ADDING BACKEND DATA SERVICES

Adding APIs and data

Using Amplify, we are going to deploy an AWS AppSync API.

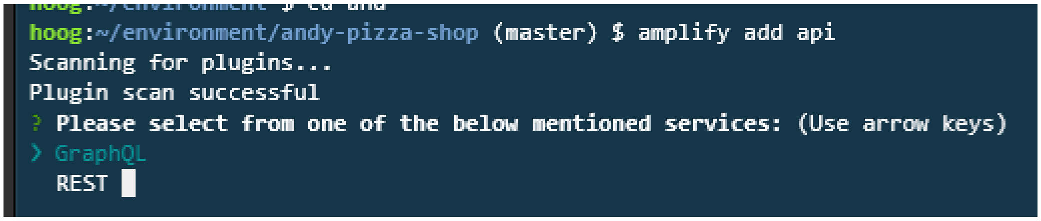
Note

There are many features and benefits of AppSync and GraphQL. These are not covered in this workshop, but you can learn more at https://aws.amazon.com/appsync/ and https://docs.aws.amazon.com/appsync/latest/devguide/designing-a-graphql-api.html

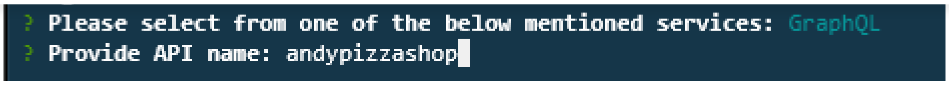
Run the following command to add an API:

```
amplify add api
```

Choose **GraphQL**, and enter the API name as `andypizzashop` :

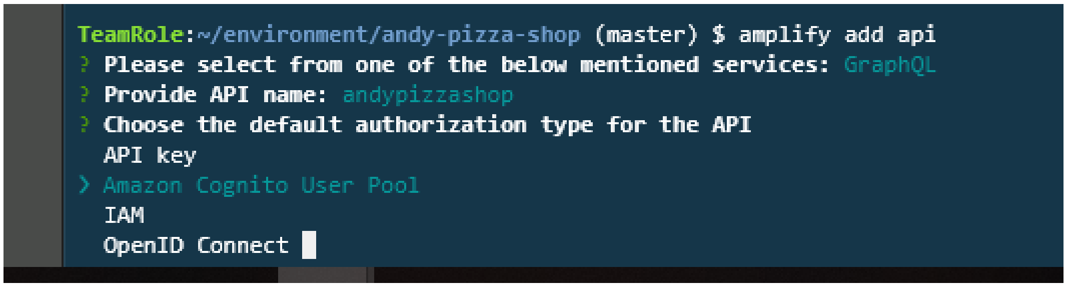


```
hoog:~/environment $ cd and
hoog:~/environment/andy-pizza-shop (master) $ amplify add api
Scanning for plugins...
Plugin scan successful
? Please select from one of the below mentioned services: (Use arrow keys)
❯ GraphQL
  REST
```



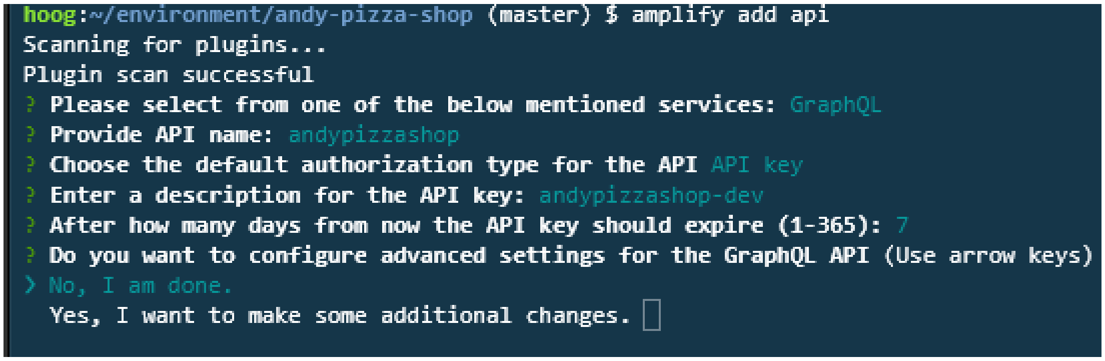
```
? Please select from one of the below mentioned services: GraphQL
? Provide API name: andypizzashop
```

Choose **Amazon Cognito User Pool**. This will enforce security in our application by requiring the user to have authenticated before adding items in our API.



