Building serverless applications

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Agenda

- Serverless?
- AWS Lambda
- Simplifying development
- Simplifying deployment
- Serverless architectures

Werner Vogels, CTO, Amazon.com
AWS re:Invent 2015

aws

Serverless architecture

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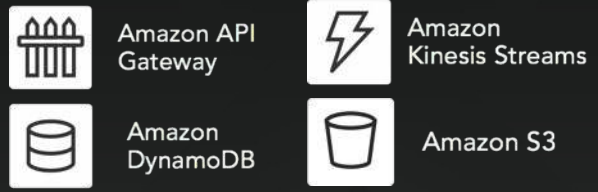
Managed services



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AWS Lambda

aws

AWS Lambda

- Announced at re:Invent 2014
- Deploy functions in Java, Python, Node.js ,C# and Go.
- Just code, without the infrastructure drama
- Built-in scalability and high availability
- Integrated with many AWS services
- Pay as you go
  - Combination of execution time (100ms slots) & memory used.
  - Starts at $0.20 per million requests.
  - Free tier available: first 1 million requests per month are free.
- Orchestration with AWS Step Functions.

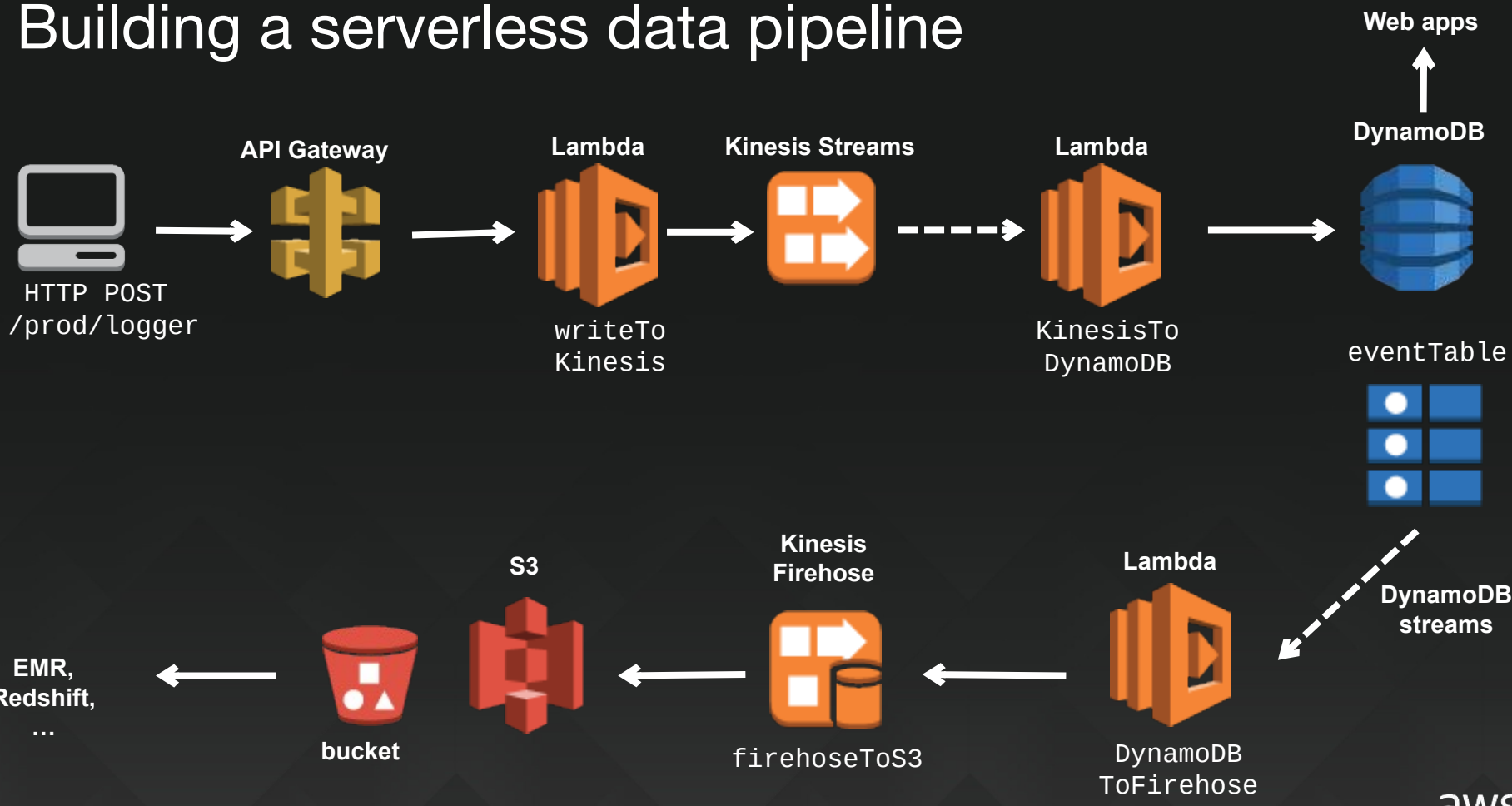
http://aws.amazon.com/lambda

aws

What can you build with serverless architectures?

