AWS Amplify Workshop

Create a web application with AWS native services

Jason Hoog, Solution Architect

November 13, 2021

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Agenda

- Overview of AWS Amplify: Creating an Amplify Project (15 min)
- Adding Authentication: Amazon Cognito (10 min)
- Adding Data: AWS AppSync (15 min)
- Storing Content: Amazon S3 (10 min)
- Adding Intelligent Chatbots: Amazon Lex (15 min)
- Adding Intelligent Comprehension: Amazon Comprehend (15 min)
- Recap (5 min)

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What we will build – Andy's Pizza and Subs!

Home Menu Account

Order an Item Find

Weekly Special!
Ultimate Large Pizza only $8.59!

Your Current Cart

TOTAL: $13.99

Item Name	Options	Price
Large Pizza	Qty: 1 Pepperoni	$5.99
Large Pizza	Qty: 1 Ham, Green Pepper	$7.99

Checkout

ANDY'S PIZA AND SUBS

Check out our latest creations!

Our new Ultimate Pizza brings together all the flavor of classic pepperoni and old-style New York!

ORDER NOW!

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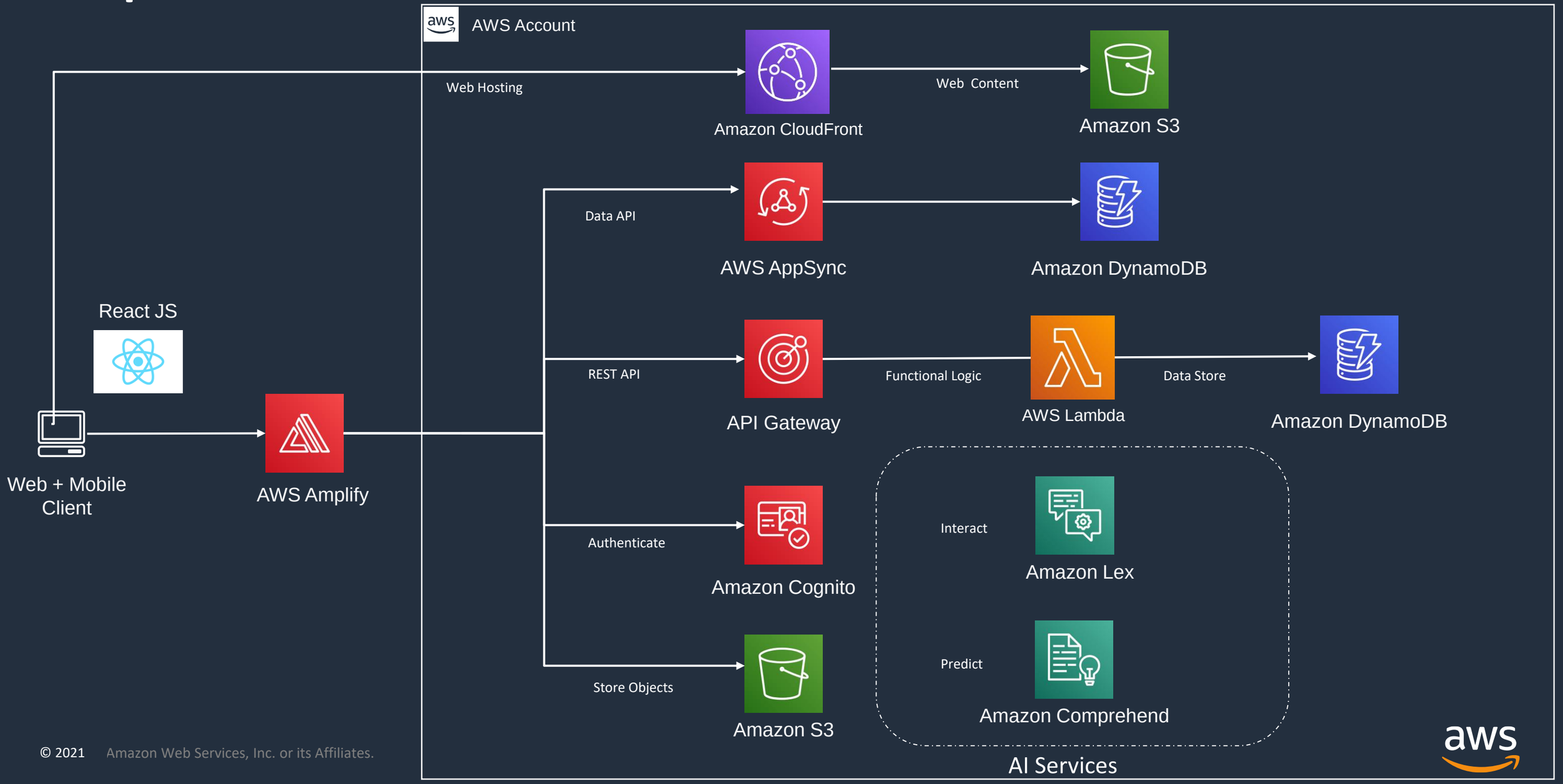
Component Architecture – Core Features



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AWS Amplify

The fastest, easiest way to develop mobile and web apps that scale

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What is AWS?

AWS provides a highly reliable, scalable, low-cost infrastructure platform in the cloud that powers millions of businesses in over 190 countries around the world.

Benefits

- Low Cost
- Elasticity & Agility
- Open & Flexible
- Secure
- Global Reach

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Front-End Web & Mobile on AWS

Developer Requirements

Agility

Innovation &
Differentiation

Production Grade &
Flexible

AWS Front-End Solutions

Easy to Use

Comprehensive

Scalable

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AWS Solutions for Front-end Development

AWS Amplify

AWS AppSync

AWS Device Farm

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AWS Amplify: Benefits across the entire app lifecycle

DEVELOP

Configure AWS backends fast

Seamlessly connect frontends

DELIVER

Deploy your app frontend and backend

MANAGE

Easily manage users & content

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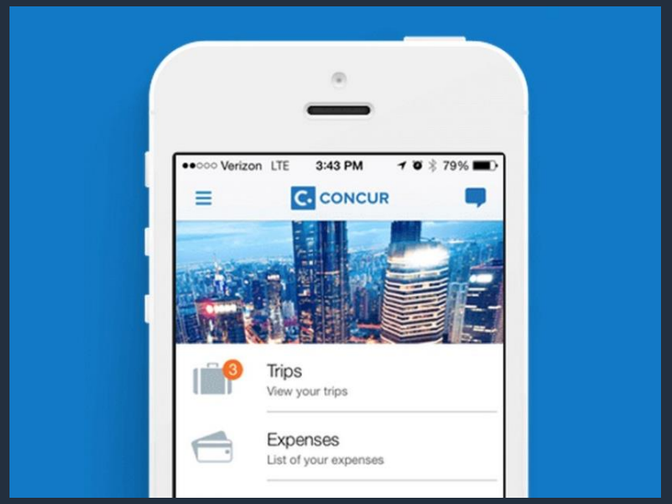
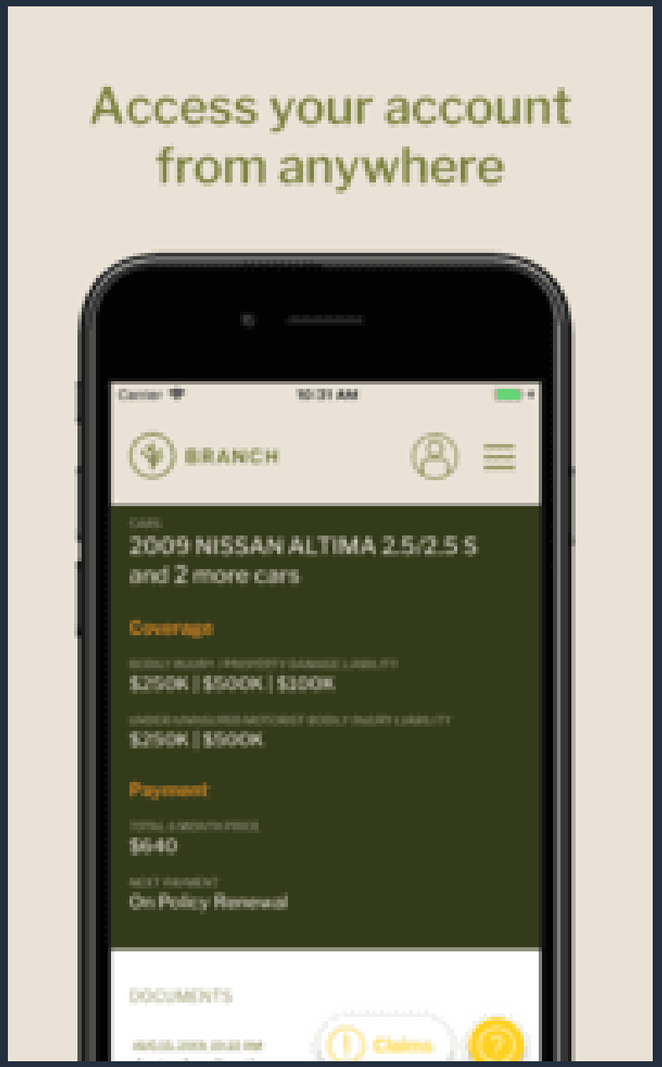
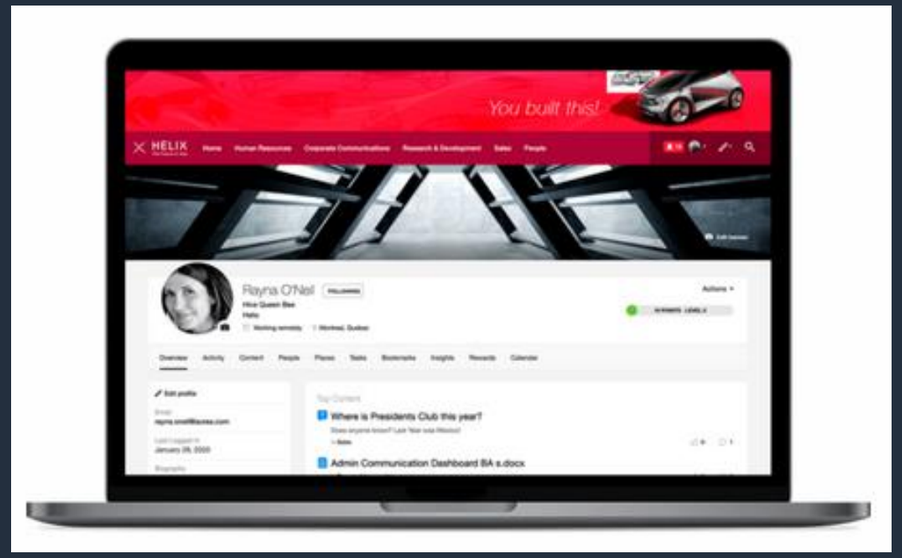
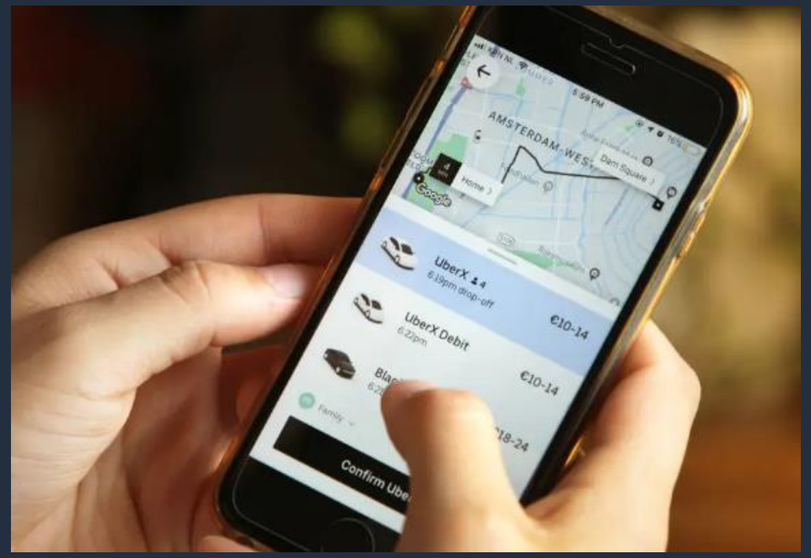
…to accelerate the development of all types of apps









