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

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VIRGINIA TECH

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

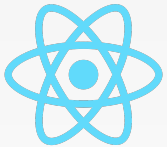
Introduce Yourself

- 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

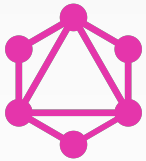
AWS Amplify

AWS AppSync

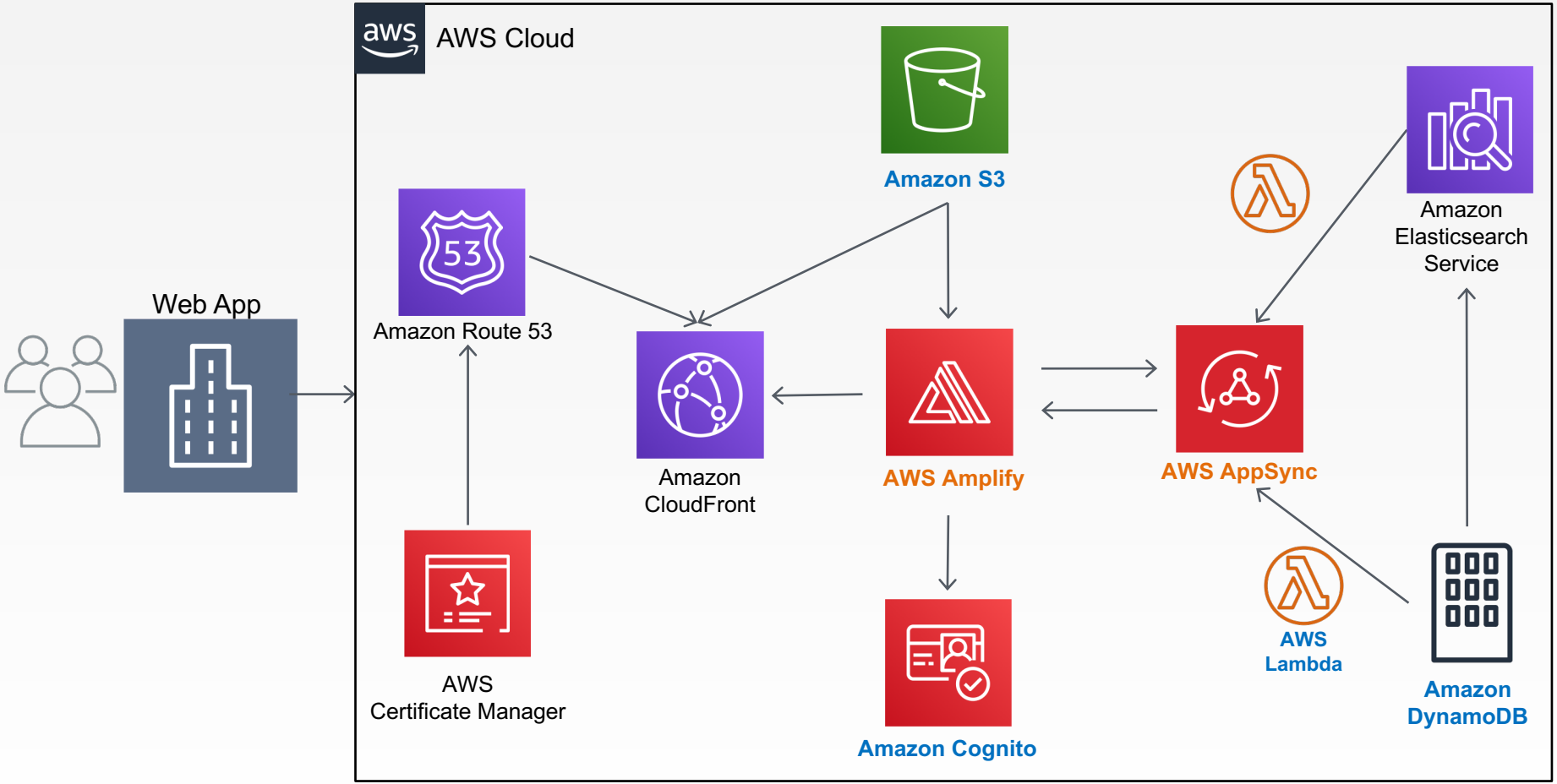
Node.js

JavaScript

Web App



GraphQL


AWS Cloud
Amazon S3
Amazon Elasticsearch Service
Web App
Amazon Route 53
Amazon CloudFront
AWS Amplify
AWS AppSync
AWS Certificate Manager
AWS Lambda
Amazon DynamoDB
Amazon Cognito