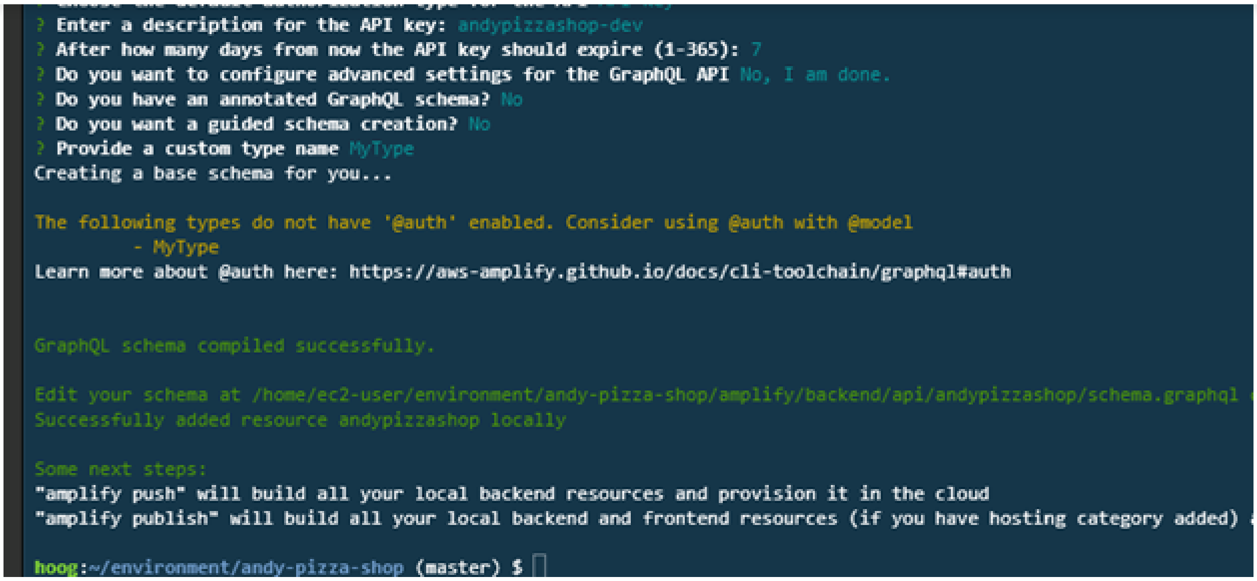
```
TeamRole:~/environment/andy-pizza-shop (master) $ amplify add api
? Please select from one of the below mentioned services: GraphQL
? Provide API name: andypizzashop
? Choose the default authorization type for the API
  API key
❯ Amazon Cognito User Pool
  IAM
  OpenID Connect
```

Enter **No I am done** when prompted for additional changes



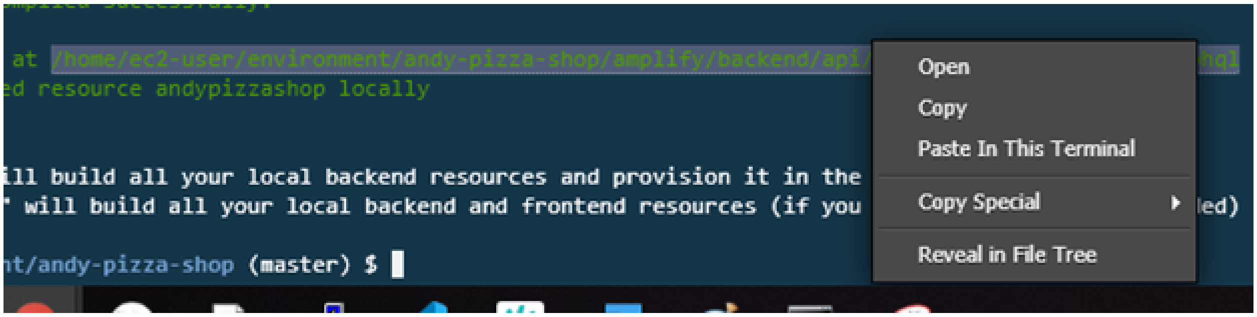
```
hoog:~/environment/andy-pizza-shop (master) $ amplify add api
Scanning for plugins...
Plugin scan successful
? Please select from one of the below mentioned services: GraphQL
? Provide API name: andypizzashop
? Choose the default authorization type for the API API key
? Enter a description for the API key: andypizzashop-dev
? After how many days from now the API key should expire (1-365): 7
? Do you want to configure advanced settings for the GraphQL API (Use arrow keys)
❯ No, I am done.
  Yes, I want to make some additional changes.
```

Choose **N** for annotated GraphQL Schema and **N** for guided schema creation. Leave the custom type name as **MyType** and press enter. This will create a base schema, but we will replace that with our own.



```
? Enter a description for the API key: andypizzashop-dev
? After how many days from now the API key should expire (1-365): 7
? Do you want to configure advanced settings for the GraphQL API No, I am done.
? Do you have an annotated GraphQL schema? No
? Do you want a guided schema creation? No
? Provide a custom type name MyType
Creating a base schema for you...

The following types do not have '@auth' enabled. Consider using @auth with @model
         - MyType
Learn more about @auth here: https://aws-amplify.github.io/docs/cli-toolchain/graphql#auth


GraphQL schema compiled successfully.

Edit your schema at /home/ec2-user/environment/andy-pizza-shop/amplify/backend/api/andypizzashop/schema.graphql
Successfully added resource andypizzashop locally

Some next steps:
"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)

hoog:~/environment/andy-pizza-shop (master) $
```