- Automate your AWS infrastructure
- Build event-driven applications
- Build APIs together with Amazon API Gateway

Building a serverless data pipeline

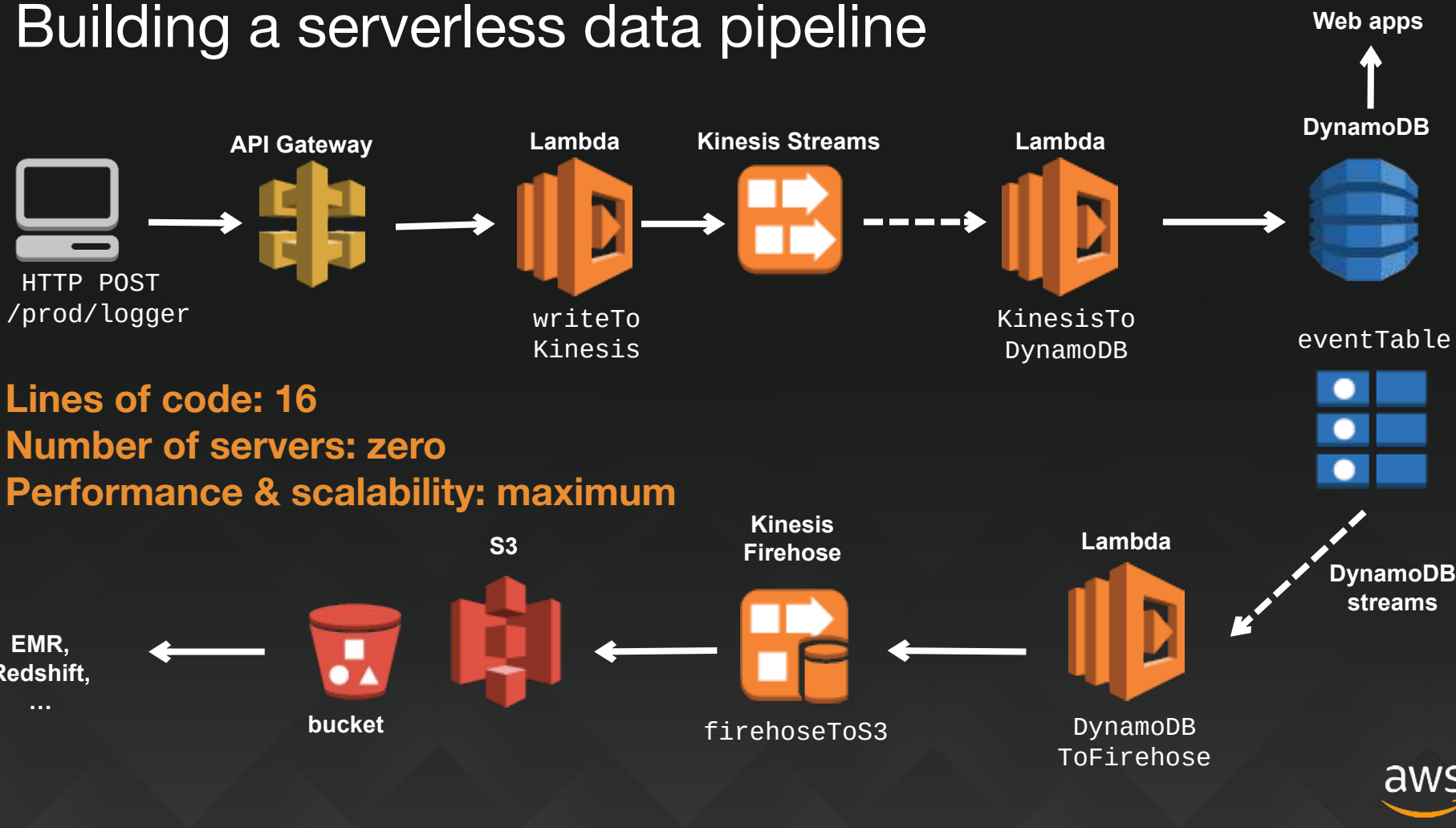


http://www.slideshare.net/JulienSIMON5/building-a-serverless-pipeline

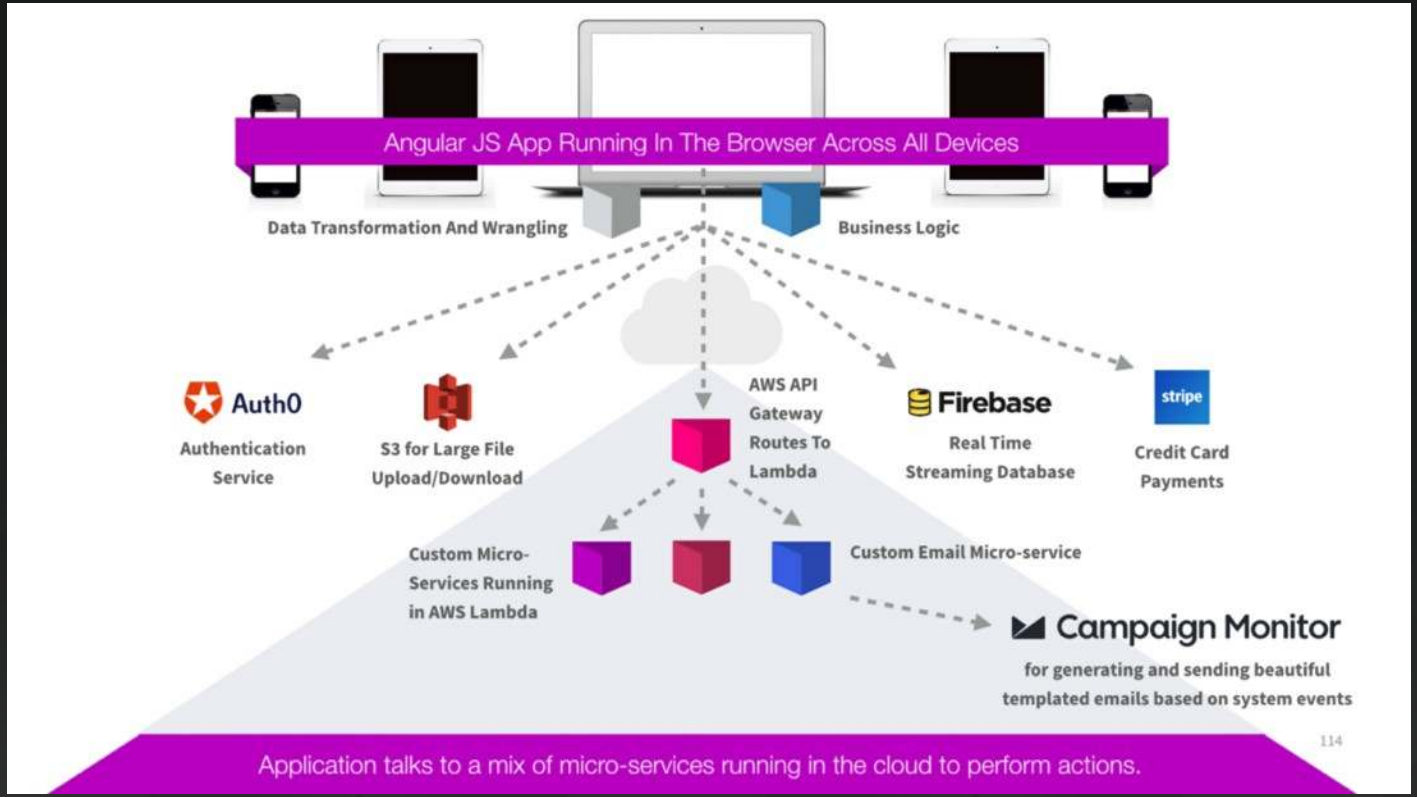
aws

DEMO

Building a serverless data pipeline



A Cloud Guru: 100% Serverless



https://read.acloud.guru/serverless-the-future-of-software-architecture-d4473ffed864

Simplifying Development

Code available at https://github.com/juliensimon/aws/tree/master/lambda_frameworks

The Serverless framework

formerly known as JAWS: Just AWS Without Servers

- Announced at re:Invent 2015
- Auto-deploys and runs Lambda functions, locally or remotely
- Auto-deploys your Lambda event sources: API Gateway, S3, DynamoDB, etc.
- Creates all required infrastructure with CloudFormation
- Simple configuration in YML

http://github.com/serverless/serverless
https://serverless.com

aws

Serverless: “Hello World” API

```
$ serverless create

Edit handler.js, serverless.yml and event.json

$ serverless deploy [--stage stage_name]

$ serverless invoke [local] --function function_name

$ serverless info

$ http $URL
```

AWS Chalice

Think of it as a serverless framework for Flask apps

- Released in July 2016
- Just add your Python code
  - Deploy with a single call and zero config
  - The API is created automatically, the IAM policy is auto-generated
- Run APIs locally on port 8000 (similar to Flask)

https://github.com/awslabs/chalice

AWS Chalice: PUT/GET in S3 bucket

```
$ chalice new-project s3test

Write your function in app.py

$ chalice local

$ http put http://localhost:8000/objects/doc.json value1=5 value2=8

$ http get http://localhost:8000/objects/doc.json

$ chalice deploy [stage_name]

$ export URL=`chalice url`

$ http put $URL/objects/doc.json value1=5 value2=8

$ http get $URL/objects/doc.json
```

DEMO