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

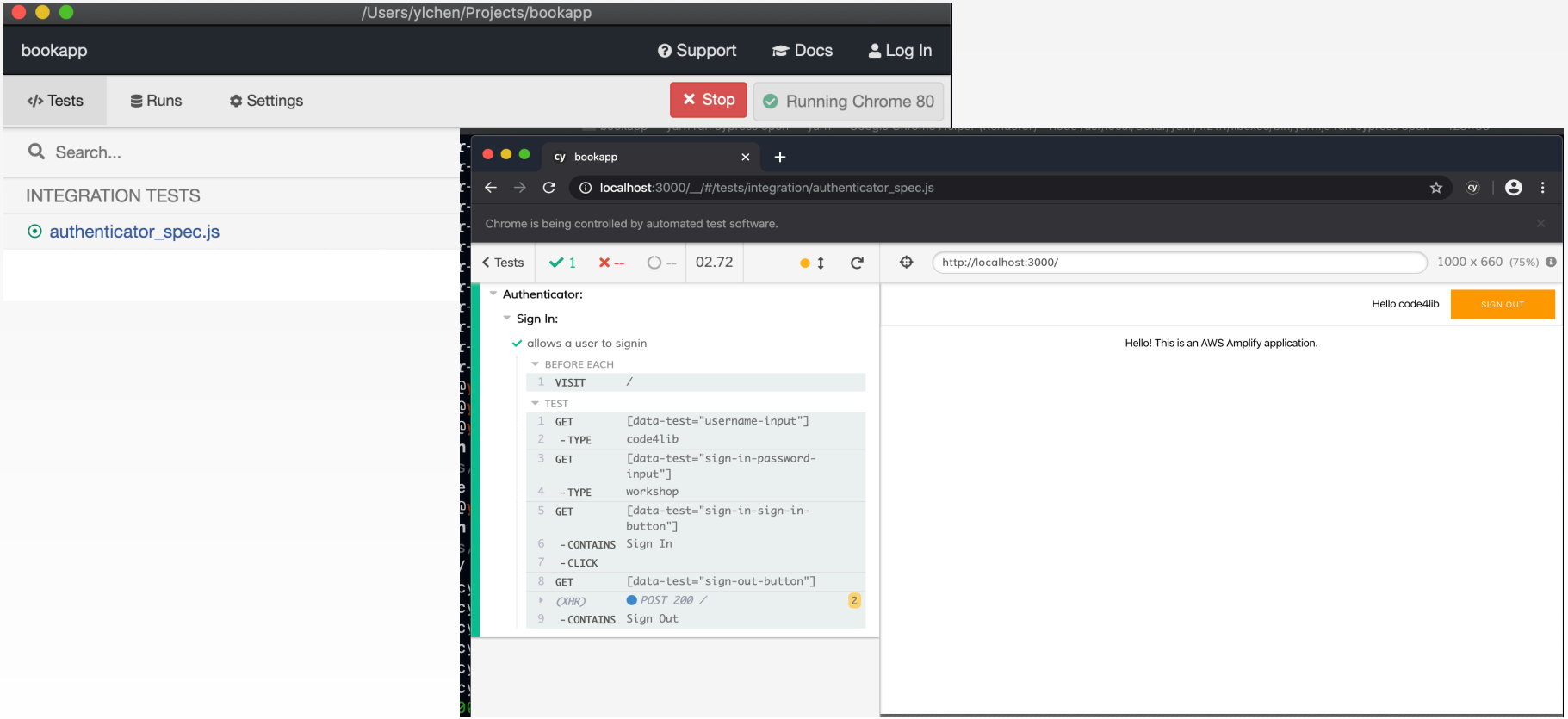
AWS Cognito

Amazon Cognito

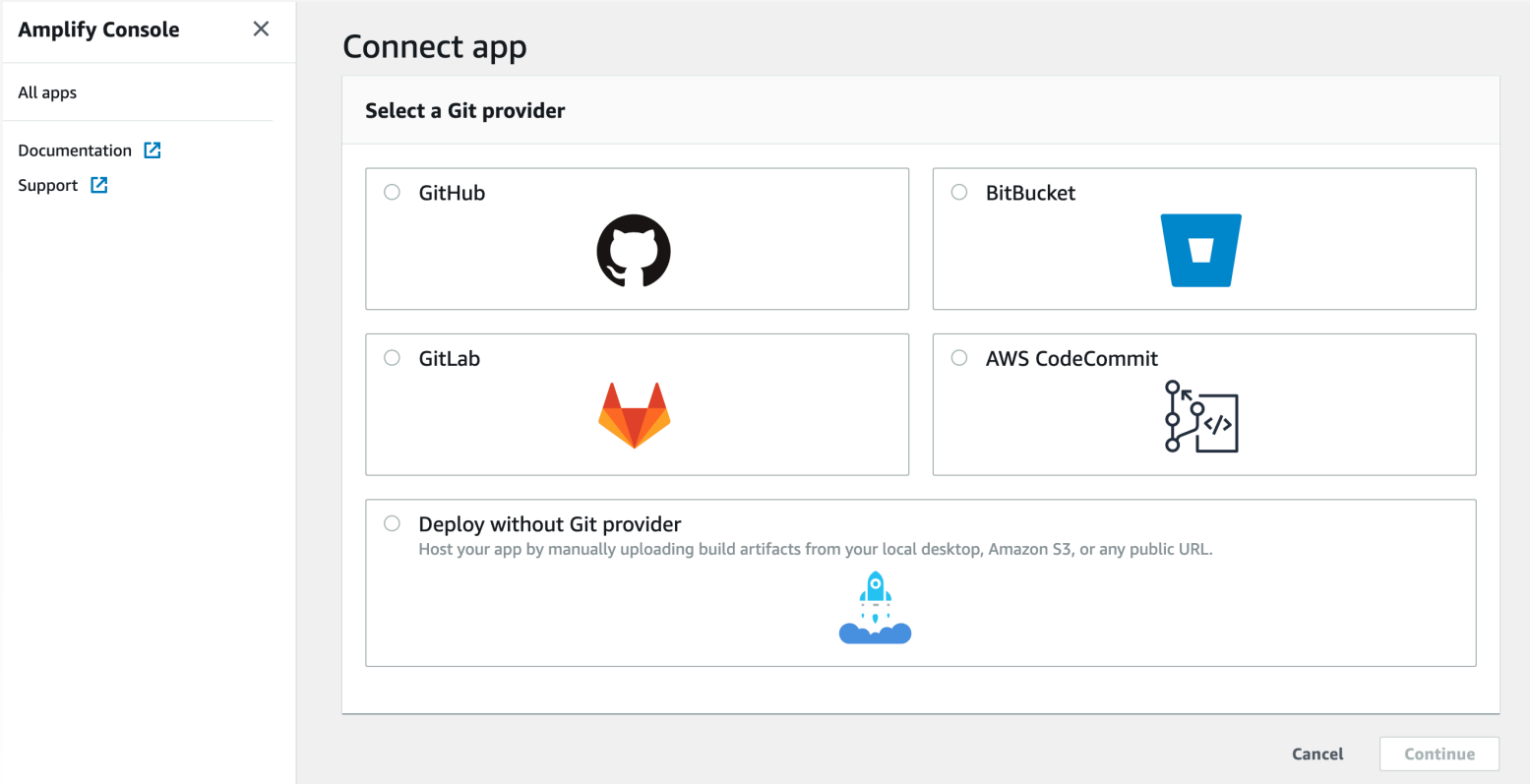
Amazon Cognito offers user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your app users. Identity pools provide AWS credentials to grant your users access to other AWS services.

