Introduction to GraphQL

July 13, 2018
MidDevCon
Baltimore, MD

@ShopifyDevs
http://developers.shopify.com

shopify

Welcome! My name is Evan

Evan Huus, Developer Lead, Shopify

- I’m here to lead this session and help you learn all about GraphQL!
- I’m a Developer Lead at Shopify, in Canada
- My favorite programming language/tool is Golang
- Join us on the MidDevCon Slack in #introtographql
- Tweet along with the workshop and tag @ShopifyDevs!

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- Special thanks to Major League Hacking, who created these workshop materials
- Major League Hacking (MLH) powers over 200 weekend-long invention competitions that inspire innovation, cultivate communities and teach computer science skills to more than 65,000 students around the world.
- Localhost is their “between hackathon” workshop offering

https://mlh.io/
@MLHacks

What will you learn today?

1. Why are APIs important?
2. Explain the difference between RESTful and GraphQL APIs.
3. Write your first API calls using GraphQL.

Why does this matter?

1. APIs are a large part of how applications communicate with each other.
2. GraphQL is a new way to interact with APIs.
3. GraphQL solves certain problems caused by RESTful APIs.

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Why are APIs important?

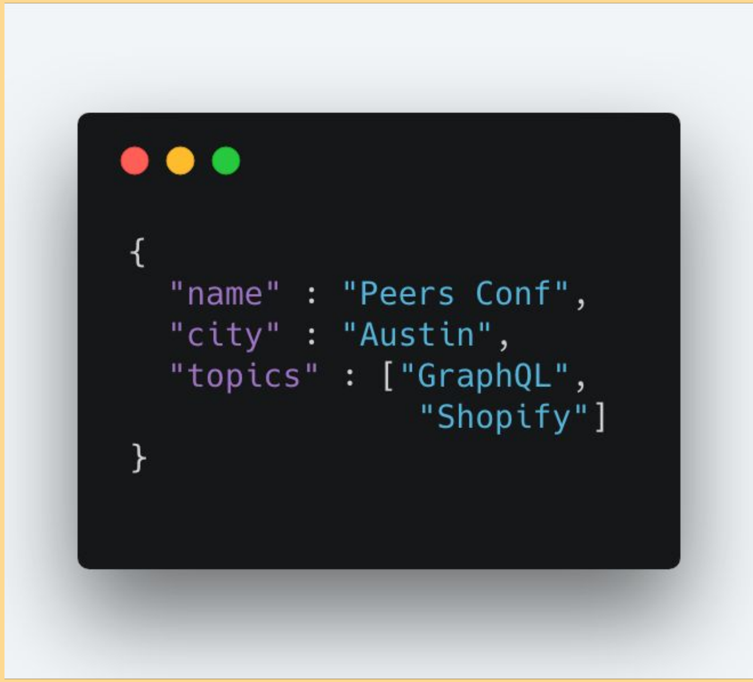
Example: Google APIs

- Google offers a number of APIs that developers can use in their own applications:
- Google Maps API
- Google Fonts API
- Google URL Shortener API
- and many more!

For example, an application that you use to find a restaurant might use the Google Maps API to show you restaurants near your current location.

What is REST?

- REST stands for **Representational State Transfer.**
- Most modern APIs are RESTful APIs.
- Every resource has its own URL.
- Data is generally returned in JSON (JavaScript Object Notation) ->



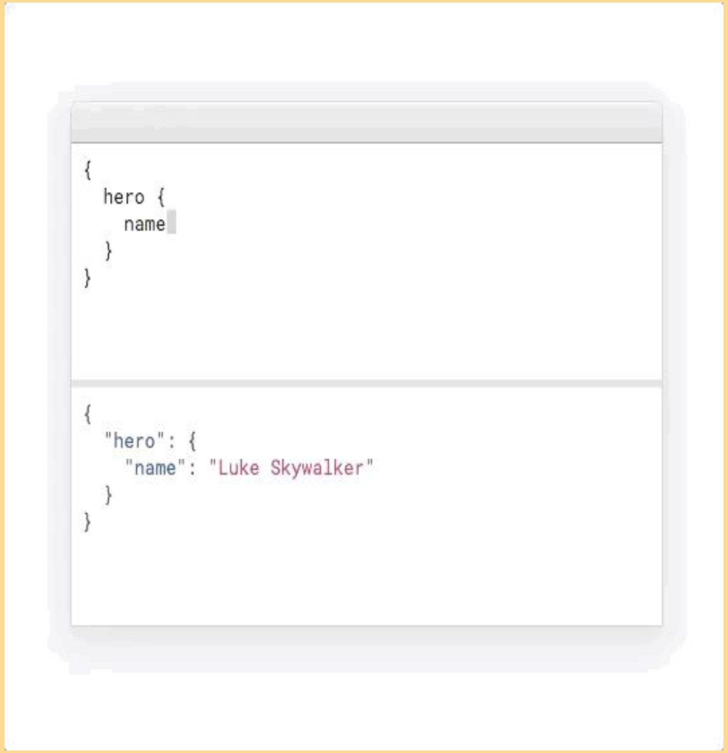
```
{
   "name"  : "Peers Conf",
   "city"  : "Austin",
   "topics" : ["GraphQL",
               "Shopify"]
}
```

What is GraphQL?

GraphQL stands for **Graph Query Language.**

APIs written using GraphQL schemas have only one endpoint that return a data graph

When using a GraphQL API, an application can request multiple resources at a time and only receive what it needs. The information returned looks like this:

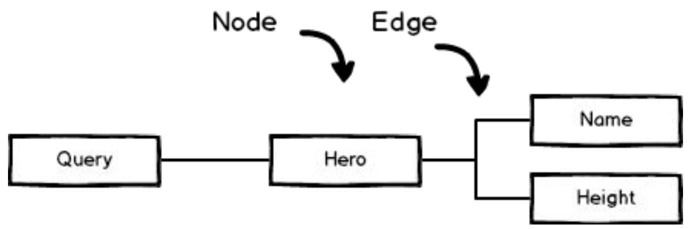


```
{
  hero {
    name
  }
}
```

```
{
  "hero": {
    "name": "Luke Skywalker"
  }
}
```

The graph in GraphQL

A partial data graph

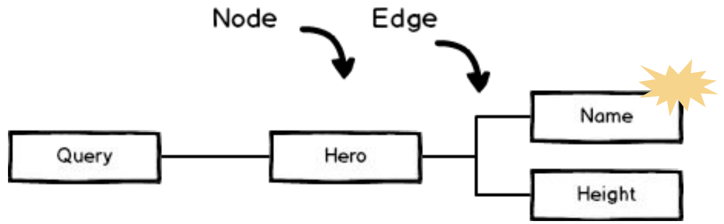


GraphQL schema

```
type Hero {
  name: String
  height: Float
}
```

GraphQL execution

A partial data graph



Resolver

```
name(hero) {
  return hero.name
}
```

Benefits of GraphQL

- GraphQL allows you to specify the information you want to retrieve.
- GraphQL has a feature called "introspection" where developers can use commands to ask the server about what queries are allowed.
- GraphQL allows you to retrieve information from multiple data sources in a single request, speeding up your web application.
- GraphQL can be implemented in many languages and there's a strong community to help!

GraphQL

GraphQL basics

- There are three types of GraphQL calls - queries, subscriptions, and mutations. In this workshop, you will explore one query and one mutation.
- **Query:** a GraphQL call that retrieves information from an application through an API.
- **Mutation:** A GraphQL call that updates information in an application's database through an API.

GraphQL query structure

A GraphQL query:

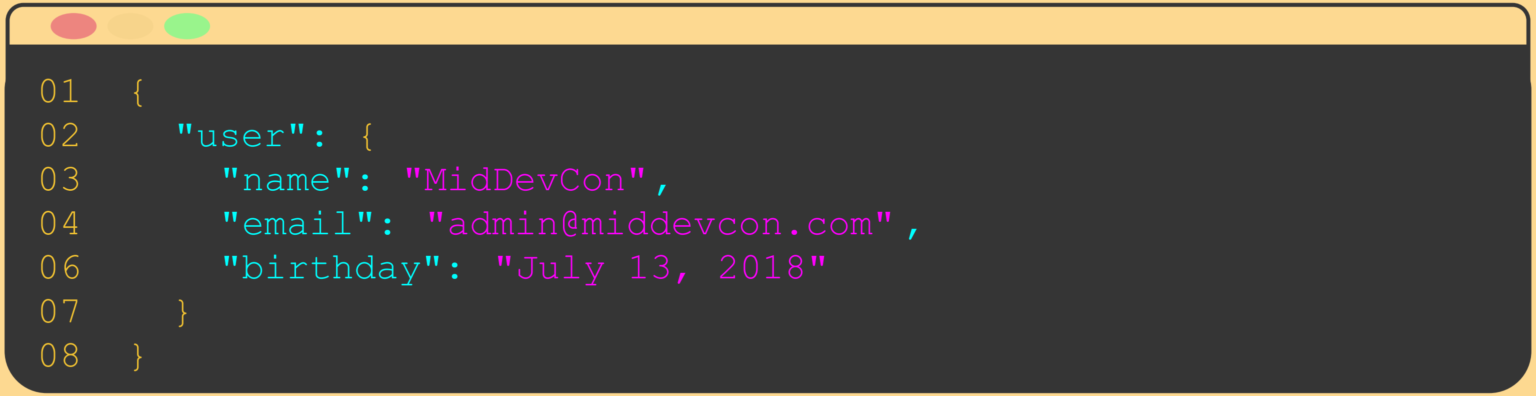
- begins with the keyword "query" followed by a set of curly braces
- has a Query Root as its first requested field
- In the query below, the Query Root user accepts an argument id that has a value of the user's id number
- This query is requesting the user's name, email, and birthday which are fields

```
query {
  user(id: "abc123") {
    name
    email
    birthday
  }
}
```

GraphQL response structure

A GraphQL response:

- returns information in the same way that it was requested
- can return error messages if the queries are written incorrectly



```
{
  "user": {
    "name": "MidDevCon",
    "email": "admin@middevcon.com",
    "birthday": "July 13, 2018"
  }
}
```

GraphQL users

Facebook created GraphQL. Coursera’s engineering team was in the process of designing their own replacement for RESTful APIs when they found GraphQL and decided to use it instead. Now, it's being used by Github, Pinterest, Coursera, and of course Shopify!

GraphQL at Shopify

- Shopify has been using GraphQL internally for several years.
- Shopify now has two public GraphQL APIs.
- Today we'll be using the Storefront API which is designed for building customer-facing shopping flows.
- The other one is the Admin API which is for building merchant-facing applications.

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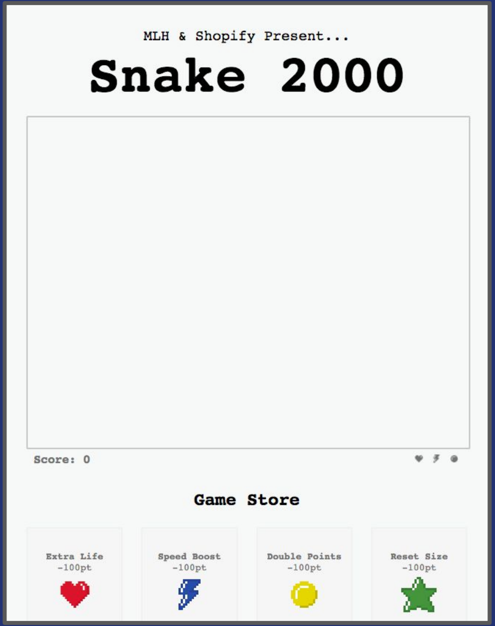
Try the demo application:
https://nl-localhost-shopify.herokuapp.com/

Goal:
Purchase power- in a game using the Shopify Storefront API

Technologies:
Node.js
JavaScript
HTML / CSS
GraphQL



Step1: install Node

Follow the installation instructions for the type of computer you have at the following URL:

https://nodejs.org/en/download/

Let me know if you have any trouble!

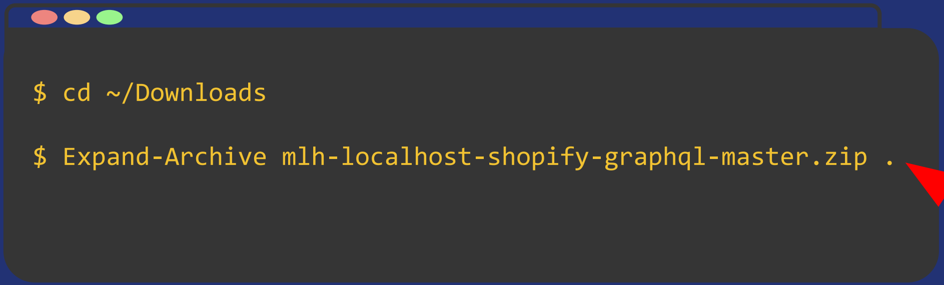
Step 2: download the sample code

To get the sample code, enter this URL in your browser:

https://bit.ly/GraphQLIntro

Let me know if you have any trouble!

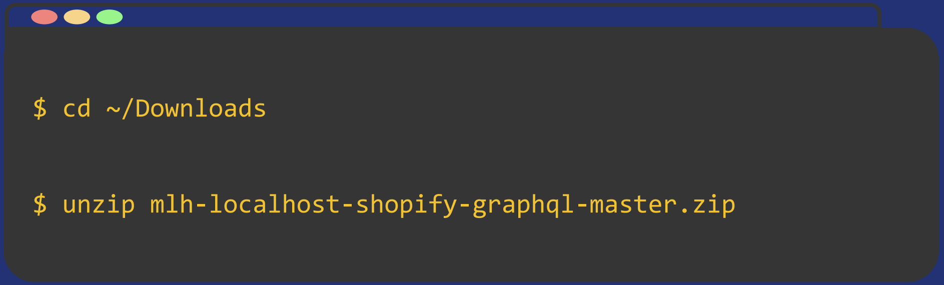
Step 3: unzip files



```
$ cd ~/Downloads

$ Expand-Archive mlh-localhost-shopify-graphql-master.zip .
```

Windows

Do not forget the "." in this command



```
$ cd ~/Downloads


$ unzip mlh-localhost-shopify-graphql-master.zip
```

Mac

Step 4: run the Node server

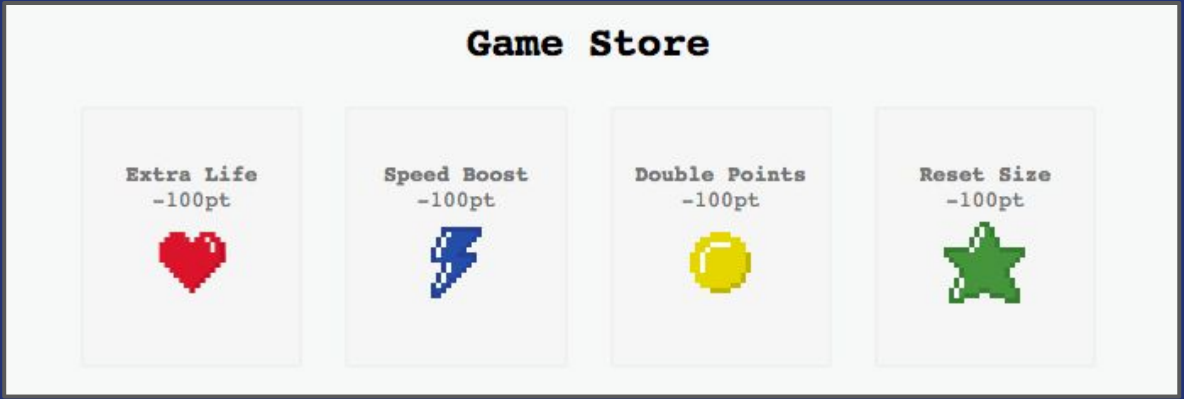
Mac and Windows

```
$ cd mlh-localhost-shopify-graphql-master

$ ls

README.md  node_modules/ package.json  public/  server.js

$ node server.js

Listening on http://localhost:5000/
```

Step 5: navigate to the URL below

localhost:5000

Notice something missing?



Game Store

Extra Life
-100pt

Speed Boost
-100pt

Double Points
-100pt

Reset Size
-100pt

Set up Shopify for development

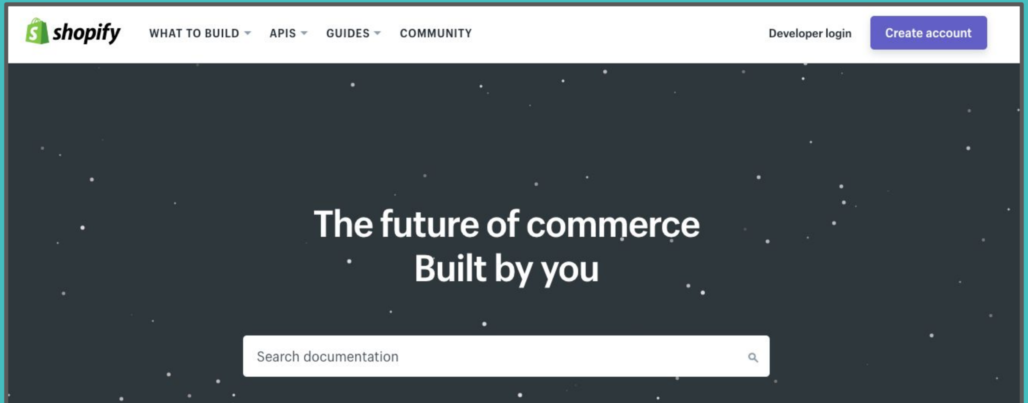
https://developers.shopify.com

1. Creating a developer account.
2. Creating a development store on your account.
3. Creating an app on your store.
4. Setting up free payments on your store.