Notice the location of the schema file that Amplify created. This is the schema definition that amplify will use to create the AppSync schema. To edit this, you can click the file location and it will open a context menu where you can select **Open**



```
 at /home/ec2-user/environment/andy-pizza-shop/amplify/backend/api/
ed resource andypizzashop locally


ill build all your local backend resources and provision it in the
" will build all your local backend and frontend resources (if you

nt/andy-pizza-shop (master) $
```

Replace the schema in **schema.graphql** with the following code and **save schema.graphql**:

```
type Order @model @auth(rules: [{ allow: owner }]) {
  id: ID!
  name: String!
  user: String!
  phone: AWSPhone
  email: AWSEmail
  orderDate: AWSDateTime
  orderTotal: Float!
  deliveryType: String!
  deliveryDate: AWSDateTime
}
type Item @model @auth(rules: [{ allow: owner }]){
  id: ID!
  itemName: String!
  comments: String
  quantity: Int!
  size: String!
  unitPrice: Float!
  totalPrice: Float!
  order: Order @connection(name: "OrderItems")
  toppings: [Topping] @connection(name: "ItemToppings")
}
type Topping @model @auth(rules: [{ allow: owner }]){
  id: ID!
  toppingName: String!
  toppingWeight: String
  toppingSpread: String
  item: Item @connection(name: "ItemToppings")
}
type Product @model {
  id: ID!
  productId: String!
  productName: String!
  category: String!
  description: String
  defaultPrice: Float
  sizes: [Variation] @connection(name: "ProductSizes")
}
type Variation @model {
  id: ID!
  size: String!
  price: Float
  product: Product @connection(name: "ProductSizes")
}
```

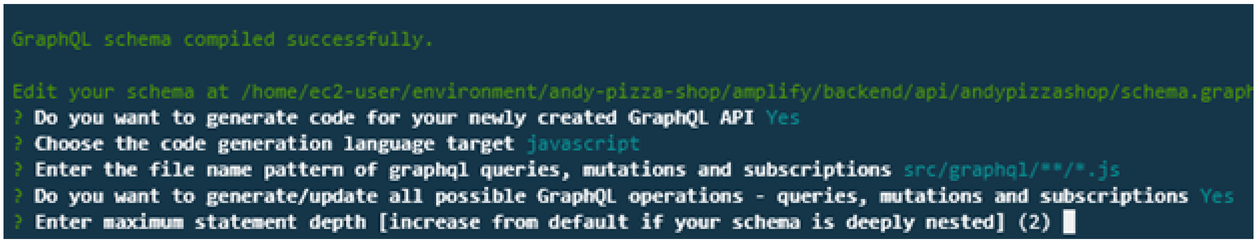
Tip

Notice the **@ signs** in this schema? The Amplify framework supports these GraphQL annotations - which are directives that tell amplify to configure our AppSync API in a certain way:
@model - creates the data model using DynamoDB
@connection - creates relationship between types
@auth - creates fields identifying access control and the appropriate query controls

Make sure you **save the schema.graphql** file and then run the following to push our changes into AWS.

```
amplify push
```

Leave the default responses for the next set of questions.



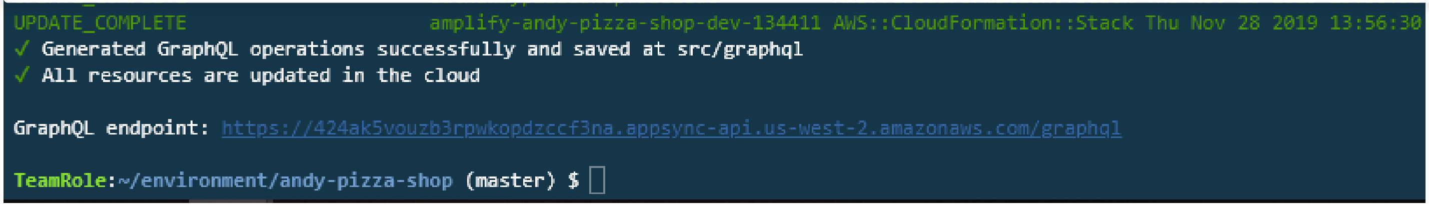
```
GraphQL schema compiled successfully.

Edit your schema at /home/ec2-user/environment/andy-pizza-shop/amplify/backend/api/andypizzashop/schema.graph
? Do you want to generate code for your newly created GraphQL API Yes
? Choose the code generation language target javascript
? Enter the file name pattern of graphql queries, mutations and subscriptions src/graphql/**/*.js
? Do you want to generate/update all possible GraphQL operations - queries, mutations and subscriptions Yes
? Enter maximum statement depth [increase from default if your schema is deeply nested] (2)
```

Once you get through all the questions, deployment will start. This will take a few minutes.

