

Building a full-stack Serverless Web application with React and AWS

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Agenda

- Introduction to AWS, Serverless, AWS Amplify, and React
- Create your first React application and setup AWS Amplify
- Setup access controls for your application
- Perform data mutations using AWS AppSync and GraphQL
- Introduction to multiple development environments
- Wrap-up and discussion

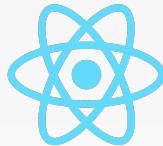
Introduce Yourself

- Your name
- Your organization
- Your role
- Your experience level with AWS
- Your expectations

Introduction

- **Amazon Web Service (AWS)**: <https://aws.amazon.com/>
- **Serverless**: Build and run applications and services without thinking about servers.
- **React**: A JavaScript library
- **AWS Amplify**: An open source **JavaScript** library provided by AWS that enables developers to build applications with cloud services on web or mobile platforms.

Workshop Overview



React



AWS Amplify



AWS AppSync



Node.js



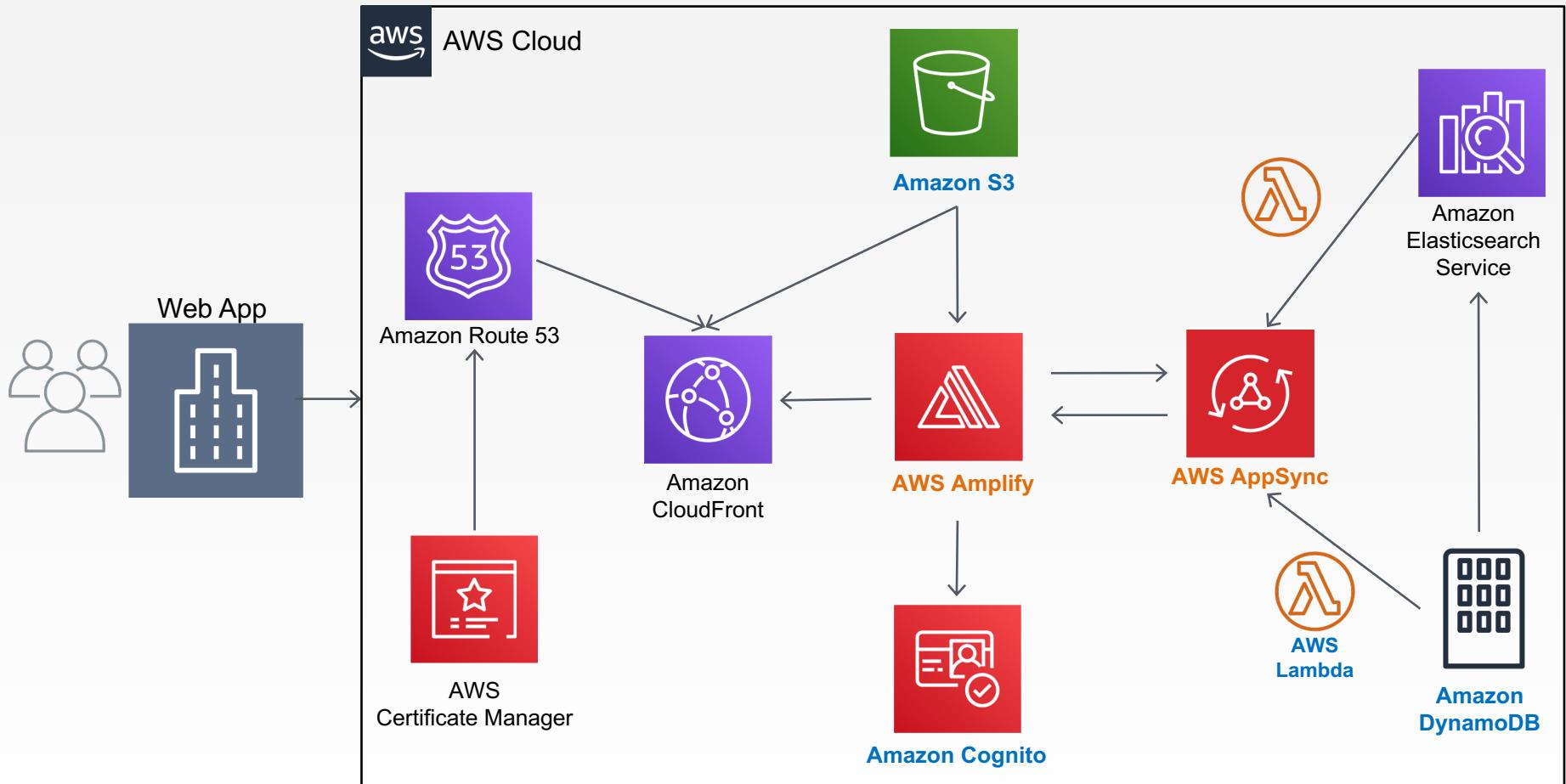
JavaScript



Web App



GraphQL



AWS Amplify

Everything you need to develop & deploy
cloud-powered mobile and web apps



Develop

With the Amplify Framework

Build scalable cloud-powered apps



The Amplify Framework provides a command-line interface (CLI) and library for simplifying mobile and web development.

[GET STARTED](#)



Deploy

With the Amplify Console

Build, deploy, and host modern web apps



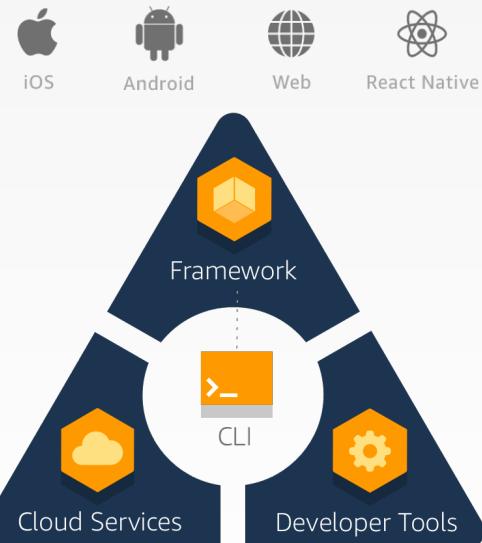
Connect your Git repository to continuously deploy your frontend and backend. Host it on a globally available CDN.

[GET STARTED](#)



AWS Amplify Framework

- AWS Amplify: <https://aws-amplify.github.io/>
- Library: Connect to AWS services
 - Authentication, API, Storage, and etc.
- Toolchain: Command line interface
 - <https://github.com/aws-amplify/amplify-cli>
- UI Components
 - React or Angular, and Vue