Manage User Pools Manage Identity Pools

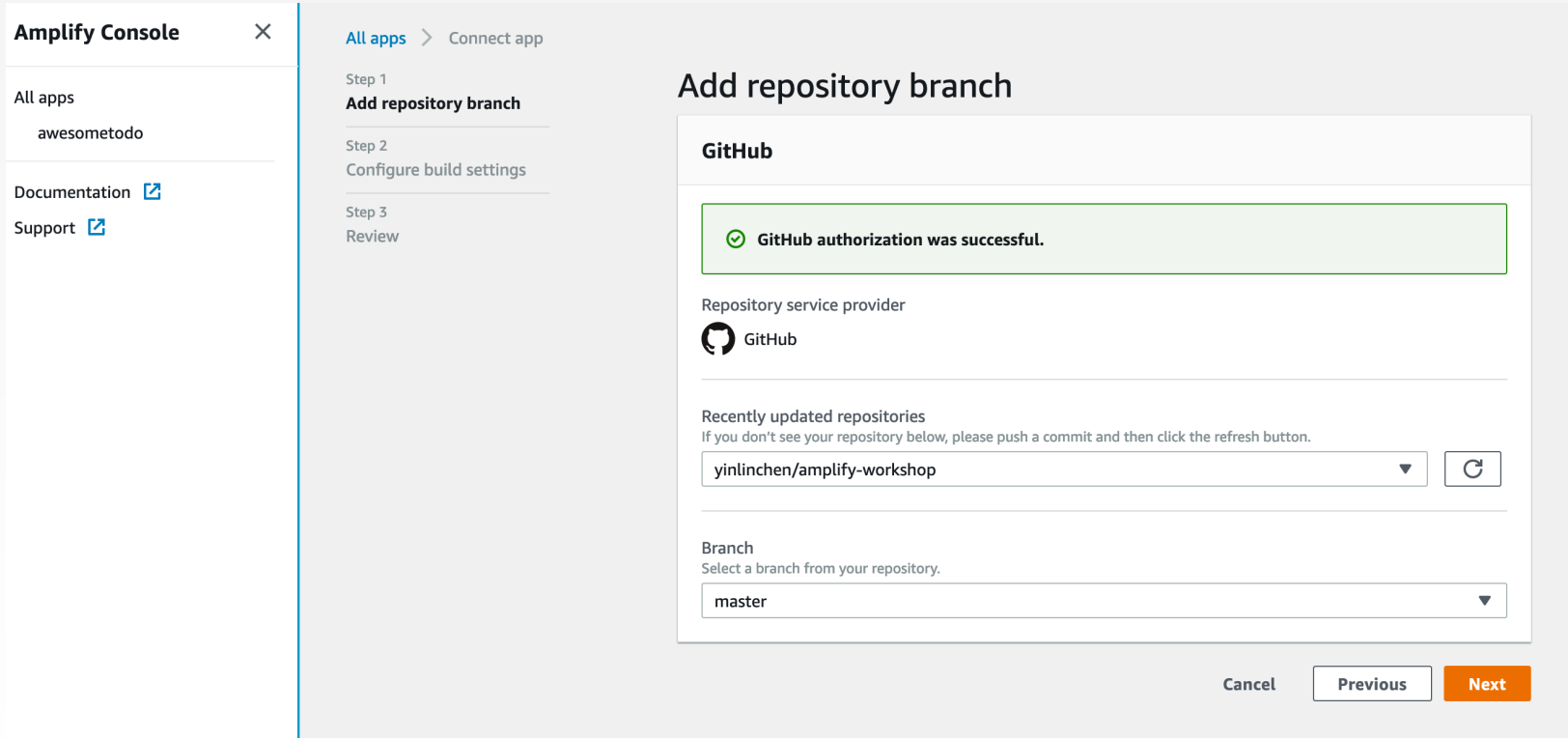
Cypress



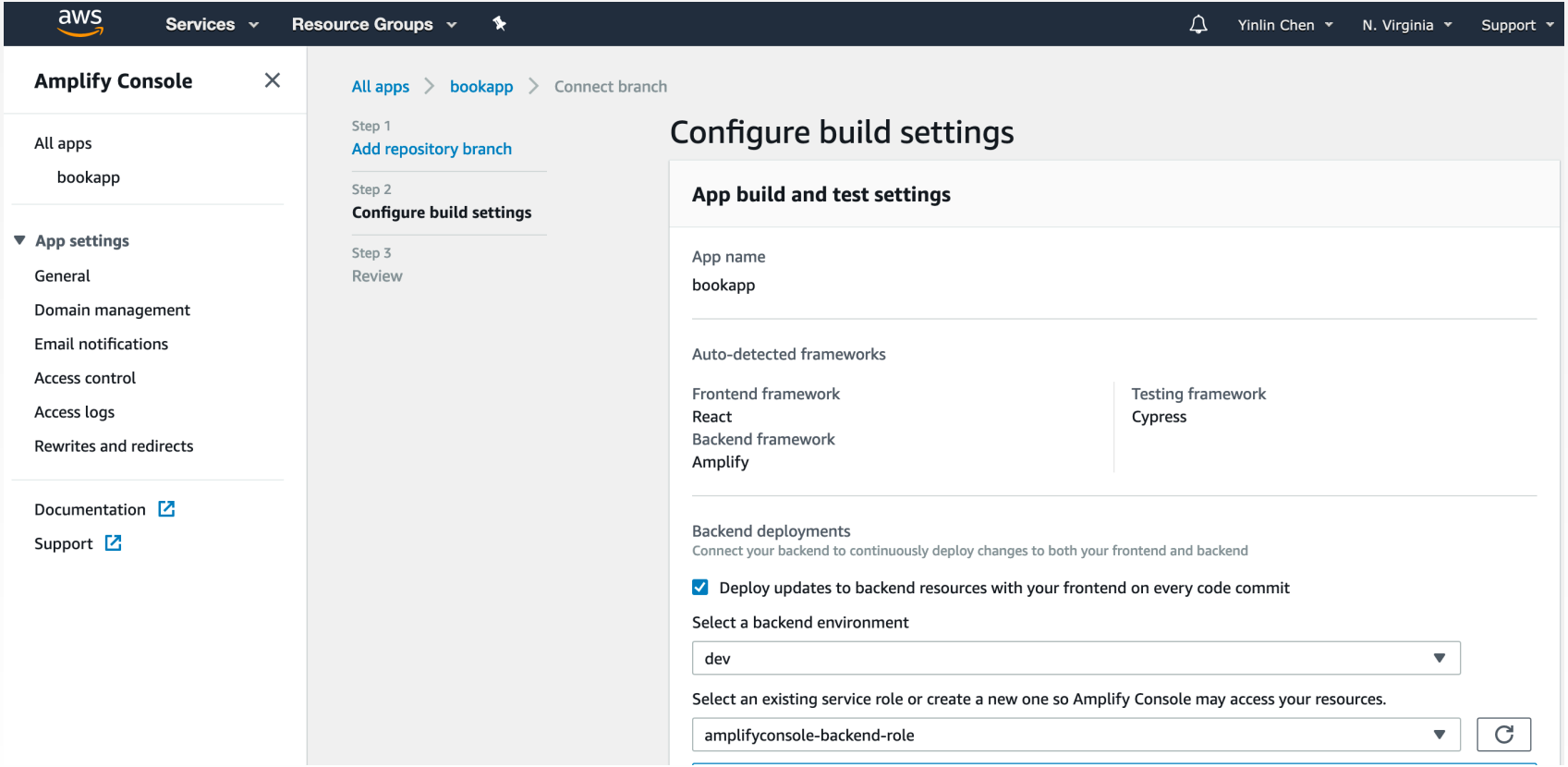
Connect to Source Code



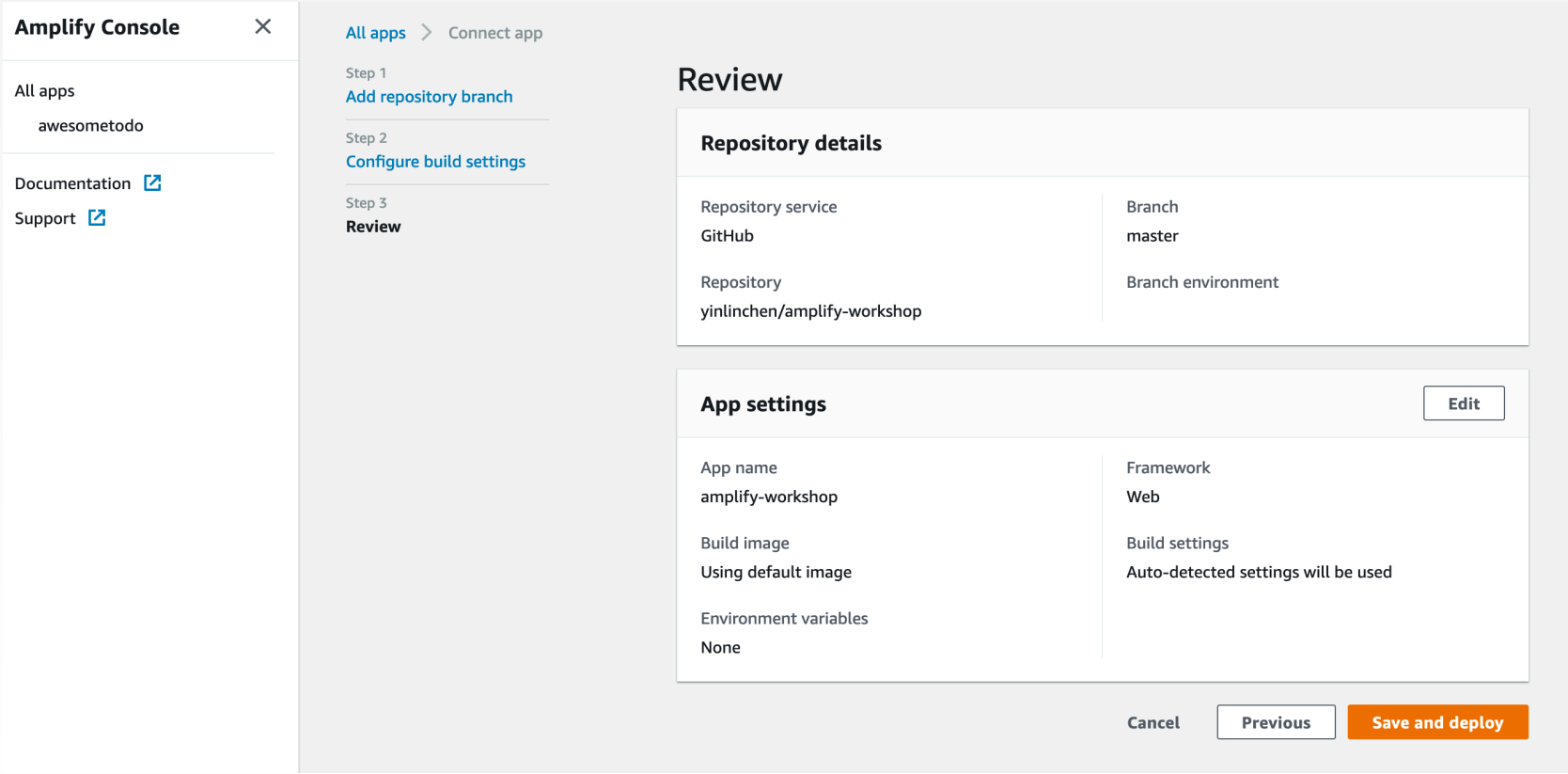
Add Repository Branch