Register for a Shopify developer account

https://developers.shopify.com

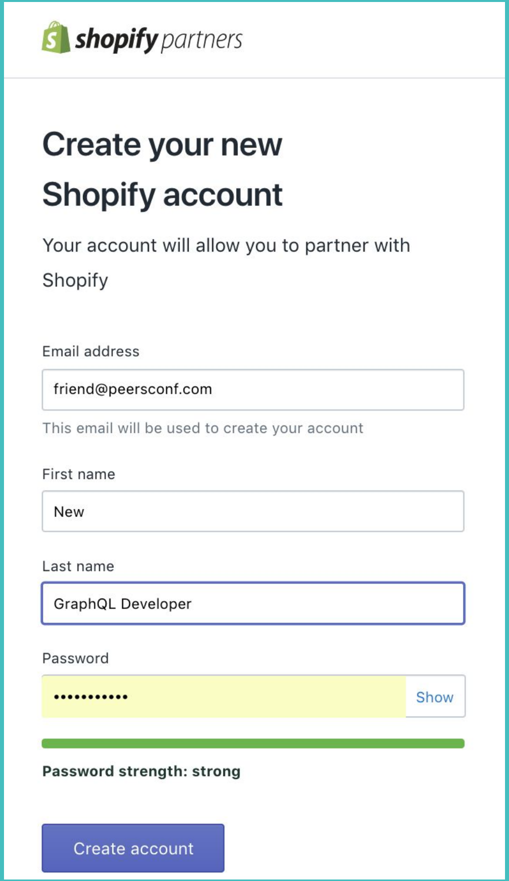
1. Navigate to the address above.
2. Click "Create account."



The future of commerce
Built by you

Register for a Shopify developer account

3. Enter your name and email address
4. Choose a password
5. Click “Create account”


shopify partners

Create your new Shopify account

Your account will allow you to partner with Shopify

Email address

friend@peersconf.com

This email will be used to create your account

First name

New

Last name

GraphQL Developer

Password

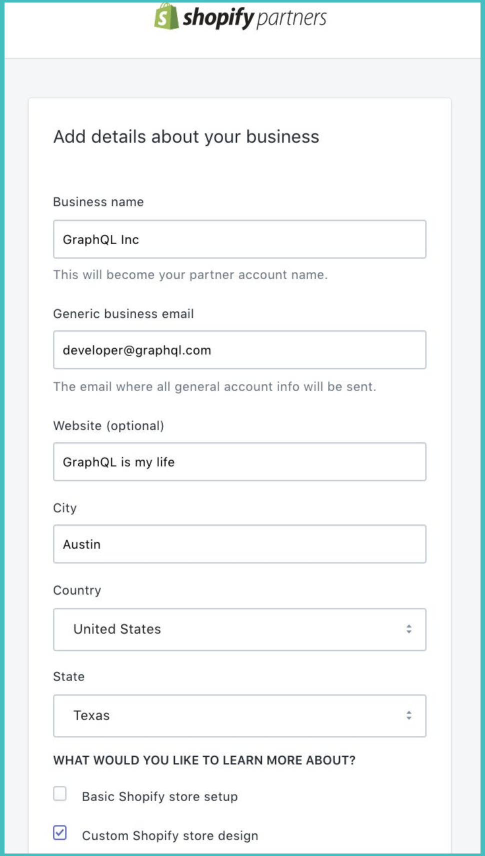
•••••••••••• Show

Password strength: strong

Create account

Register for a Shopify developer account

6. Fill in the rest of the form and click “See Partner dashboard” at the bottom.



Add details about your business

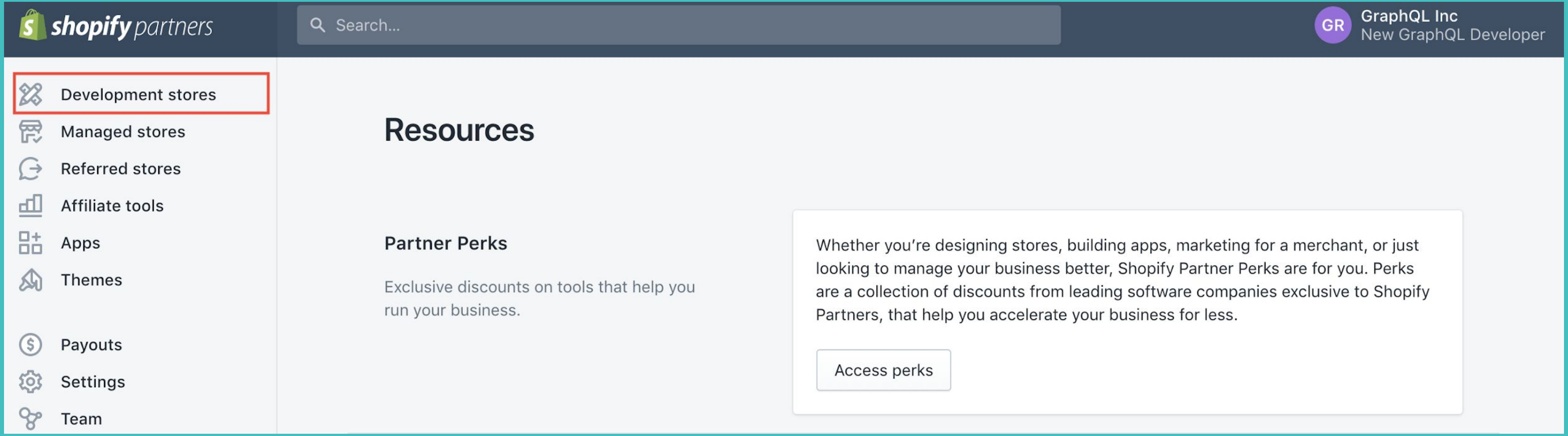
Business name	GraphQL Inc
	This will become your partner account name.
Generic business email	developer@graphql.com
	The email where all general account info will be sent.
Website (optional)	GraphQL is my life
City	Austin
Country	United States
State	Texas

WHAT WOULD YOU LIKE TO LEARN MORE ABOUT?

- [ ] Basic Shopify store setup
- [✓] Custom Shopify store design

Register for a Shopify developer account

7. Click “Development stores.”



Resources

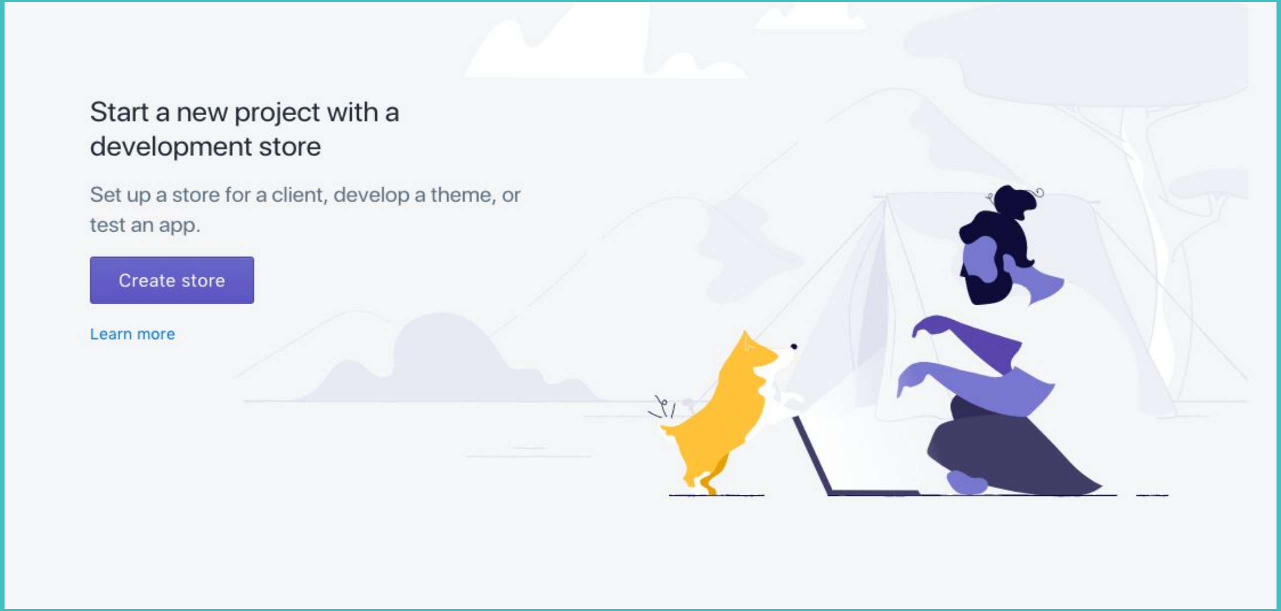
Partner Perks

Exclusive discounts on tools that help you run your business.

Whether you’re designing stores, building apps, marketing for a merchant, or just looking to manage your business better, Shopify Partner Perks are for you. Perks are a collection of discounts from leading software companies exclusive to Shopify Partners, that help you accelerate your business for less.

Register for a Shopify developer account

8. Click “Create store”

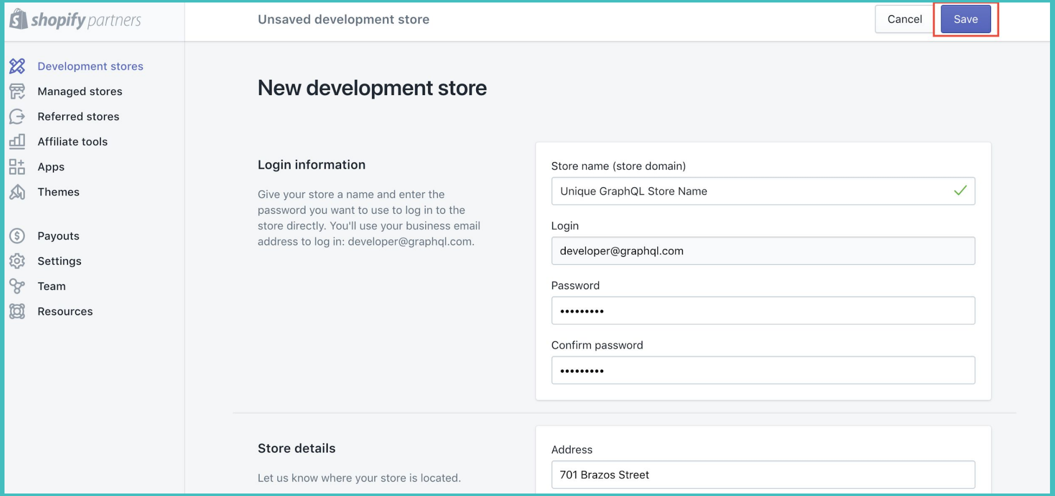


Start a new project with a development store

Set up a store for a client, develop a theme, or test an app.

Register for a Shopify developer account

9. Give your store a unique name, don't use "snake game" or anything similar because the name needs to be unique to your store.
10. Fill in the rest of the form and then click "Save."



New development store

Login information

Give your store a name and enter the password you want to use to log in to the store directly. You'll use your business email address to log in: developer@graphql.com.

Store name (store domain): Unique GraphQL Store Name

Login: developer@graphql.com

Password: •••••••••

Confirm password: •••••••••

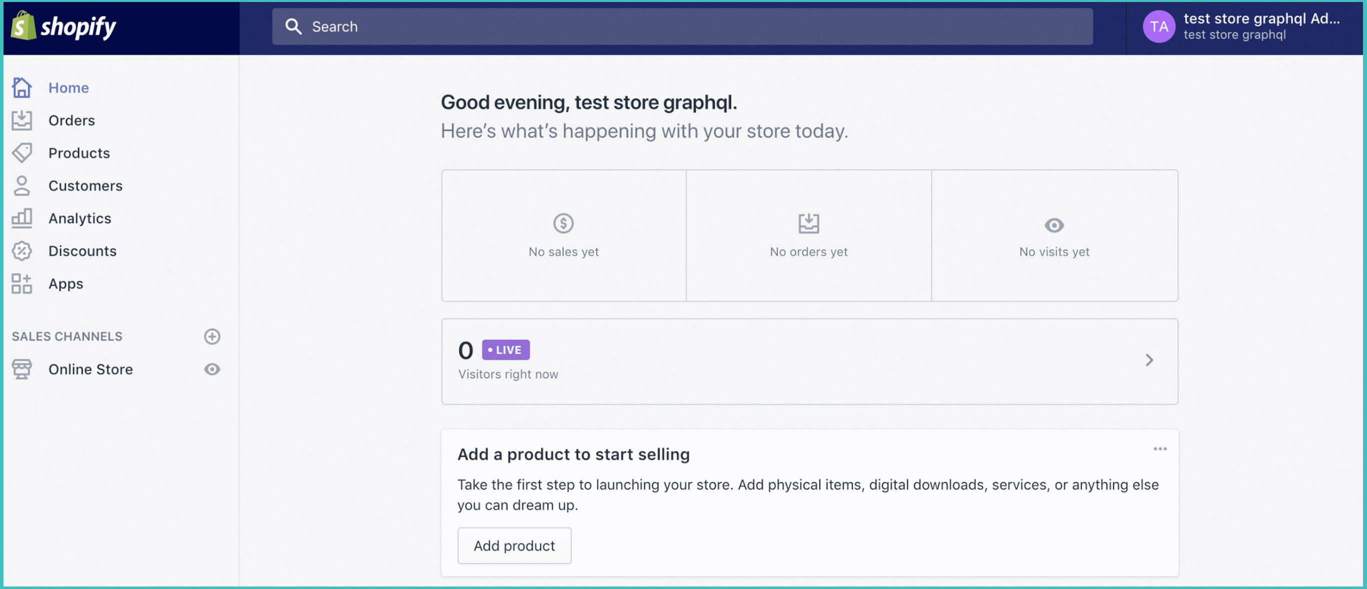
Store details

Let us know where your store is located.

Address: 701 Brazos Street

Get credentials

11. On the left side of the home screen, click "Apps".
12. Click "Manage private apps" on the bottom of the next screen.



Good evening, test store graphql.
Here's what's happening with your store today.

No sales yet
No orders yet
No visits yet

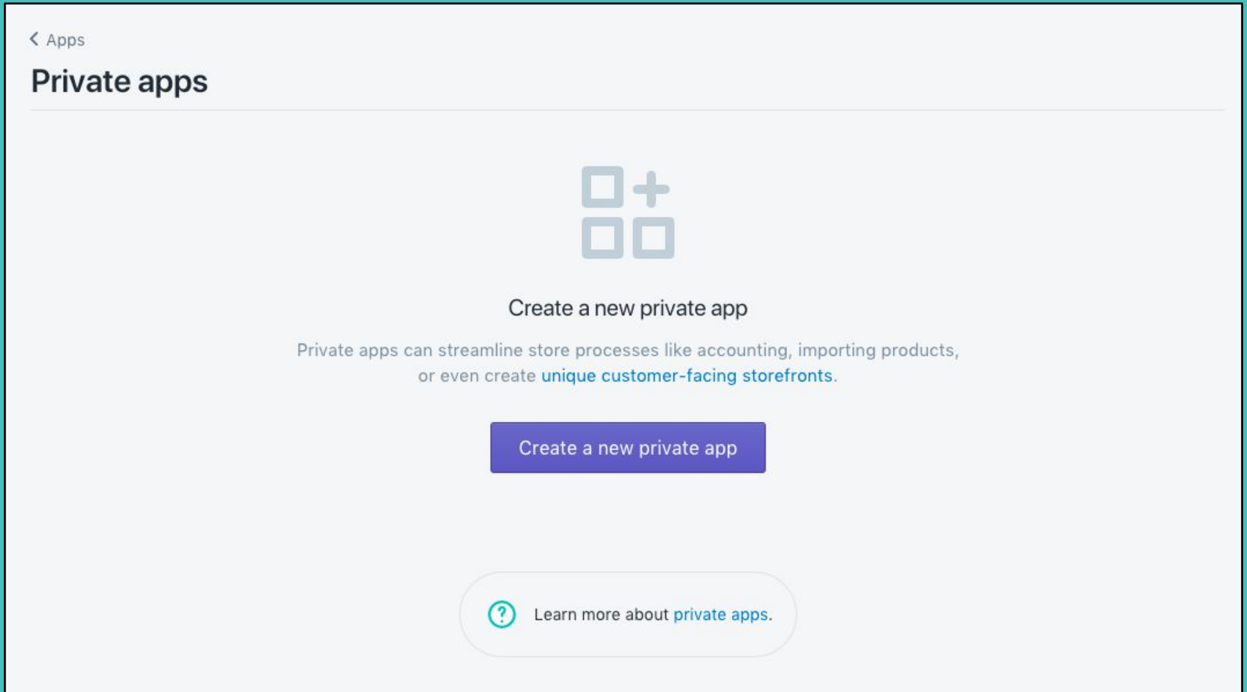
0 • LIVE
Visitors right now

Add a product to start selling
Take the first step to launching your store. Add physical items, digital downloads, services, or anything else you can dream up.