More development tools

Eclipse plug-in

- Code, test and deploy Lambdas from Eclipse
- Run your functions locally and remotely
- Test with local events and Junit4

Serverless Express

Use your existing Node.js application framework on top of Lambda and API Gateway.

Serverless Java Container

- Run Java RESTful APIs as-is
- Default implementation of the Java servlet `HttpServletRequest` `HttpServletResponse`
- Support for Java frameworks such as Spring, Jersey or Spark

https://java.awsblog.com/post/TxWZES6J1RSQ2Z/Testing-Lambda-functions-using-the-AWS-Toolkit-for-Eclipse
https://aws.amazon.com/blogs/developer/aws-toolkit-for-eclipse-serverless-application
https://github.com/awslabs/aws-serverless-java-container
https://github.com/awslabs/aws-serverless-express

Simplifying Deployment

AWS Serverless Application Model (SAM)

- CloudFormation extension to bundle Lambda functions, APIs & events
- 3 new CloudFormation resource types
  - *AWS::Serverless::Function*
  - *AWS::Serverless::Api*
  - *AWS::Serverless::SimpleTable*
- 2 new CloudFormation CLI commands
  - *'aws cloudformation package'*
  - *'aws cloudformation deploy'*
- Integration with CodeBuild and CodePipeline for CI/CD

https://aws.amazon.com/fr/blogs/compute/introducing-simplified-serverless-application-deplyoment-and-management
https://github.com/awslabs/serverless-application-model/

```
AWSTemplateFormatVersion: '2010-09-09'
Transform: AWS::Serverless-2016-10-31
Description: Get items from a DynamoDB table.
Resources:
  GetFunction:
    Type: AWS::Serverless::Function
    Properties:
      Handler: index.get
      Runtime: nodejs4.3
      Policies: AmazonDynamoDBReadOnlyAccess
      Environment:
        Variables:
          TABLE_NAME: !Ref Table
      Events:
        GetResource:
          Type: Api
          Properties:
            Path: /resource/{resourceId}
            Method: get
  Table:
    Type: AWS::Serverless::SimpleTable
```