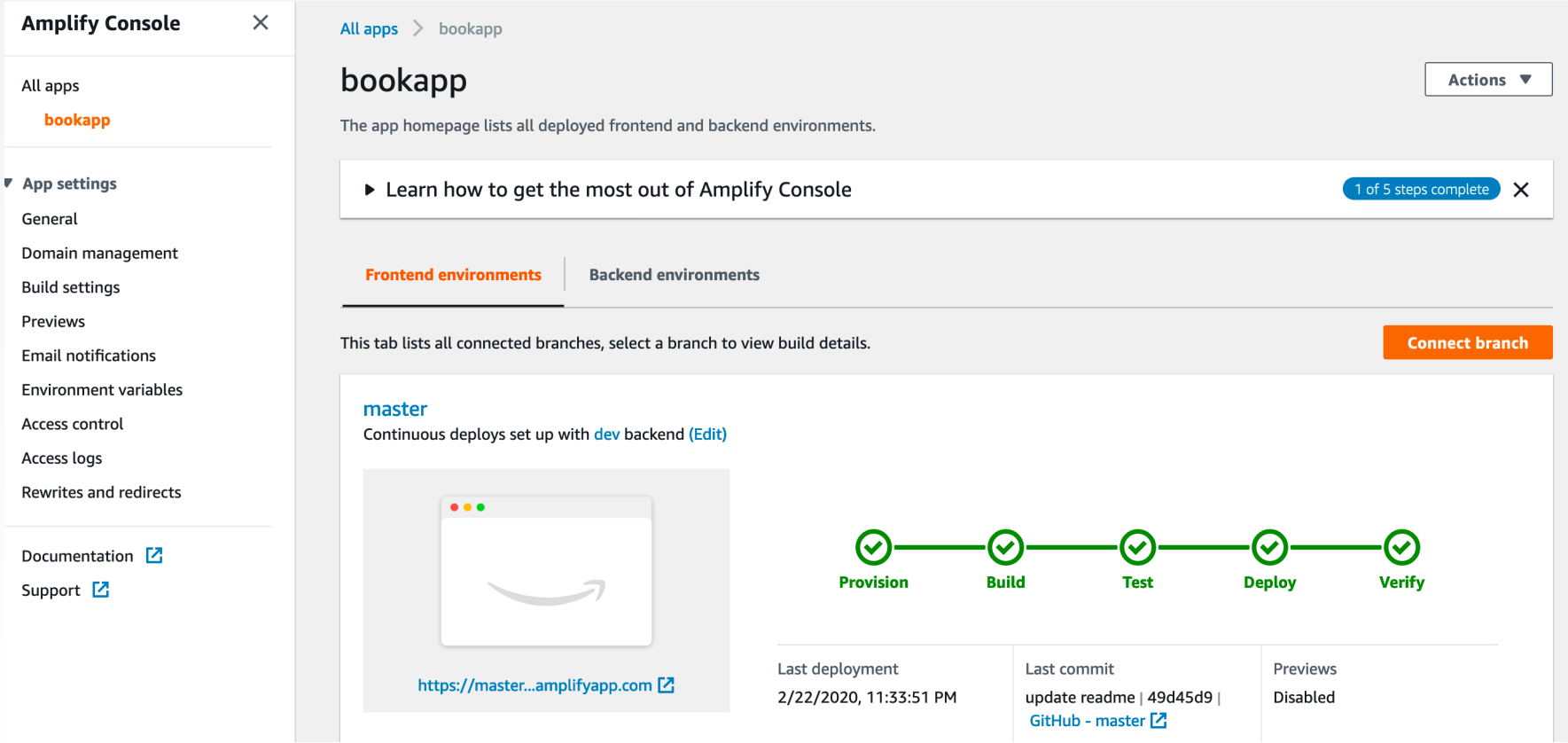
Build Settings



Review



Automatic Deployment



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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
  }