Add product

Get credentials

13. Click “Create a new private app.”


< Apps

Private apps

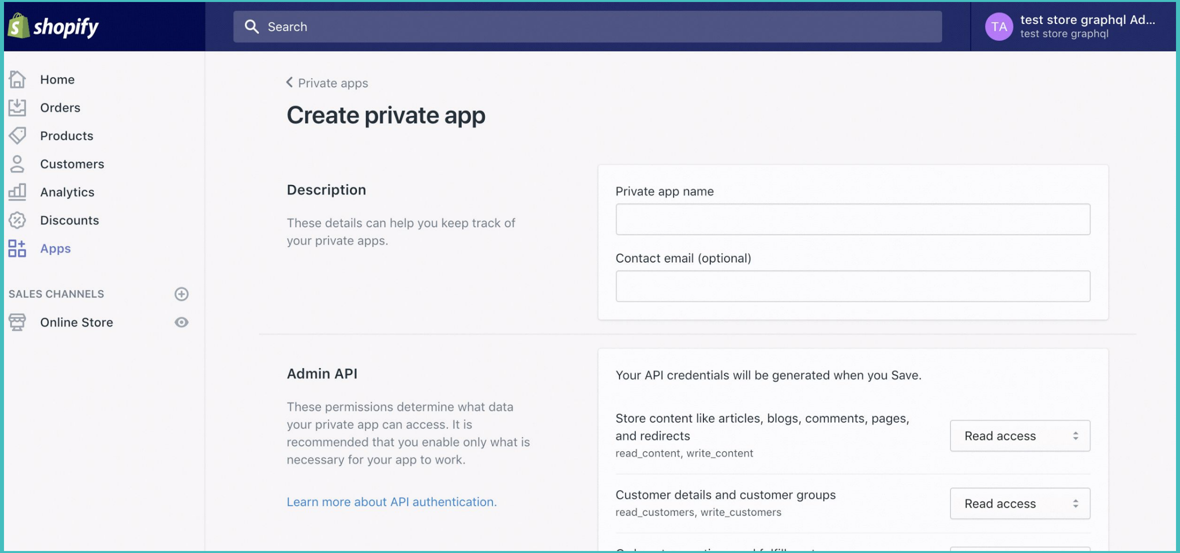
Create a new private app

Private apps can streamline store processes like accounting, importing products, or even create unique customer-facing storefronts.

Learn more about private apps.

Get credentials

14. Name your private app.
15. Enter an email.
16. Click "Allow this app to access your storefront data using the Storefront API."
17. Click "Save."



Create private app

Description

These details can help you keep track of your private apps.

Private app name

Contact email (optional)

Admin API

These permissions determine what data your private app can access. It is recommended that you enable only what is necessary for your app to work.

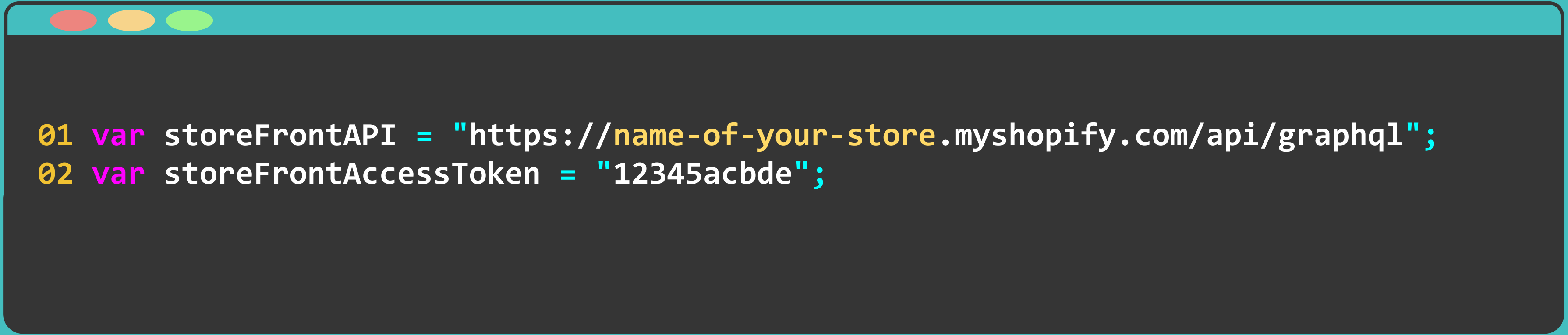
Learn more about API authentication.

Your API credentials will be generated when you Save.

Store content like articles, blogs, comments, pages, and redirects read_content, write_content	Read access
Customer details and customer groups read_customers, write_customers	Read access

Connect your store to application

19. In your preferred text editor, open the project folder you downloaded. In public/js/queries.js, paste your storefront access token on Line 2.

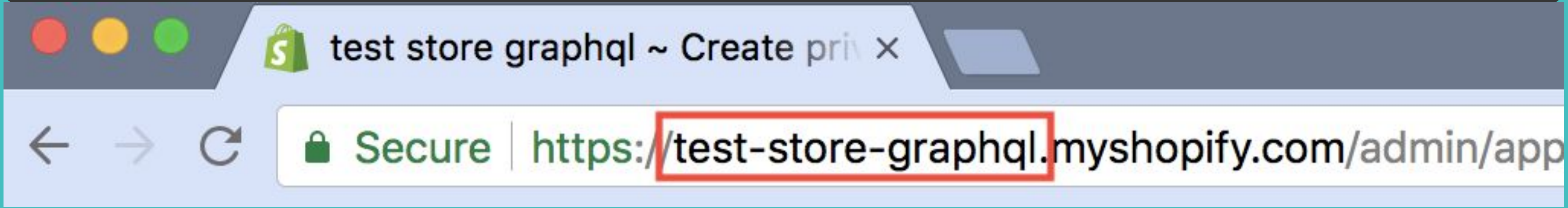


```
01 var storeFrontAPI = "https://name-of-your-store.myshopify.com/api/graphql";
02 var storeFrontAccessToken = "12345acbde";
```

Connect your store to application

20. On Line 1, change the words "`name-of-your-store`" to the name you gave your store when you created your account, which can be found in the URL of your Shopify account homepage.

```
01 var storeFrontAPI = "https://name-of-your-store.myshopify.com/api/graphql";
02 var storeFrontAccessToken = "12345acbde";
```

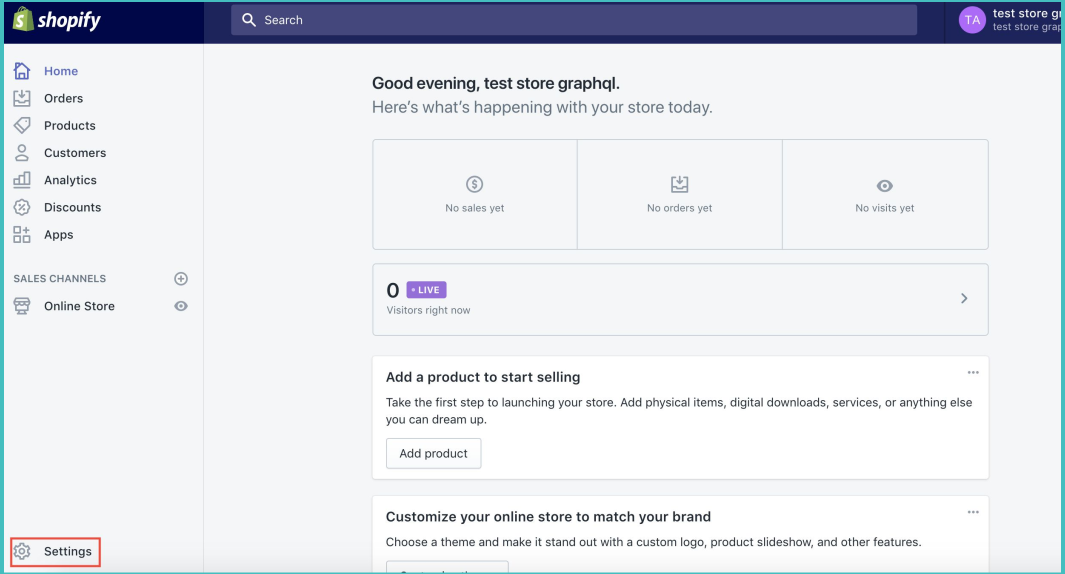


https://test-store-graphql.myshopify.com/admin/app

Set up payments

Now that you have connected your store to your application, return to your Storefront home page in your browser so that you can set up payments.

1. Click "Settings" at the bottom of your screen.



Good evening, test store graphql.
Here's what's happening with your store today.

No sales yet

No orders yet

No visits yet

0 • LIVE
Visitors right now

Add a product to start selling

Take the first step to launching your store. Add physical items, digital downloads, services, or anything else you can dream up.

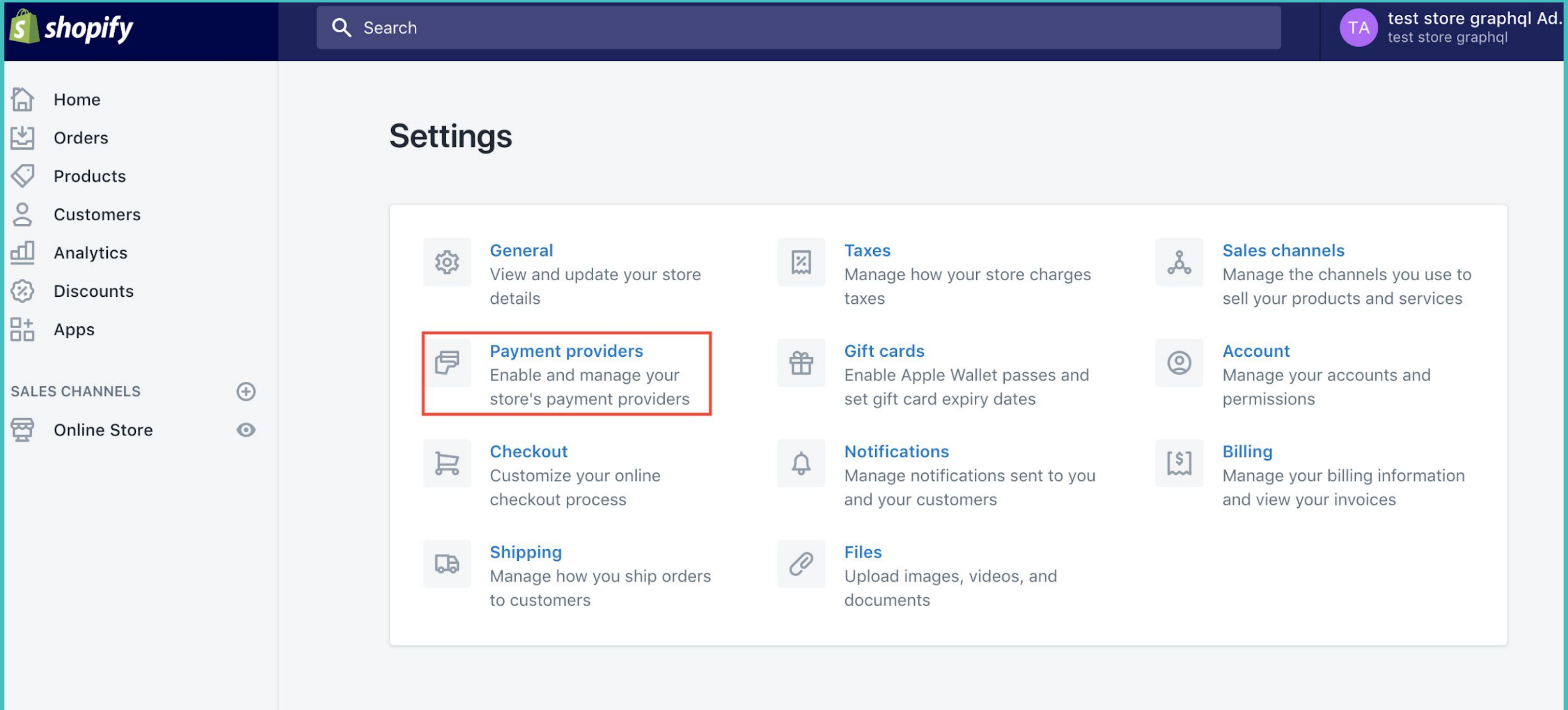
Add product

Customize your online store to match your brand

Choose a theme and make it stand out with a custom logo, product slideshow, and other features.

Set up payments

2. Click “Payment providers”

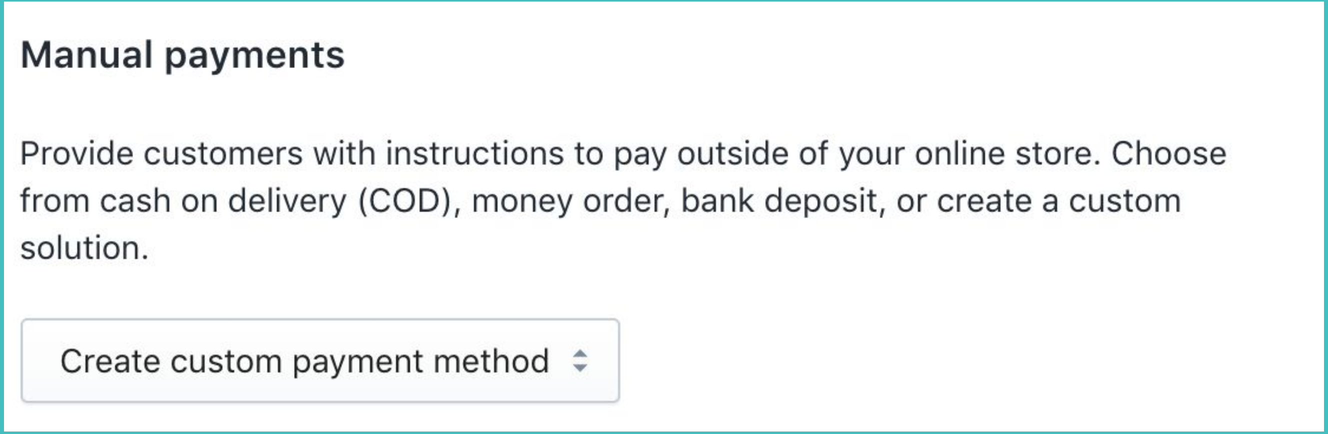


Settings

General	View and update your store details
Taxes	Manage how your store charges taxes
Sales channels	Manage the channels you use to sell your products and services
Payment providers	Enable and manage your store's payment providers
Gift cards	Enable Apple Wallet passes and set gift card expiry dates
Account	Manage your accounts and permissions
Checkout	Customize your online checkout process
Notifications	Manage notifications sent to you and your customers
Billing	Manage your billing information and view your invoices
Shipping	Manage how you ship orders to customers
Files	Upload images, videos, and documents

Set up payments

3. Scroll to "Manual payments" and select "Create custom payment method."

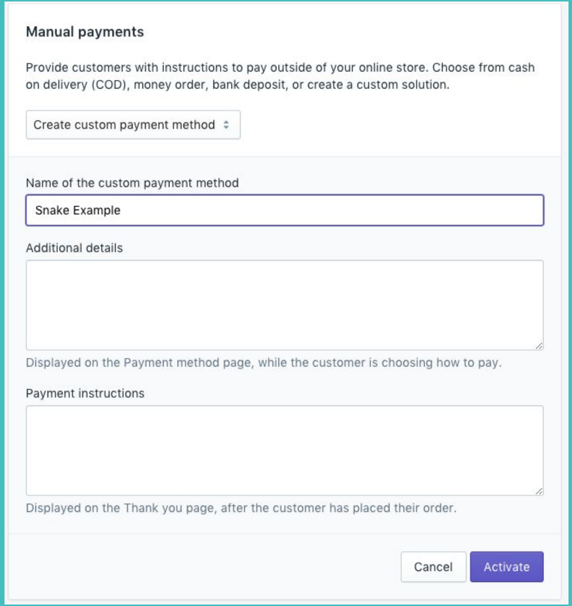


Manual payments

Provide customers with instructions to pay outside of your online store. Choose from cash on delivery (COD), money order, bank deposit, or create a custom solution.

Set up payments

4. Give your payment method a name and click "Activate."



Manual payments

Provide customers with instructions to pay outside of your online store. Choose from cash on delivery (COD), money order, bank deposit, or create a custom solution.

Create custom payment method

Name of the custom payment method

Snake Example

Additional details

Displayed on the Payment method page, while the customer is choosing how to pay.

Payment instructions

Displayed on the Thank you page, after the customer has placed their order.

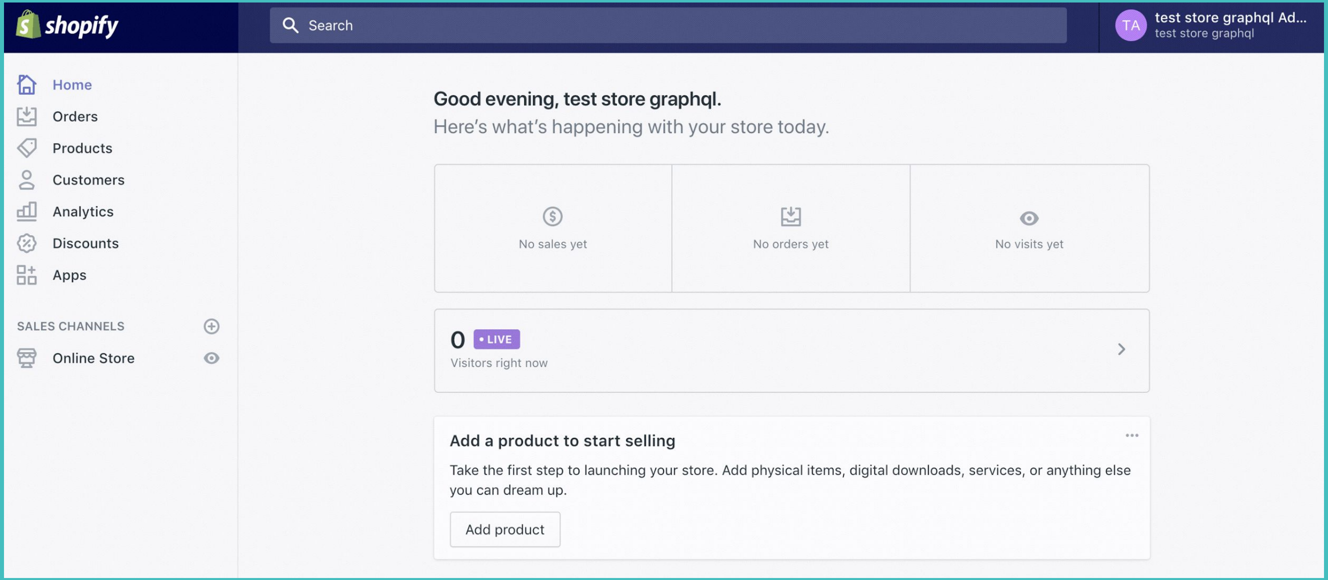
Add power-ups to the storefront 🚀

Now that you have created your Storefront, we're going to add the power-ups to the store!

