. SNS), and static content (i.e. S3).**
  - **The AWS cloud provides the underpinnings for these higher level services. However that aspect is hidden, abstracted away from development and operations.**
- **In many cases, the same code (i.e. Java) can be used.**
  - **Essentially, API Gateway & Lambda provide a scalable web platform**

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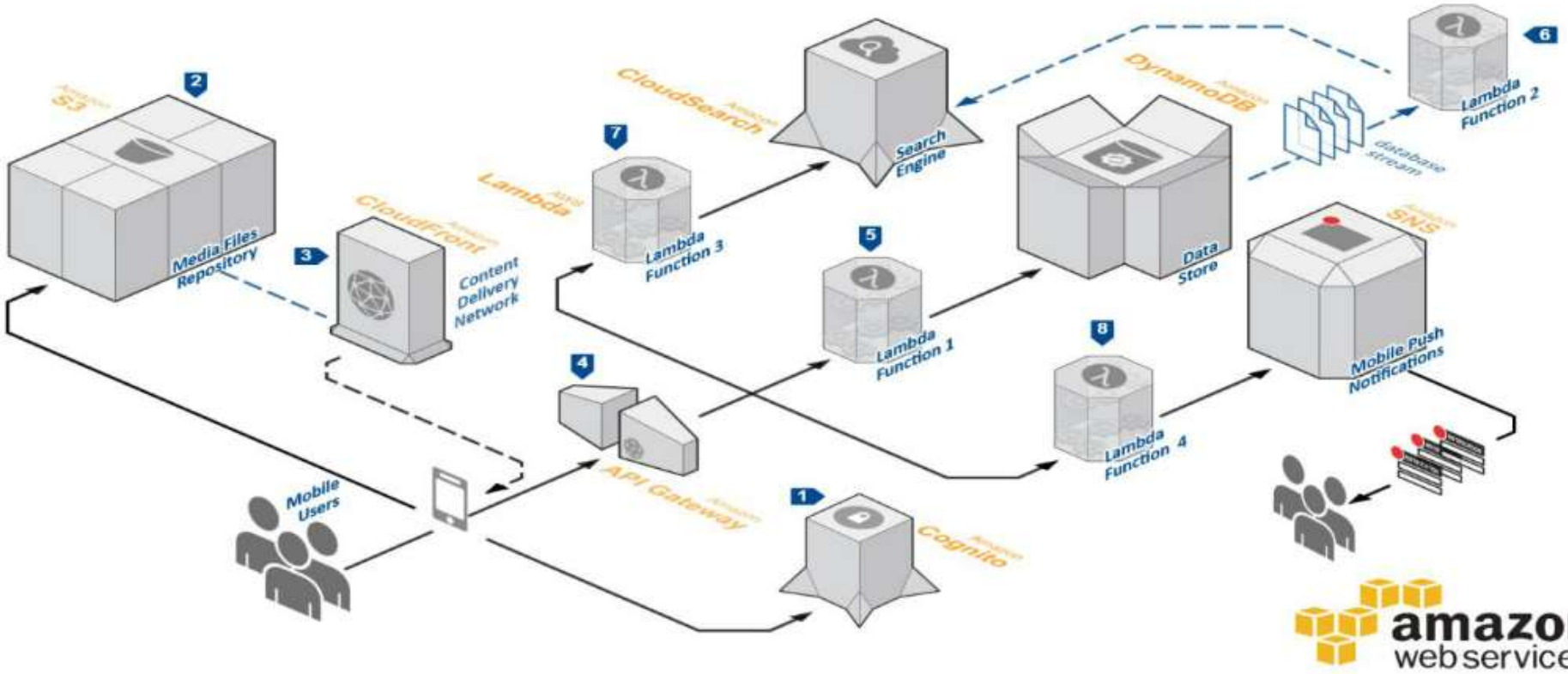
AWS Serverless Architecture Example