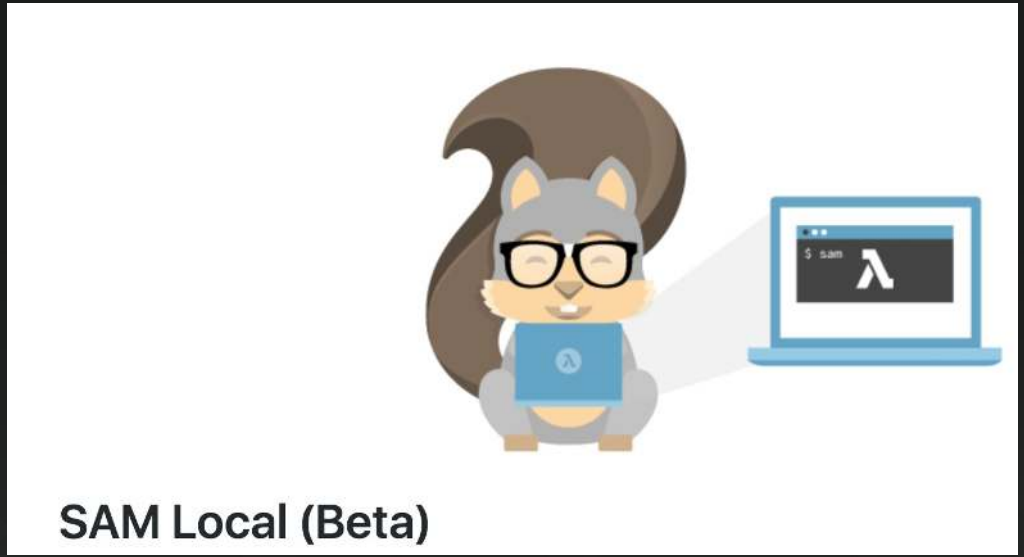
Sample SAM template for:

- Lambda function
- HTTP GET API
- DynamoDB table

DEMO

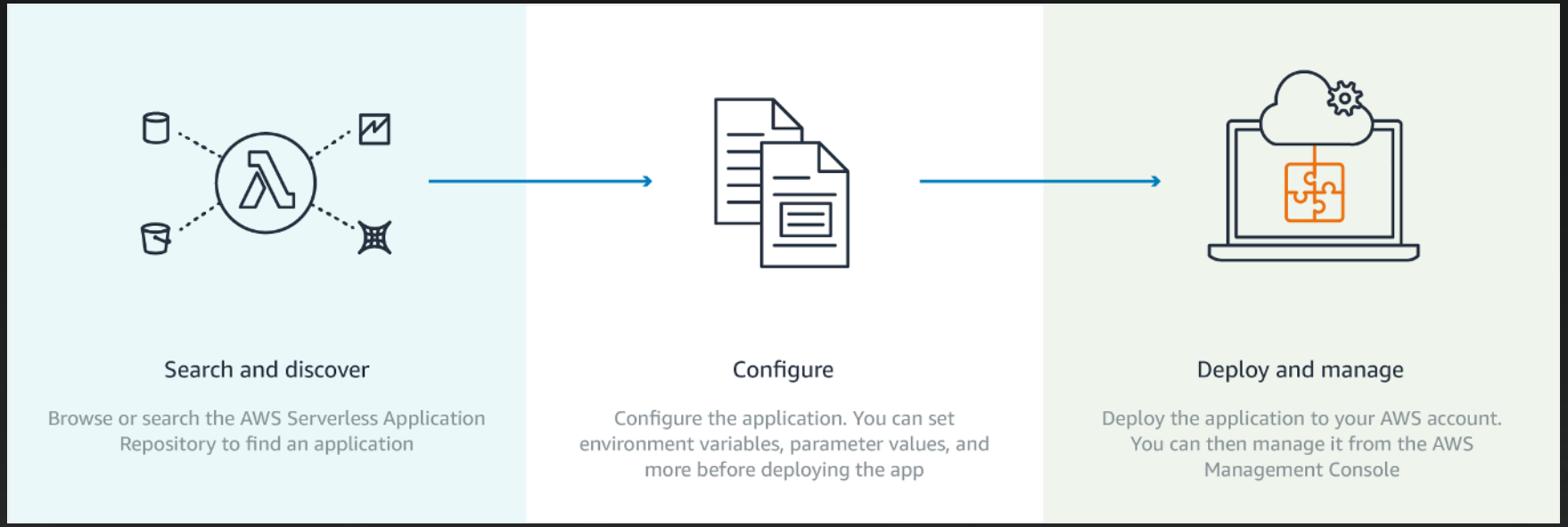
AWS SAM Local

- Test functions locally.
- Start a local API Gateway from a SAM template.
- Validate a SAM template.
- Generate sample payloads for various event sources.



https://github.com/awslabs/aws-sam-local
https://aws.amazon.com/blogs/aws/new-aws-sam-local-beta-build-and-test-serverless-applications-locally/