 - https://aws-amplify.github.io/media/ui_library



Workshop – Section 1

- Create your first React application
- AWS Amplify Setup
- GitHub Setup

Amplify Command Overview

Command	Description
amplify configure	Configures a new AWS User Profile
amplify init	Initializes a new project
amplify status	Displays the state of local resources
amplify add <category>	Adds cloud features to your app
amplify update <category>	Updates existing cloud features in your app
amplify push	Provisions cloud resources with the latest local developments
amplify env <category>	Setup multiple environments
amplify delete	Delete resources tied to the project

Workshop – Section 2

- Setup access controls for your application
- Add authentication
 - Email signup
- AWS Cognito
- Configure the React application
- Add E2E tests to app with Cypress
- Deploy the application
 - AWS Amplify Console

AWS Cognito



Amazon Cognito

Amazon Cognito offers user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your app users. Identity pools provide AWS credentials to grant your users access to other AWS services.

[Manage User Pools](#)[Manage Identity Pools](#)

Cypress

The screenshot shows the Cypress Test Runner interface running a test for a book application. The browser window displays the test results and the application's UI.

Test Results:

- 1 Tests passed
- 0 Tests failed
- 0 Tests pending
- 02.72 Duration

Test Script (authenticator_spec.js):

```
describe('Authenticator:', () => {
  describe('Sign In:', () => {
    it('allows a user to sign in', () => {
      cy.visit('/')
      cy.get('[data-test="username-input"]').type('code4lib')
      cy.get('[data-test="sign-in-password-input"]').type('workshop')
      cy.contains('Sign In').click()
      cy.get('[data-test="sign-out-button"]').click()
      cy.contains('Sign Out').click()
    })
  })
})
```

Application UI (localhost:3000):

Hello! This is an AWS Amplify application.