Source: https://s3.amazonaws.com/awslambda-reference-architectures/mobile-backend/lambda-refarch-mobilebackend.pdf

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AWS API Gateway + Lambda Benefits

- **No Servers to Manage**
  - Simple. Write code and deploy it.
  - SDK supports most workflows
    - Microservice without servers
- **Scale automatically based on events**
- **Reduced Cost**
  - Cost of Lambda & API Gateway is cheaper
    - When compared with the cost of EC2 instances + OS licenses + web server licenses
  - Charged for every 100ms your code executes and the number of times code is triggered

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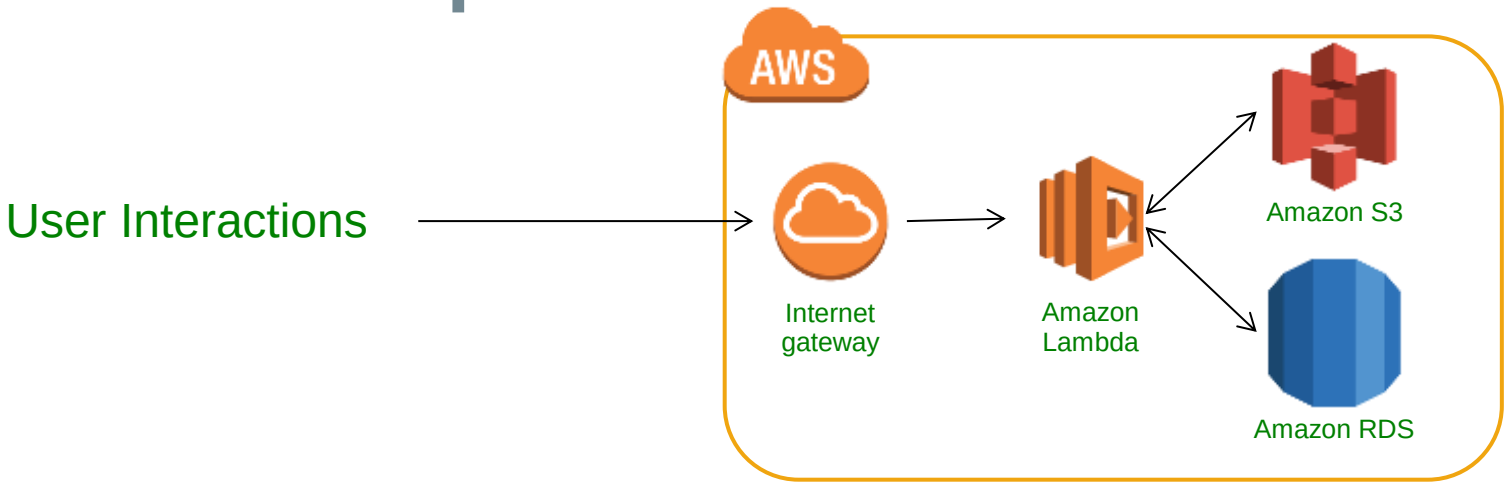
Sample CRUD workflow



- HTTP endpoint hits the API gateway
- API Gateway then invokes the configured AWS Lambda function
- The Lambda function connects with storage services to create, replace, update, or delete data
  - HTML response or JSON, XML, etc.