Note

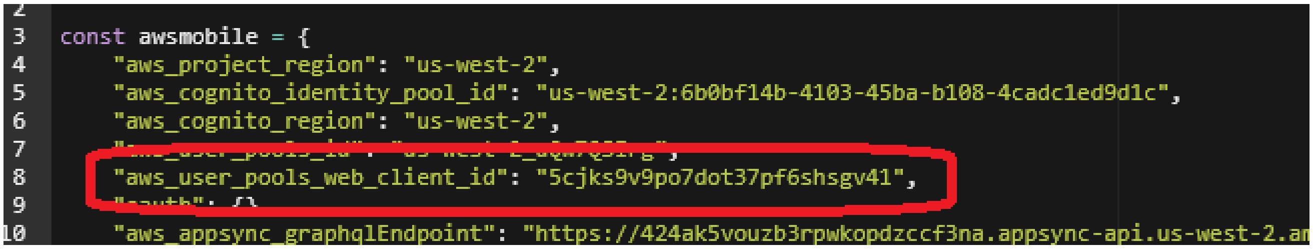
If you are bored, you can take some time to think about what is being provisioned here. Although Amplify makes it seem simple, it is not trivial: Amplify is deploying the schema, the backend Dynamo DB tables, the AppSync resolvers (using Velocity Templates), and the AppSync authentication integration with Cognito. We are not going to get into what all of this is in this workshop, but it is very powerful.

Once complete, you will receive the GraphQL endpoint information in the terminal window. This endpoint is now accessible by an authenticated user.



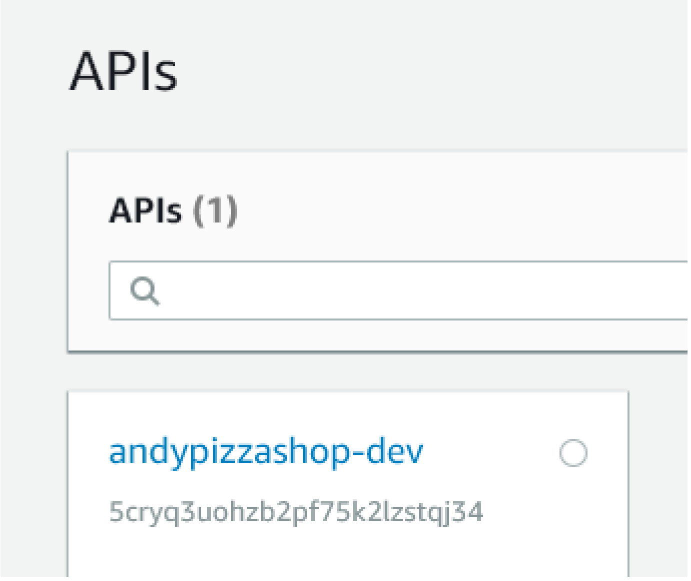
```
UPDATE_COMPLETE                    amplify-andy-pizza-shop-dev-134411 AWS::CloudFormation::Stack Thu Nov 28 2019 13:56:30
✓ Generated GraphQL operations successfully and saved at src/graphql
✓ All resources are updated in the cloud

GraphQL endpoint: https://424ak5vouzb3rpwkopdzccf3na.appsync-api.us-west-2.amazonaws.com/graphql

TeamRole:~/environment/andy-pizza-shop (master) $ 
```

Next, open the file **src/aws-exports.js** and find the **aws_user_pools_web_client_id** value. Copy the value as you will need it for the next step:



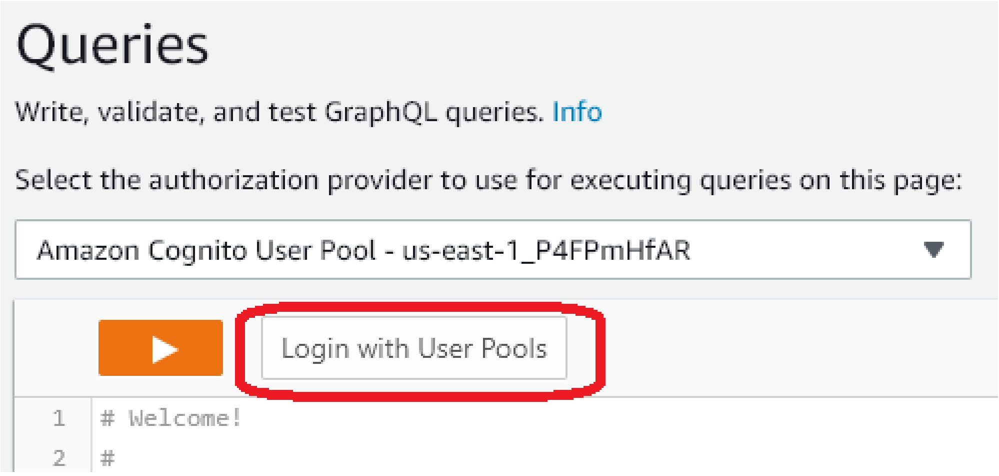
```
const awsmobile = {
    "aws_project_region": "us-west-2",
    "aws_cognito_identity_pool_id": "us-west-2:6b0bf14b-4103-45ba-b108-4cadc1ed9d1c",
    "aws_cognito_region": "us-west-2",
    "aws_user_pools_id": "us-west-2_[illegible]",
    "aws_user_pools_web_client_id": "5cjks9v9po7dot37pf6shsgv41",
    "auth": {},
    "aws_appsync_graphqlEndpoint": "https://424ak5vouzb3rpwkopdzccf3na.appsync-api.us-west-2.am
```

Now visit the AWS AppSync console to view your AppSync API at https://console.aws.amazon.com/appsync/home?. Click on the name of your API.