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What is AWS Amplify?

Develop

Deliver

Manage

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AWS Amplify: Tools & Services to get it done

NEW!

DEVELOP

- Authentication
- DataStore
- Storage
- API
- Functions
- Analytics
- PubSub
- Predictions
- Interactions
- Notifications

Configure backends

NEW!

CLI

Admin UI

Connect frontends

Libraries

DELIVER

Static Web Hosting

- Fully managed
- Full stack deployments
- CI/CD built in
- Pull request previews

Tools

CLI

Console

MANAGE

Authentication

- Manage users & groups

DataStore

- Manage data content

Admin UI

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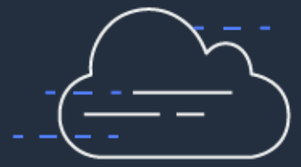
DELIVER with AWS Amplify:
Managed hosting and full-stack deployment with CI/CD

DELIVER



Deploy your app frontend and backend

Services & Features

Static web hosting
- Fully managed hosting service for static web apps
- Easy custom domain setup

Full-stack continuous deployments
- Both Amplify CLI and admin UI generate infrastructure as code (IAC)
- Deploy via the CLI or console

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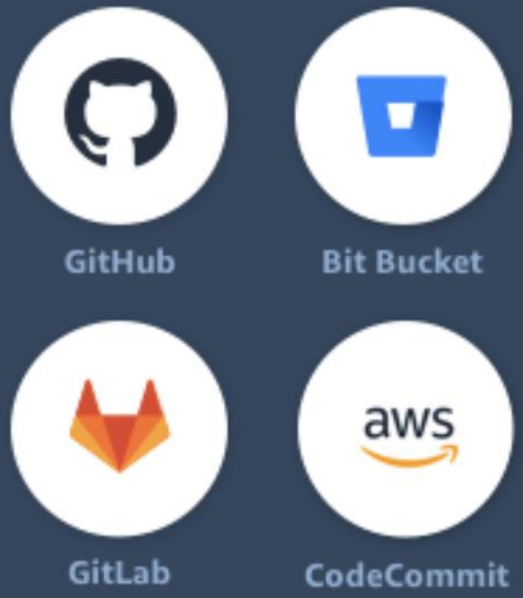
Amplify Web Hosting

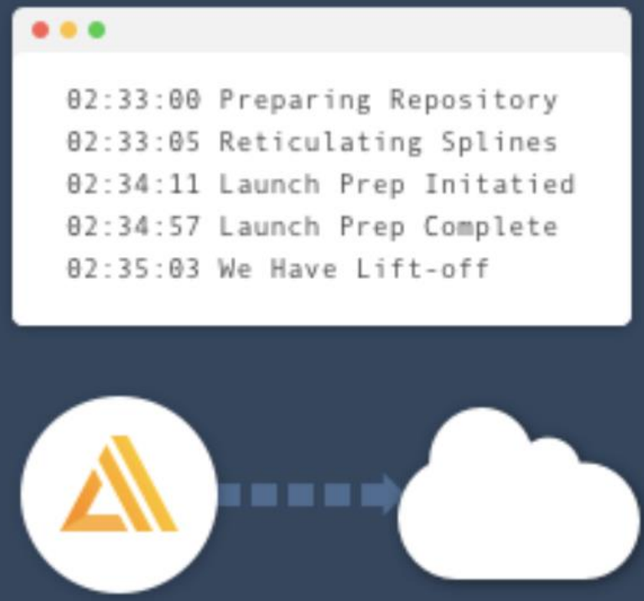
How it works

1. Connect your repository



2. Configure build settings

3. Deploy your app



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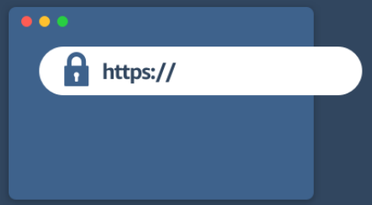
AWS Amplify: Build and Host Web Apps

Globally available



Easy custom domain setup

Simplified continuous workflows

Feature branch deployments

Atomic deployments

Password protection

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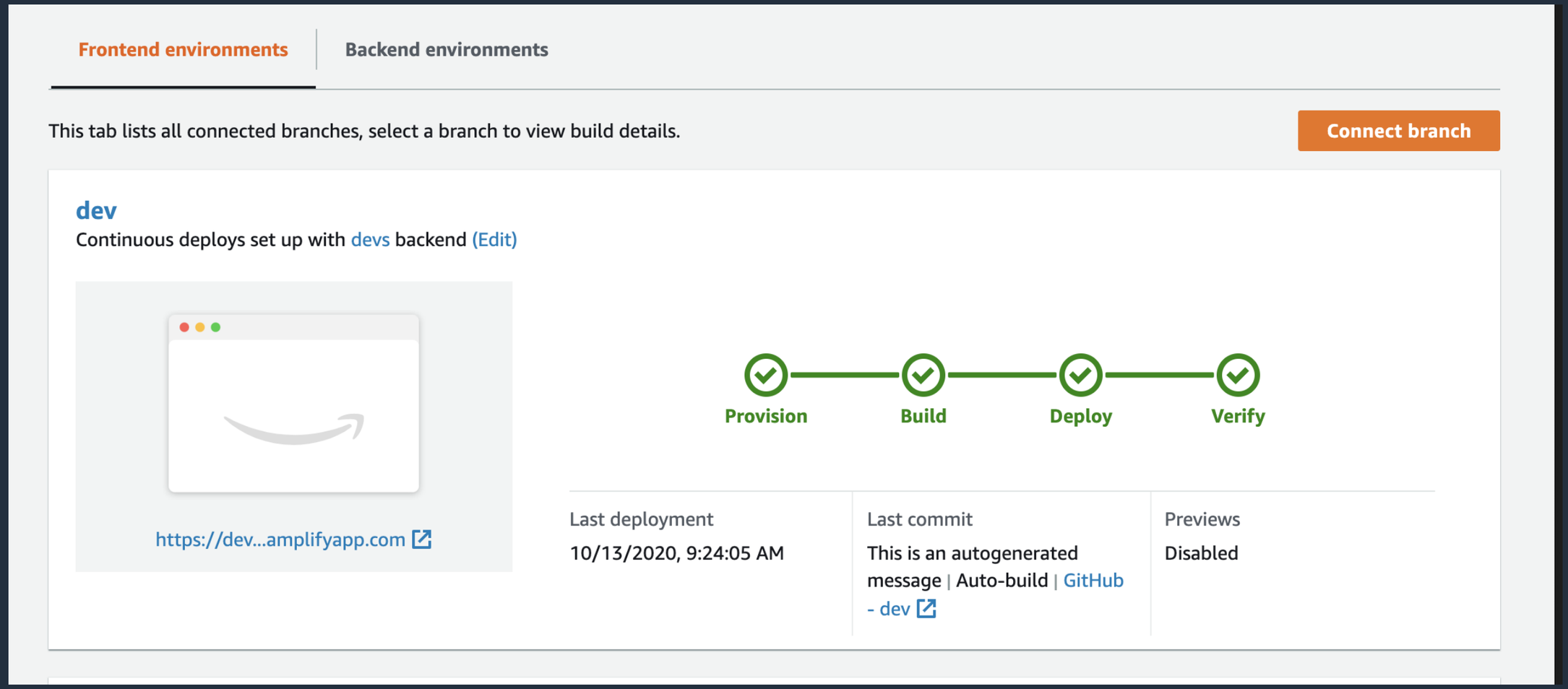
DELIVER with AWS Amplify:
Managed hosting and full-stack deployment with CI/CD