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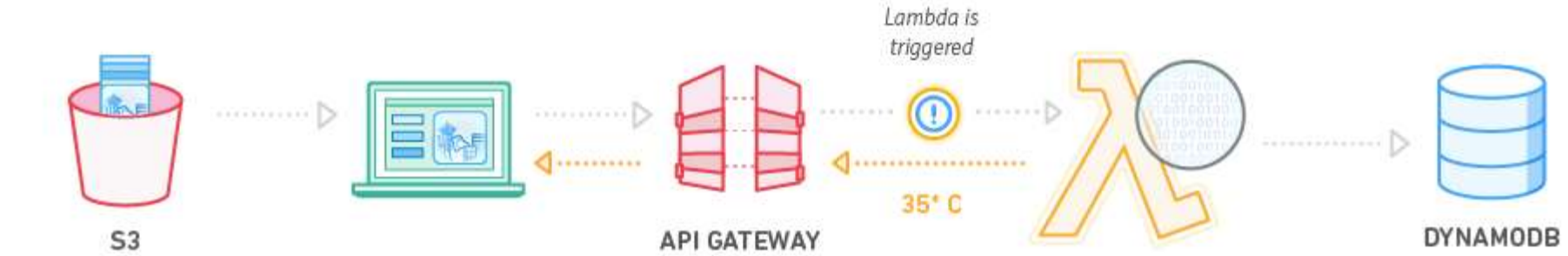
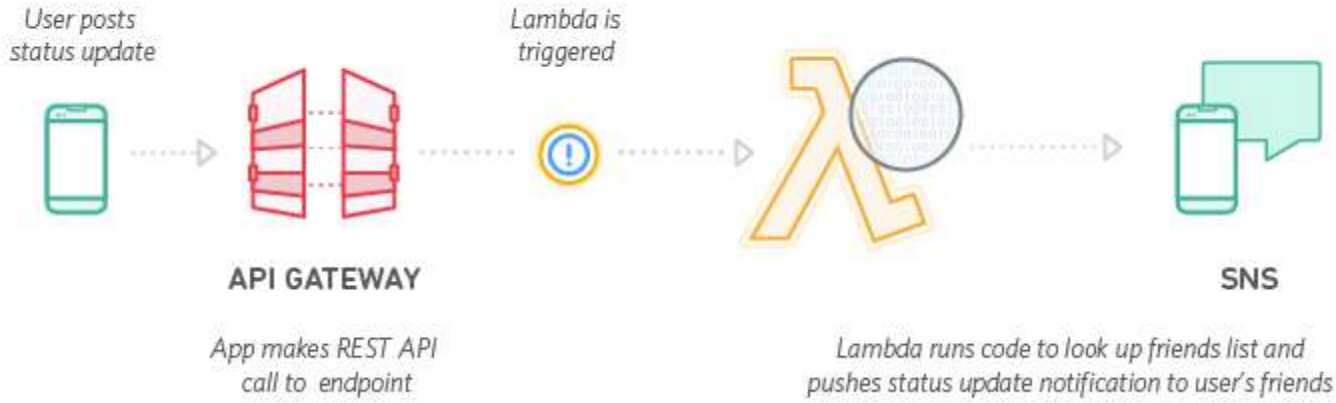
Another Examples

Example: *Weather Application*



Example: *Mobile Backend for Social Media App*



Source: http://aws.amazon.com/lambda/

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Demo

- A live demonstration of a simple web application
  - Installed and running on AWS Cloud using API Gateway and Lambda functions
- AWS Demo code available on internet
    - https://docs.aws.amazon.com/apigateway/latest/developerguide/getting-started-mappings.html
    - http://www.serverless.com/
    - https://github.com/awslabs/lambda-refarch-mobilebackend
- R2AD is working to apply this technology to applications this fiscal year
  - Proof of concept to reduce sustainment cost and increase scalability & maintainability
  - If successful, deployment in 2017
    - AWS GovCloud first, then later in C2S