If you don’t see your API, make sure that you using the same region where you deployed your Cloud9 environment!

Select **Queries** from the left column, and then click **Login with User Pools**:



Queries

Write, validate, and test GraphQL queries. Info

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

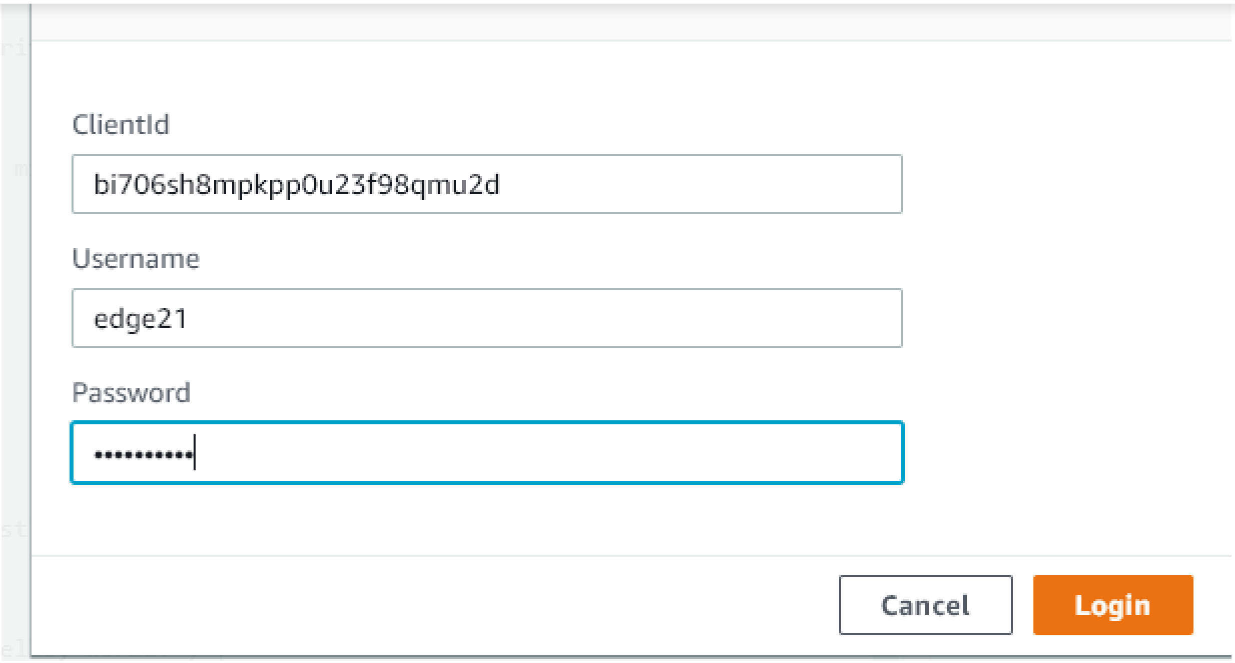
Amazon Cognito User Pool - us-east-1_P4FPmHfAR

```
# Welcome!
#
```

Then enter in the following values:

- ClientId: enter the value you copied for ***aws_user_pools_web_client_id***
- Username: `edge21`
- Password: the password that you entered when you registered