Hello code4lib SIGN OUT

Connect to Source Code

Amplify Console X

All apps

Documentation ↗

Support ↗

Connect app

Select a Git provider

GitHub 

BitBucket 

GitLab 

AWS CodeCommit 

Deploy without Git provider
Host your app by manually uploading build artifacts from your local desktop, Amazon S3, or any public URL. 

Cancel Continue

Add Repository Branch

Amplify Console X

All apps awesometodo

Documentation ↗

Support ↗

All apps > Connect app

Step 1 Add repository branch

Step 2 Configure build settings

Step 3 Review

Add repository branch

GitHub

GitHub authorization was successful.

Repository service provider GitHub

Recently updated repositories If you don't see your repository below, please push a commit and then click the refresh button.
yinlinchen/amplify-workshop ▾ C

Branch Select a branch from your repository.
master ▾

Cancel Previous Next

Build Settings

AWS Services Resource Groups ⚙

Yinlin Chen N. Virginia Support

Amplify Console X

All apps bookapp Connect branch

Step 1 Add repository branch

Step 2 Configure build settings

Step 3 Review

App settings

- General
- Domain management
- Email notifications
- Access control
- Access logs
- Rewrites and redirects

Documentation ↗

Support ↗

Configure build settings

App build and test settings

App name bookapp

Auto-detected frameworks

Frontend framework React

Backend framework Amplify

Testing framework Cypress

Backend deployments

Connect your backend to continuously deploy changes to both your frontend and backend

Deploy updates to backend resources with your frontend on every code commit

Select a backend environment

dev

Select an existing service role or create a new one so Amplify Console may access your resources.

amplifyconsole-backend-role

G

Review

Amplify Console X

All apps > Connect app

Step 1 Add repository branch

Step 2 Configure build settings

Step 3 Review

Review

Repository details	
Repository service	Branch
GitHub	master
Repository	Branch environment
yinlinchen/amplify-workshop	

App settings	
App name	Framework
amplify-workshop	Web
Build image	Build settings
Using default image	Auto-detected settings will be used
Environment variables	
None	

Cancel Previous Save and deploy

Automatic Deployment

Amplify Console X

All apps > bookapp

bookapp

The app homepage lists all deployed frontend and backend environments.

▶ Learn how to get the most out of Amplify Console 1 of 5 steps complete X

Frontend environments Backend environments

This tab lists all connected branches, select a branch to view build details. Connect branch

master
Continuous deploys set up with **dev** backend ([Edit](#))

<https://master...amplifyapp.com>

Last deployment
2/22/2020, 11:33:51 PM

Last commit
update readme | 49d45d9 | [GitHub - master](#)

Previews
Disabled

Provision Build Test Deploy Verify

Workshop – Section 3

- Introduction to GraphQL
- Introduction to AWS AppSync
- Add a GraphQL API

Introduction to GraphQL

- A query language for APIs
- Type system
- Operations
 - Queries
 - Mutations
 - Subscriptions

```
type BestSeller
{
    title: String          #from Book Database
    coverArtUrl: AWSURL   #from Object Store (S3)
    salesRank: Int          #from external web service
}

type Query {
    getBestSellers(week: Int): [BestSeller]
}
```

Type System

- Type Book {
 - uuid: ID
 - title: String!
 - author: String
 - stars: Int
 - reviews: [Review]
 - inventory: Inventory}

Query

- type BookQuery {
 search(q: String): [Book]
 getBook(uuid: ID): Book
}
- search(q: “graphql”) {
 uuid
 title
}
- getBook(uuid: “A123”) {
 uuid
 title
 review {stars}
}