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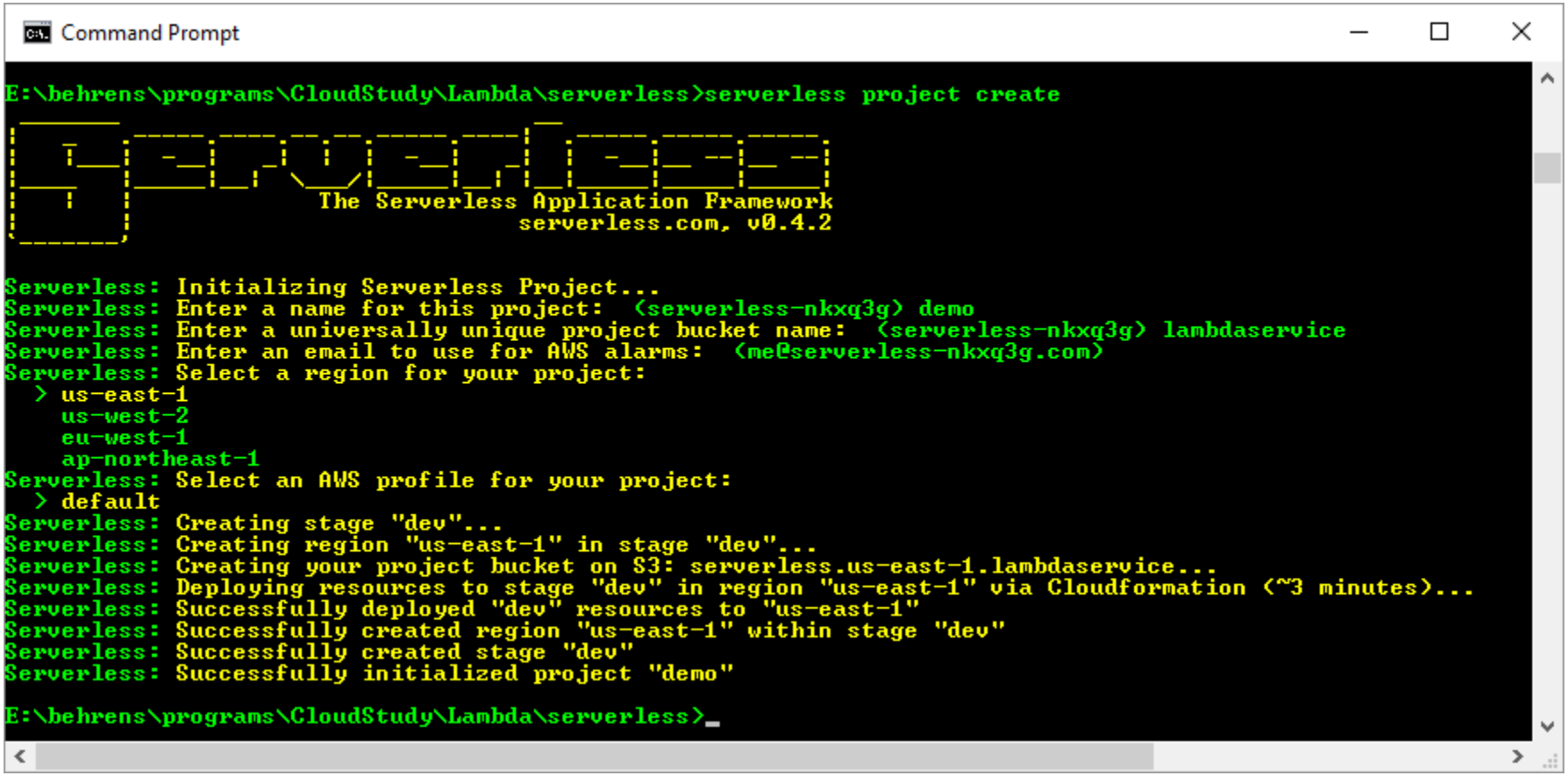
Serverless demo