Let us know if you’re still setting up! ✋

Add power-ups to store

1. Return to your account home page on Shopify.
2. On the upper left-hand side of the screen, click "Products."
3. Then, click "Add Product."



Good evening, test store graphql.

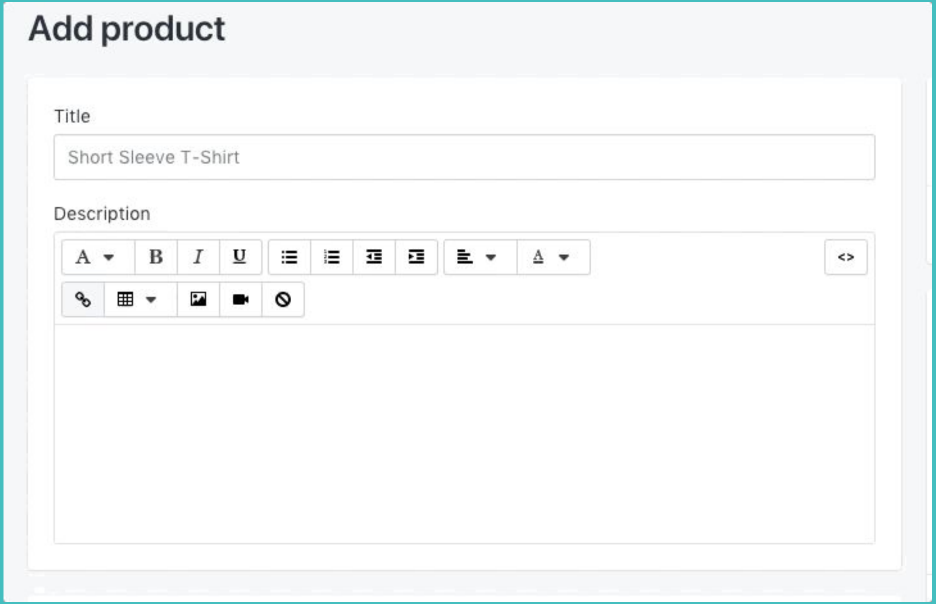
Here's what's happening with your store today.

Add a product to start selling

Take the first step to launching your store. Add physical items, digital downloads, services, or anything else you can dream up.

Add power-ups to store

4. Name the product "Extra Life."
5. Give the product a simple description, like "Extra Life Power-Up."



Add product

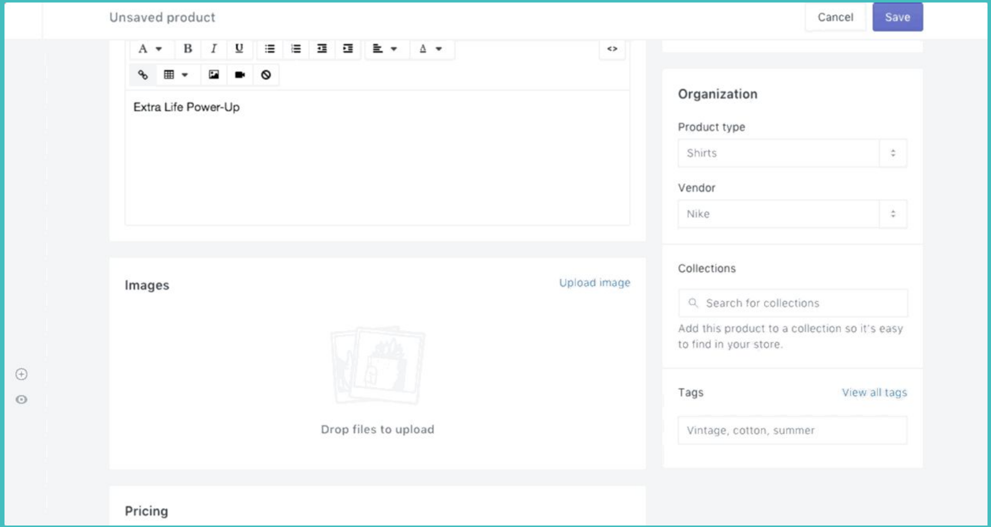
Title

Short Sleeve T-Shirt

Description

Add power-ups to store

6. Upload public/images/storefront-images/extra-life.png image from the project folder you downloaded.
7. Verify that "Charge taxes on this product" is NOT checked.
8. Verify that "This is a physical product" is NOT checked.


Unsaved product

Extra Life Power-Up

Images

Upload image

Drop files to upload

Pricing

Organization

Product type: Shirts

Vendor: Nike

Collections

Search for collections

Add this product to a collection so it's easy to find in your store.

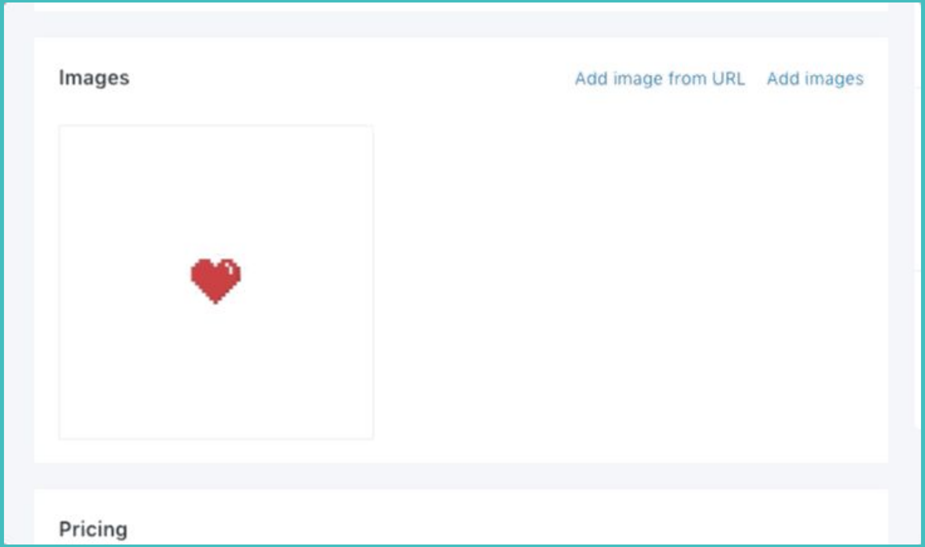
Tags

View all tags

Vintage, cotton, summer

Add power-ups to store

9. At the bottom of the page, click "Edit website SEO."
10. In the URL and handle field, change the name from "`extra-life`" to "<u>`power-up-1.`</u>" **It must be spelled and formatted exactly like this for the game to work.**



Add power-ups to store

The game we previewed at the beginning of this workshop had four power-ups. Repeat the process you just completed to add the Speed Boost Power-Up.

Be sure to:

- Upload the "speed-boost.png" image
- Uncheck "Charge taxes on this product" and "This product requires shipping"
- Change the website seo to be "`power-up-2`"

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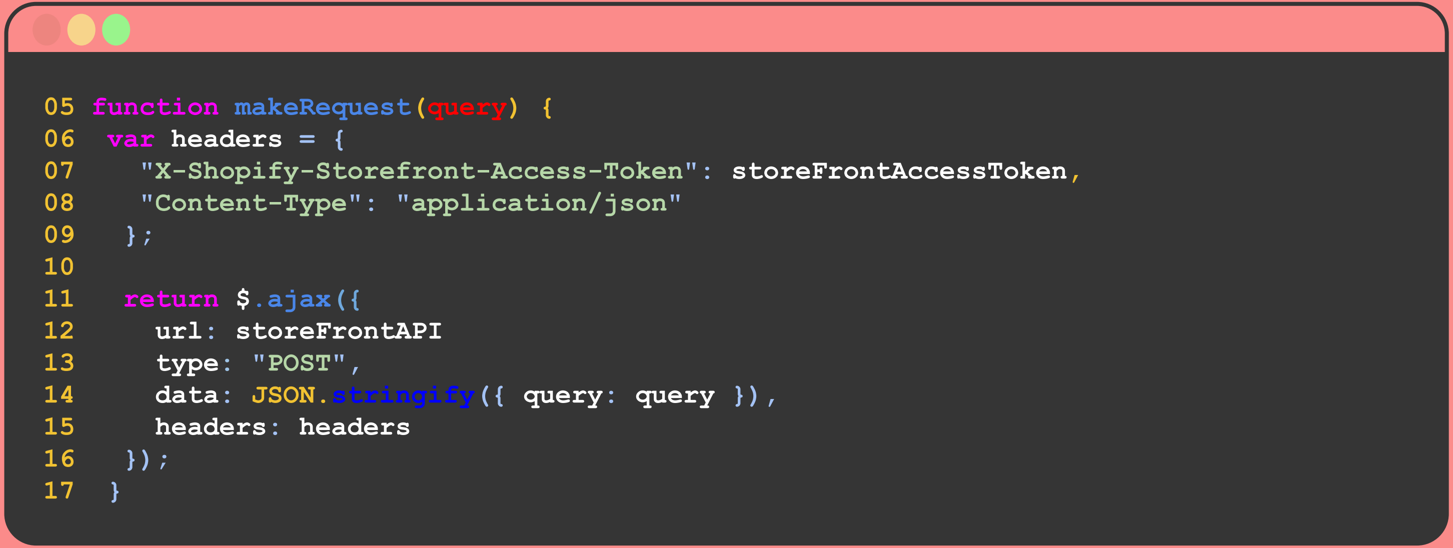
What queries do we need?

Now that you have set up your Storefront and connect it to your application, you need to write the GraphQL queries that will retrieve information from your Storefront and purchase items. Three queries are necessary:

1. **Retrieve the products from your store**
2. **Create the Checkout**
3. **Complete the Checkout**

Code review: *queries.js*

In **queries.js**, there is a function called `makeRequest`() that sets up our request with the necessary information.



```
function makeRequest(query) {
 var headers = {
   "X-Shopify-Storefront-Access-Token": storeFrontAccessToken,
   "Content-Type": "application/json"
  };

  return $.ajax({
    url: storeFrontAPI
    type: "POST",
    data: JSON.stringify({ query: query }),
    headers: headers
  });
 }
```

Write your first GraphQL call

https://help.shopify.com/en/api/custom-storefronts

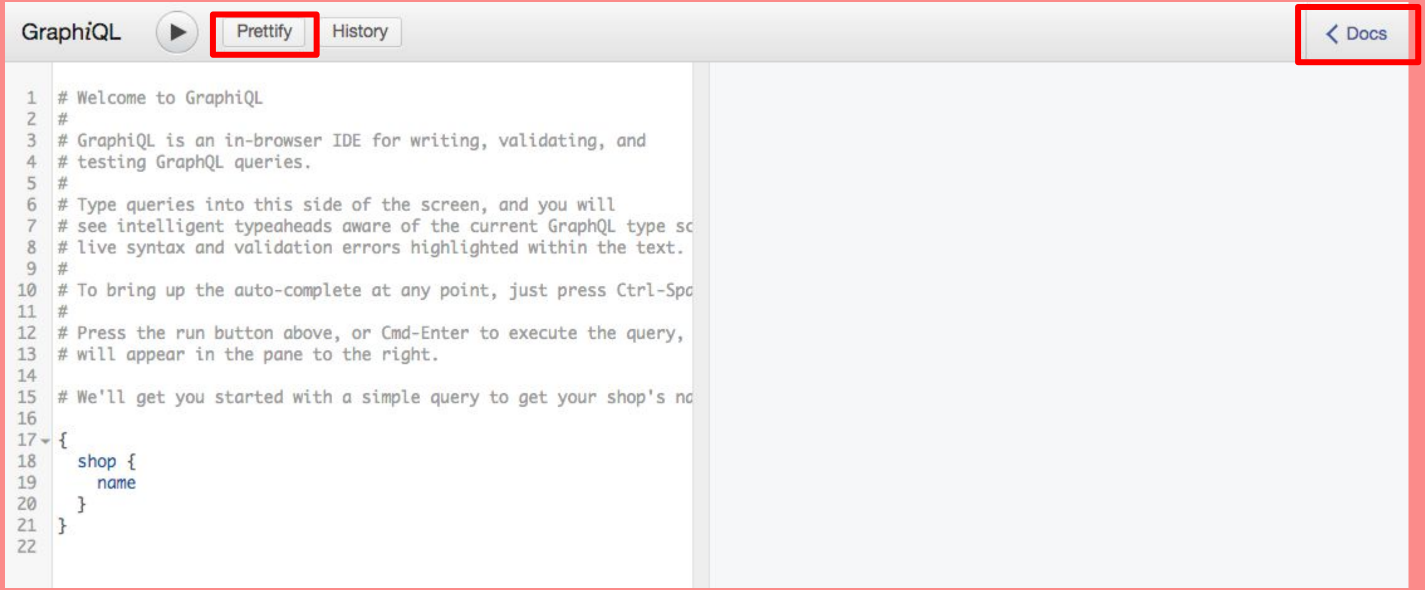
/storefront-api/graphql-explorer

We want to retrieve information from our shop. In order to complete our game, we need to retrieve the title of each product and its image.

Navigate to the URL above to access **GraphiQL**, a tool that allows you to test your GraphQL queries.

Query to fetch products

1. Click "Prettify" to remove the notes.
2. Click "Docs" to see the documentation.

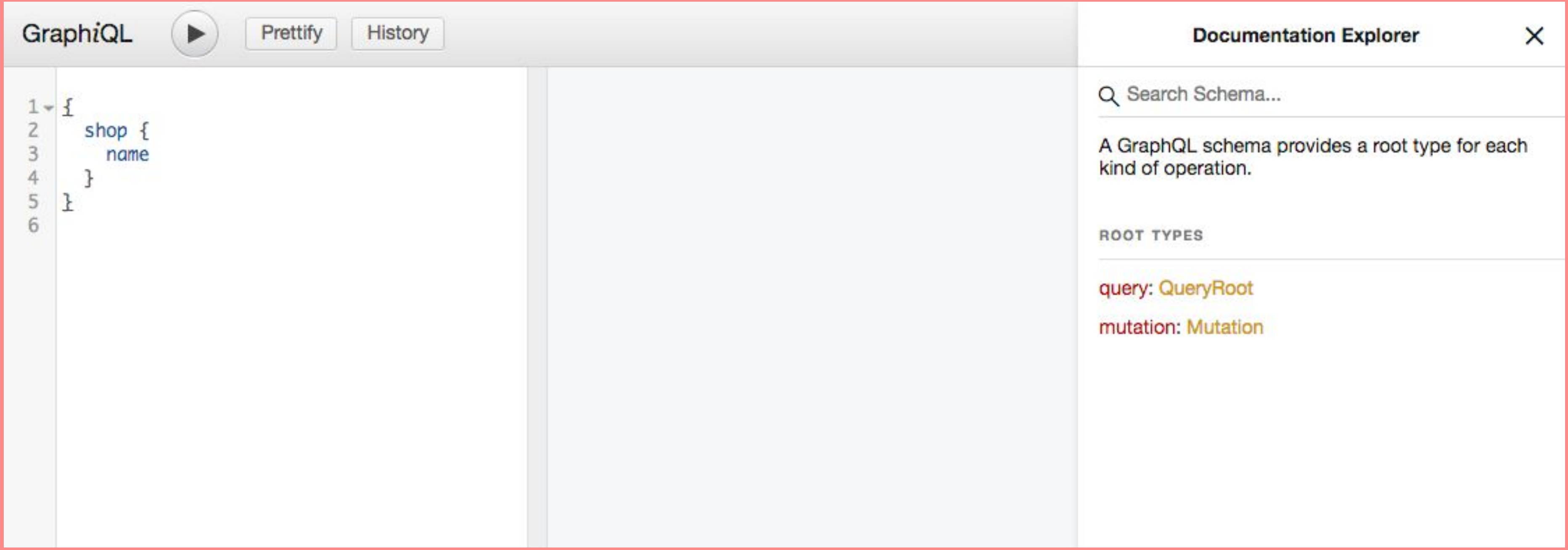


```
# Welcome to GraphiQL
#
# GraphiQL is an in-browser IDE for writing, validating, and
# testing GraphQL queries.
#
# Type queries into this side of the screen, and you will
# see intelligent typeaheads aware of the current GraphQL type sc
# live syntax and validation errors highlighted within the text.
#
# To bring up the auto-complete at any point, just press Ctrl-Spa
#
# Press the run button above, or Cmd-Enter to execute the query,
# will appear in the pane to the right.

# We'll get you started with a simple query to get your shop's na

{
  shop {
    name
  }
}

```

Query to fetch products

3. Click "QueryRoot" to see the entry points for the Shopify Storefront API schema.

Key term: QueryRoot: *a "Query Root" is a GraphQL schema's entry-point for queries.*



```
{
  shop {
    name
  }
}
```

A GraphQL schema provides a root type for each kind of operation.