Mutation

- type BookMutation {
 addStar(num: Int): Review
}
- addStar(num: 1) {
 stars
}

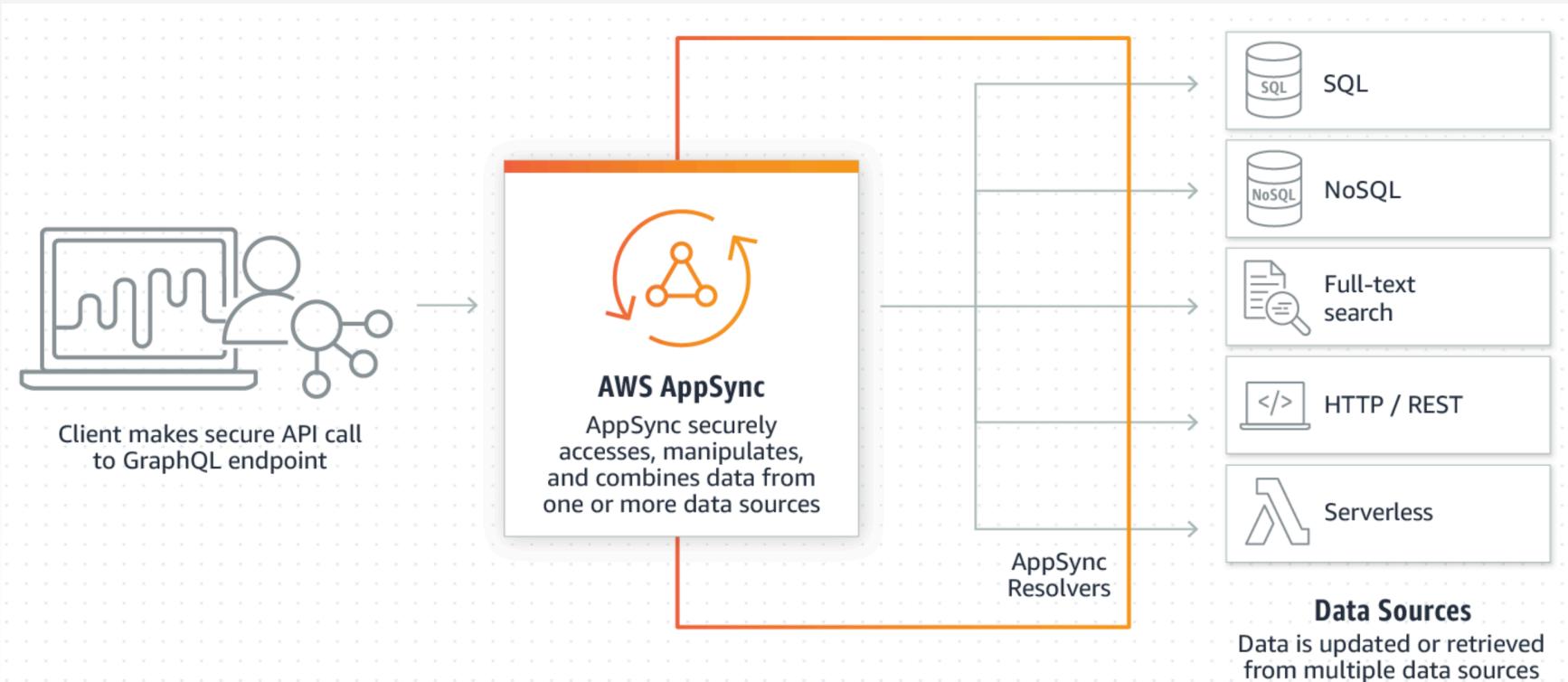
Subscription

- Type BookSubscription {
 onReview(uuid: ID): Review
}
- onReview(uuid: “abcd”) {
 uuid
 id
 stars
}

Schema

- schema {
 - query: BookQuery
 - mutation: BookMutation
 - subscription: BookSubscription}

Introduction to AWS AppSync



Set up GraphQL in Amplify

- amplify add api
- amplify status
- amplify push

AWS AppSync Console

AWS AppSync X

APIs

BookGraphQL-master

Schema

Data Sources

Functions

Queries

Settings

AWS AppSync > BookGraphQL-master > Queries

Queries

Write, validate, and test GraphQL queries. [Info](#)

Select the authorization provider to use for executing queries on this page:

API key ▾

▶

```
1 # Welcome!
2 #
3 # This is an in-browser tool for writing, validating, and
4 # testing GraphQL queries.
5 #
6 # An example query named "GetPost" might look like:
7 #
8 #   query GetPost {
9 #     singlePost(id: 123) {
10 #       id
11 #       title
12 #     }
13 #   }
14 #
15 # An example mutation named "PutPost" might look like:
16 #
17 #   mutation PutPost {
18 #     putPost(id: 123, title: "Hello, world!") {
```

Workshop - Section 4

- Perform data mutations for your application
 - **C**reate
 - **R**ead
 - **U**pdate
 - **D**elete

Update

Schema	Mutation	Mutation	updateBook	updateBook	UpdateBookInput
<p>No Description</p> <p>FIELDS</p> <p><code>createBook(input: CreateBookInput!): Book</code></p> <p><code>updateBook(input: UpdateBookInput!): Book</code></p> <p><code>deleteBook(input: DeleteBookInput!): Book</code></p>		<p>No Description</p> <p>TYPE</p> <p><code>Book</code></p> <p>ARGUMENTS</p> <p><code>input: UpdateBookInput!</code></p>		<p>No Description</p> <p>FIELDS</p> <p><code>id: ID!</code></p> <p><code>bookId: ID</code></p> <p><code>name: String</code></p> <p><code>category: String</code></p> <p><code>description: String</code></p> <p><code>price: Float</code></p>	

Delete

◀ Mutation

deleteBook

No Description

TYPE

Book

ARGUMENTS

input: DeleteBookInput!

◀ deleteBook

DeleteBookInput

🔍 Search DeleteBookInput...

No Description

FIELDS

id: ID

More about API

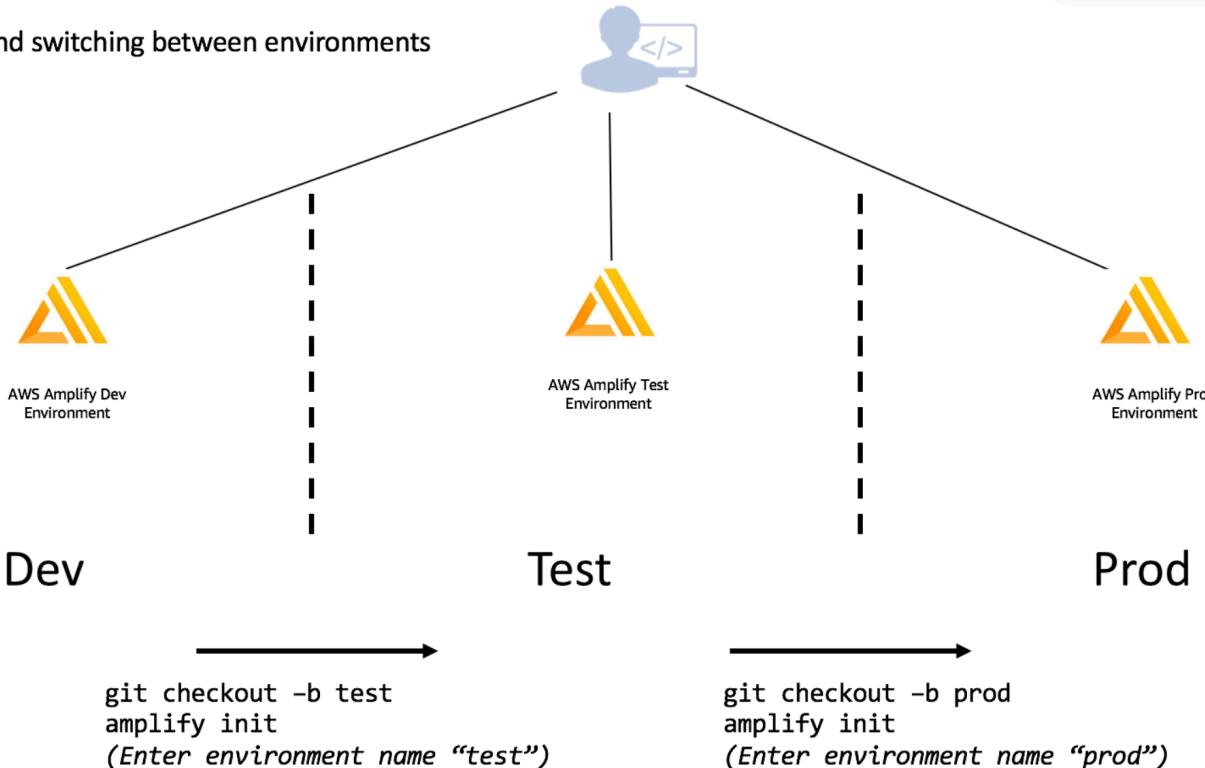
- Interact with REST API
- Add a Search API
 - ElasticSearch
 - @searchable