- serverless project create



Ref: http://docs.serverless.com/docs/installing-serverless

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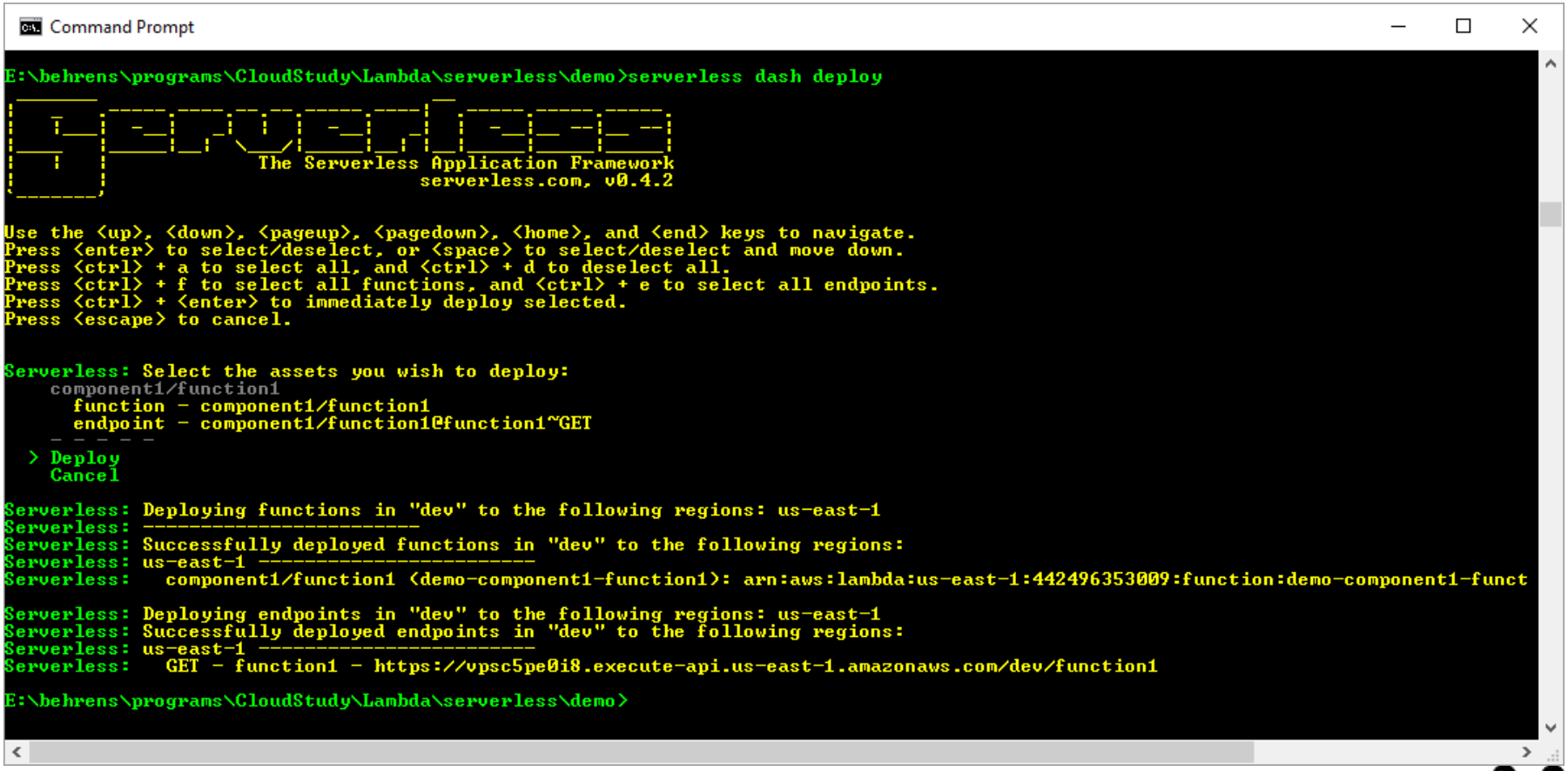
Create a demo function

- serverless component create component1
- serverless function create component1/function1
- serverless dash deploy