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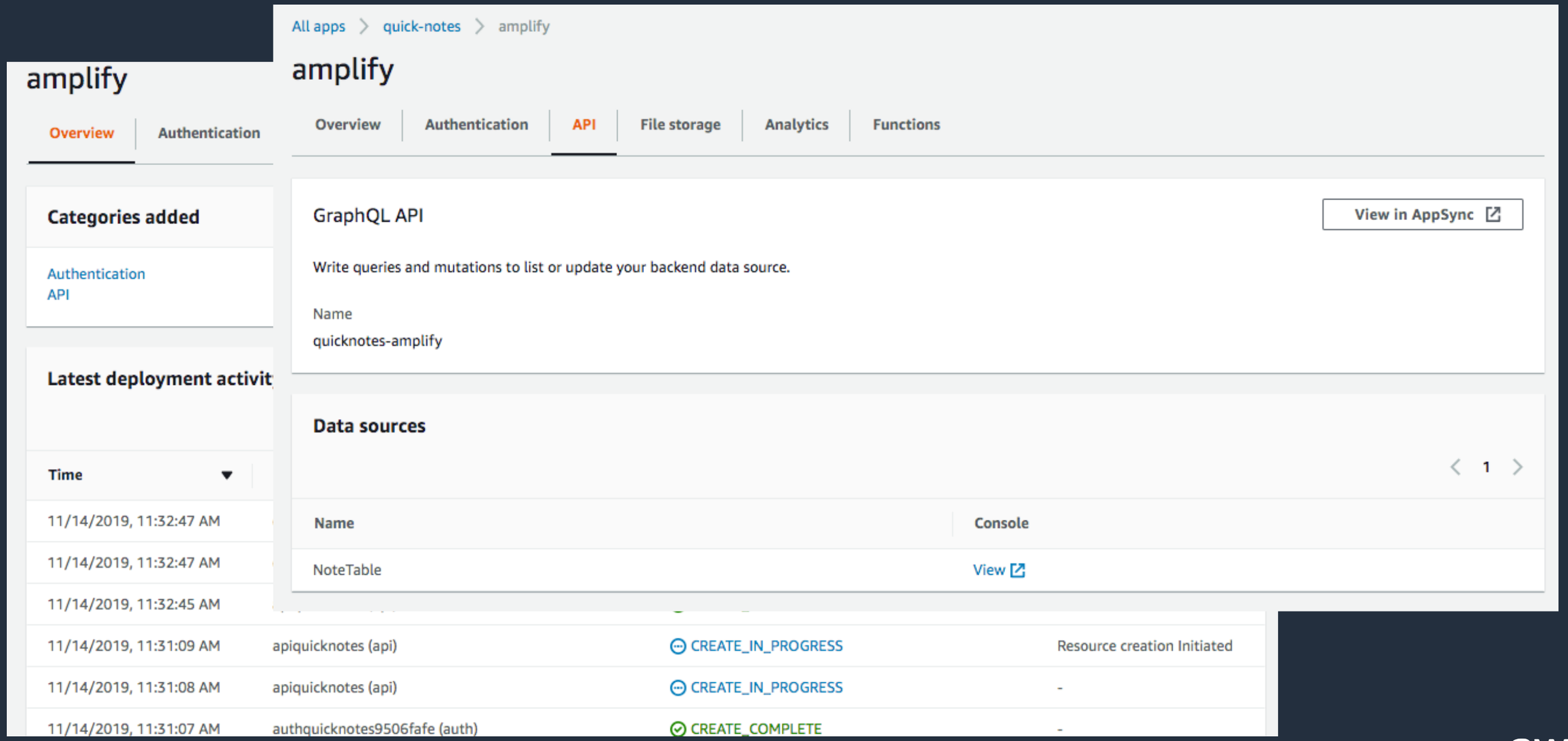
Amplify Web Hosting: Full-stack deployments



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DEVELOP with AWS Amplify:

Full-stack developer experience across multiple feature categories

DEVELOP

Configure AWS backends fast

Seamlessly connect frontends

CLI

Admin UI

NEW!

Libraries & UI Components

Feature Categories

- Authentication
- DataStore
- Storage
- API (GraphQL & REST)
- Functions
- Analytics
- PubSub
- Predictions
- Interactions
- Notifications

Powered by AWS services such as
AWS AppSync (GraphQL API) and Amazon Cognito (Authentication)

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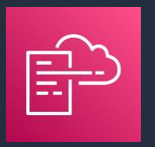
What Does it Do?

CLI

Creates & configures AWS services

> amplify init

Powered by Amazon CloudFormation



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What is AWS CloudFormation?

- Simplified way to create and manage a collection of AWS resources
- Enables orderly and predictable provisioning and updating of resources
- Enables version control of your AWS infrastructure
- Deploy and update stacks using the AWS Management Console, the AWS Command Line Interface (CLI), or the AWS API
- Only pay for the resources you create

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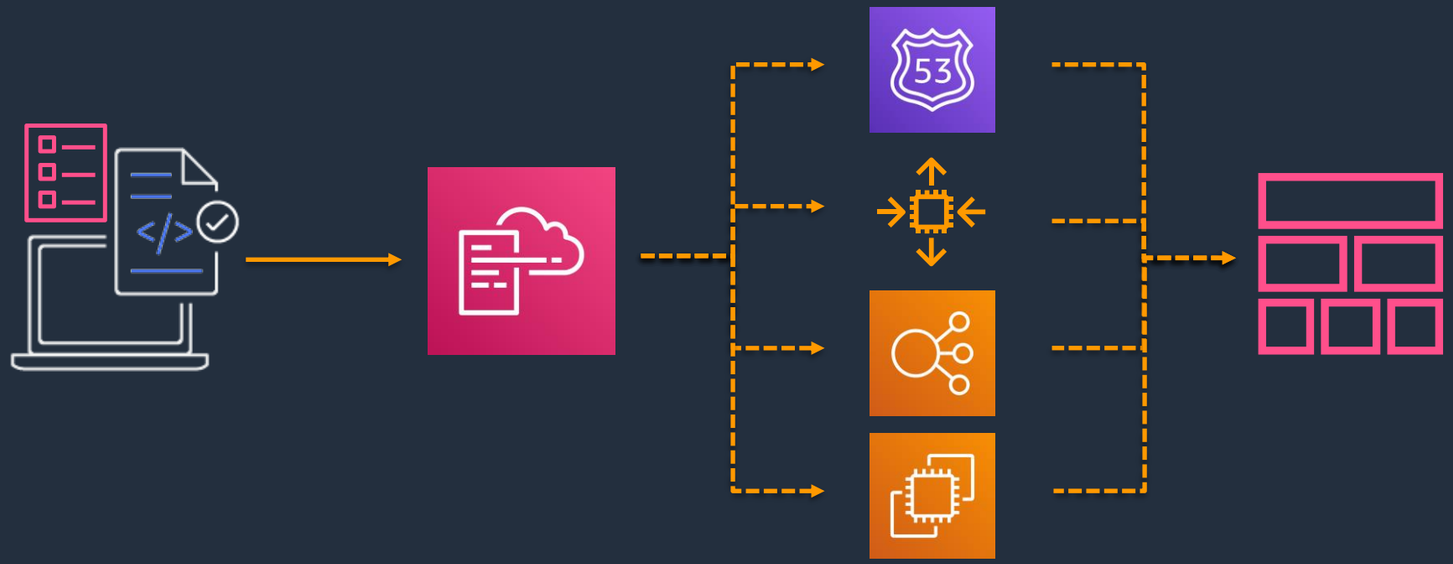
CloudFormation Overview



Code in YAML or JSON directly or use sample templates

Upload local files or from an S3 bucket

Create stack using API via AWS CloudFormation

Stacks and resources are provisioned as a running environment

- JSON/YAML format template
- Presents template to AWS CloudFormation
- AWS CloudFormation translates it to an API request
- Forms a stack of resources

- FREE – you only pay for resources
- All regions
- APIs are called in parallel
- Manages **dependencies/relationships**

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AWS CloudFormation syntax

- JSON – JavaScript object notation
- Attribute-value pairs
- Similar to XML

```
{
  "AWSTemplateFormatVersion": "2010-09-09",
  "Parameters": {
    "S3NameParam": {
      "Type": "String",
      "Default": "mybucket",
      "Description": "Name for your AWS S3 bucket",
      "MinLength": 5,
      "MaxLength": 30
    }
  },
  "Resources": {
    "S3Bucket": {
      "Type": "AWS::S3::Bucket",
      "Properties": {
        "AccessControl": "PublicRead",
        "BucketName": {"Ref" : "S3NameParam"}
      },
      "DeletionPolicy": "Retain"
    }
  },
  "Outputs": {
    "Bucketname": {
      "Description": "Name of AWS S3 Bucket"
    }
  }
}
```

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Amplify CLI: Quickly add Cloud Services

$ amplify init	Initialize a project and environment
$ amplify add auth	Add an Amazon Cognito user pool
$ amplify add analytics	Create an Amazon Pinpoint application
$ amplify add api	Provision an API and data infrastructure
$ amplify push	Deploy via AWS CloudFormation

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```
edlima@AWS ~/TechSummit2018 >> amplify init
? Please enter a name for the project myproj
? Please choose the type of app that you're building javascript
Please tell us about your project
? What javascript framework are you using angular
? Source Directory Path:  src
? Distribution Directory Path: dist
? Build Command:  npm run-script build
```

App Details

.amplifyrc

```
{
    "providers": {
        "amplify-provider-awscloudformation": {
            "AuthRoleName": "myproj-20180805162556-authRole",
            "UnauthRoleArn": "arn:aws:iam::[redacted]:role/myproj-20180805162556-unauthRole",
            "AuthRoleArn": "arn:aws:iam::[redacted]:role/myproj-20180805162556-authRole",
            "Region": "ap-southeast-2",
            "DeploymentBucketName": "myproj-20180805162556-deployment",
            "UnauthRoleName": "myproj-20180805162556-unauthRole",
            "StackName": "arn:aws:cloudformation:ap-southeast-2:[redacted]:stack/myproj-20180805162556/5e64c54
            "StackId": "myproj-20180805162556"
        }
    }
}
```

