Serverless Computing with AWS Lambda

Functions as a Service
in the age of
Cloud, Containers and Microservices
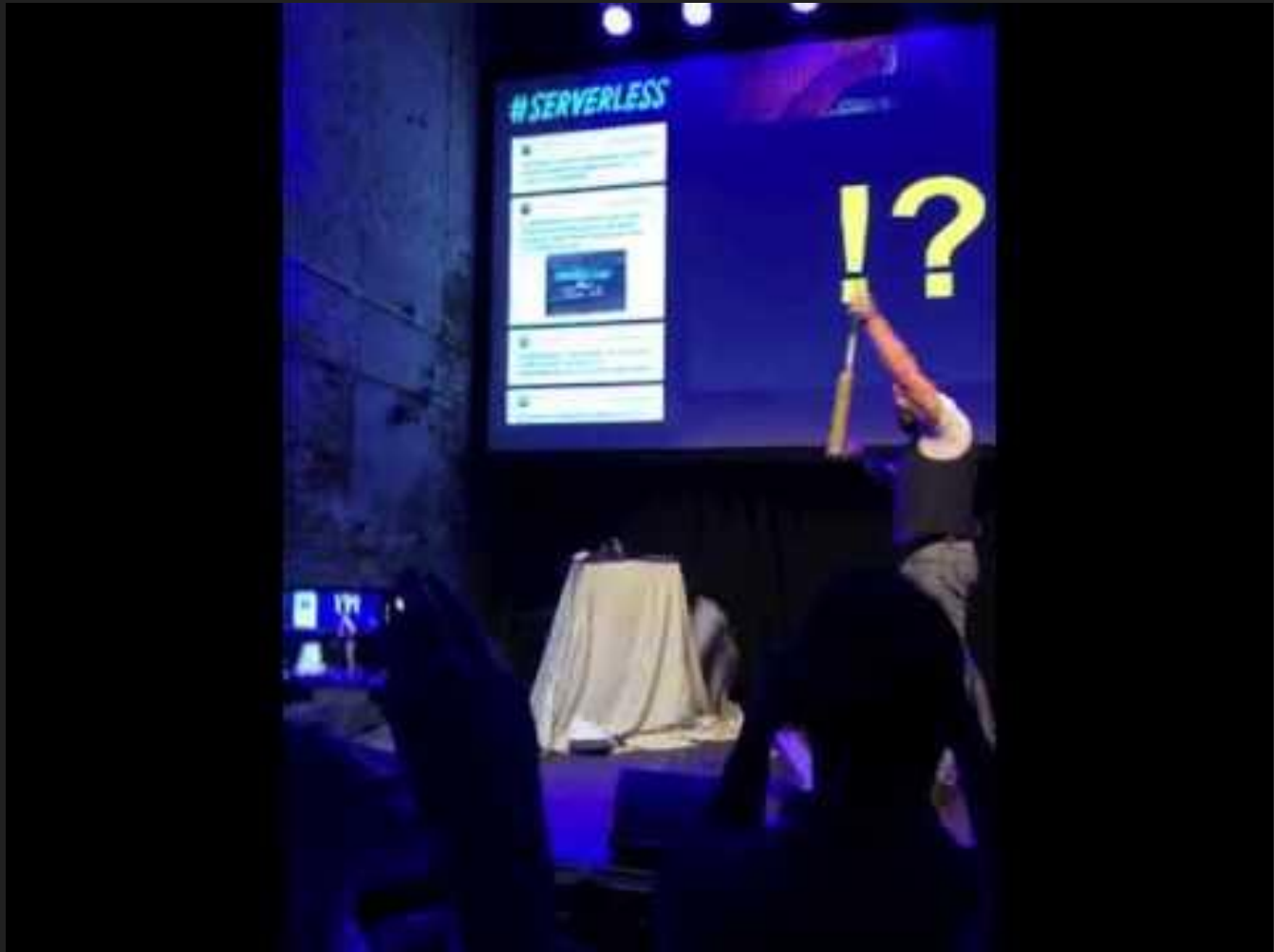
Ersin Er

https://ersiner.net

Agenda

- Current (Cloud) Computing Models and Motivation

- AWS Lambda

- AWS Lambda Integrations

- API Lambda + API Gateway

- AWS Serverless Sample Architectures

- Community and Resources

SERVERLESS

https://www.youtube.com/watch?v=aXaZAFi3Ytk

Serverless - Computing Model

"All problems in computer science can be solved by another level of indirection."