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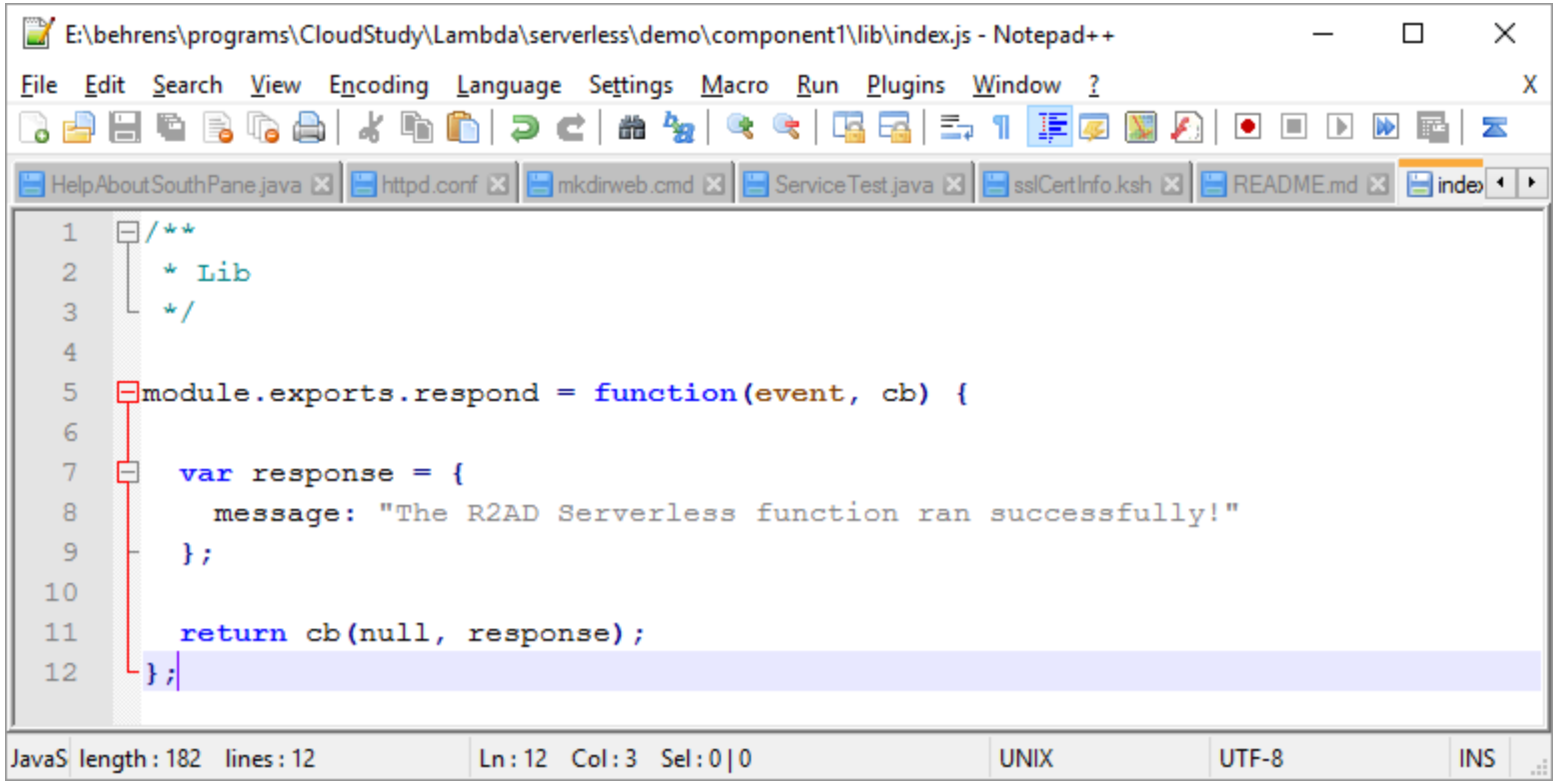
Edit the function and re-deploy

- The function can be locally edited, in this case, and re-published by re-executing the deploy command.