Workshop – Section 5

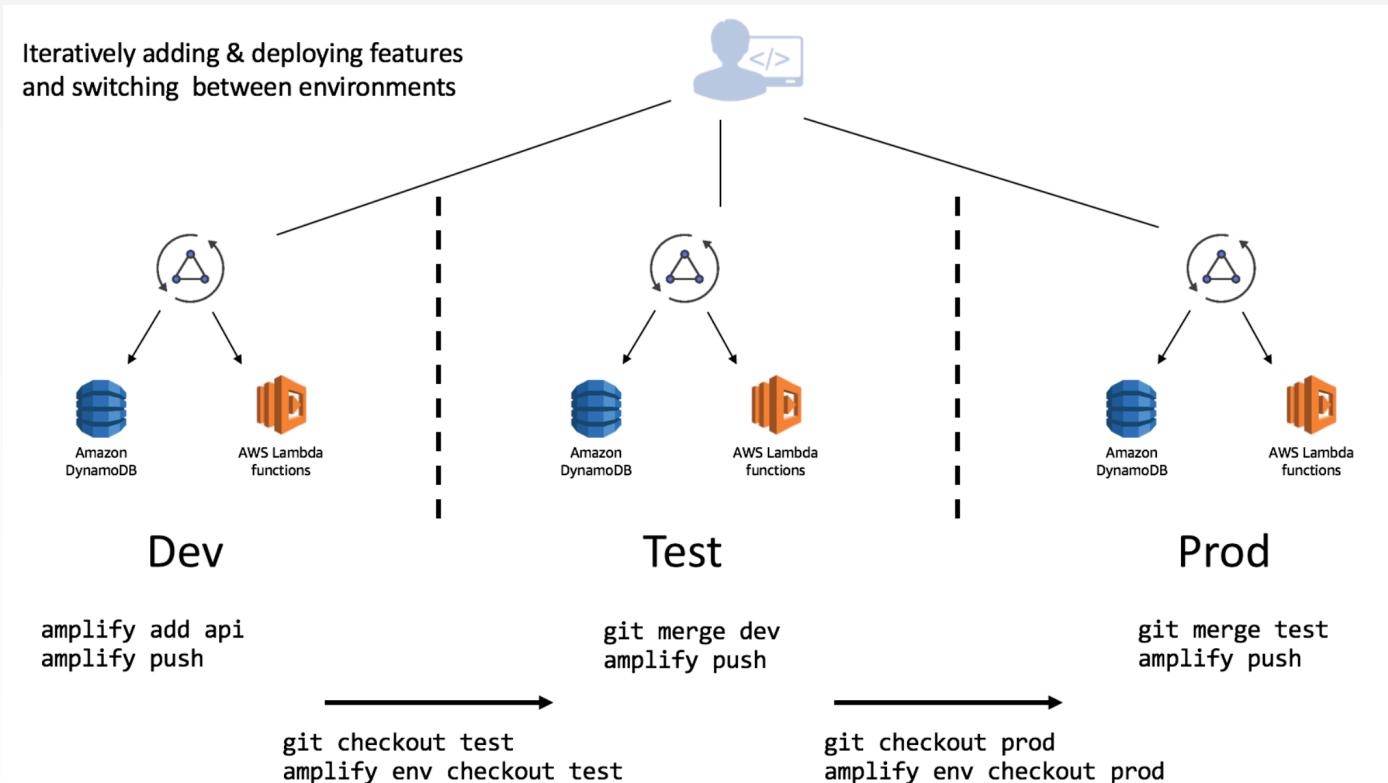
- Multiple development environments

Switch between Environments

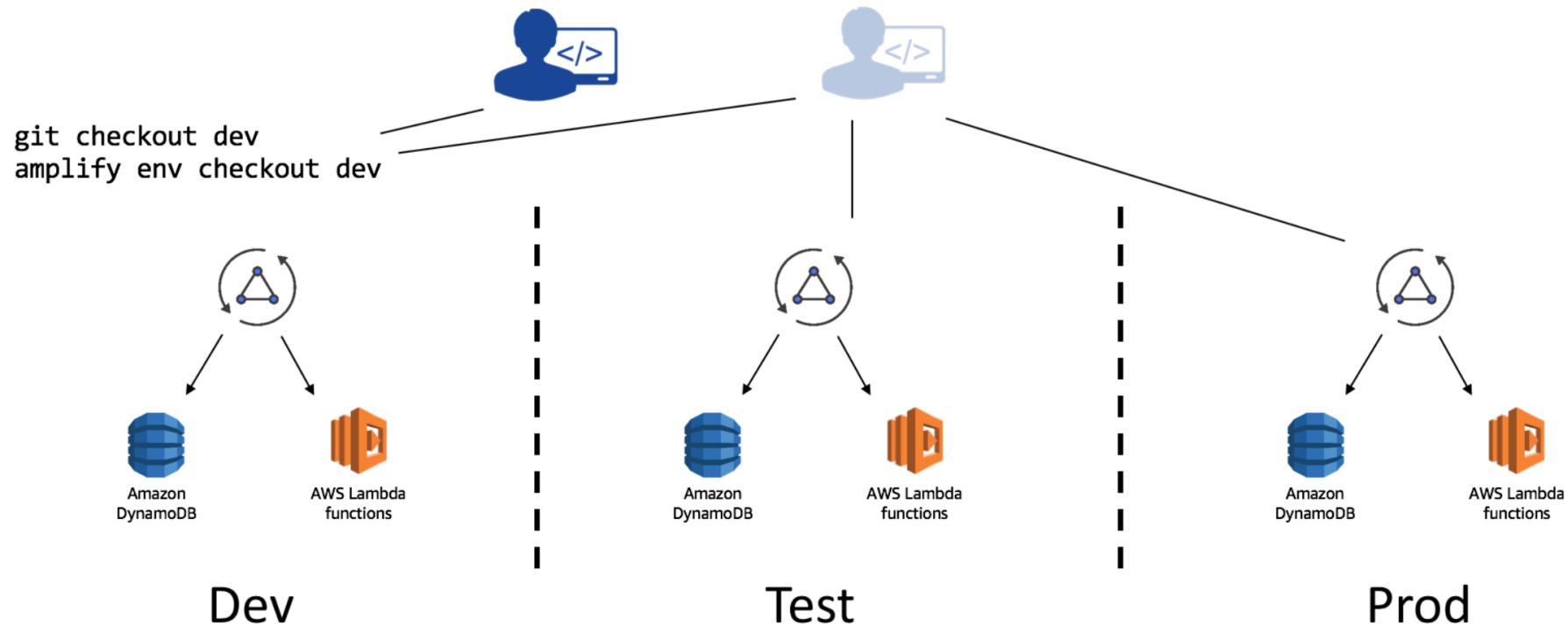
Creating and switching between environments



Function add / update / test / merge



Multiple developers sharing environments in the same account



Amplify env commands

Command	Description
amplify env add	Adds a new environment to your Amplify Project
amplify env list	Displays a list of all the environments in your Amplify project
amplify env remove	Removes an environment from the Amplify project
amplify env get –name	Displays the details of the environment specified in the command
amplify env pull	Pulls your environment with the current cloud environment. Use the restore flag to overwrite your local backend configs with that in the cloud
amplify env checkout	Moves your environment to the environment specified in the command. Use the restore flag to overwrite your local backend configs with the backend configs of the environment specified.

Recap

- Create a React application
- Amplify setup
- Access control and data CRUD
- Application deployment
- More references:
 - <https://aws-amplify.github.io/docs/js/start>
 - <https://amplify.aws/community/>

Q & A

Thank You!