```
Some next steps:
"amplify status" will show you what you've added already and if it's locally configured or deployed
"amplify <category> add" will allow you to add features like user login or a backend API
"amplify push" will build all your local backend resources and provision it in the cloud
"amplify publish" will build all your local backend and frontend resources (if you have hosting category added) and provision it in the cloud
ck to add notes
Pro tip:
Try "amplify add api" to create a backend API and then "amplify publish" to deploy everything
```

Notes Comments

AWS Amplify

> This CLI & toolchain for the client greatly lowers the barrier to entry for developers & companies looking to build full-stack applications allowing them to not only iterate & experiment quickly, but also giving them the ability to do so at a lower cost.

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What Does it Do?

JavaScript Library

Connects your front-end application to cloud services

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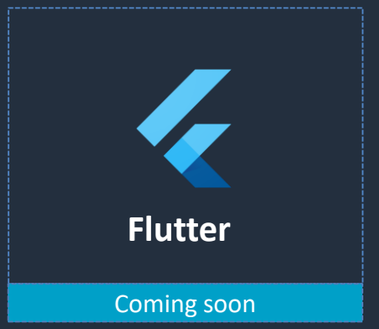
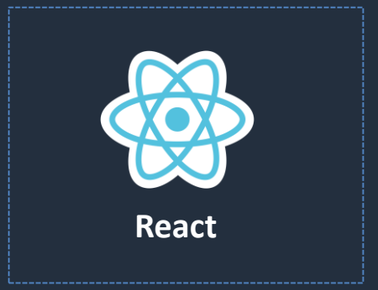
DEVELOP with AWS Amplify:

Connect to your backend with UI components & libraries





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What kind of services?

- ✓ Database
- ✓ API
- ✓ Lambda / Serverless
- ✓ Authentication
- ✓ Analytics
- ✓ Hosting
- ✓ Storage

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Customers – Innovating at Rapid Pace

"At Noom we run many A/B tests per week, so we require a robust and simple-to-use deployment pipeline. Amplify provides many features we want without having to build them from scratch which dramatically improves our development speed."

-Patrick Lee, Senior Engineer Growth Team, Noom

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Auth

> amplify add auth

Powered by Amazon Cognito

Amazon Cognito

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Amplify Auth: Simple, Secure, Scalable

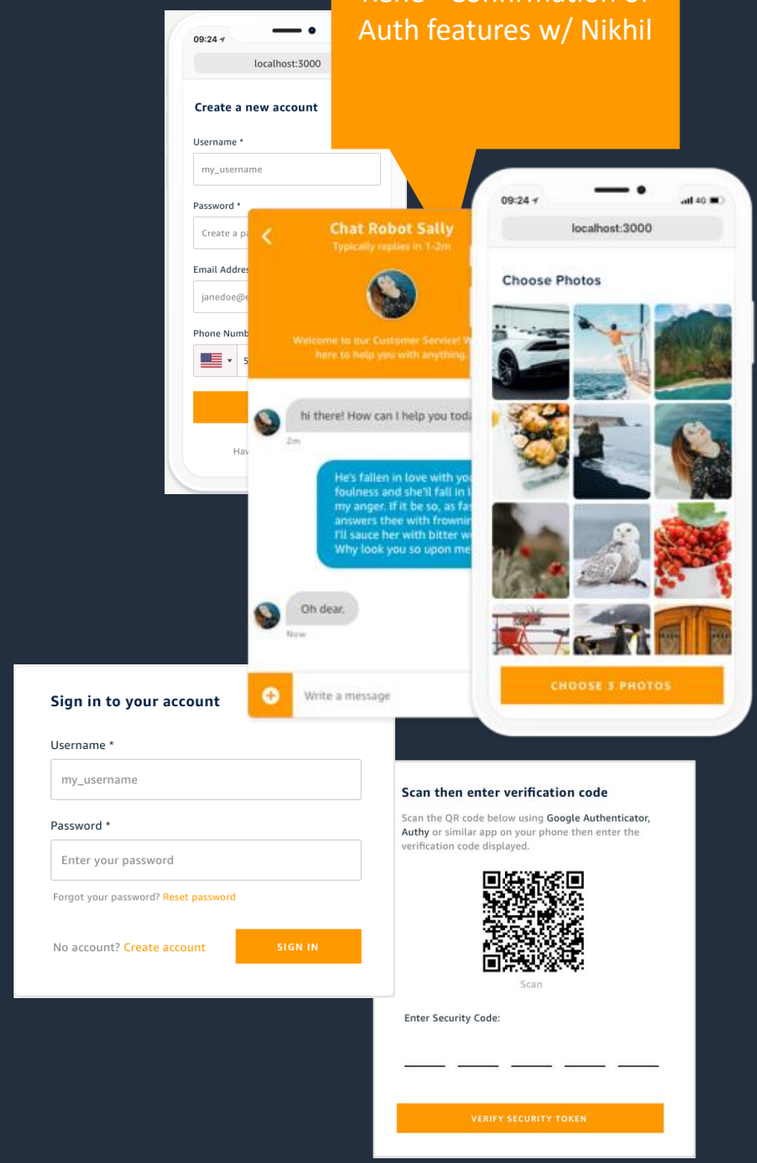
Drop in UI Components

- Built-in UI for sign-up, sign out, and other common auth workflows
- Styled experience out of the box
- Flexible and customizable
- Multi-factor auth

Libraries

- Out of the box social log-in functionality FB, Google or Amazon
- Automatic integration with existing AWS Cognito resources
- Custom auth flow, ie captcha

Rene - Confirmation of Auth features w/ Nikhil



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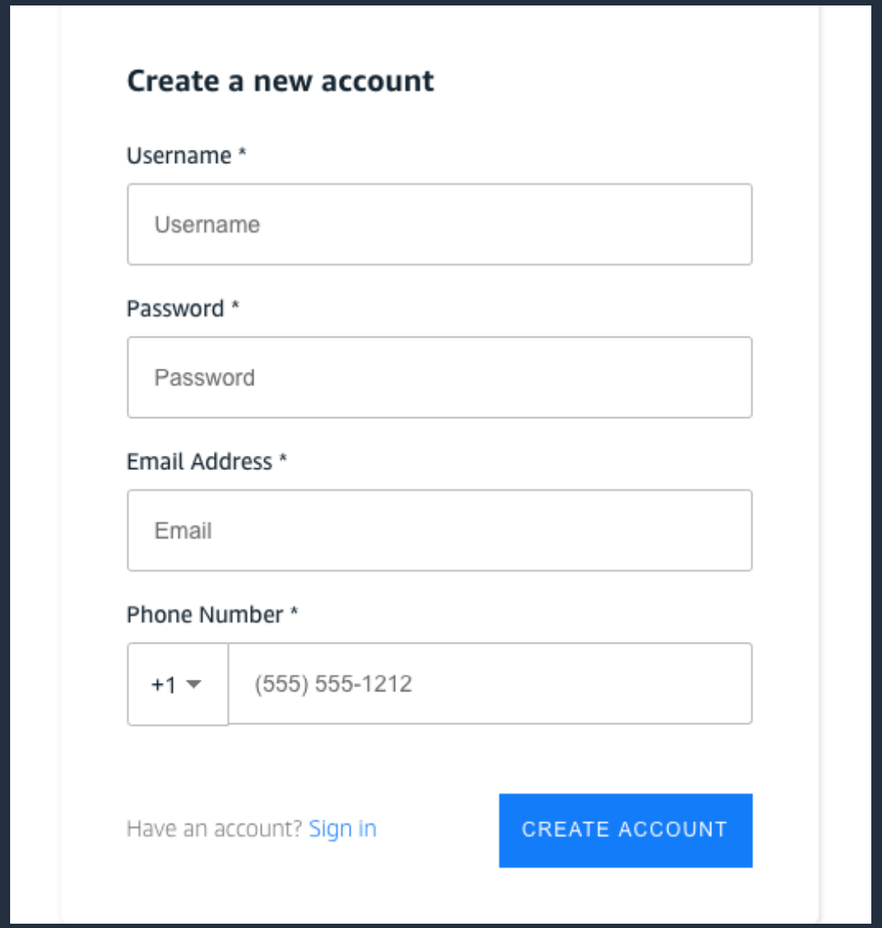
DEVELOP with AWS Amplify:

Example – Add sign-up/sign-in flows using the React UI component