AWS Lambda

- **Run Time for your Functions**
- **Container** based Linux Environment*
  - Node.js (4.3)
  - Python (2.7)
  - Java (8)
  - Any binary you can launch via existing runtimes
    - Go is a popular choice
  - Your libraries and files of any type
- IAM and VPC Integration

*https://aws.amazon.com/blogs/compute/container-reuse-in-lambda/

- Extend other AWS services with custom logic
- Build custom back-end services
- Completely Automated Administration
- Built-in Fault Tolerance
- Automatic Scaling
- Integrated Security Model
- Bring Your Own Code
- Pay Per Use
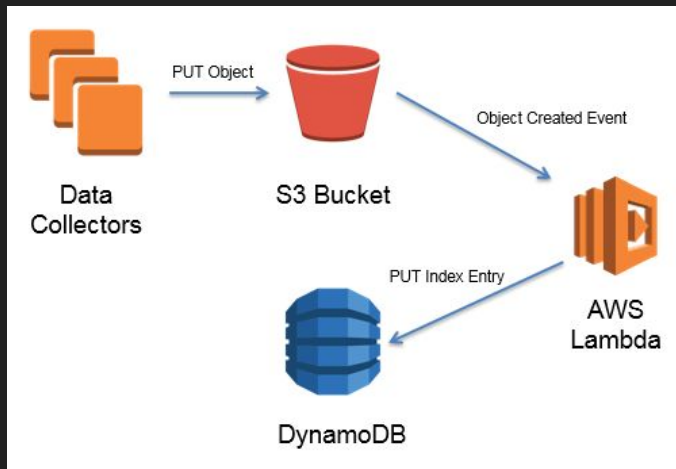- Flexible Resource Model

AWS Lambda Pricing

- Truly pay-as-you-go
- Cheaper than EC2
- 1M *free* requests per month and 400,000 GB-seconds of compute time per month

Memory (MB)	Free tier seconds per month	Price per 100ms ($)
128	3,200,000	0.000000208
192	2,133,333	0.000000313
256	1,600,000	0.000000417
320	1,280,000	0.000000521
384	1,066,667	0.000000625
448	914,286	0.000000729
512	800,000	0.000000834
576	711,111	0.000000938

AWS Lambda Integrations / Event Sources

- **Kinesis**
  - Scalable Stream Processing
- **DynamoDB**
  - Change Stream Handling, Triggers
- **S3**
  - Handle Bucket Change Notifications
- **SNS**
  - Handle Amazon SNS notifications
- Any service that can push data onto the services above
- **Scheduled Events**
  - Cron jobs, console only

- **SES**
  - Process e-mails
- **CodePipeline**
  - Custom step as a Lambda function
- **CodeCommit**
  - Repository Triggers/Hooks
- **CloudFormation**
  - Custom resource creation
- **CloudWatch**
  - Amazon EC2 Event Type, AWS API Call Event Type, Auto Scaling Event Types, ...
- **Alexa**
- **API Gateway !**