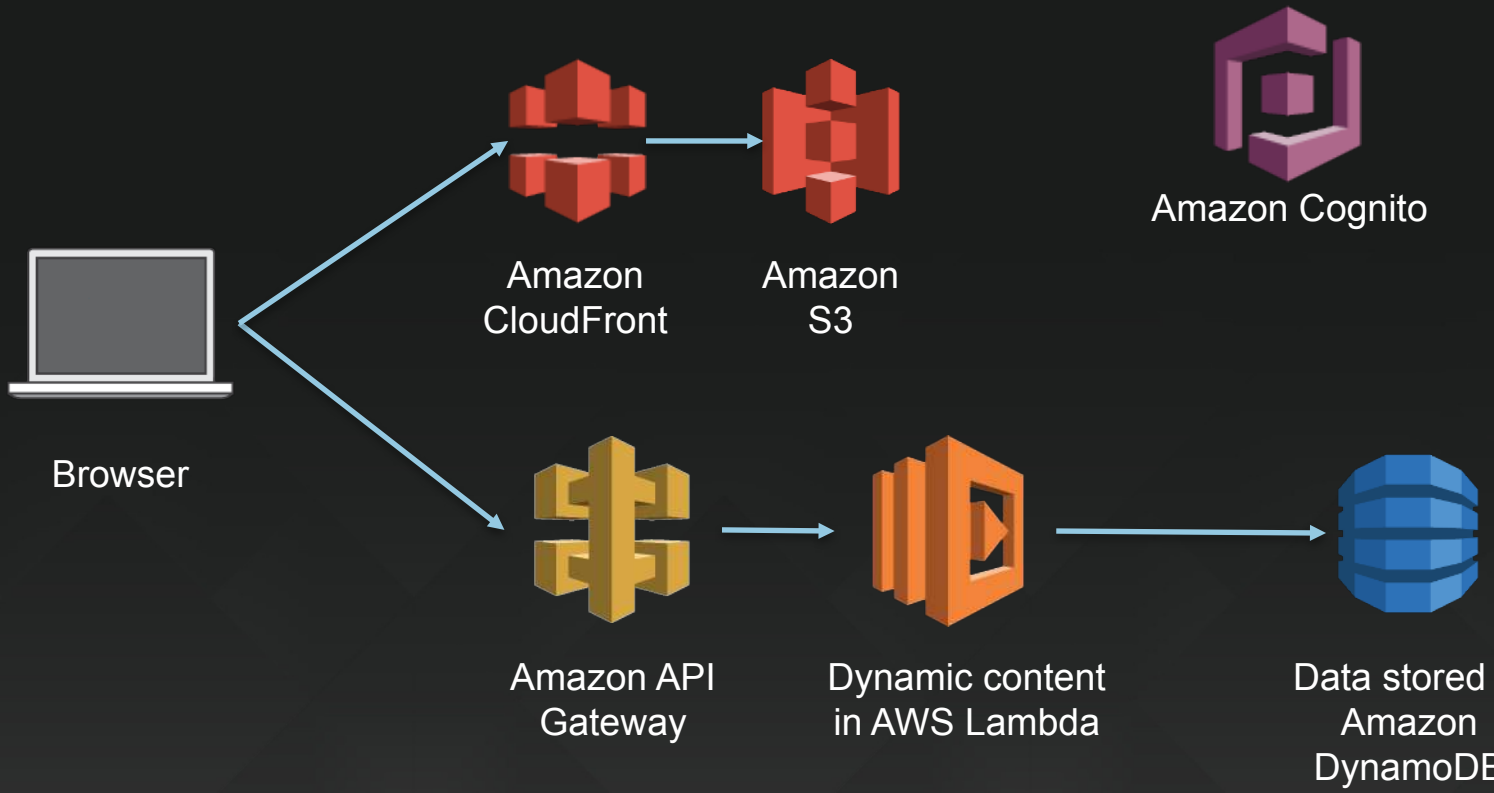
AWS Serverless Application Repository



https://aws.amazon.com/serverless/serverlessrepo/
https://aws.amazon.com/blogs/aws/now-available-aws-serverless-application-repository/