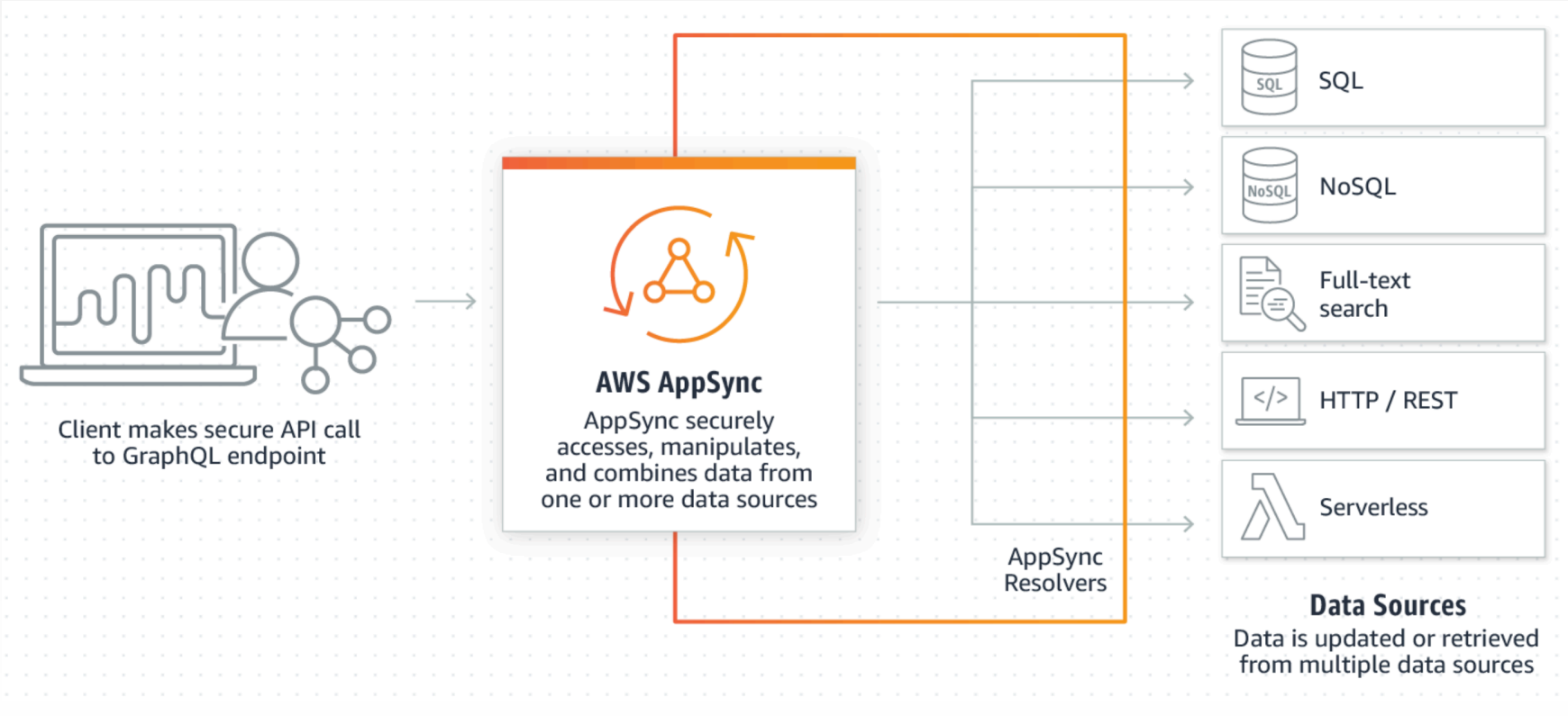
Subscription

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

Schema

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

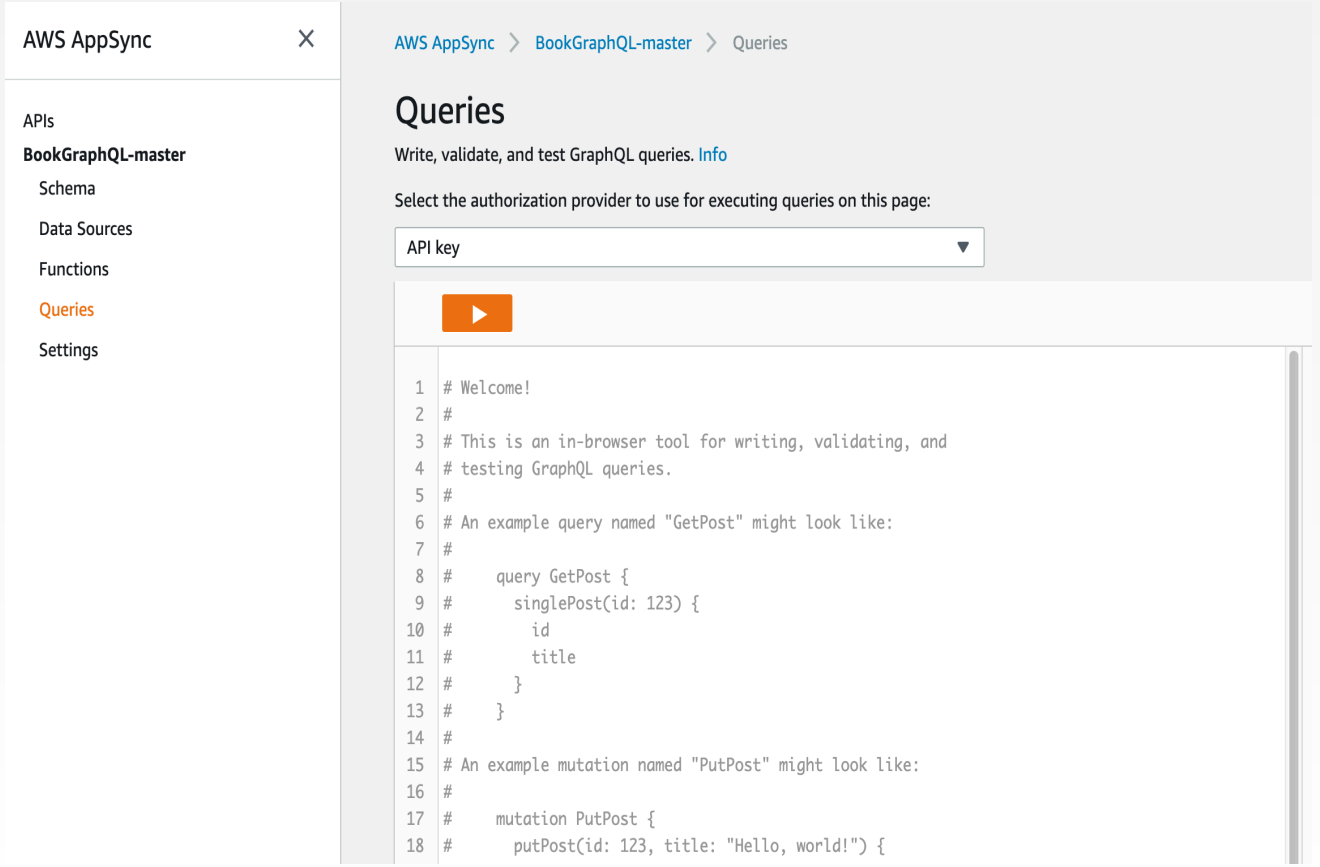
Introduction to AWS AppSync



Set up GraphQL in Amplify