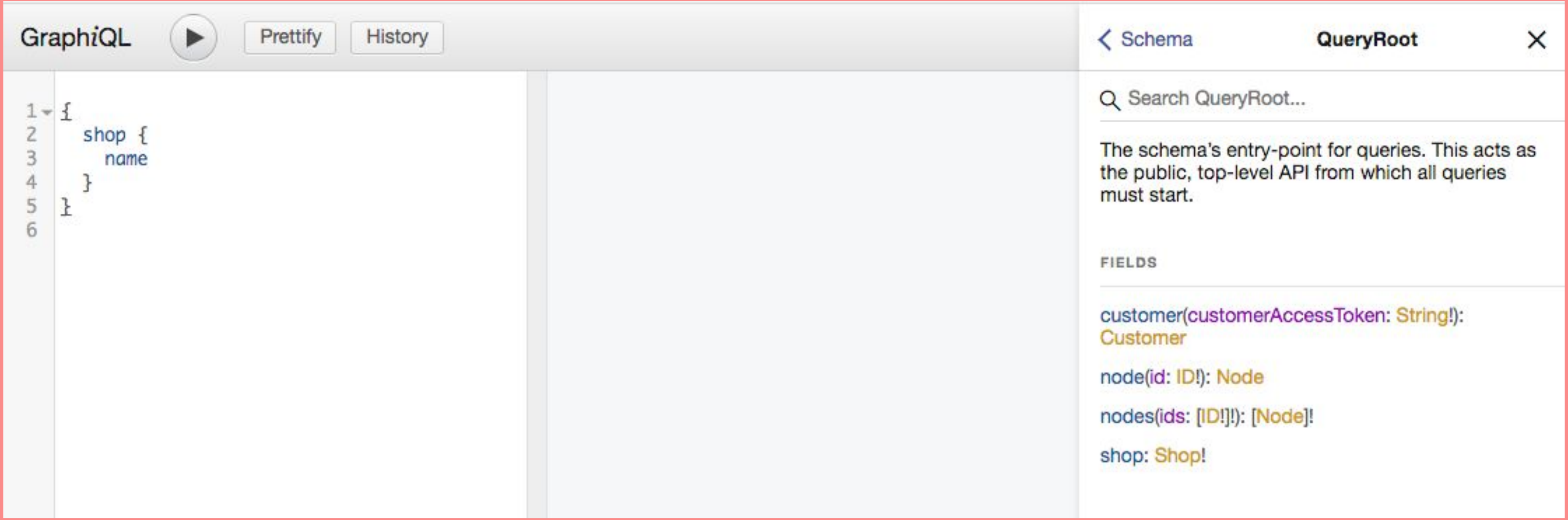
ROOT TYPES

query: QueryRoot

mutation: Mutation

Query to fetch products

4. We want to retrieve products from our shop. Click "Shop!"



```
{
  shop {
    name
  }
}
```

The schema's entry-point for queries. This acts as the public, top-level API from which all queries must start.

FIELDS

customer(customerAccessToken: String!): Customer

node(id: ID!): Node

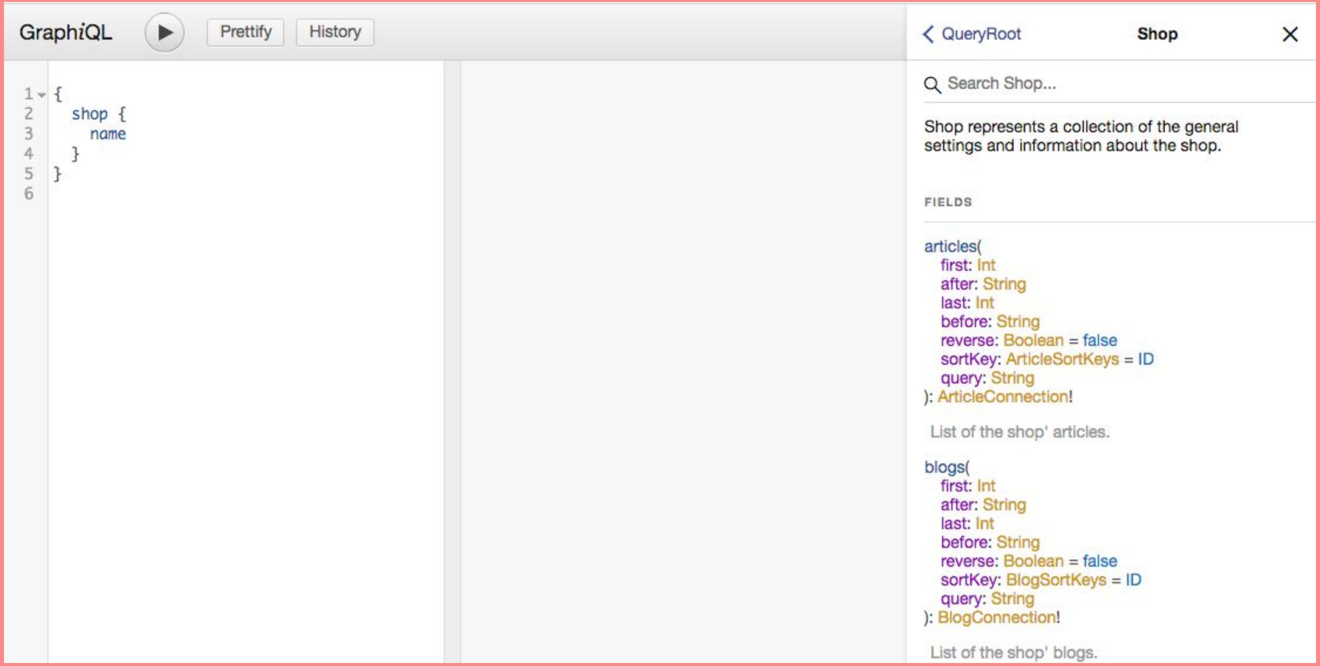
nodes(ids: [ID!]!): [Node]!

shop: Shop!

Query to fetch products

5. Scroll through the documentation until you find "products."

6. Click "products."



```
{
  shop {
    name
  }
}
```

Shop represents a collection of the general settings and information about the shop.

```
articles(
  first: Int
  after: String
  last: Int
  before: String
  reverse: Boolean = false
  sortKey: ArticleSortKeys = ID
  query: String
): ArticleConnection!
```

List of the shop' articles.

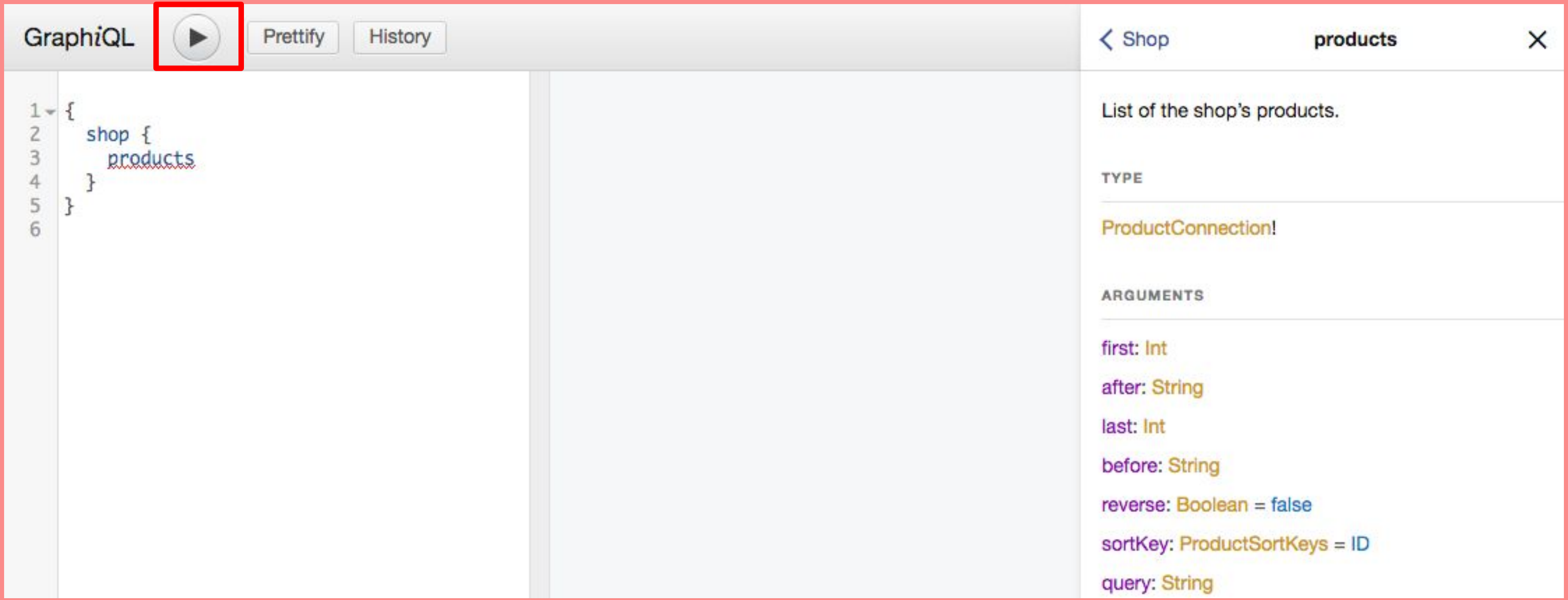
```
blogs(
  first: Int
  after: String
  last: Int
  before: String
  reverse: Boolean = false
  sortKey: BlogSortKeys = ID
  query: String
): BlogConnection!
```

List of the shop' blogs.

Query to fetch products

7. In the left section of the GraphiQL explorer, replace "name" with "products.

8. Click the Play symbol.



```
{
  shop {
    products
  }
}
```

List of the shop's products.

TYPE

ProductConnection!

ARGUMENTS

first: Int

after: String

last: Int

before: String

reverse: Boolean = false

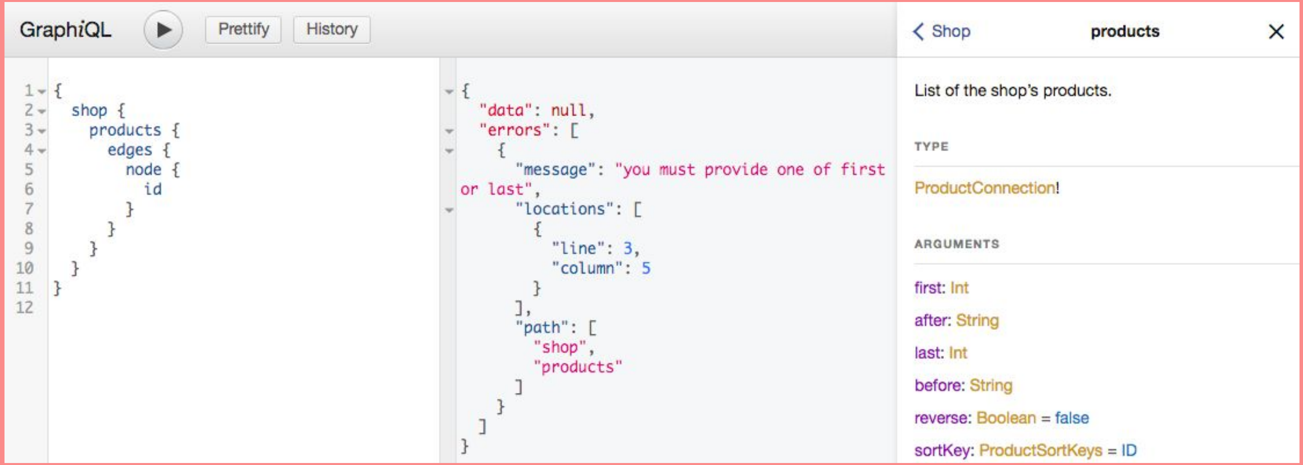
sortKey: ProductSortKeys = ID

query: String

Query to fetch products

Two things happened:

1. Several more required fields were added.
2. We received an error message: "`you must provide one of first or last.`"



```
{
  shop {
    products {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": null,
  "errors": [
    {
      "message": "you must provide one of first or last",
      "locations": [
        {
          "line": 3,
          "column": 5
        }
      ],
      "path": [
        "shop",
        "products"
      ]
    }
  ]
}
```

List of the shop's products.

TYPE

ProductConnection!

ARGUMENTS

first: Int

after: String

last: Int

before: String

reverse: Boolean = false

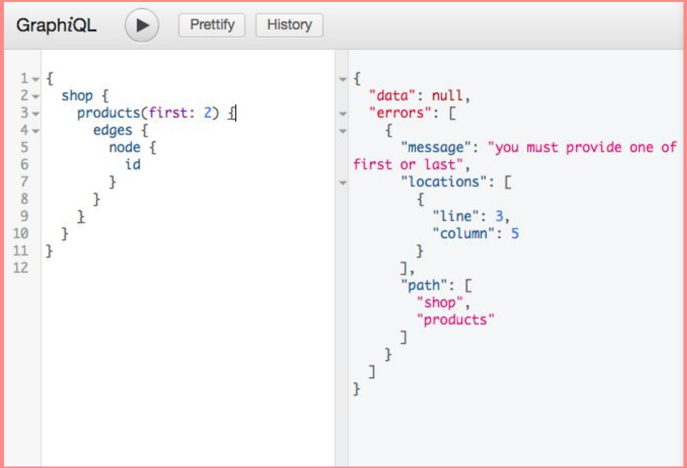
sortKey: ProductSortKeys = ID

Query to fetch products

`first` and `last` are arguments that can be passed to "`products`." We want to retrieve the first 2 products we added to our storefront.

9. Add `(first: 2)` to the end of the word "`products`."

10. Click the Play symbol.



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

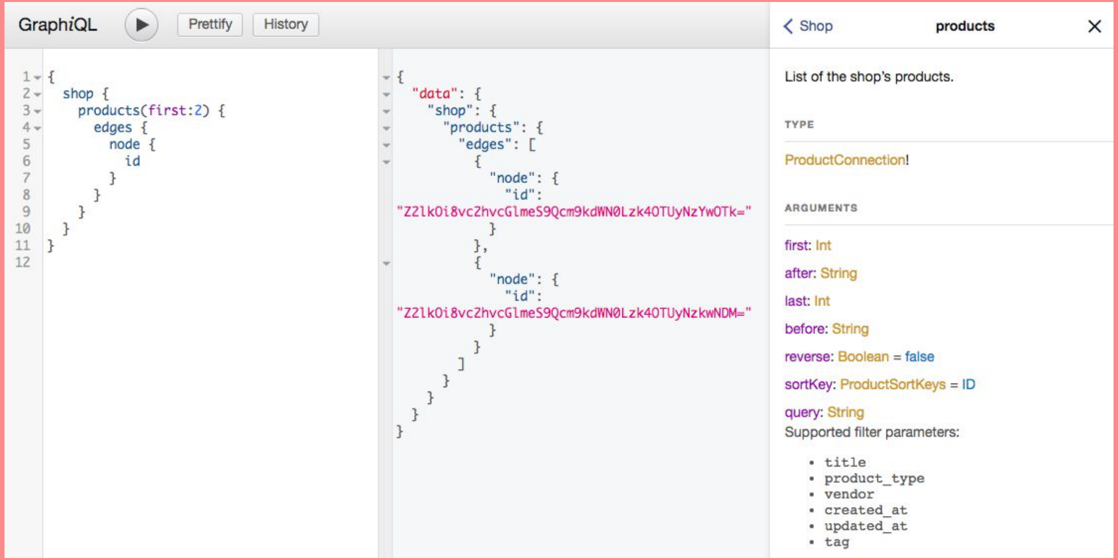
```
{
  "data": null,
  "errors": [
    {
      "message": "you must provide one of first or last",
      "locations": [
        {
          "line": 3,
          "column": 5
        }
      ],
      "path": [
        "shop",
        "products"
      ]
    }
  ]
}
```

Key term: Argument: *Information passed to a function that is used by the function to produce the desired result.*

Query to fetch products

Now, a response has been returned!

11. Click "`Product Connection!`" to see what other information can be returned.



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk="
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM="
            }
          }
        ]
      }
    }
  }
}
```

List of the shop's products.

TYPE

ProductConnection!

ARGUMENTS

first: Int

after: String

last: Int

before: String

reverse: Boolean = false

sortKey: ProductSortKeys = ID

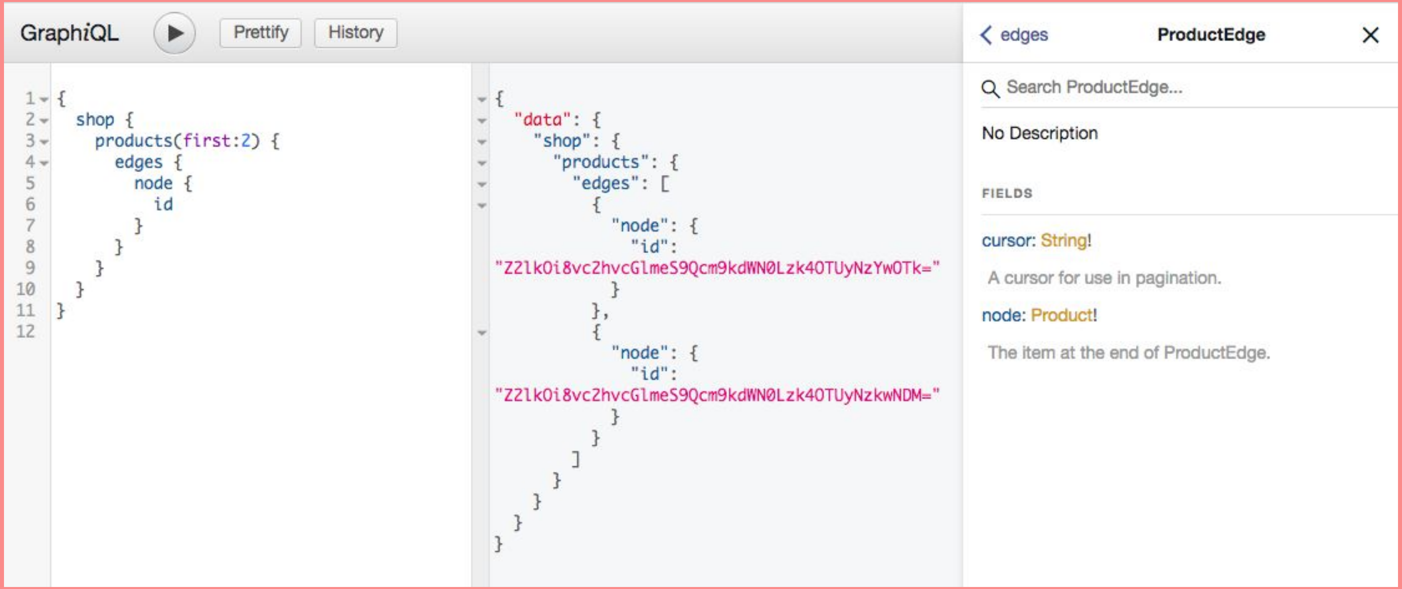
query: String
Supported filter parameters:

- `title`
- `product_type`
- `vendor`
- `created_at`
- `updated_at`
- `tag`

Query to fetch products

In the query, inside of "products," the "edges" field is added.

12. Click "`ProductEdge!`" to see what fields "`edges`" accepts.



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk="
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM="
            }
          }
        ]
      }
    }
  }
}
```

No Description

FIELDS

cursor: String!