```
const App = () => (
  <AmplifyAuthenticator>
    <div>
      My App
      <AmplifySignOut />
    </div>
  </AmplifyAuthenticator>
);
```



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Amplify Auth: Powered by Amazon Cognito

Secure and scalable user directory

Wide enterprise and social identity federation support

Standards base authentication

Multi factor authentication and full encryption

Access control for all AWS resources

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Amplify Auth: Amazon Cognito Services

User Pools

- Fully-managed, secure, scalable and flexible user management service
- Scales to hundreds of millions of users
- Sign-up, Sign-in, Sign-out = Authentication
- Multi-factor option, password policy, user group, customized auth flow

Identity pools

- Provide temporary credentials to access to AWS resources
- Delegate authentication to external identity providers
- Support guest access for unauthenticated user
- Can manage a person with multiple devices/accounts as "Identity"

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APIs

> amplify add api

Powered by:
Amazon API Gateway
Amazon AppSync

Amazon API Gateway

AWS AppSync

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API Architectures: Integrate with Existing Services

AMPLIFY LIBRARIES

API

Amazon
API Gateway

AWS
AppSync

LOGIC

AWS
Lambda

DATA SOURCES

Amazon Aurora
Serverless

Amazon
DynamoDB

Amazon
RDS

On prem, SaaS,
Existing APIs,
VPCs integrations

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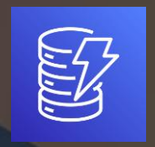
APIs

> amplify add api

Backend Powered by:
AWS Lambda
Amazon DynamoDB

AWS Lambda



Amazon DynamoDB

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Storage

> amplify add storage

Powered by:
Amazon DynamoDB
Amazon S3

Amazon DynamoDB

Amazon Simple Storage Service (Amazon S3)

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NoSQL database

Seamless scalability

Zero admin

Single-digit millisecond latency

Multi-Master

Multi-Region

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Functions

> amplify add function

Powered by:
AWS Lambda

AWS Lambda

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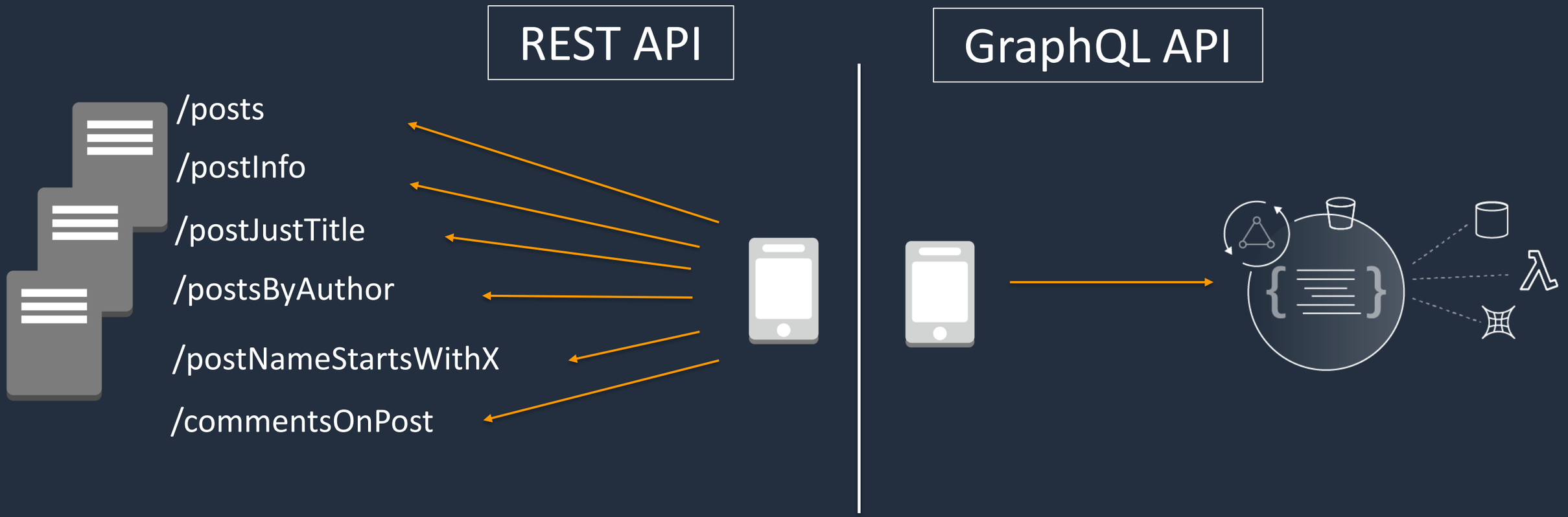
API Architectures: Choose Your API



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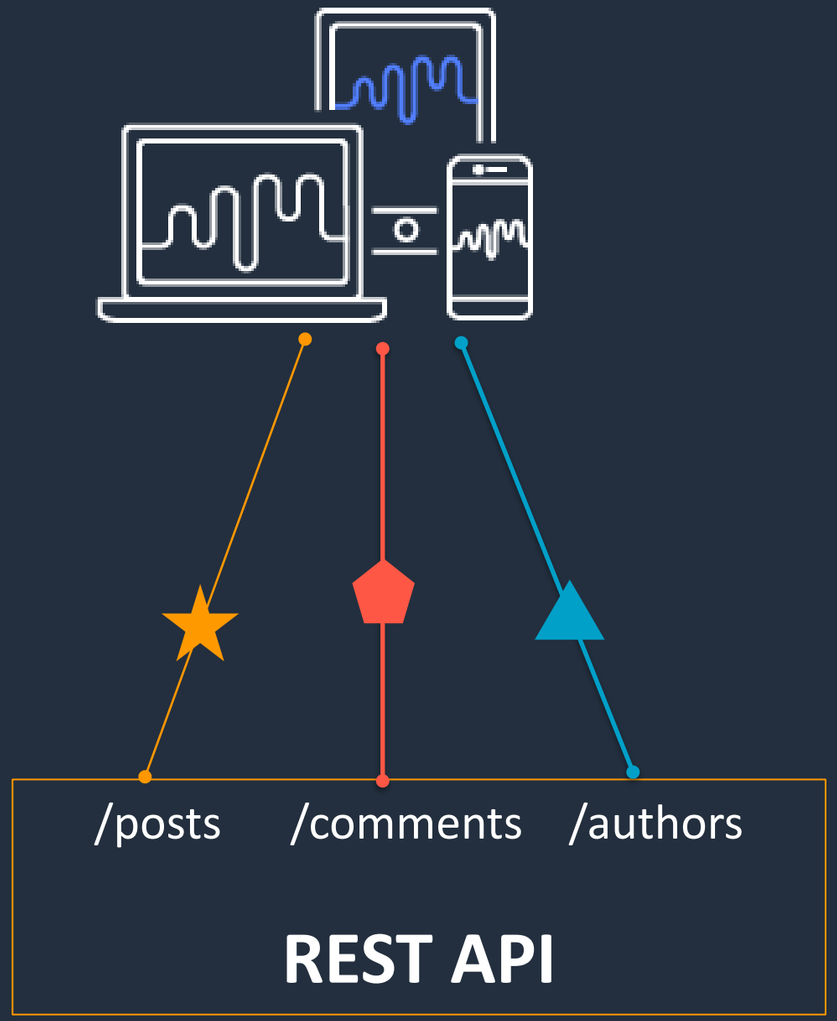
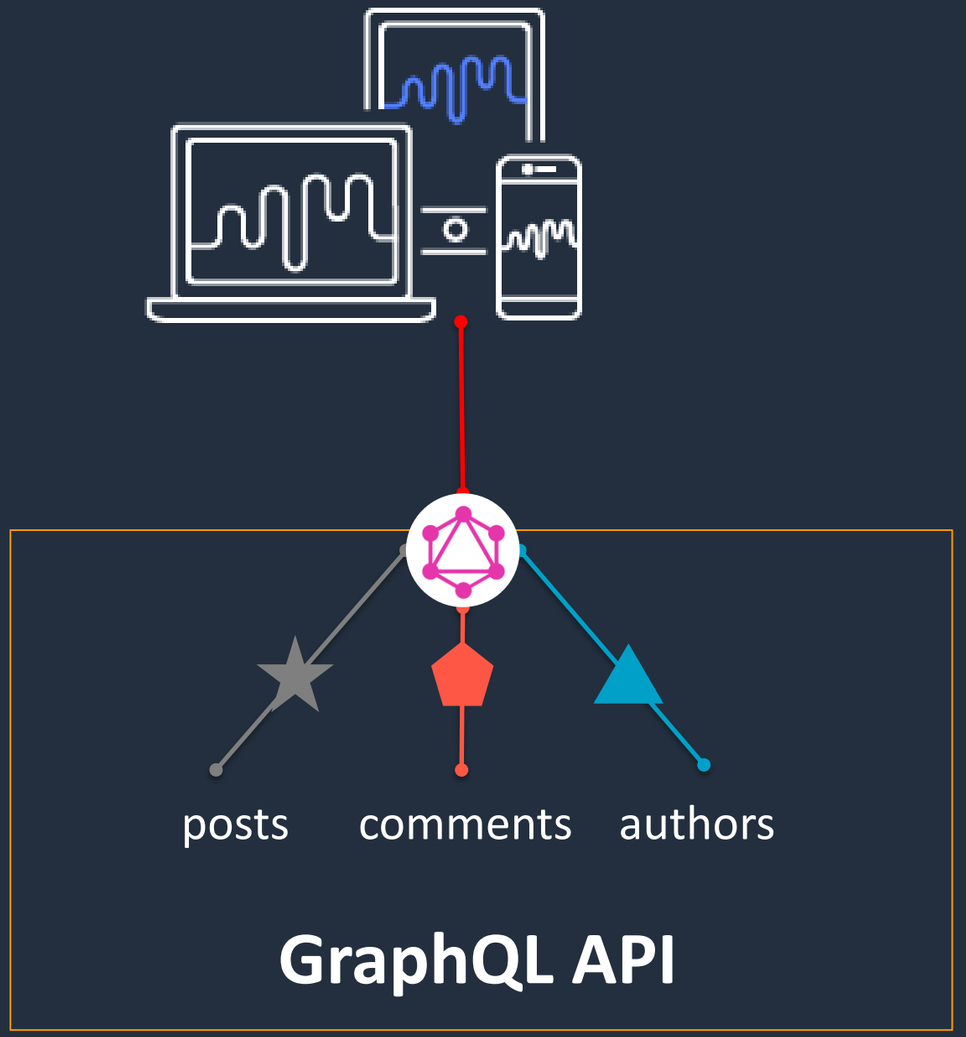
API Architectures: Choose Your API





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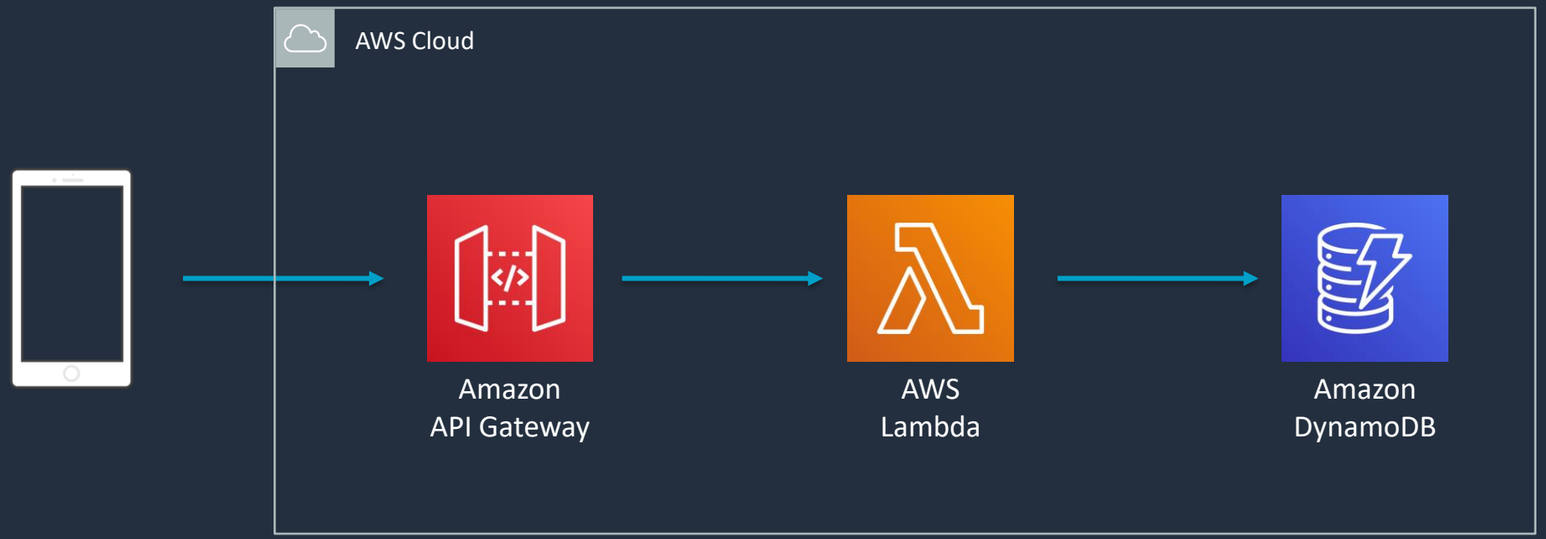
API Gateway is a front door for managing REST APIs



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High-level APIs with best practices built-in