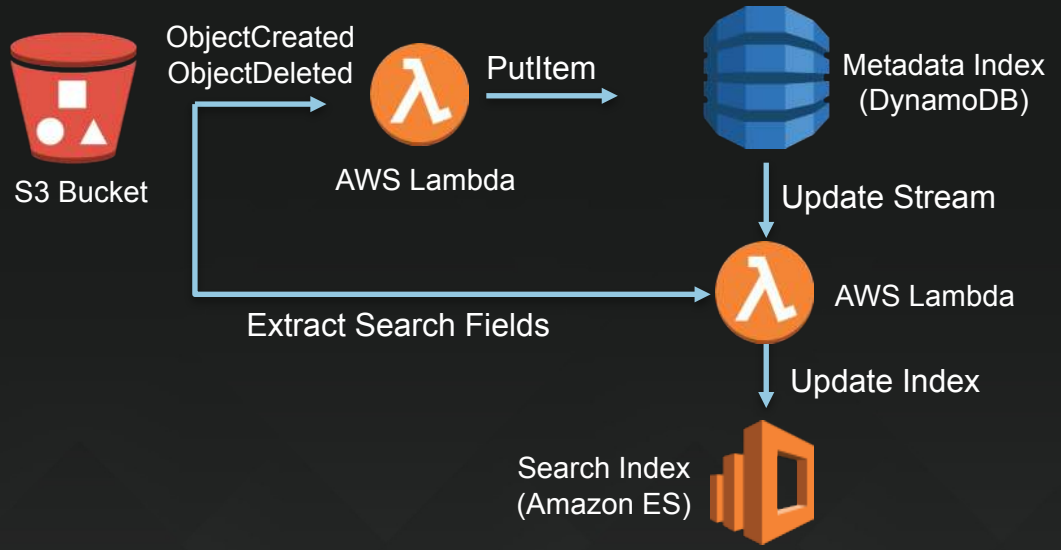
Serverless architectures

Web application



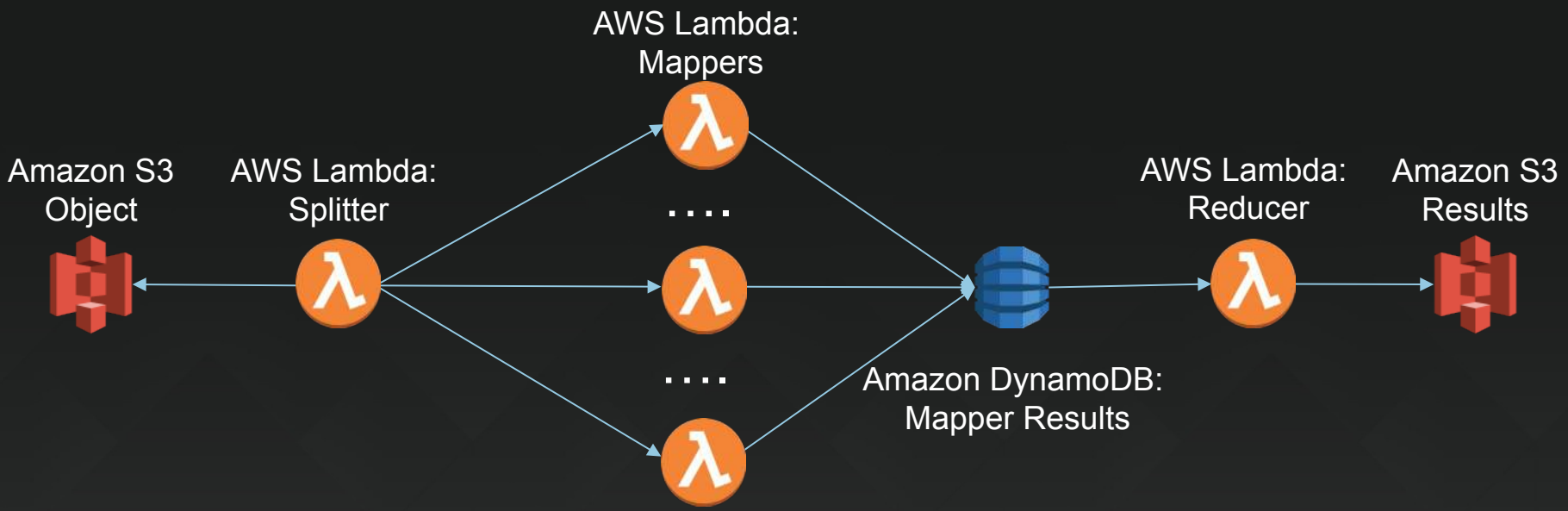
Search and Data Catalog

- DynamoDB as Metadata repository
- Amazon Elasticsearch

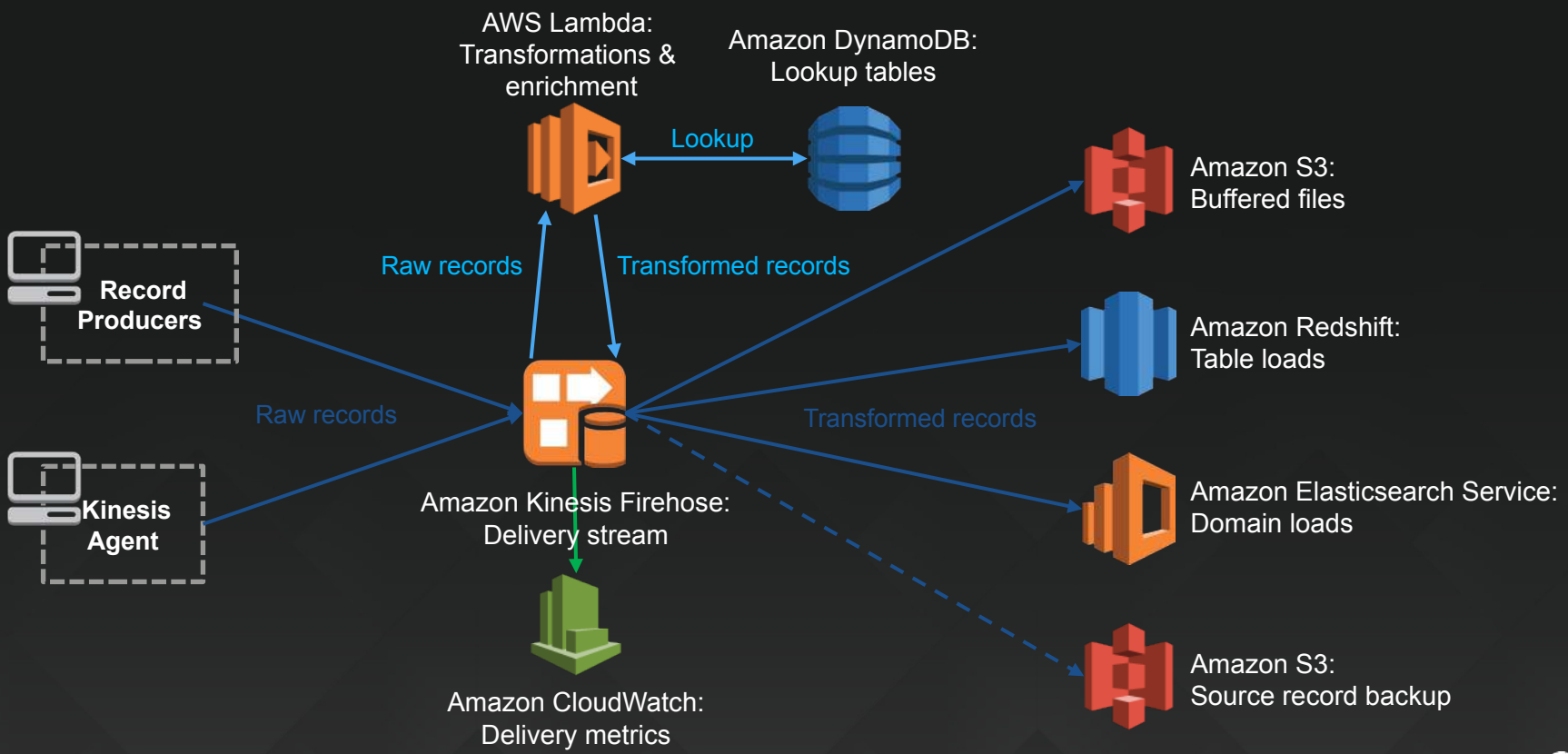