Sample Real-World S3 Integration Scenario

"Building and

Maintaining an Amazon

S3 Metadata Index

without Servers"

https://blogs.aws.amazon.com/bigdata/post/Tx2YR

X3Y16CVQFZ/Building-and-Maintaining-an-Amazon-

S3-Metadata-Index-without-Servers

API Gateway

- Low-Cost and Efficient
- Performance at Any Scale
  - **CloudFront**
- Easily Monitor API Activity
  - **CloudWatch**
- Streamline API Development
  - **Swagger, Stages, Two-way mapping templates**
- Flexible Security Controls
  - **IAM authorization, Custom Authorization, API Key Support**
- Create RESTful Endpoints for Existing Services
  - Provide any AWS Service with a transformed API
- **Run Your APIs Without Servers**
  - **Lambda**
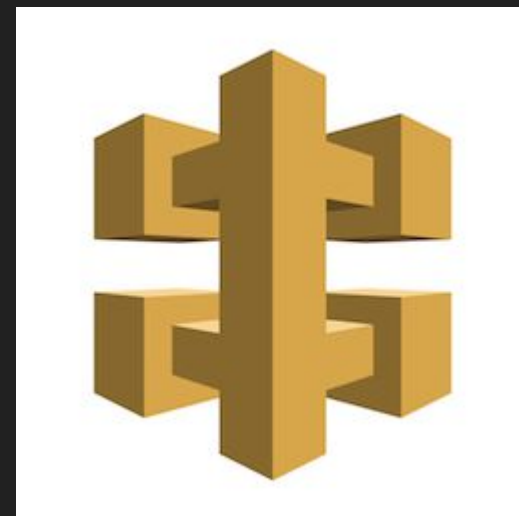
AWS Serverless Multi-Tier Architectures - Whitepaper