A cursor for use in pagination.

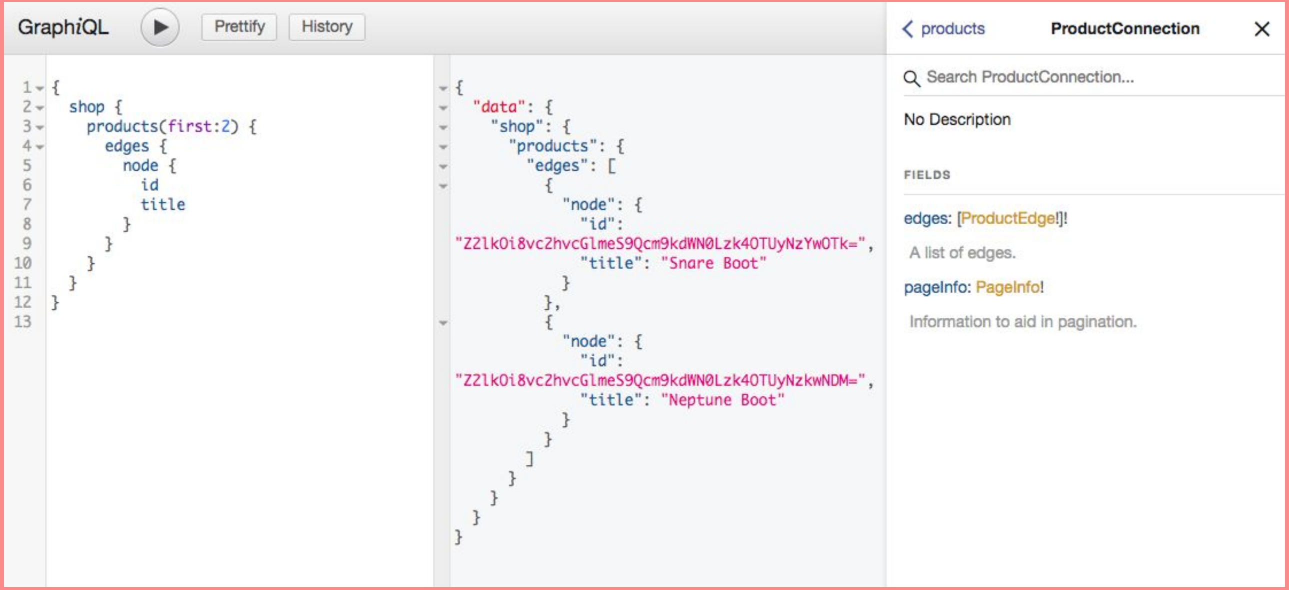
node: Product!

The item at the end of ProductEdge.

Query to fetch products

Inside of the "`edges`" field, there is the "`node`" field.

13. Click "`Product!`" to see what fields "`node`" accepts.



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
          title
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk=",
              "title": "Snare Boot"
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM=",
              "title": "Neptune Boot"
            }
          }
        ]
      }
    }
  }
}
```

< products ProductConnection

Search ProductConnection...

No Description

FIELDS

edges: [ProductEdge!]!

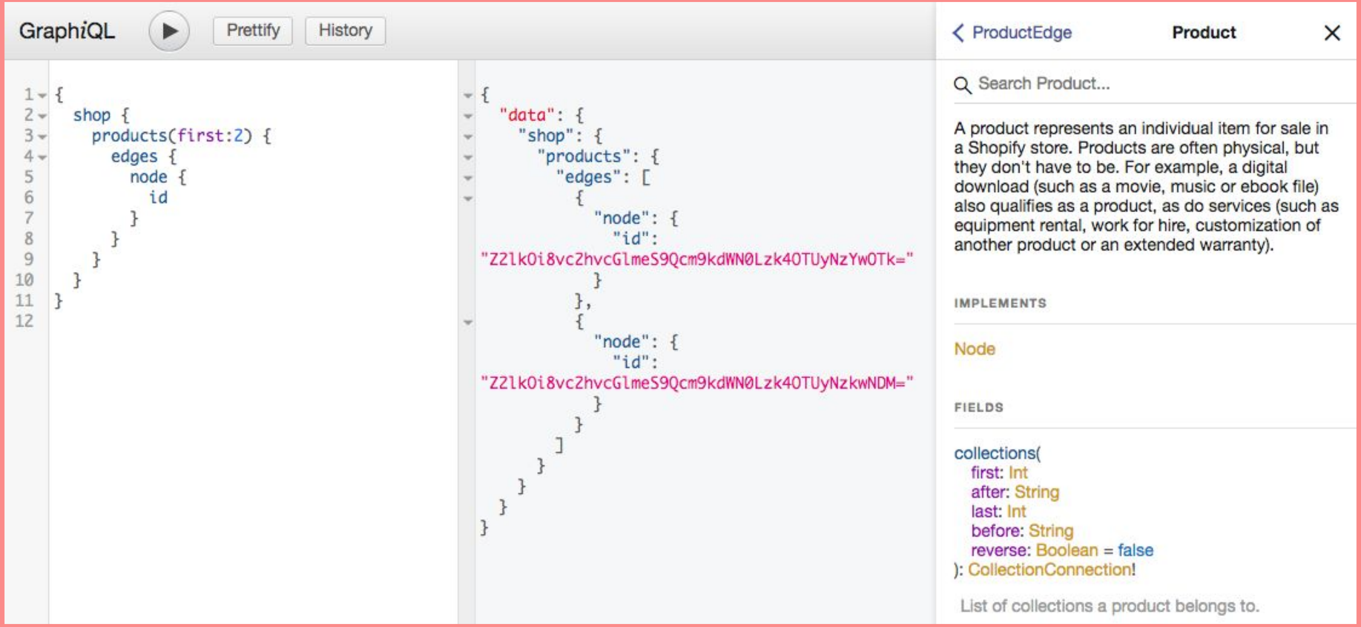
A list of edges.

pageInfo: PageInfo!

Information to aid in pagination.

Query to fetch products

Question: What are the two pieces of information that we need to retrieve to include in our game?



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk="
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM="
            }
          }
        ]
      }
    }
  }
}
```

< ProductEdge **Product** ✕

Search Product...

A product represents an individual item for sale in a Shopify store. Products are often physical, but they don't have to be. For example, a digital download (such as a movie, music or ebook file) also qualifies as a product, as do services (such as equipment rental, work for hire, customization of another product or an extended warranty).

IMPLEMENTS

Node

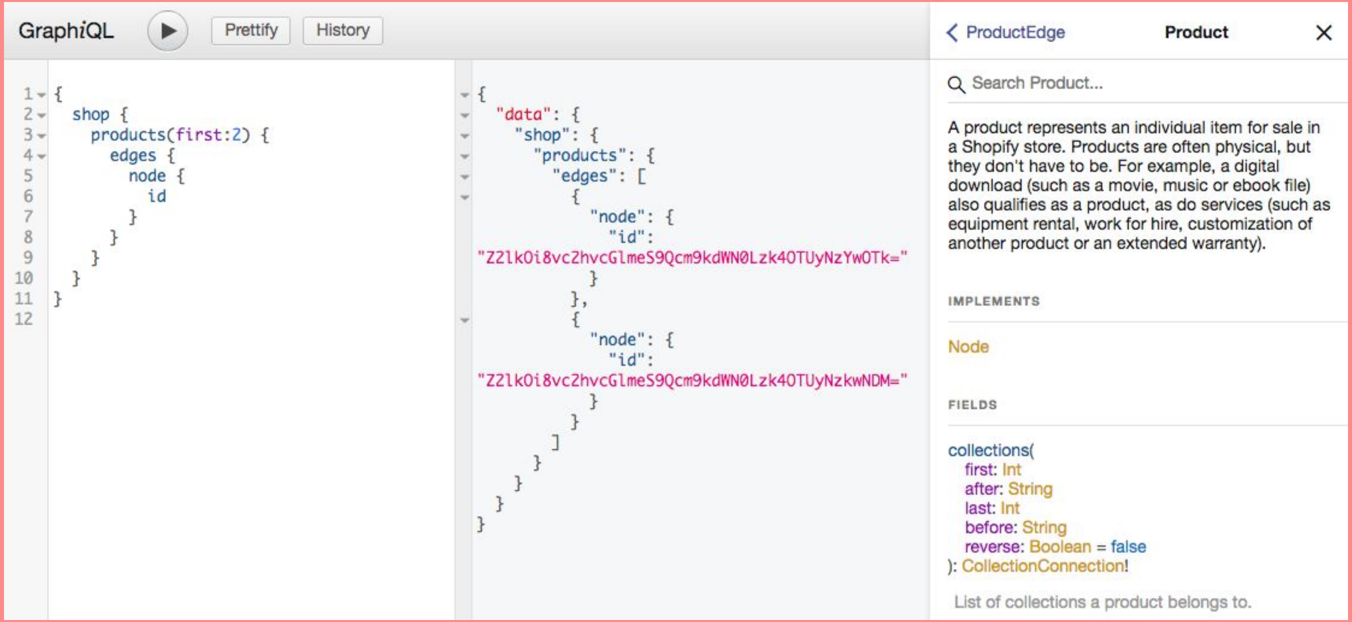
FIELDS

```
collections(
  first: Int
  after: String
  last: Int
  before: String
  reverse: Boolean = false
): CollectionConnection!
```

List of collections a product belongs to.

Query to fetch products

Answer: `images` and `title`



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk="
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM="
            }
          }
        ]
      }
    }
  }
}
```

< ProductEdge **Product** ×

Search Product...

A product represents an individual item for sale in a Shopify store. Products are often physical, but they don't have to be. For example, a digital download (such as a movie, music or ebook file) also qualifies as a product, as do services (such as equipment rental, work for hire, customization of another product or an extended warranty).

IMPLEMENTS

Node

FIELDS

```
collections(
  first: Int
  after: String
  last: Int
  before: String
  reverse: Boolean = false
): CollectionConnection!
```

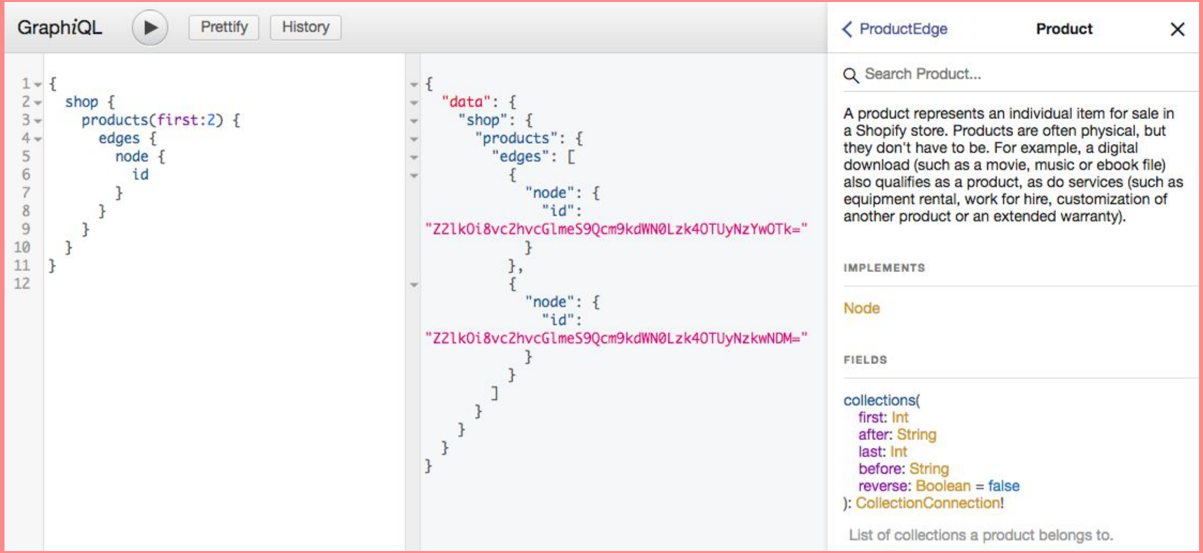
List of collections a product belongs to.

Query to fetch products

14. In the query, delete "`id`" because we don't need it.

15. Replace it with "`title`."

16. Click the Play symbol.



```
{
  shop {
    products(first:2) {
      edges {
        node {
          id
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzYwOTk="
            }
          },
          {
            "node": {
              "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0Lzk4OTUyNzkwNDM="
            }
          }
        ]
      }
    }
  }
}
```

A product represents an individual item for sale in a Shopify store. Products are often physical, but they don't have to be. For example, a digital download (such as a movie, music or ebook file) also qualifies as a product, as do services (such as equipment rental, work for hire, customization of another product or an extended warranty).

IMPLEMENTS

Node

FIELDS

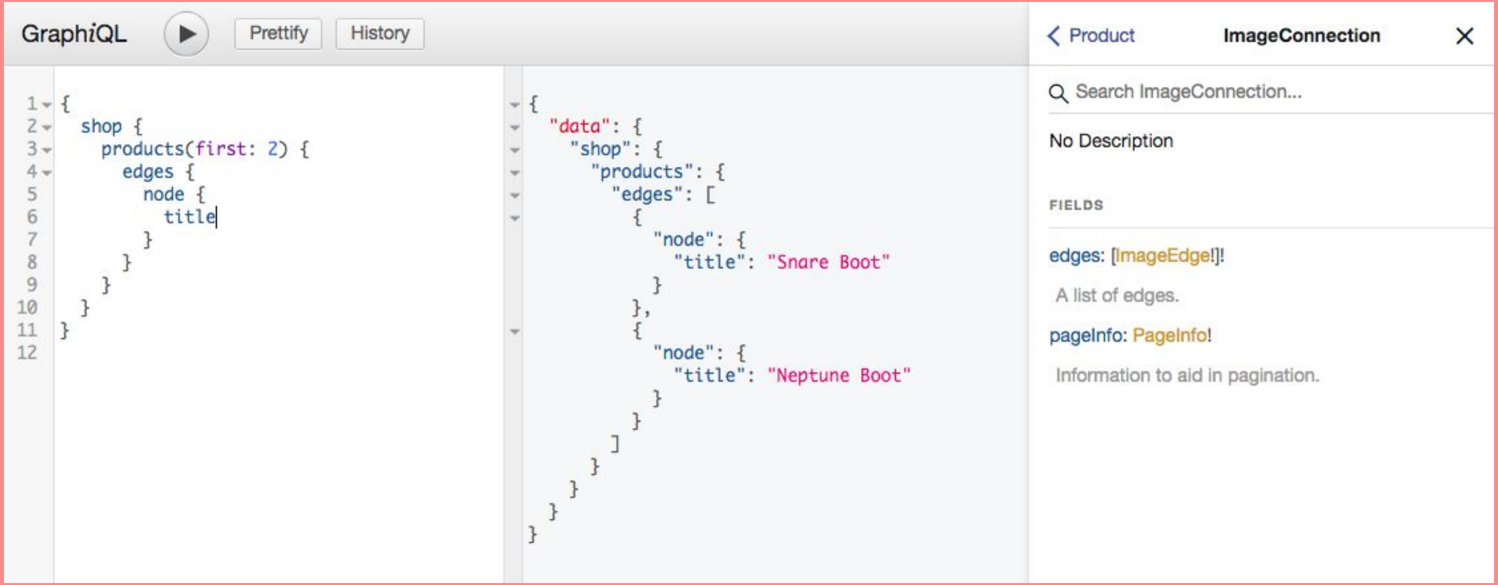
```
collections(
  first: Int
  after: String
  last: Int
  before: String
  reverse: Boolean = false
): CollectionConnection!
```

List of collections a product belongs to.

Query to fetch products

17. Below `title`, add the "`images`" field.

18. Click the Play symbol.



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          title
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "title": "Snare Boot"
            }
          },
          {
            "node": {
              "title": "Neptune Boot"
            }
          }
        ]
      }
    }
  }
}
```

No Description

FIELDS

edges: [ImageEdge!]!

A list of edges.