https://aws.amazon.com/answers/big-data/data-lake-solution/

Serverless batch processing



Streaming data ingestion



Real-time analytics

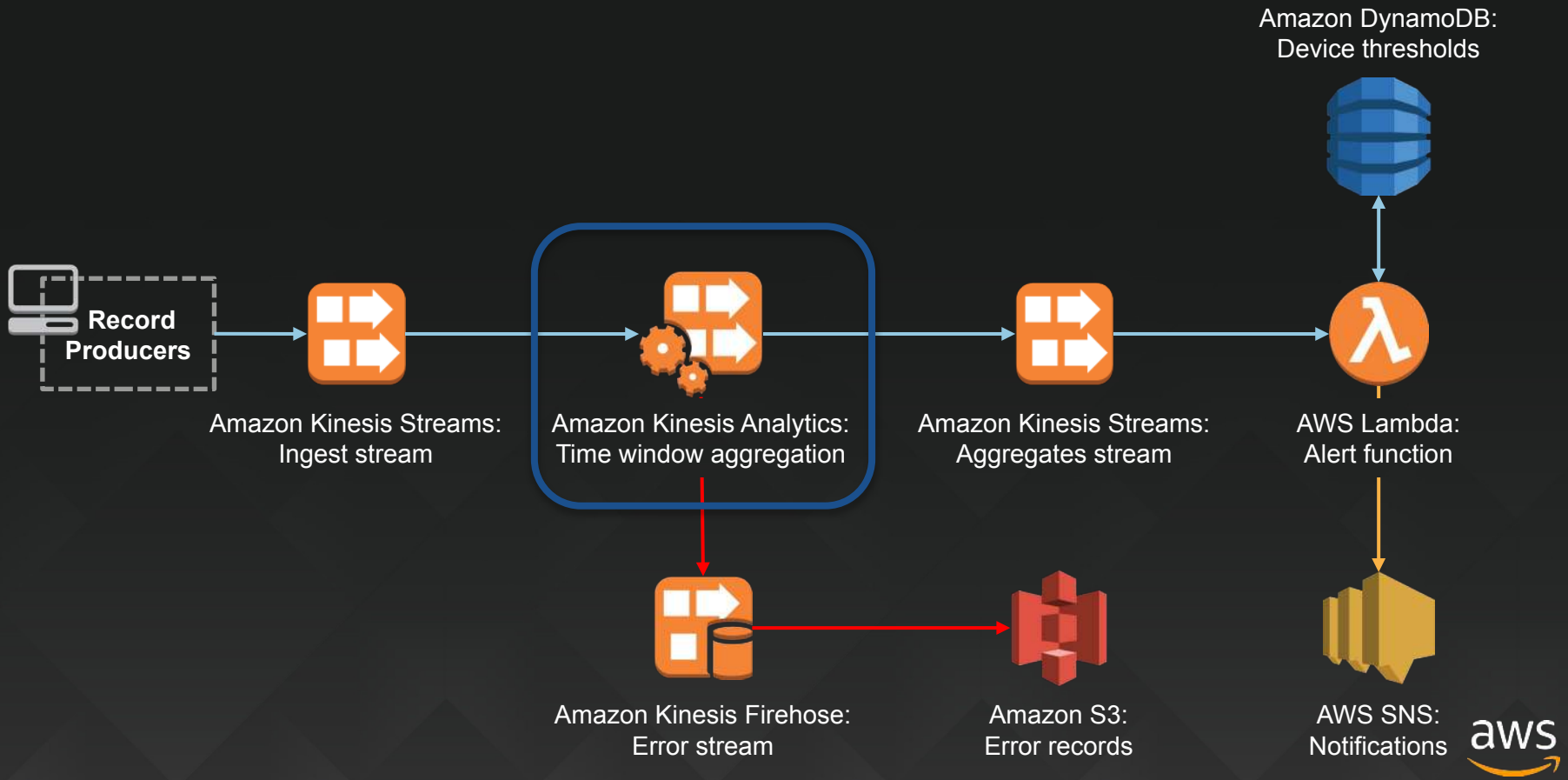
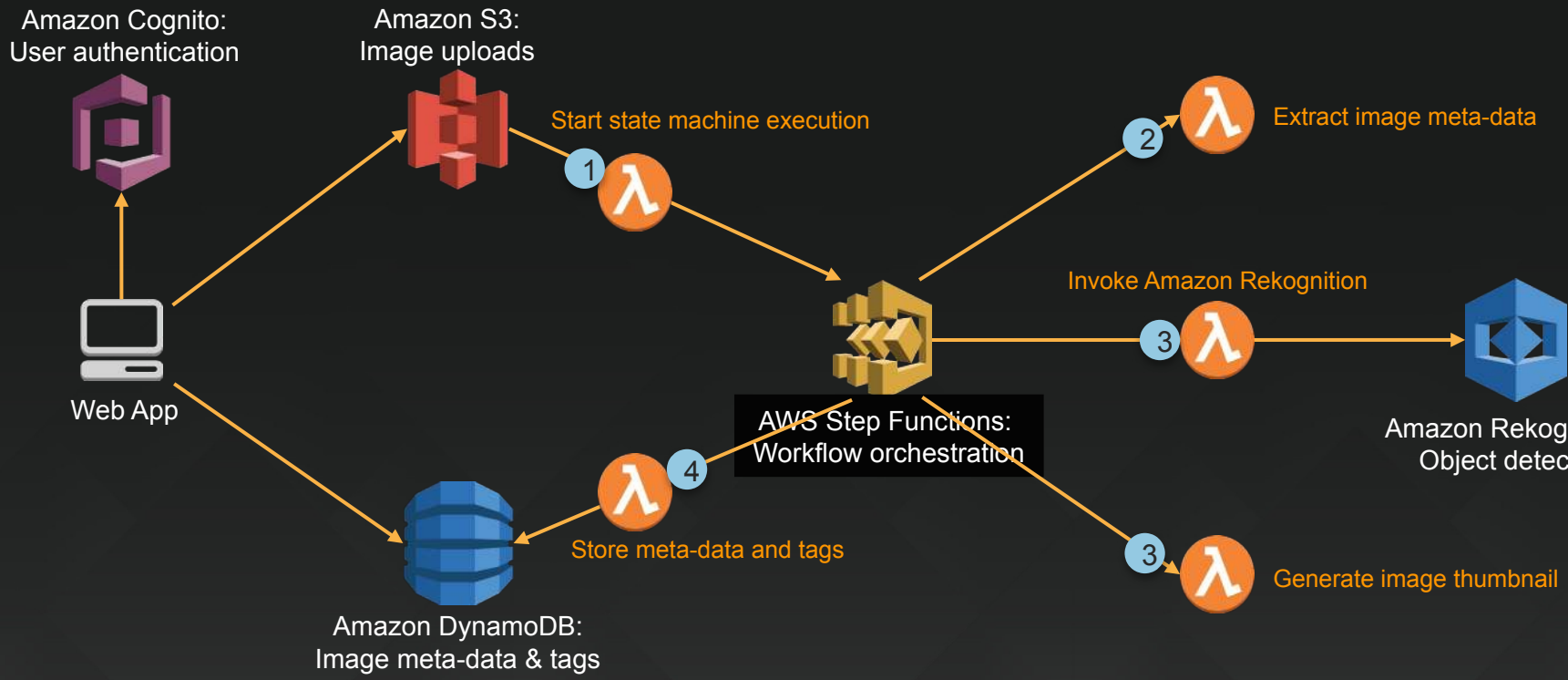