AWS Serverless Multi-Tier Architectures

Using Amazon API Gateway and AWS Lambda

November 2015

amazon web services

Contents

https://d0.awsstatic.com/whitepapers/AWS_Serverless_Multi-Tier_Architectures.pdf
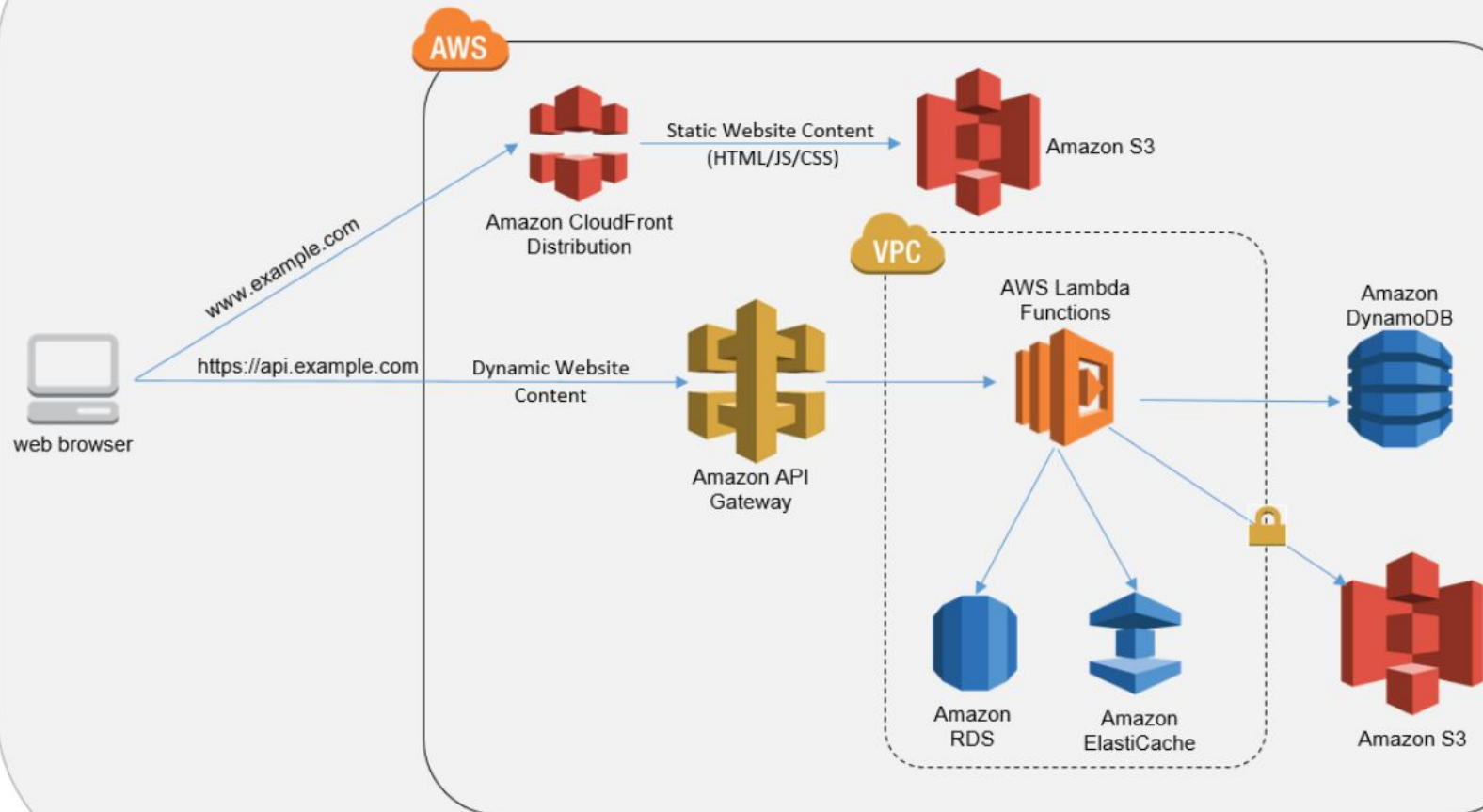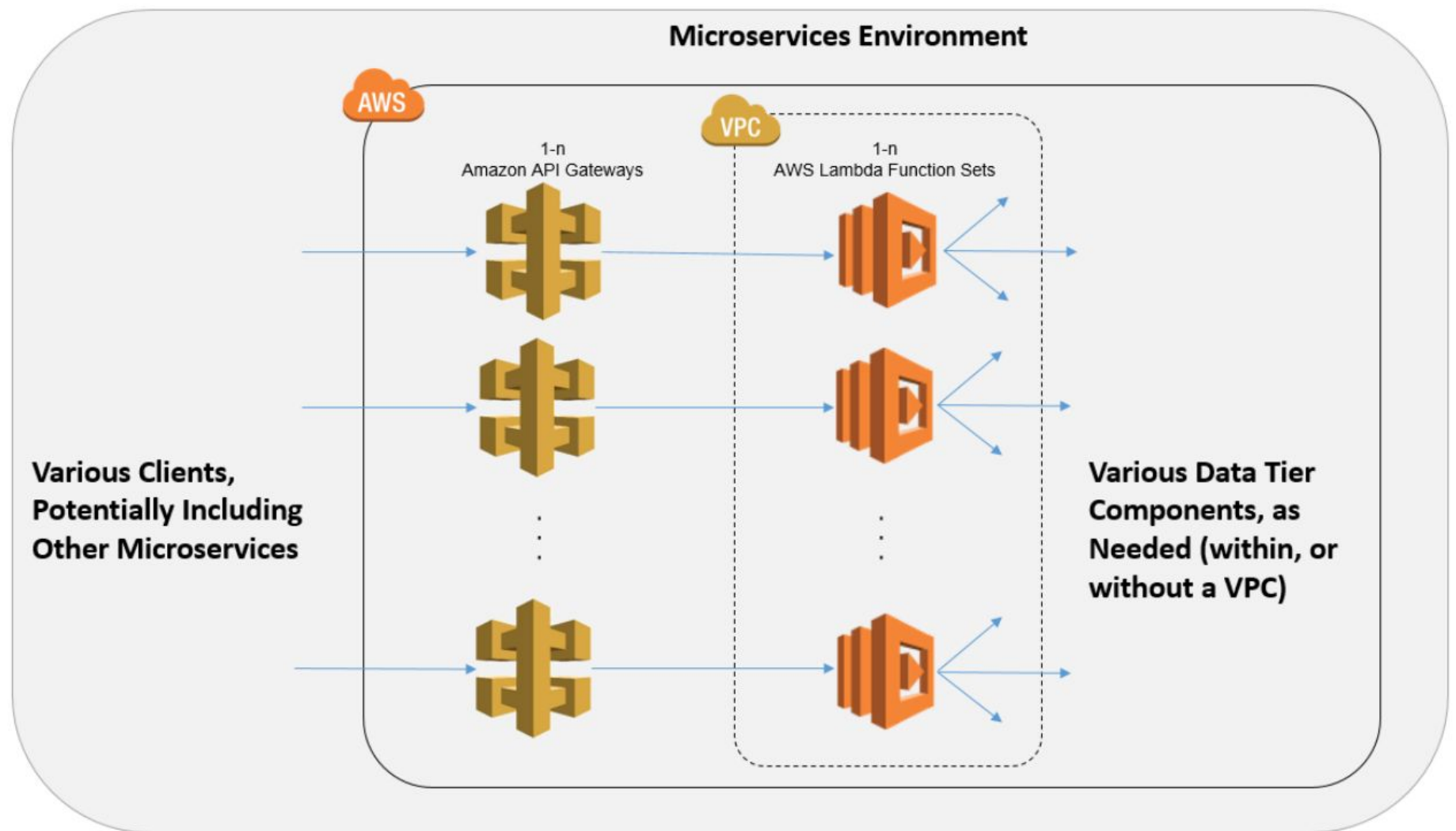
Mobile Backend Sample Architecture
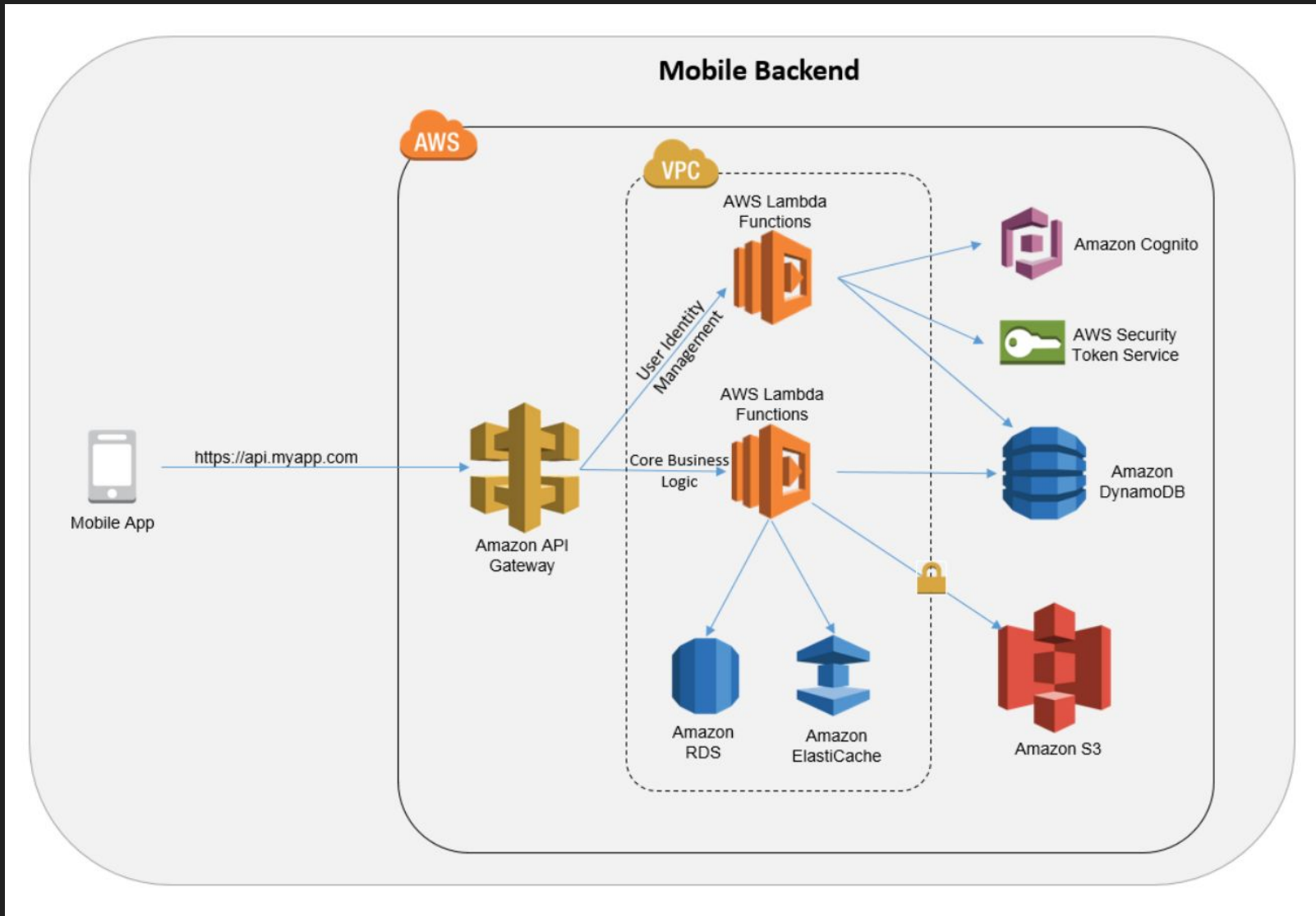
Amazon S3 Hosted Website Sample Architecture