- In the browser, visit:
  - https://vpsc5pe0i8.execute-api.us-east-1.amazonaws.com/dev/function1

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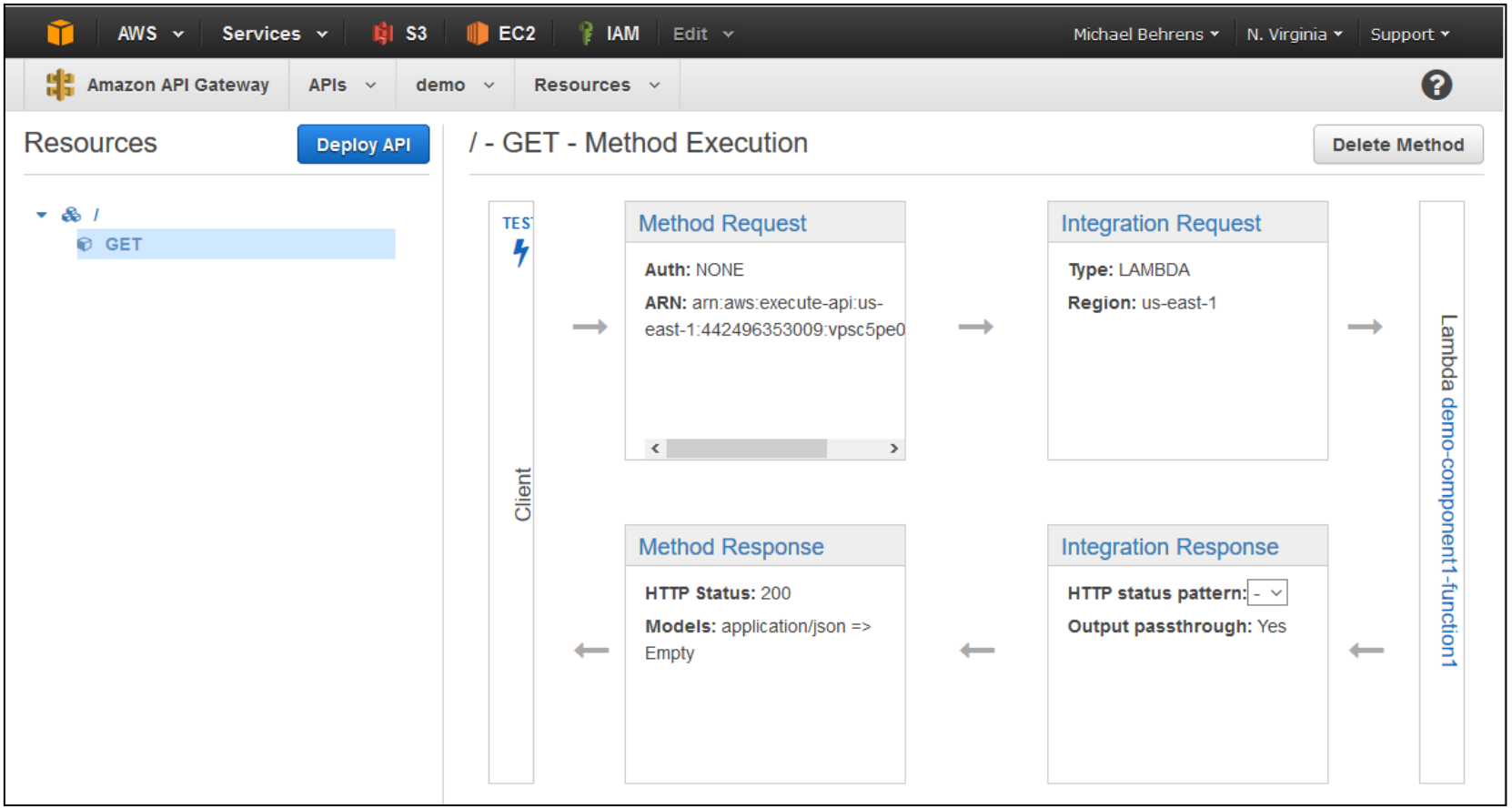
Examine the AWS API endpoint