- amplify add api
- amplify status
- amplify push

AWS AppSync Console



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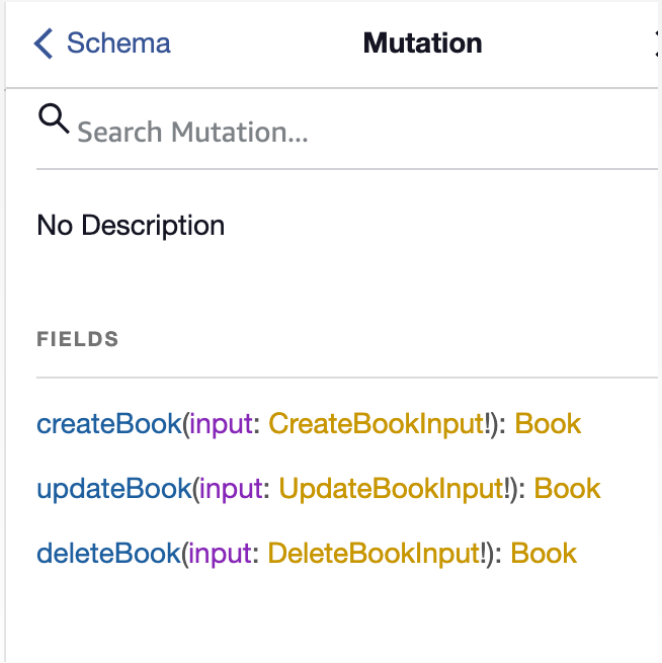
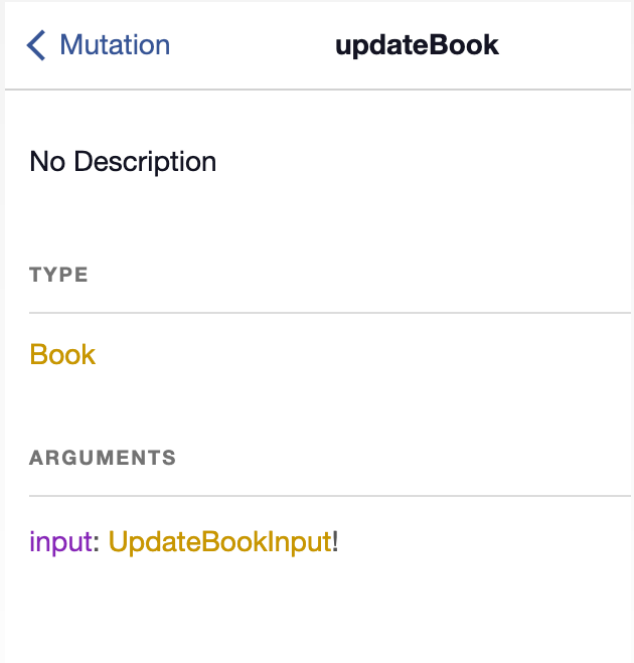
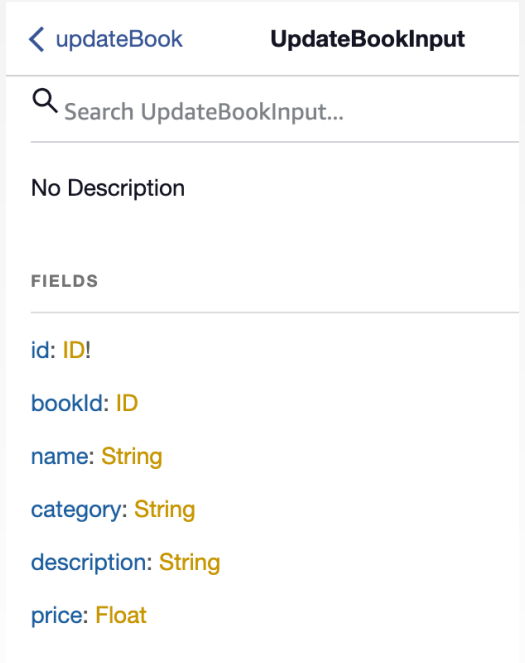
Workshop - Section 4