Amazon S3 Hosted Websites

- web browser
- www.example.com
- https://api.example.com
- Amazon CloudFront Distribution
- Static Website Content (HTML/JS/CSS) → Amazon S3
- Dynamic Website Content → Amazon API Gateway
- AWS Lambda Functions
- Amazon DynamoDB
- Amazon RDS
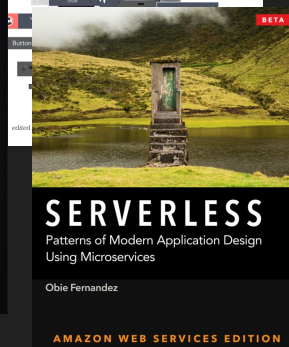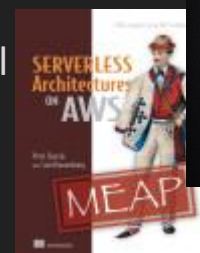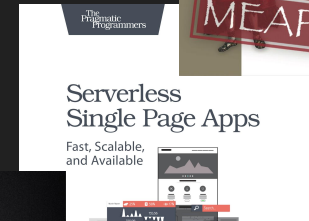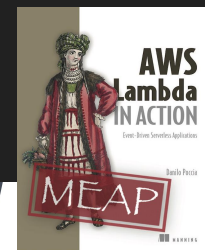- Amazon ElastiCache
- Amazon S3
- AWS
- VPC

Microservices Environment

Community and Resources

- Open Source Frameworks and Tools
  - **Serverless**: Build web, mobile and IoT applications with serverless architectures...
  - **Sparta**: A Go framework for AWS Lambda microservices
  - **claudia**: Deploy Node.js microservices to AWS easily
  - **apex**: Build, deploy, and manage AWS Lambda functions with ease
- AWS Reference Architectures
  - https://github.com/awslabs/lambda-refarch-mobilebackend
  - https://github.com/awslabs/lambda-refarch-webapp
  - https://github.com/awslabs/lambda-refarch-streamprocessing
- **ServerlessConf**, the first dedicated event
  - http://serverlessconf.io
- A conceptual overview by Martin Fowler
  - http://martinfowler.com/articles/serverless.html

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Thank you!

Now time for demo...

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