```
import { API } from 'aws-amplify’

Import { listTodos } from './graphql/queries'

const todos = await API.graphql(graphqlOperation(listTodos));
```

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Storage

> amplify add storage

Powered by:
Amazon DynamoDB
Amazon S3

Amazon DynamoDB

Amazon Simple Storage Service (Amazon S3)

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Amazon S3 (Simple Storage Service)

- Web accessible object store (through API or HTTPS)
- Highly durable (99.999999999% design)
- Limitlessly scalable
- Multiple Tiers to match your workload
- Data Lifecycle Rules
- Static Website Hosting
- Security, Compliance, and Audit capabilities
- Standard Storage Pricing (us-east-1) - $0.023 per GB

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APIs

> amplify add api

Powered by:
Amazon API Gateway
Amazon AppSync

Amazon API Gateway

AWS AppSync

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AWS AppSync: Managed GraphQL Service

Managed serverless GraphQL service

Connect to data sources in your account

Add data sync, real-time, and offline capabilities for any data source or API

GraphQL facade for any AWS service

Conflict detection and resolution in the cloud

Enterprise security features: IAM, Amazon Cognito, OIDC, API keys

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AppSync: Common Use Cases

- GraphQL microservices
- Field service apps where offline support is critical
- IoT dashboards
- Unified API for accessing data from data lake
- Retail product catalogs, in-store shopping experience
- Shopping cart checkout
- Real-time currency changes, stock prices, account balance
- Chat and second screen communication within live broadcast
- Display live tv and video metadata
- High throughput real-time fanout to millions of clients

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Customer Insights: Delivering in Days Instead of Weeks

"Developers across industries and countries build location-aware applications with HyperTrack, and count on us to power real-time experiences. Amplify and AppSync are a core part of streaming hundreds of millions of live location events between apps in real-time. Amplify and AppSync accelerated time to market for HyperTrack, and saved us months of engineering effort."

– Thomas Raffetseder, Software Architect, HyperTrack

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Interactions

> amplify add interactions

Chatbots Powered by:
Amazon Lex

Amazon Lex

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Amazon Lex

Build conversational interfaces using voice and text

- Easy to use
- High quality text and speech language understanding
- Seamlessly deploy and scale
- Built-in integration with the AWS platform
- Cost effective

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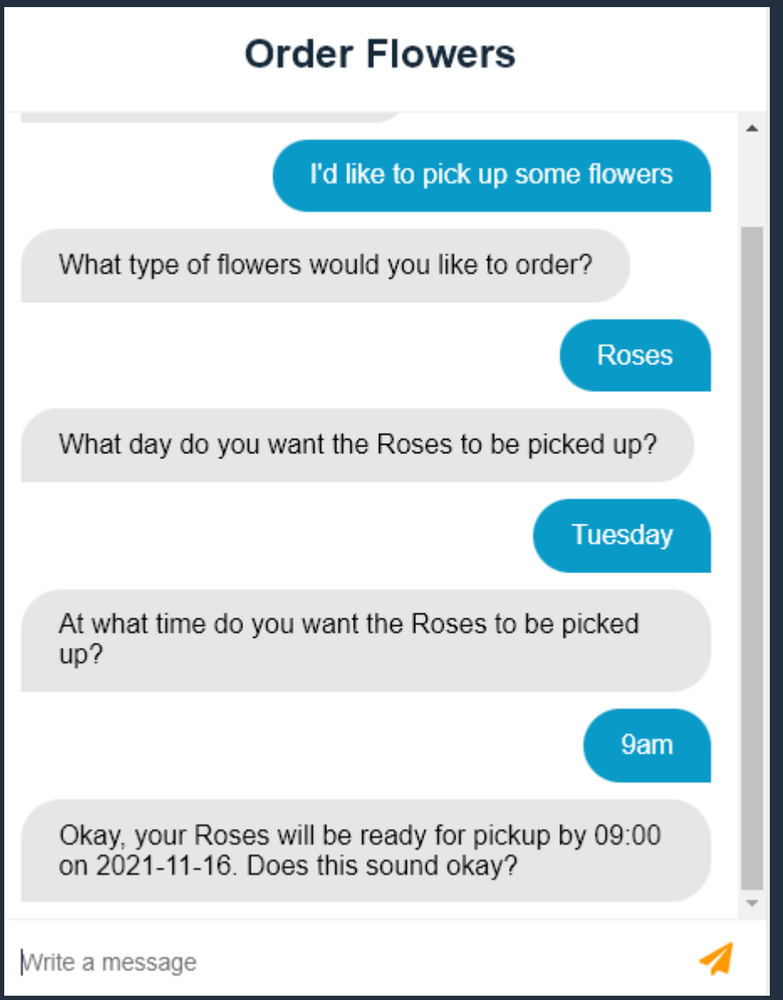
DEVELOP with AWS Amplify:

Example – Add Chatbot with React UI Component