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

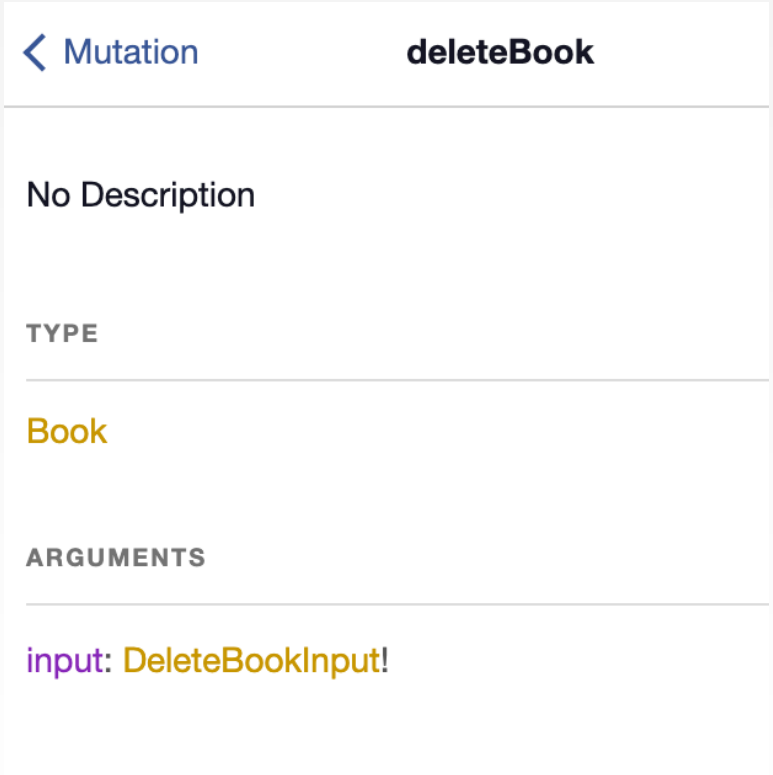
Update

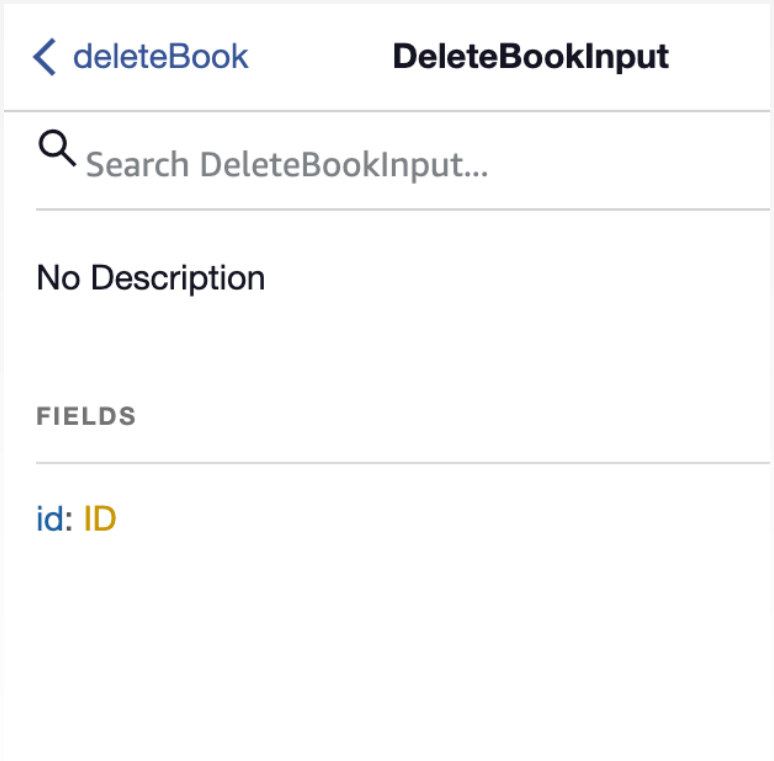

Schema
Mutation
Search Mutation...
No Description
FIELDS
createBook(input: CreateBookInput!): Book
updateBook(input: UpdateBookInput!): Book
deleteBook(input: DeleteBookInput!): Book


Mutation
updateBook
No Description
TYPE
Book
ARGUMENTS
input: UpdateBookInput!


updateBook
UpdateBookInput
Search UpdateBookInput...
No Description
FIELDS
id: ID!
bookId: ID
name: String
category: String
description: String
price: Float

Delete


Mutation
deleteBook
No Description
TYPE
Book
ARGUMENTS
input: DeleteBookInput!


deleteBook
DeleteBookInput
Search DeleteBookInput...
No Description
FIELDS
id: ID