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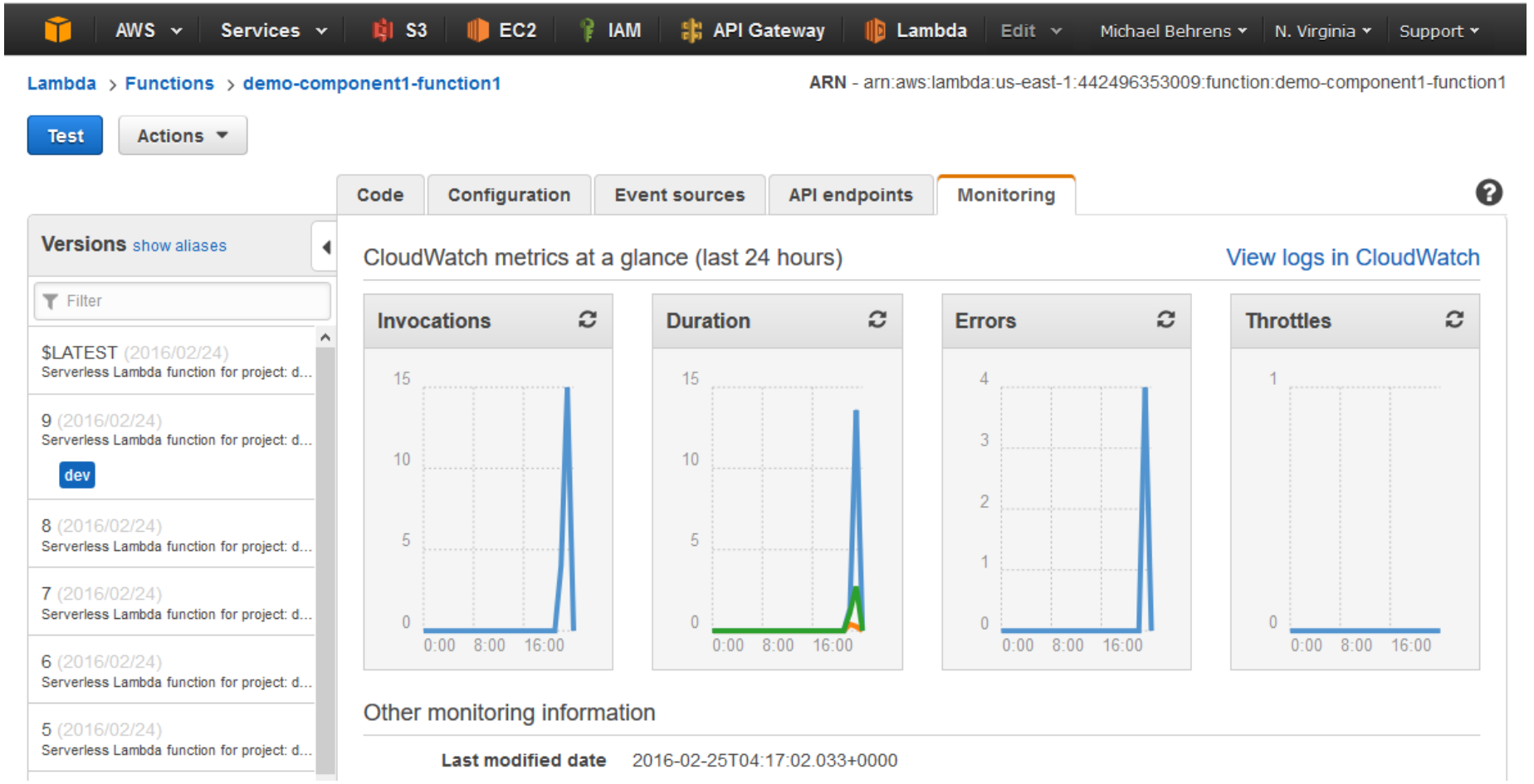
Examine the AWS Lambda Function



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