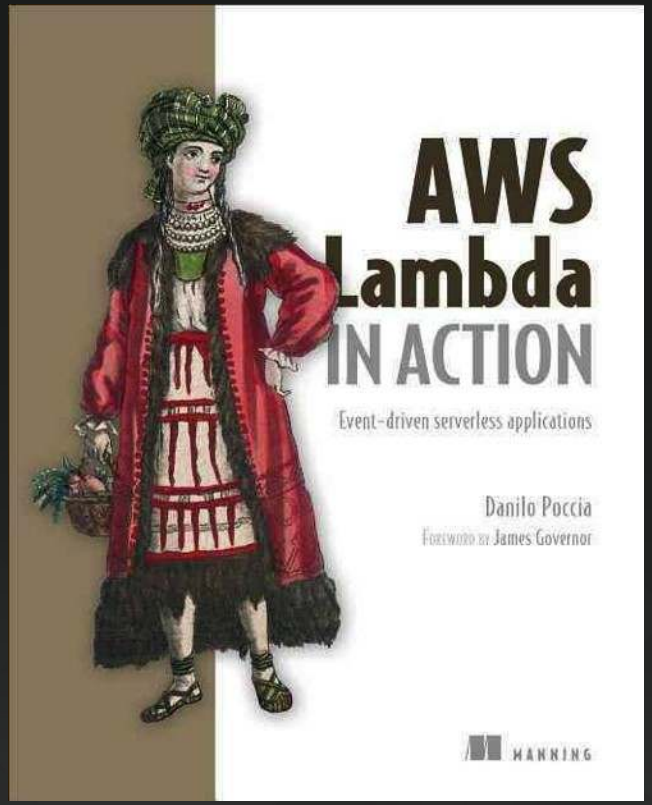
Image recognition and processing



https://github.com/awslabs/lambda-refarch-imagerecognition

Going further

The only Lambda book you need to read



Written by AWS Technical Evangelist Danilo Poccia

https://www.amazon.com/Aws-Lambda-Action-Event-driven-Applications/dp/1617293717/

AWS Whitepapers on serverless architectures

- Optimizing Enterprise Economics with Serverless Architectures
  https://d0.awsstatic.com/whitepapers/optimizing-enterprise-economics-serverless-architectures.pdf

- Serverless Architectures with AWS Lambda
  https://d1.awsstatic.com/whitepapers/serverless-architectures-with-aws-lambda.pdf

- Serverless Applications Lens - AWS Well-Architected Framework
  https://d1.awsstatic.com/whitepapers/architecture/AWS-Serverless-Applications-Lens.pdf

- Streaming Data Solutions on AWS with Amazon Kinesis
  https://d1.awsstatic.com/whitepapers/whitepaper-streaming-data-solutions-on-aws-with-amazon-kinesis.pdf

- AWS Serverless Multi-Tier Architectures

Thank you!

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