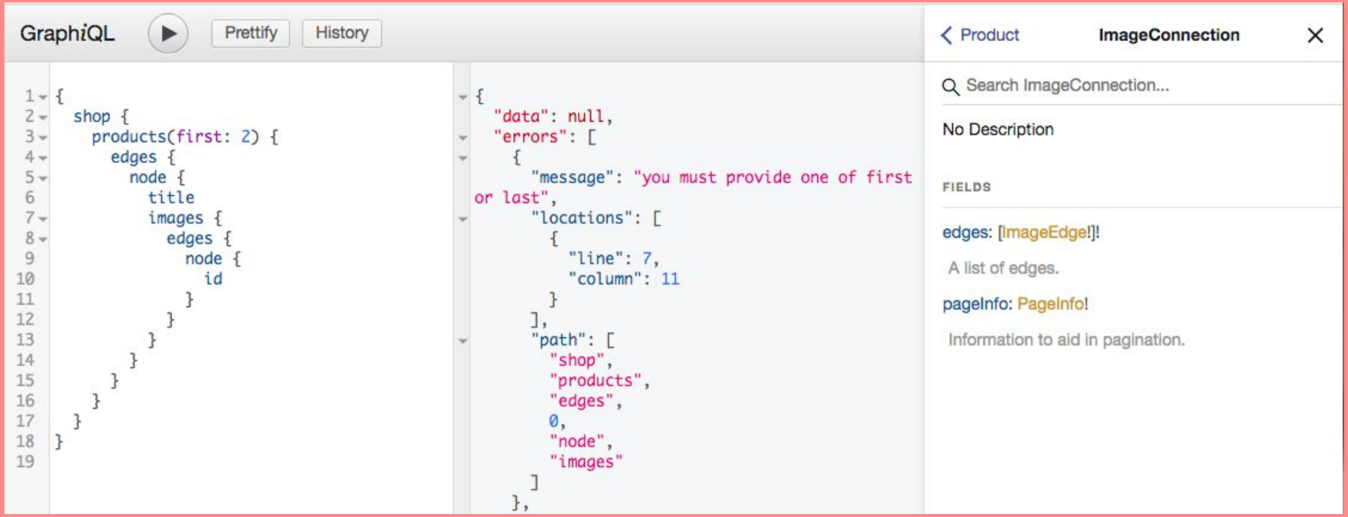
pageInfo: PageInfo!

Information to aid in pagination.

Query to fetch products

We get the same error message: "`you must provide one of first or last`" and the location for the error is line 7. The "`images`" field is on line 7.

19. Add (`first: 1`) to "`images`." Click Play.



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          title
          images {
            edges {
              node {
                id
              }
            }
          }
        }
      }
    }
  }
}
```

```
{
  "data": null,
  "errors": [
    {
      "message": "you must provide one of first
or last",
      "locations": [
        {
          "line": 7,
          "column": 11
        }
      ],
      "path": [
        "shop",
        "products",
        "edges",
        0,
        "node",
        "images"
      ]
    },
```

Search ImageConnection...

No Description

FIELDS

edges: [ImageEdge!]!

A list of edges.

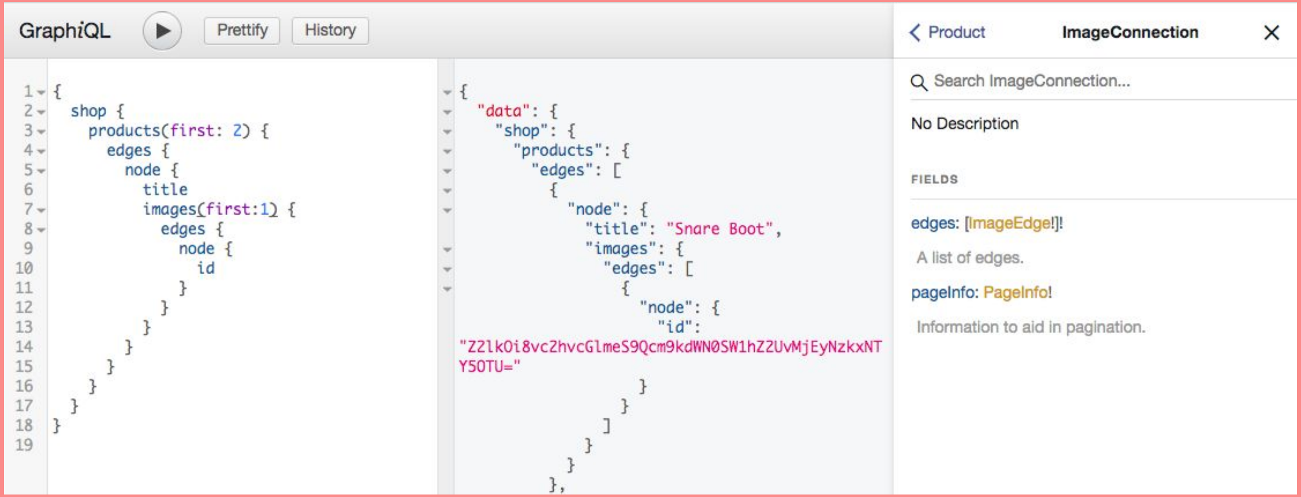
pageInfo: PageInfo!

Information to aid in pagination.

Query to fetch products

That worked. However, the "`id`" field isn't very useful when trying to put the image on our webpage. Let's find out what other fields we can request.

20. Click "`ImageConnection!`" then "`ImageEdge!`" then "`Image.`"



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          title
          images(first:1) {
            edges {
              node {
                id
              }
            }
          }
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "title": "Snare Boot",
              "images": {
                "edges": [
                  {
                    "node": {
                      "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0SW1hZ2UvMjEyNzkxNTY5OTU="
                    }
                  }
                ]
              }
            }
          },
```

< Product   ImageConnection   ✕

Search ImageConnection...

No Description

FIELDS

edges: [ImageEdge!]!

A list of edges.

pageInfo: PageInfo!

Information to aid in pagination.

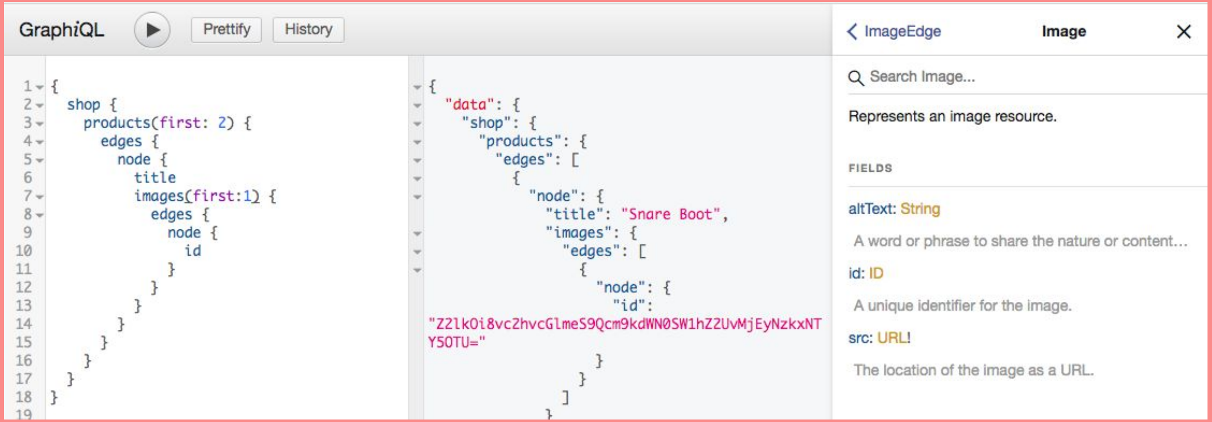
Query to fetch products

Instead of `id`, we can use `originalSrc`, which will return a `URL`.

That will be more helpful for adding the image to the game

21. Delete `id` and replace it with `originalSrc`.

22. Click the Play symbol.



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          title
          images(first:1) {
            edges {
              node {
                id
              }
            }
          }
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "title": "Snare Boot",
              "images": {
                "edges": [
                  {
                    "node": {
                      "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0SW1hZ2UvMjEyNzkxNTY5OTU="
                    }
                  }
                ]
```

Represents an image resource.

FIELDS

altText: String
A word or phrase to share the nature or content...

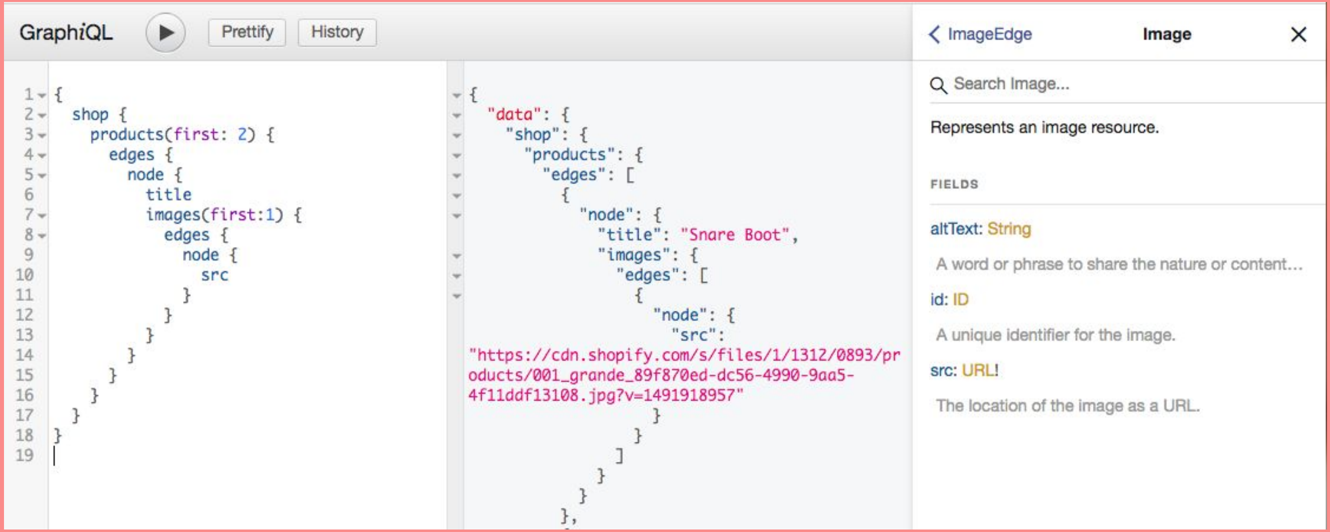
id: ID
A unique identifier for the image.

src: URL!
The location of the image as a URL.

Query to fetch products

In order to create a Checkout instance, we also need the product `variant`.

23. Under the 3rd closing curly brace below `src`, add "`variants(first: 1)`" and click the Play symbol.



```
{
  shop {
    products(first: 2) {
      edges {
        node {
          title
          images(first:1) {
            edges {
              node {
                src
              }
            }
          }
        }
      }
    }
  }
}
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "title": "Snare Boot",
              "images": {
                "edges": [
                  {
                    "node": {
                      "src":
"https://cdn.shopify.com/s/files/1/1312/0893/products/001_grande_89f870ed-dc56-4990-9aa5-4f11ddf13108.jpg?v=1491918957"
                    }
                  }
                ]
              }
            }
          },
```

Represents an image resource.

FIELDS

altText: String

A word or phrase to share the nature or content...

id: ID

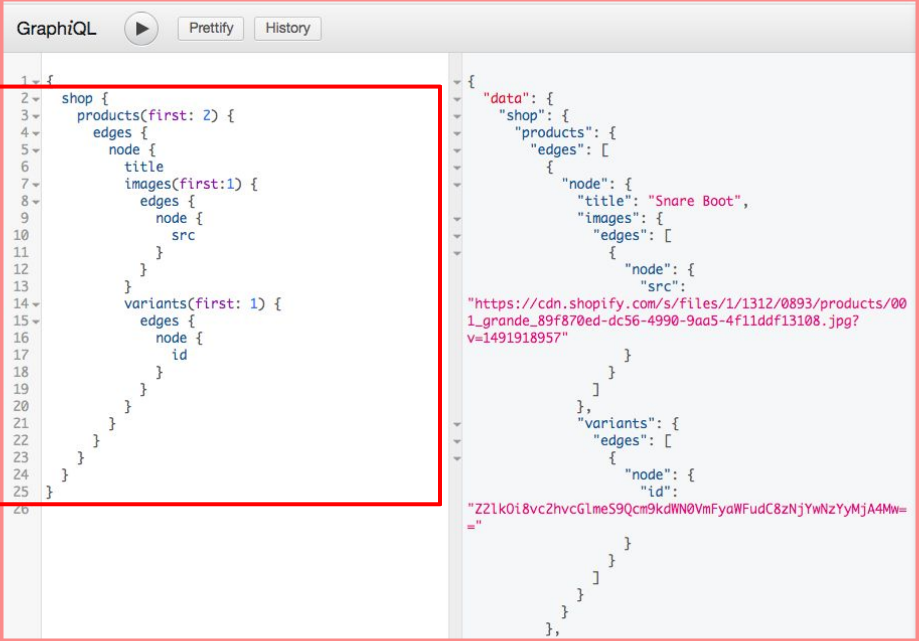
A unique identifier for the image.

src: URL!

The location of the image as a URL.

Query to fetch products

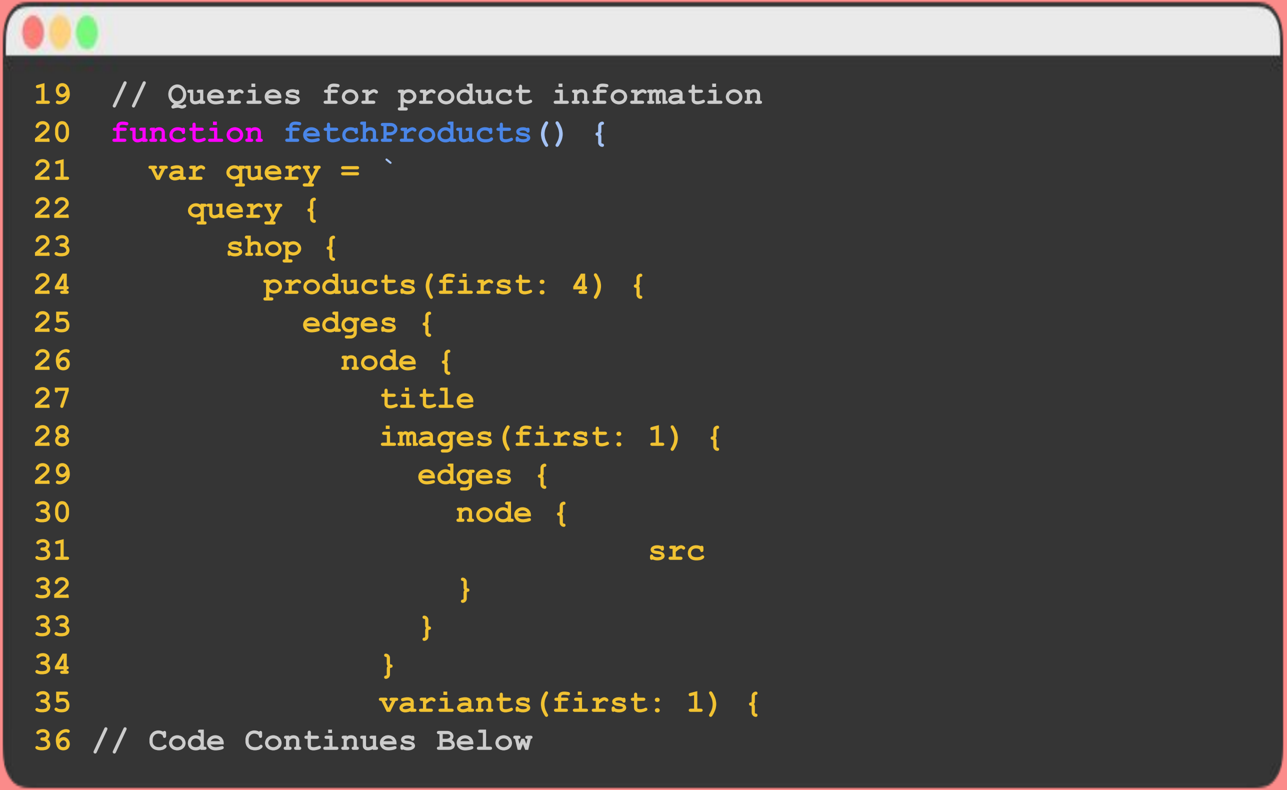
Now you have everything you need to write your query! Copy and paste the code from Line 2 to Line 24 of the GraphiQL explorer into **queries.js**.