```
<AmplifyChatbot
    botName="OrderFlowers_dev"
    botTitle="Order Flowers"
    welcomeMessage="Hello, how can I help you?"
/>
```



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Predictions

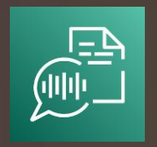
> amplify add predictions

Powered by:
Amazon Comprehend
Amazon Rekognition
Amazon Translate
Amazon Transcribe
Amazon Polly
Amazon Textract

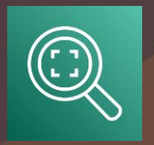
Amazon Comprehend

Amazon Polly

Amazon Textract


Amazon Transcribe

Amazon Translate


Amazon Rekognition

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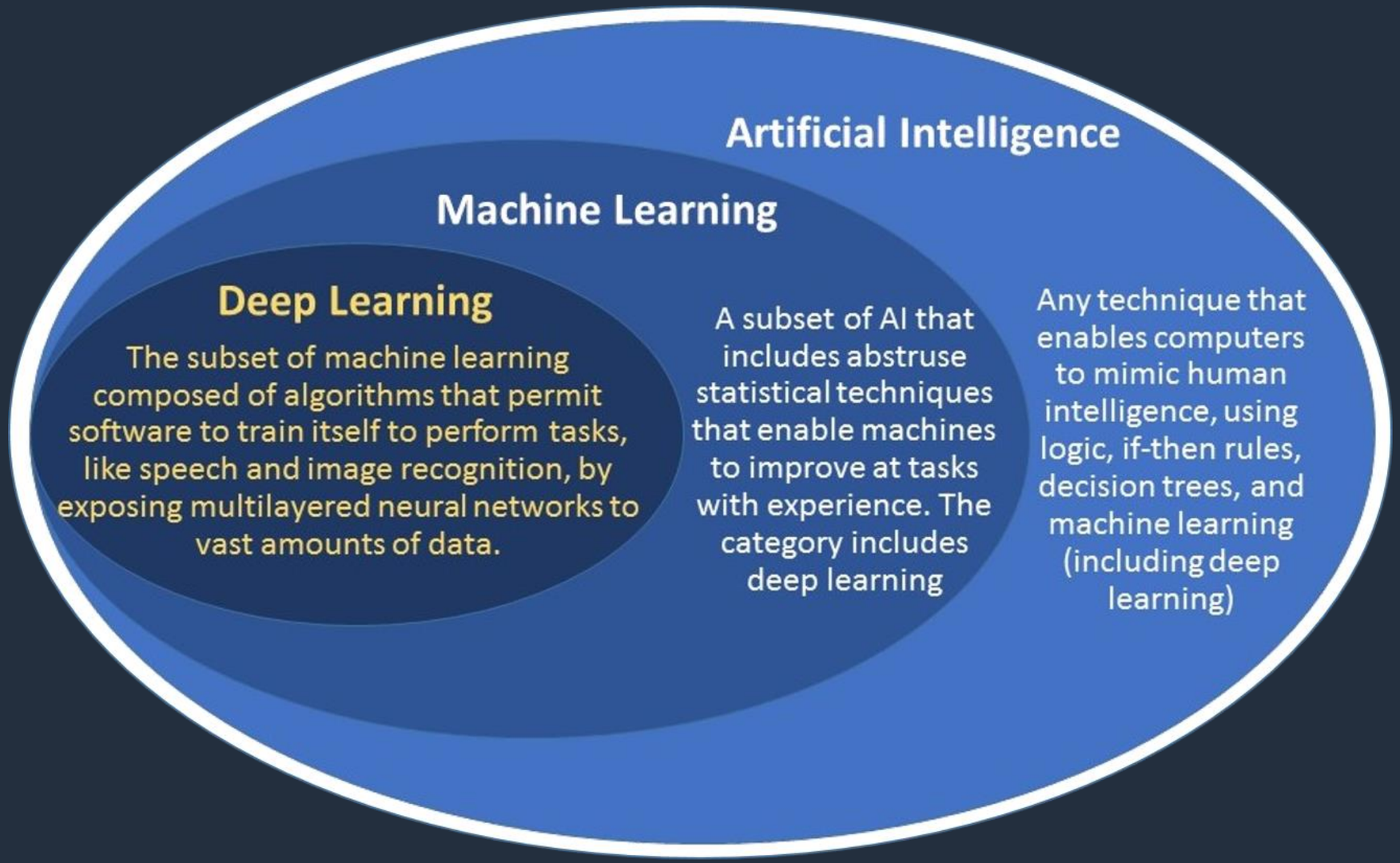
What is AI?


Artificial Intelligence
Any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (including deep learning)
Machine Learning
A subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience. The category includes deep learning
Deep Learning
The subset of machine learning composed of algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing multilayered neural networks to vast amounts of data.

AWS AI Services

Vision

Extract data from images, video and documents.

Amazon Rekognition

Amazon Textract

Speech

Interpret audio and create voice

Amazon Polly

Amazon Transcribe

Language

Understand and interpret language

Amazon Translate

Amazon Comprehend

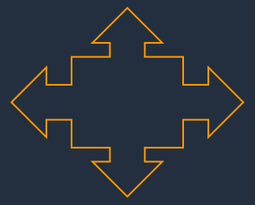
Amazon Lex

Intelligence

Make intelligent predictions

Amazon Personalize

Amazon Forecast



Custom

Run your own models

Amazon SageMaker

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Amazon Comprehend

Overview

Documents

Email, chat, social, phone calls and more

Amazon Comprehend

Automatically extract insights from text

Entities

+ Custom Entities

Sentiment

Key Phrases

Syntax

Language

Topics

Document Classification

+ Custom Classifiers

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Hosting

> amplify add hosting

Hosting Powered by:
Amazon CloudFront
Amazon S3

Amazon Simple Storage Service (Amazon S3)

Amazon CloudFront

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Hosting Options

Amplify Managed Hosting – AWS Amplify Manages the provisioning of the application

Self Hosting – You have full control of your hosted application

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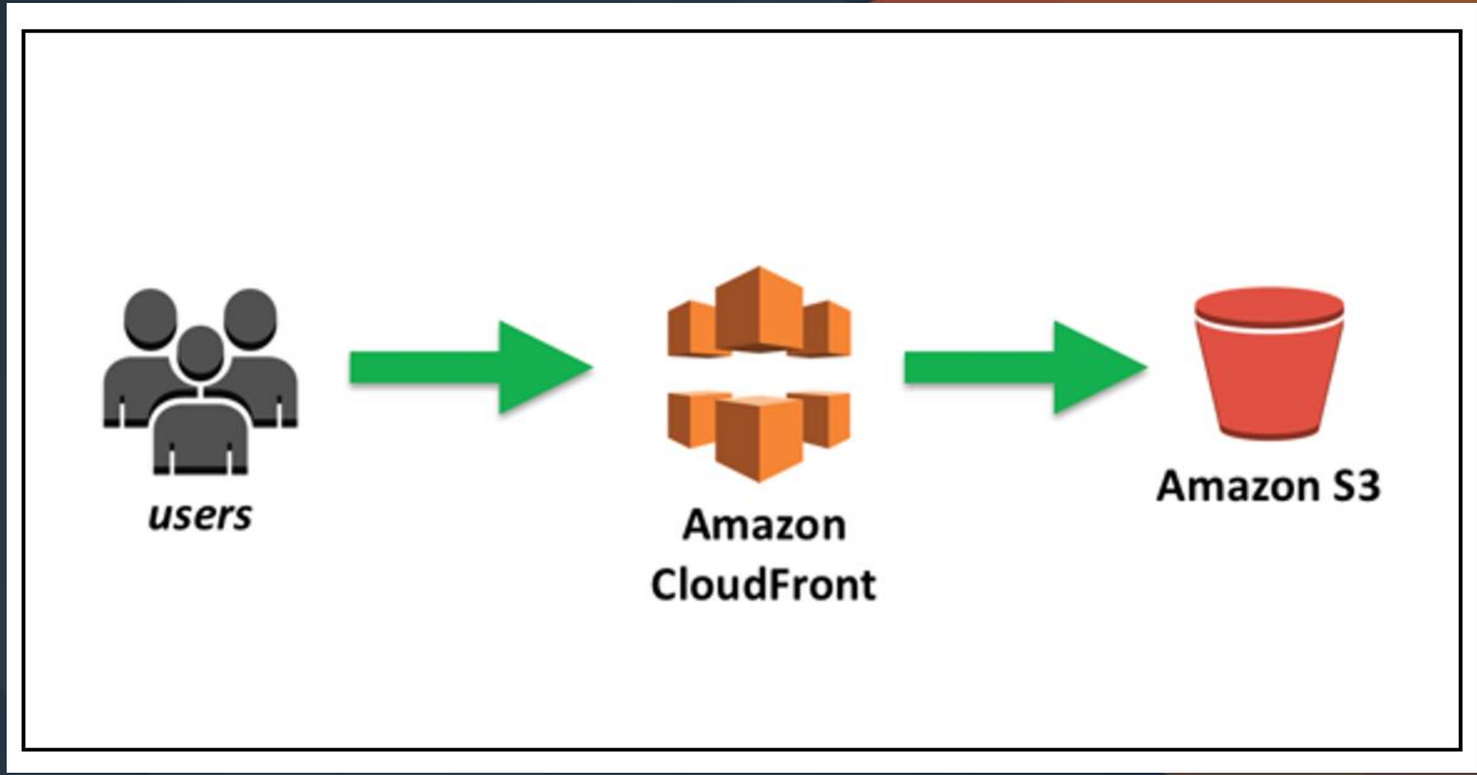
Hosting Architecture



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What is Amazon CloudFront

Global Content Delivery Network with Massive Capacity and Scale

Optimized for Performance and Scale

Built in Security Features

Self-Service Full Control Configurations

Robust Real Time Reporting

Static and Dynamic Object and Video Delivery

Amazon
CloudFront

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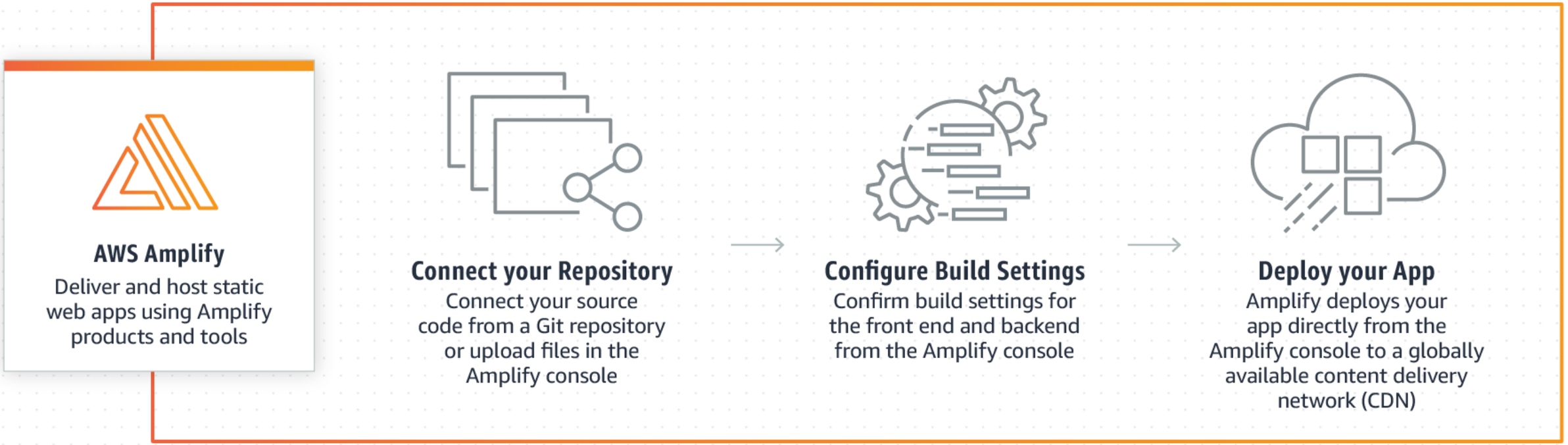
Amplify Hosting



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What Else Can I do?

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Amplify DataStore

Multi-platform (iOS/Android/React Native/Web) on-device persistent storage engine that automatically synchronizes data between mobile/web apps and the cloud using GraphQL

Automatic versioning, conflict detection, and resolution in the cloud

Familiar and local first programming model

Delta sync and auto-merge

Powered by AWS AppSync and GraphQL

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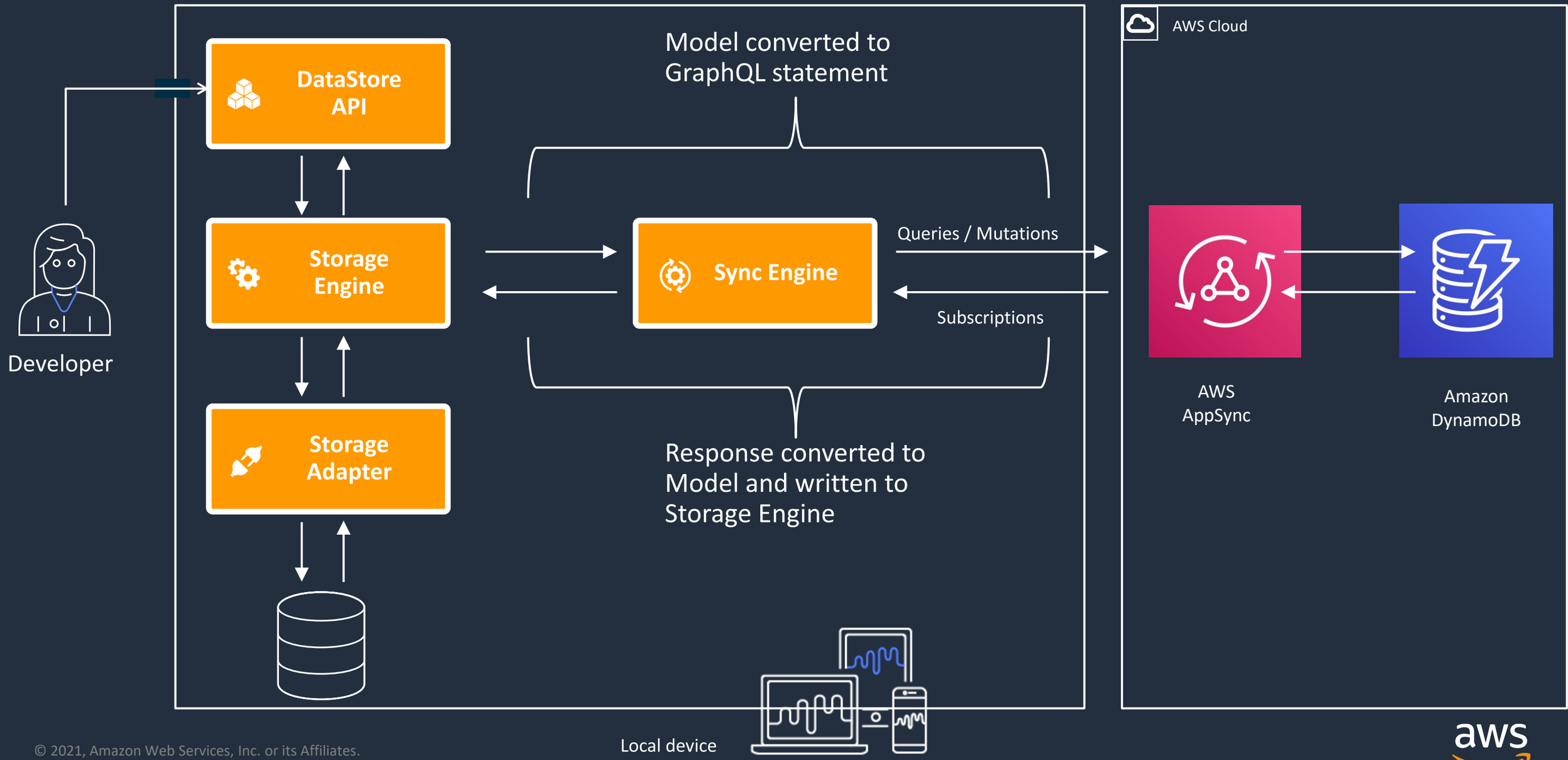
Amplify DataStore



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Example: Synchronize app data with DataStore