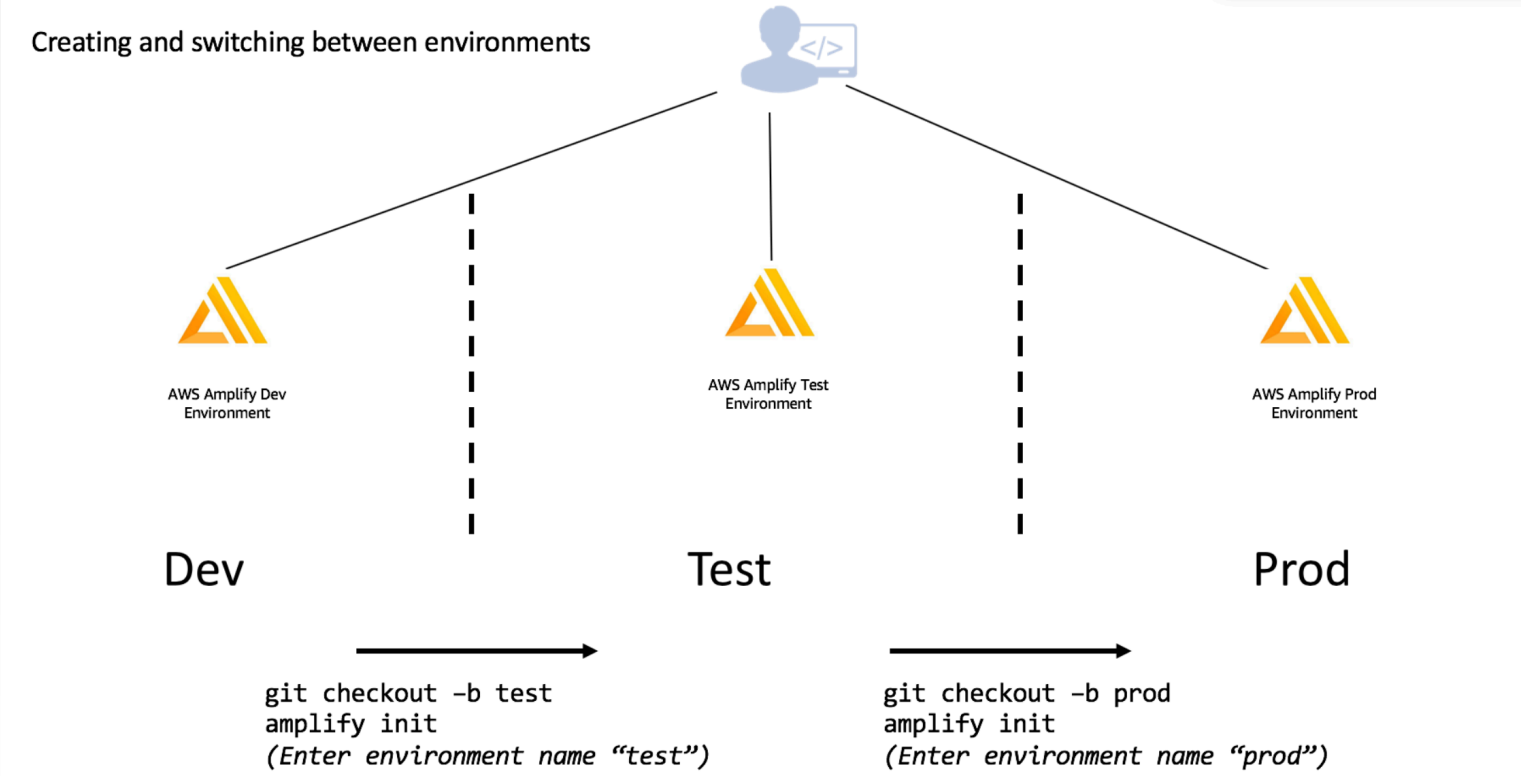
More about API

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

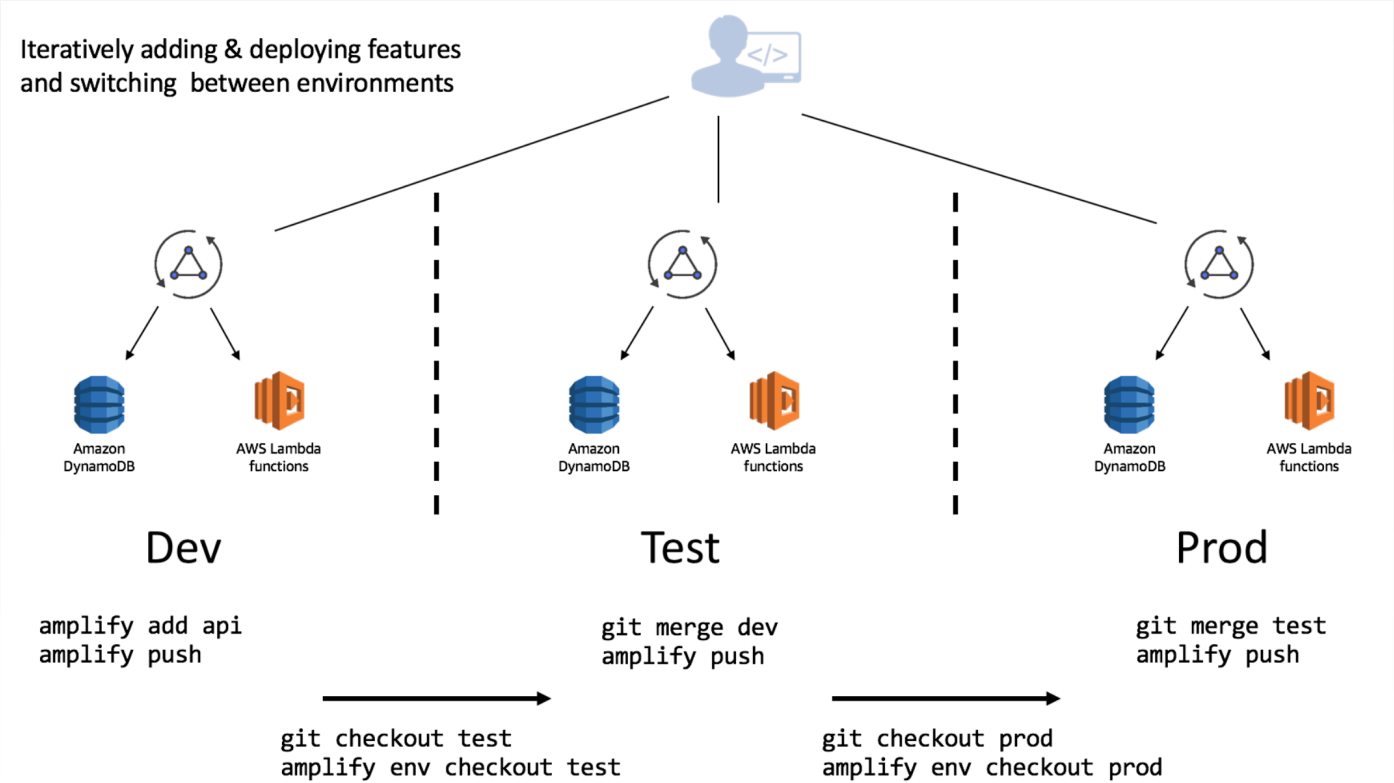
Workshop – Section 5

- Multiple development environments

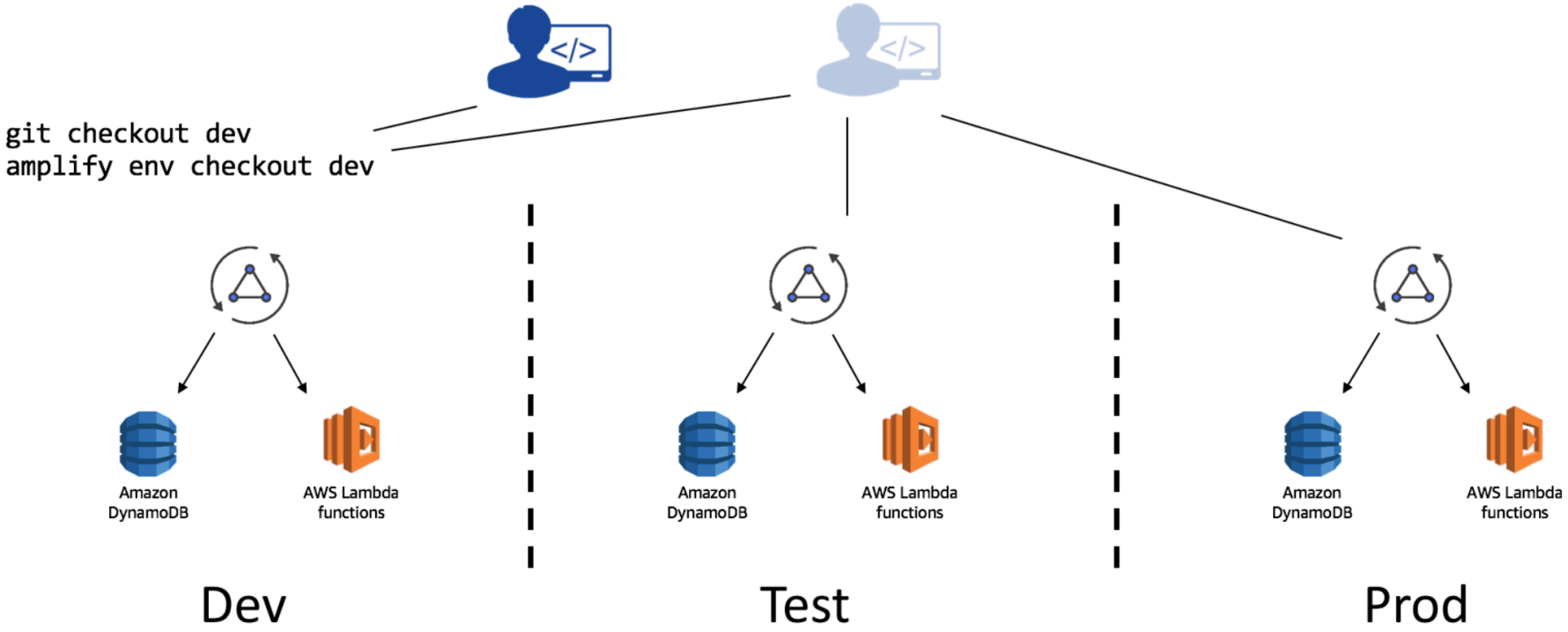
Switch between Environments



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!