Click **Login**



ClientId

bi706sh8mpkpp0u23f98qmu2d

Username

edge21

Password

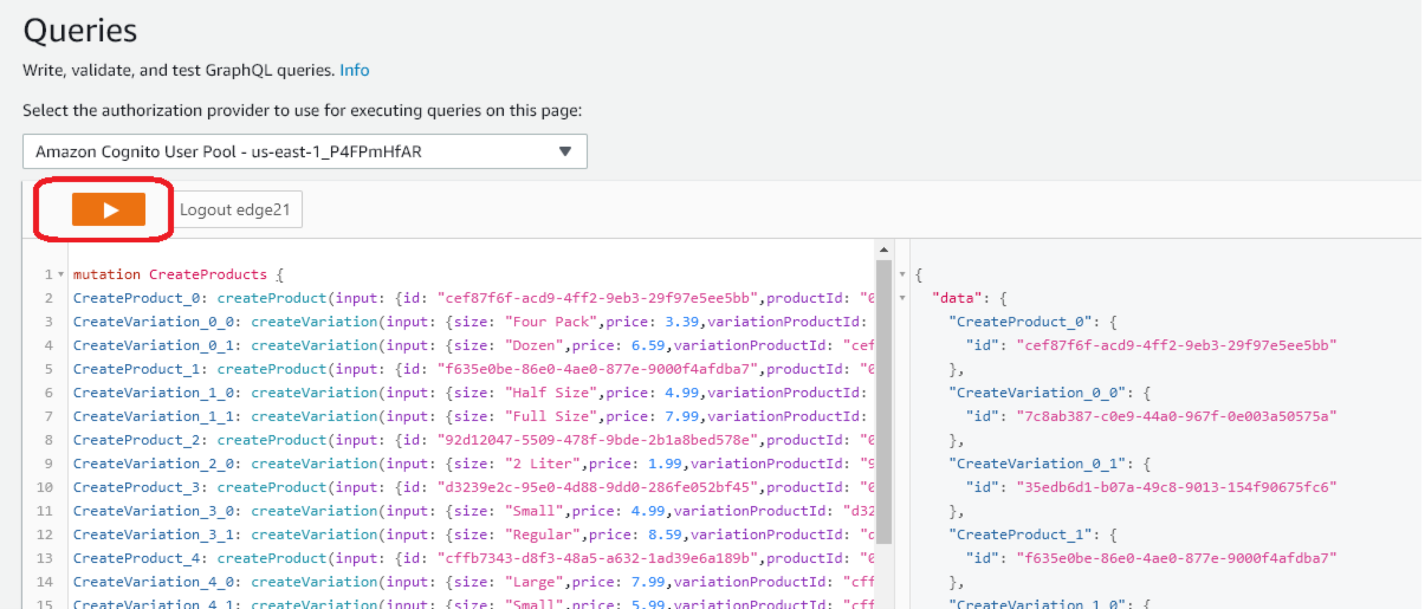
••••••••••

We need to add some product data so we don’t have an empty menu. To do this, paste in the following set of queries and then press the **Orange Play** button to run **CreateProducts**

```
mutation CreateProducts {
CreateProduct_0: createProduct(input: {id: "cef87f6f-acd9-4ff2-9eb3-
29f97e5ee5bb",productId: "0007",productName: "Cheese Sticks",category:
"SIDE",description: "Cheesey and scrupmtious, great as a side or a full
meal",defaultPrice: 6}) {id}
CreateVariation_0_0: createVariation(input: {size: "Four Pack",price:
3.39,variationProductId: "cef87f6f-acd9-4ff2-9eb3-29f97e5ee5bb"}){id}
CreateVariation_0_1: createVariation(input: {size: "Dozen",price:
6.59,variationProductId: "cef87f6f-acd9-4ff2-9eb3-29f97e5ee5bb"}){id}
CreateProduct_1: createProduct(input: {id: "f635e0be-86e0-4ae0-877e-
9000f4afdba7",productId: "0006",productName: "Garden Salad",category:
"SIDE",description: "Fresh greens and tomatoes and
cucumbers",defaultPrice: 6}) {id}
CreateVariation_1_0: createVariation(input: {size: "Half Size",price:
4.99,variationProductId: "f635e0be-86e0-4ae0-877e-9000f4afdba7"}){id}
CreateVariation_1_1: createVariation(input: {size: "Full Size",price:
7.99,variationProductId: "f635e0be-86e0-4ae0-877e-9000f4afdba7"}){id}
CreateProduct_2: createProduct(input: {id: "92d12047-5509-478f-9bde-
2b1a8bed578e",productId: "0010",productName: "Lemon Lime
Spritzer",category: "SIDE",description: "A fruity sode with lemon and
lime",defaultPrice: 3}) {id}
CreateVariation_2_0: createVariation(input: {size: "2 Liter",price:
1.99,variationProductId: "92d12047-5509-478f-9bde-2b1a8bed578e"}){id}
"SUB",description: "This thing is loaded with beef, turkey, bacon and
veggies",defaultPrice: 9}) {id}
CreateVariation_3_0: createVariation(input: {size: "Small",price:
4.99,variationProductId: "d3239e2c-95e0-4d88-9dd0-286fe052bf45"}){id}
CreateVariation_3_1: createVariation(input: {size: "Regular",price:
8.59,variationProductId: "d3239e2c-95e0-4d88-9dd0-286fe052bf45"}){id}
CreateProduct_4: createProduct(input: {id: "cffb7343-d8f3-48a5-a632-
1ad39e6a189b",productId: "0002",productName: "Supreme Pizza",category:
"PIZZA",description: "Just about every topping you'll need to satisfy
your appetite.",defaultPrice: 10}) {id}
CreateVariation_4_0: createVariation(input: {size: "Large",price:
7.99,variationProductId: "cffb7343-d8f3-48a5-a632-1ad39e6a189b"}){id}
CreateVariation_4_1: createVariation(input: {size: "Small",price:
5.99,variationProductId: "cffb7343-d8f3-48a5-a632-1ad39e6a189b"}){id}
CreateVariation_4_2: createVariation(input: {size: "Medium",price:
6.99,variationProductId: "cffb7343-d8f3-48a5-a632-1ad39e6a189b"}){id}
CreateProduct_5: createProduct(input: {id: "c57ee325-407c-4a40-a428-
c5e7b2c5338a",productId: "0015",productName: "Pizza Club",category:
"SUB",description: "Pizza sauce with pepperoni and cheese, just like a
pizza",defaultPrice: 8}) {id}
CreateVariation_5_0: createVariation(input: {size: "Small",price:
3.99,variationProductId: "c57ee325-407c-4a40-a428-c5e7b2c5338a"}){id}
CreateVariation_5_1: createVariation(input: {size: "Regular",price:
6.99,variationProductId: "c57ee325-407c-4a40-a428-c5e7b2c5338a"}){id}
CreateProduct_6: createProduct(input: {id: "5ccf7ec4-9318-4695-b664-
59d6ce60baba",productId: "0001",productName: "Ultimate Pizza",category:
"PIZZA",description: "An array of delectable toppings served piping hot
on top of our classic crust.",defaultPrice: 10}) {id}
CreateVariation_6_0: createVariation(input: {size: "Medium",price:
7.59,variationProductId: "5ccf7ec4-9318-4695-b664-59d6ce60baba"}){id}
CreateVariation_6_1: createVariation(input: {size: "Small",price:
6.59,variationProductId: "5ccf7ec4-9318-4695-b664-59d6ce60baba"}){id}
CreateVariation_6_2: createVariation(input: {size: "Large",price:
8.59,variationProductId: "5ccf7ec4-9318-4695-b664-59d6ce60baba"}){id}
CreateProduct_7: createProduct(input: {id: "ae3116b4-00e7-4ac4-af35-
9ebf067b1ea9",productId: "0008",productName: "Meat Lovers
Pizza",category: "PIZZA",description: "There is pepperoni, and bacon, and
sausage, and backon, and ham, and oh yeah, did we mention
bacon?",defaultPrice: 10}) {id}
CreateVariation_7_0: createVariation(input: {size: "Large",price:
7.99,variationProductId: "ae3116b4-00e7-4ac4-af35-9ebf067b1ea9"}){id}
CreateVariation_7_1: createVariation(input: {size: "Small",price:
5.99,variationProductId: "ae3116b4-00e7-4ac4-af35-9ebf067b1ea9"}){id}
CreateVariation_7_2: createVariation(input: {size: "Medium",price:
6.99,variationProductId: "ae3116b4-00e7-4ac4-af35-9ebf067b1ea9"}){id}
CreateProduct_8: createProduct(input: {id: "0a311e6f-085e-4820-b2aa-
4ec325b82772",productId: "0005",productName: "Breadsticks",category:
"SIDE",description: "Hot and fresh, full of buttery flavor",defaultPrice:
5}) {id}
```

```
CreateVariation_8_1: createVariation(input: {size: "Half Dozen",price:
3.99,variationProductId: "0a311e6f-085e-4820-b2aa-4ec325b82772"}){id}
CreateProduct_9: createProduct(input: {id: "82d3c5f3-68b8-4b4f-8d0d-
c10cbda9324e",productId: "0009",productName: "Regular Cola",category:
"SIDE",description: "Have one of these with a smile",defaultPrice: 3})
{id}
CreateVariation_9_0: createVariation(input: {size: "2 Liter",price:
2.99,variationProductId: "82d3c5f3-68b8-4b4f-8d0d-c10cbda9324e"}){id}
CreateProduct_10: createProduct(input: {id: "92d27977-d035-4aa9-a3ae-
8d063c4a7c8f",productId: "0013",productName: "Veggie Sub",category:
"SUB",description: "This sub has just bread and veggies - good for
you!",defaultPrice: 7}) {id}
CreateVariation_10_0: createVariation(input: {size: "Regular",price:
6.99,variationProductId: "92d27977-d035-4aa9-a3ae-8d063c4a7c8f"}){id}
CreateVariation_10_1: createVariation(input: {size: "Small",price:
3.99,variationProductId: "92d27977-d035-4aa9-a3ae-8d063c4a7c8f"}){id}
CreateProduct_11: createProduct(input: {id: "2a16a92f-ff88-457d-8347-
2946ee692453",productId: "0011",productName: "Diet Cola",category:
"SIDE",description: "Have one of these with a smile and no
guilt",defaultPrice: 3}) {id}
CreateVariation_11_0: createVariation(input: {size: "2 Liter",price:
2.99,variationProductId: "2a16a92f-ff88-457d-8347-2946ee692453"}){id}
CreateProduct_12: createProduct(input: {id: "058081d9-9e1b-4900-9733-
4a7eb21ed8bd",productId: "0004",productName: "Cheese Pizza",category:
"PIZZA",description: "Mozzarella cheese, and sauce, on crust... what more
do you need?",defaultPrice: 10}) {id}
CreateVariation_12_0: createVariation(input: {size: "Medium",price:
6.99,variationProductId: "058081d9-9e1b-4900-9733-4a7eb21ed8bd"}){id}
CreateVariation_12_1: createVariation(input: {size: "Large",price:
7.99,variationProductId: "058081d9-9e1b-4900-9733-4a7eb21ed8bd"}){id}
CreateVariation_12_2: createVariation(input: {size: "Small",price:
5.99,variationProductId: "058081d9-9e1b-4900-9733-4a7eb21ed8bd"}){id}
CreateProduct_13: createProduct(input: {id: "64b18436-279c-45b8-a15b-
e30b02729987",productId: "0012",productName: "Andys Sub",category:
"SUB",description: "Andy Classic Sub, with turkey and bacon and tomatoes
and mayo",defaultPrice: 8}) {id}
CreateVariation_13_0: createVariation(input: {size: "Small",price:
4.99,variationProductId: "64b18436-279c-45b8-a15b-e30b02729987"}){id}
CreateVariation_13_1: createVariation(input: {size: "Regular",price:
7.99,variationProductId: "64b18436-279c-45b8-a15b-e30b02729987"}){id}
CreateProduct_14: createProduct(input: {id: "4c4442f6-41cc-456c-a41b-
c57b8680a30a",productId: "0003",productName: "Veggie Supreme",category:
"PIZZA",description: "Well, it's just vegetables.",defaultPrice: 10})
{id}
CreateVariation_14_0: createVariation(input: {size: "Medium",price:
6.99,variationProductId: "4c4442f6-41cc-456c-a41b-c57b8680a30a"}){id}
CreateVariation_14_1: createVariation(input: {size: "Large",price:
7.99,variationProductId: "4c4442f6-41cc-456c-a41b-c57b8680a30a"}){id}
CreateVariation_14_2: createVariation(input: {size: "Small",price:
```

```
2946ee692453",productId: "0016",productName: "Choco Cake",category:
"SIDE",description: "Chocolate mixed in with chocolate, and cake, and
topped with chocoloate",defaultPrice: 5}) {id}
CreateVariation_15_0: createVariation(input: {size: "Regular",price:
5.99,variationProductId: "3b16a92f-ff88-457d-8347-2946ee692453"}){id}
CreateProduct_16: createProduct(input: {id: "4c16a92f-ff88-457d-8347-
2946ee692453",productId: "0017",productName: "Vanilla Bean
Pudding",category: "SIDE",description: "A light, fluffy dessert filled
with vanilla cream flavoring and topped with cinnamon",defaultPrice: 5})
{id}
CreateVariation_16_0: createVariation(input: {size: "Regular",price:
5.99,variationProductId: "4c16a92f-ff88-457d-8347-2946ee692453"}){id}
CreateProduct_17: createProduct(input: {id: "5d16a92f-ff88-457d-8347-
2946ee692453",productId: "0018",productName: "Carryover Cafe
Brownies",category: "SIDE",description: "Brownies infused with caramel
and chocolate chips",defaultPrice: 5}) {id}
CreateVariation_17_0: createVariation(input: {size: "Regular",price:
6.49,variationProductId: "5d16a92f-ff88-457d-8347-2946ee692453"}){id}
}
```