```
await DataStore.save(new Appointment(
  {
    description: formState.description,
    serviceRegion: formState.serviceRegion,
    scheduledTime: formState.startDate
  }
));
```

```
await DataStore.query(
  WorkOrder,

item => item.appointmentID("eq", appointment.id));
```

Save and retrieve

```
const subscription = DataStore.observe(Appointment).subsc
ribe(msg => {
  console.log(msg.model, msg.opType, msg.element);
  if (msg.opType === "INSERT") {
    …
  } else if (msg.opType === "DELETE") {
    …
 }
});
```

Subscribe to changes

New! Use **Selective Sync** to apply predicates to the base and delta sync queries, as well as to incoming subscriptions

```
DataStore.configure({
  syncExpressions: [
    syncExpression(Appointment, () => {
      return (c) => c.serviceRegion('contains', ', WA');
    }),
    syncExpression(WorkOrder, () => {
      return (c) => c.serviceRegion('contains', ', WA');
    }),
  ]
});
```

New! Only sync a subset of data

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Analytics

> amplify add analytics

Amazon Pinpoint

Powered by:
Amazon Pinpoint
Amazon Kinesis

Amazon Kinesis

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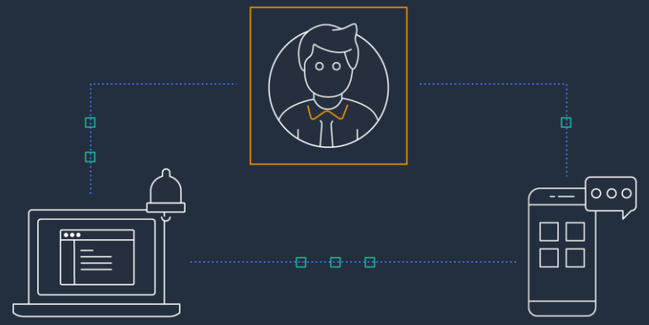
Amazon Pinpoint

Multichannel marketing communication service



Flexible use cases

Campaigns and journeys

Segmentation

Channel choice

Personalization

Rich analytics

Global scale

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Real-time: Amazon Kinesis

Easily collect, process, and analyze data and video streams in real time

Kinesis Data Streams

Collect streaming data, at scale, for real-time analytics

Kinesis Data Firehose

Prepare and load data streams into data stores and analytics services

Kinesis Data Analytics

Get actionable insights from streaming data in real time

Kinesis Video Streams

Capture, process, and store media streams for playback, analytics and machine learning

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Geo

> amplify add geo

Amazon Location Service

Powered by:
Amazon Location Service

Map

Location Search

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Amazon Location Service

- Shorter time to production
- Easy access to high-quality data
- Privacy and security
- Cost-effective

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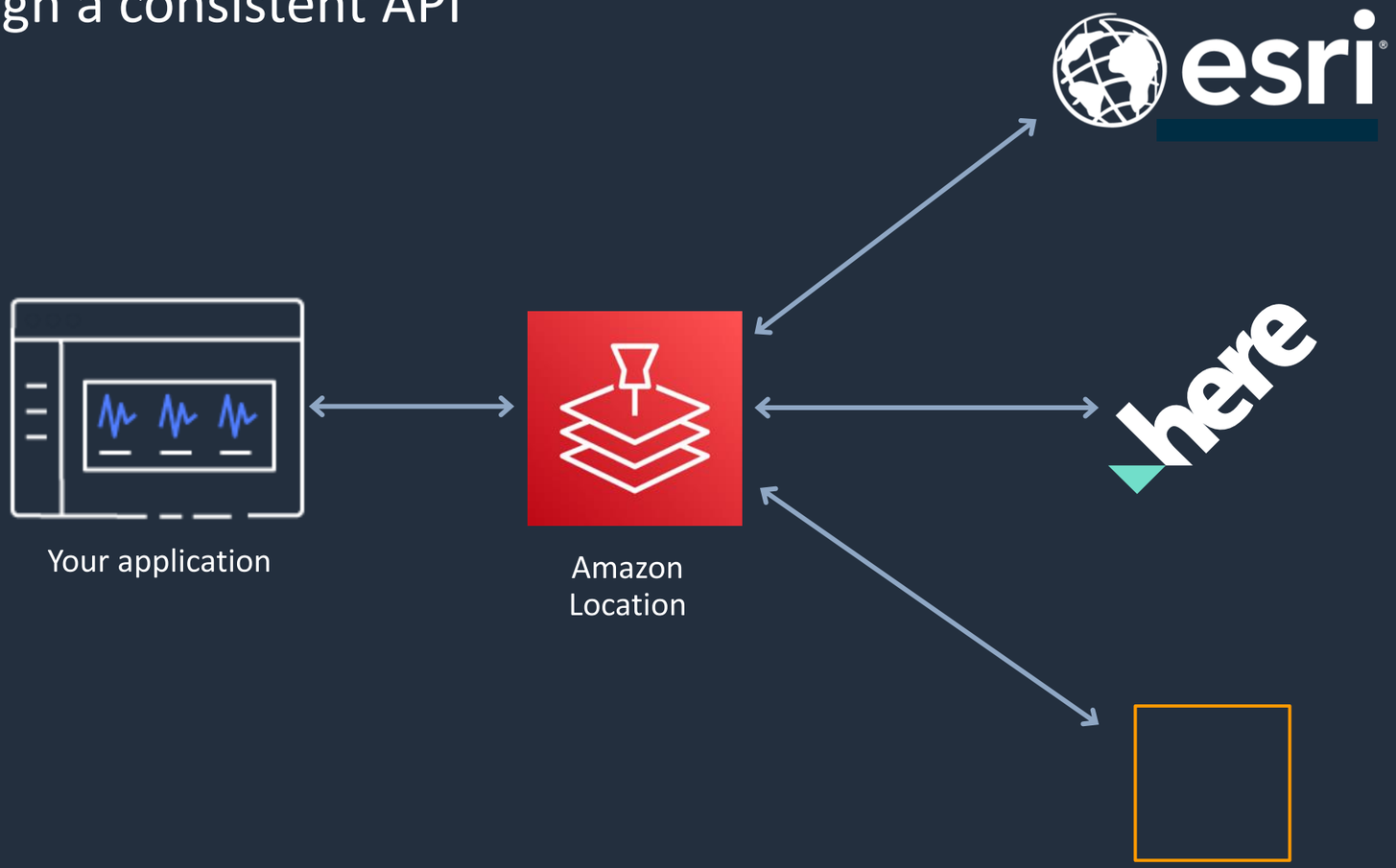
Easy Access to High-quality Data

Access data from Esri and HERE through a consistent API

- No need for new credentials, and no vendor onboarding
- Simplified global coverage
- A single consistent API
- One price regardless of data provider



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Explore All Features

Authentication
Enable sign-in, sign-up and sign-out within minutes with pre-built UI components and powerful authentication APIs

Storage
A simple mechanism for managing user content in public, protected or private storage

GraphQL API
Easy and secure solution to access your backend data with support for real-time updates using GraphQL

DataStore
Seamlessly synchronize and persist online & offline data to the cloud as well as across devices

Geo
Add modern, interactive maps with location markers and location search to your JavaScript-based web projects.

REST API
A straightforward and secure solution for making HTTP requests using REST APIs

Analytics
Make informed decisions with drop-in analytics to track user sessions, custom user attributes and in-app metrics

Push Notifications
Drive customer engagement using push notifications with campaign analytics and targeting

XR
Engage your customers in a different dimension with augmented reality (AR) and virtual reality (VR) content within your app

PubSub
Provide best-in-class real-time experiences by connecting your application with a message-oriented middleware in the cloud

Interactions
Automate customer workflows by enlisting the help of conversational chatbots powered by deep learning technologies

AI / ML Predictions
Design delightful experiences with the power of AI and ML functionality such as computer vision, translation, transcription and more

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RESOURCES

Amplify Documentation: https://docs.amplify.aws/

Amplify Blog: https://aws.amazon.com/amplify/blog/

Amplify on Github: https://github.com/aws-amplify

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