Queries

Write, validate, and test GraphQL queries. Info

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

Amazon Cognito User Pool - us-east-1_P4FPmHfAR

```
mutation CreateProducts {
CreateProduct_0: createProduct(input: {id: "cef87f6f-acd9-4ff2-9eb3-29f97e5ee5bb",productId: "0
CreateVariation_0_0: createVariation(input: {size: "Four Pack",price: 3.39,variationProductId:
CreateVariation_0_1: createVariation(input: {size: "Dozen",price: 6.59,variationProductId: "cef
CreateProduct_1: createProduct(input: {id: "f635e0be-86e0-4ae0-877e-9000f4afdba7",productId: "0
CreateVariation_1_0: createVariation(input: {size: "Half Size",price: 4.99,variationProductId:
CreateVariation_1_1: createVariation(input: {size: "Full Size",price: 7.99,variationProductId:
CreateProduct_2: createProduct(input: {id: "92d12047-5509-478f-9bde-2b1a8bed578e",productId: "0
CreateVariation_2_0: createVariation(input: {size: "2 Liter",price: 1.99,variationProductId: "9
CreateProduct_3: createProduct(input: {id: "d3239e2c-95e0-4d88-9dd0-286fe052bf45",productId: "0
CreateVariation_3_0: createVariation(input: {size: "Small",price: 4.99,variationProductId: "d32
CreateVariation_3_1: createVariation(input: {size: "Regular",price: 8.59,variationProductId: "c
CreateProduct_4: createProduct(input: {id: "cffb7343-d8f3-48a5-a632-1ad39e6a189b",productId: "0
CreateVariation_4_0: createVariation(input: {size: "Large",price: 7.99,variationProductId: "cff
CreateVariation_4_1: createVariation(input: {size: "Small",price: 5.99,variationProductId: "cff
```

```
{
  "data": {
    "CreateProduct_0": {
      "id": "cef87f6f-acd9-4ff2-9eb3-29f97e5ee5bb"
    },
    "CreateVariation_0_0": {
      "id": "7c8ab387-c0e9-44a0-967f-0e003a50575a"
    },
    "CreateVariation_0_1": {
      "id": "35edb6d1-b07a-49c8-9013-154f90675fc6"
    },
    "CreateProduct_1": {
      "id": "f635e0be-86e0-4ae0-877e-9000f4afdba7"
    },
    "CreateVariation_1_0": {
```

This will load our initial product data - you should see successful logs in the right hand column of the AppSync query console.

Now that we have a backend data store and an API layer to access it, let's put it into our application.