```
 1 {
 2   shop {
 3     products(first: 2) {
 4       edges {
 5         node {
 6           title
 7           images(first:1) {
 8             edges {
 9               node {
10                 src
11               }
12             }
13           }
14           variants(first: 1) {
15             edges {
16               node {
17                 id
18               }
19             }
20           }
21         }
22       }
23     }
24   }
25 }
```

```
{
  "data": {
    "shop": {
      "products": {
        "edges": [
          {
            "node": {
              "title": "Snare Boot",
              "images": {
                "edges": [
                  {
                    "node": {
                      "src":
"https://cdn.shopify.com/s/files/1/1312/0893/products/00
1_grande_89f870ed-dc56-4990-9aa5-4f11ddf13108.jpg?
v=1491918957"
                    }
                  }
                ]
              },
              "variants": {
                "edges": [
                  {
                    "node": {
                      "id":
"Z2lkOi8vc2hvcGlmeS9Qcm9kdWN0VmFyaWFudC8zNjYwNzYyMjA4Mw=
="
                    }
                  }
                ]
              }
            }
          },
```

Write your first GraphQL call: *queries.js*

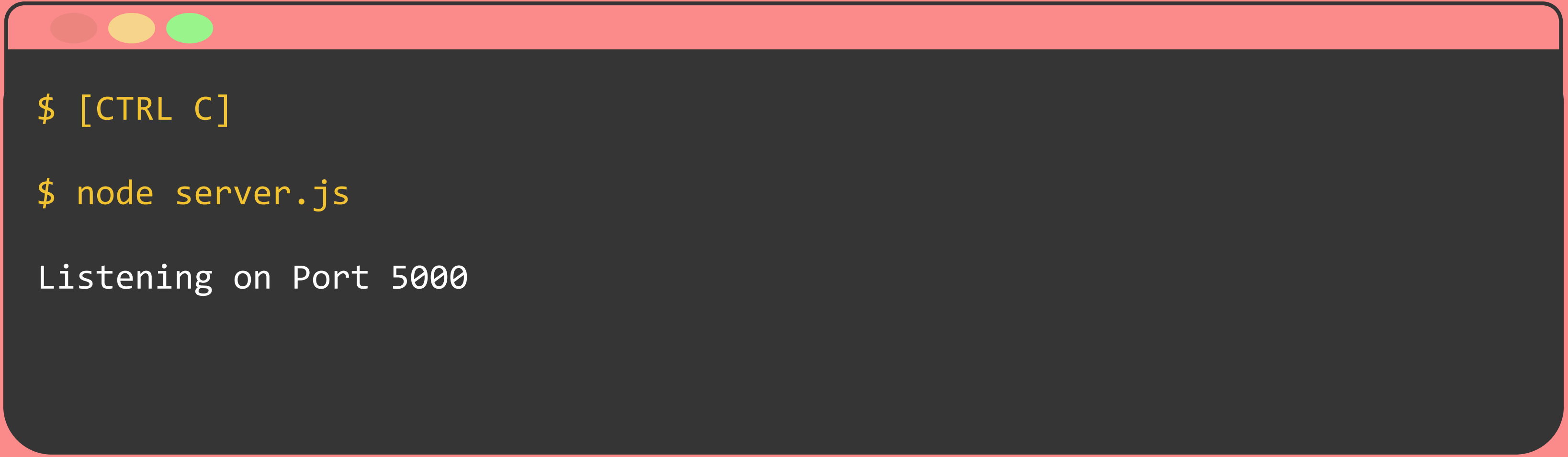


```
// Queries for product information
function fetchProducts() {
  var query = `
    query {
      shop {
        products(first: 4) {
          edges {
            node {
              title
              images(first: 1) {
                edges {
                  node {
                            src
                  }
                }
              }
              variants(first: 1) {
// Code Continues Below
```

Let’s test the game

1. Type [CTRL] [C] in the command line to kill the server.
2. Type `node server.js` to restart the server.

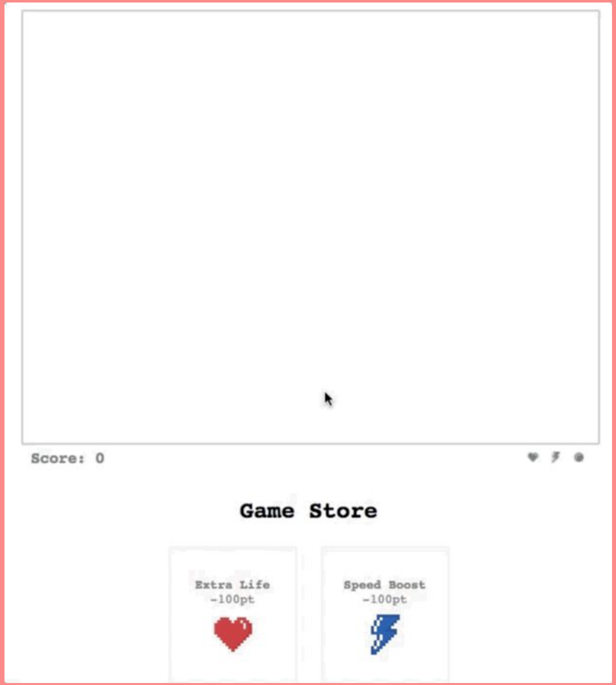
Mac and Windows



```
$ [CTRL C]

$ node server.js

Listening on Port 5000
```

Let's test the game

1. Refresh **localhost:5000** in the browser.
2. Try to purchase a power-up. What happens?

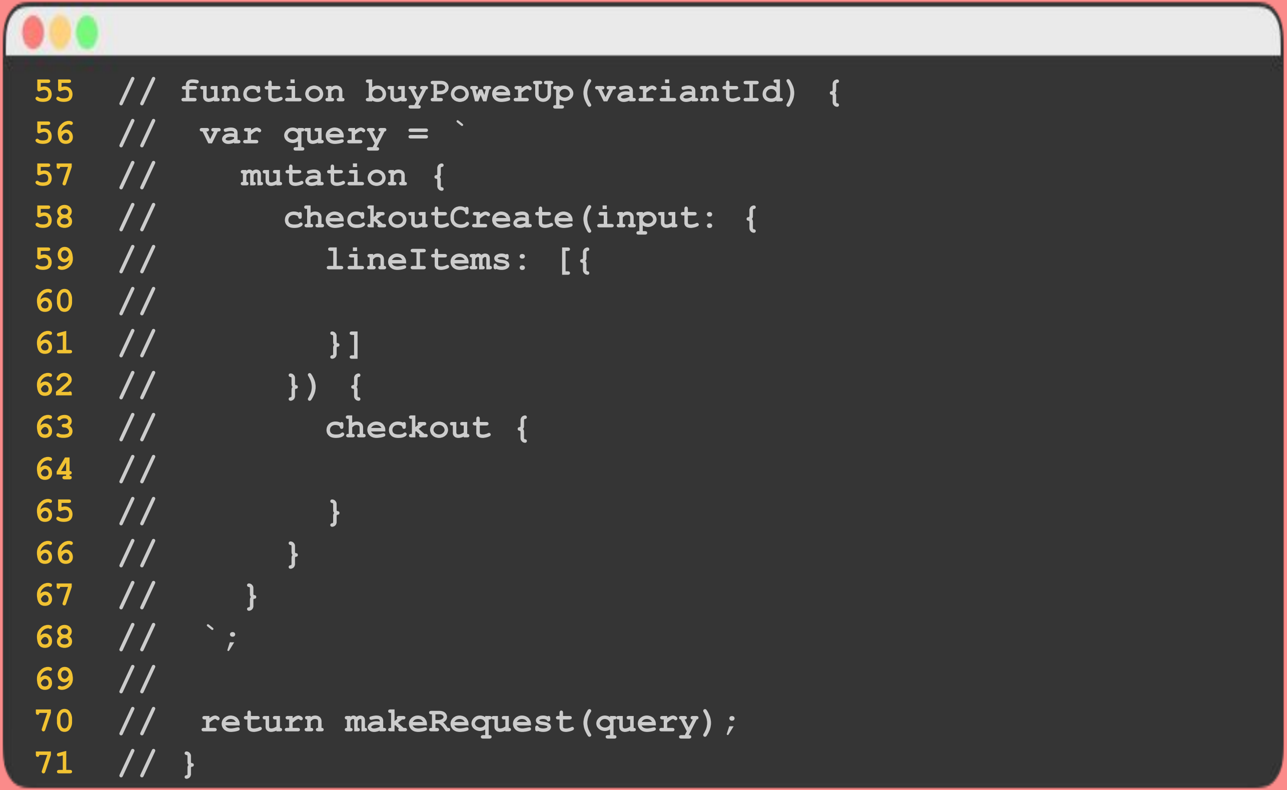


What queries do we need?

We completed the first query. Now let’s do the second!

1. ~~Retrieve the products from your store~~
2. **Create the Checkout**
3. Complete the Checkout

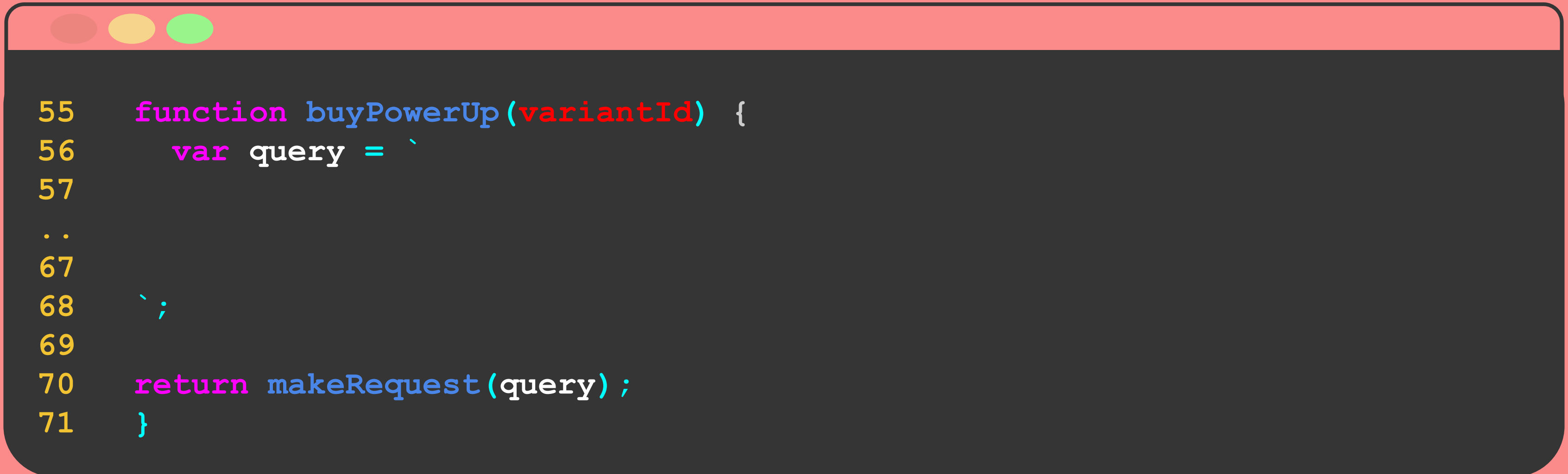
Write a mutation: Delete the double slashes / / on lines 53 to 64 in *queries.js*



```
55  // function buyPowerUp(variantId) {
56  //  var query = `
57  //    mutation {
58  //      checkoutCreate(input: {
59  //        lineItems: [{
60  //
61  //        }]
62  //      }) {
63  //        checkout {
64  //
65  //        }
66  //      }
67  //    }
68  //  `;
69  //
70  //  return makeRequest(query);
71  // }
```

Code review

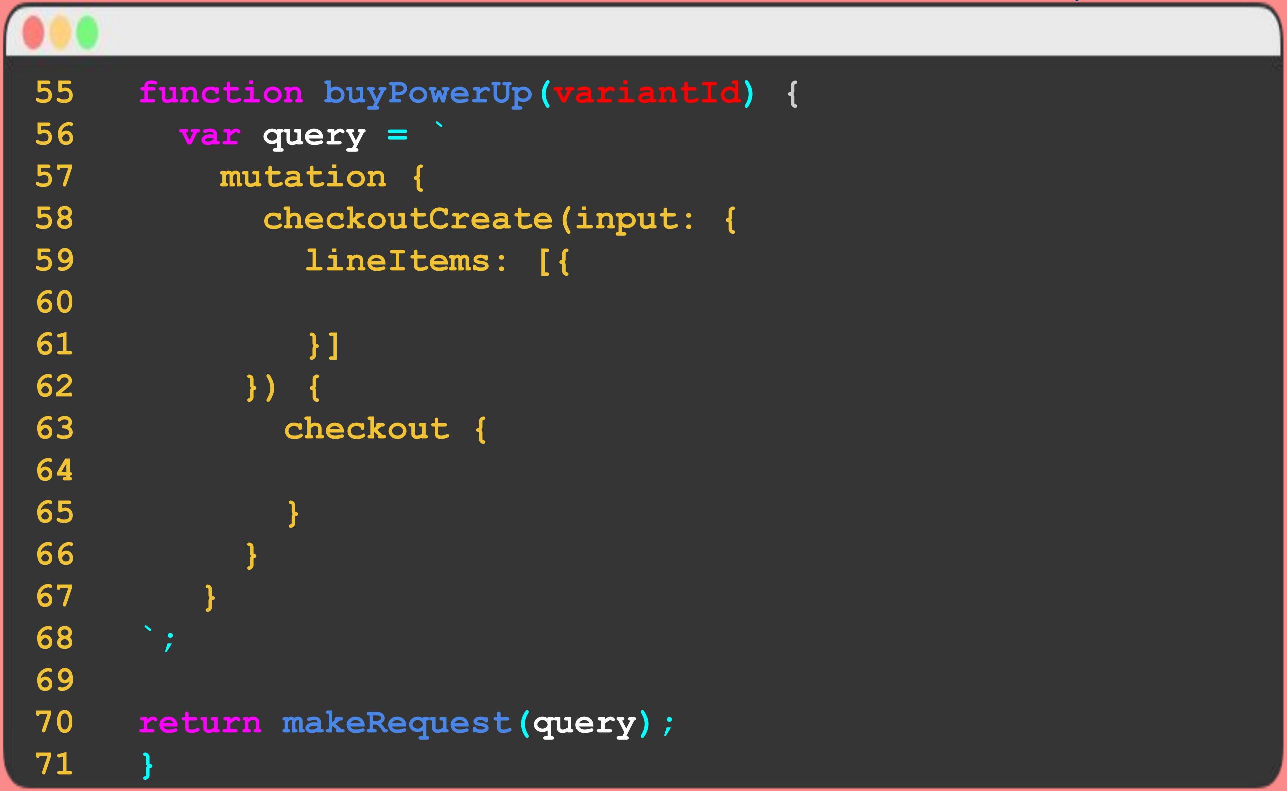
- Line 55 declares a function called `buyPowerUp()` that takes a single argument, `variantId`.
- `variantId` is the power-up that the user clicked on the website.
- Line 56 creates a new variable called `query`.



```
55   function buyPowerUp(variantId) {
56     var query = `
57
..
67
68   `;
69
70   return makeRequest(query);
71   }
```

Code review

Your code should look like this. Let’s break it into parts.



```
function buyPowerUp(variantId) {
  var query = `
    mutation {
      checkoutCreate(input: {
        lineItems: [{

        }]
     }) {
       checkout {

       }
     }
   }
`;

return makeRequest(query);
}
```

Code review

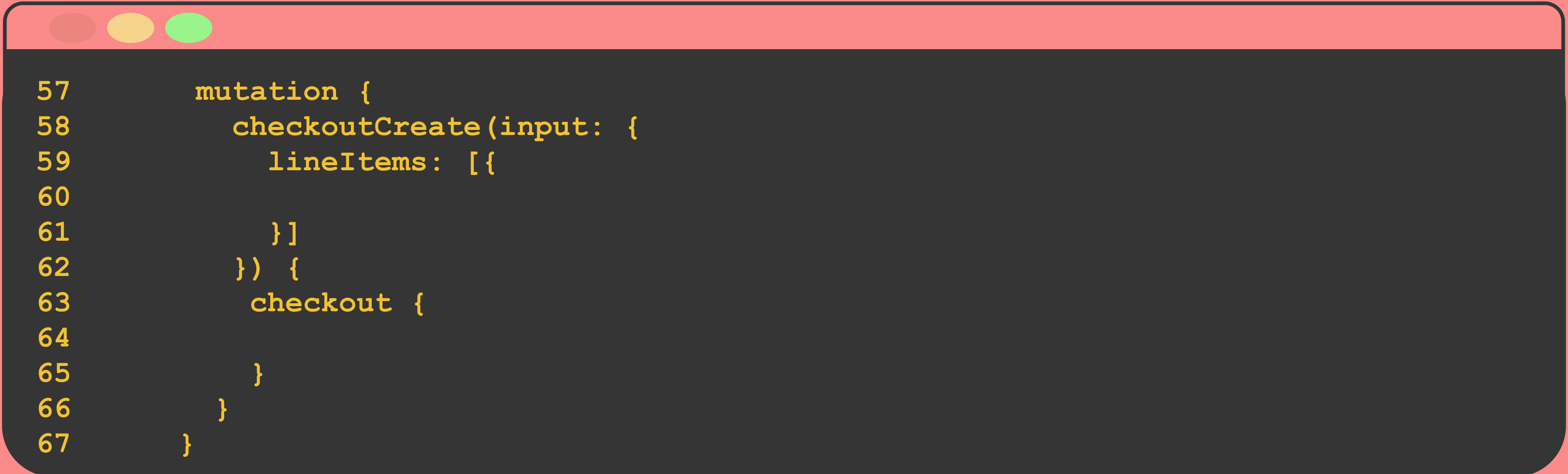
- Line 55 begins the mutation
- Line 56 specifies which mutation - `checkoutCreate()`
- Because `checkoutCreate()` is a mutation, it takes an argument, `input` (line 56), and returns a value, `checkout` (line 61).

```
57       mutation {
58         checkoutCreate(input: {
59           lineItems: [{
60
61           }]
62         }) {
63          checkout {
64
65          }
66        }
67      }
```

Code review

At **https://help.shopify.com/api/storefront-api/reference/mutation/checkoutcreate**, you can see a list of input fields that the `input` argument accepts.

- On line 59, the `lineItems` input field is added.
- The `lineItems` input field provides information about the items purchased.



```
57   mutation {
58     checkoutCreate(input: {
59       lineItems: [{
60
61       }]
62     }) {
63      checkout {
64
65      }
66    }
67  }
```

Challenge

Navigate to

https://help.shopify.com/api/storefront-api/reference/mutation/checkoutcreate

and explore the documentation to find which arguments `lineItems` requires.

```
 mutation {
   checkoutCreate(input: {
     lineItems: [{

     }]
   }) {
    checkout {

    }
  }
}
```

Solution

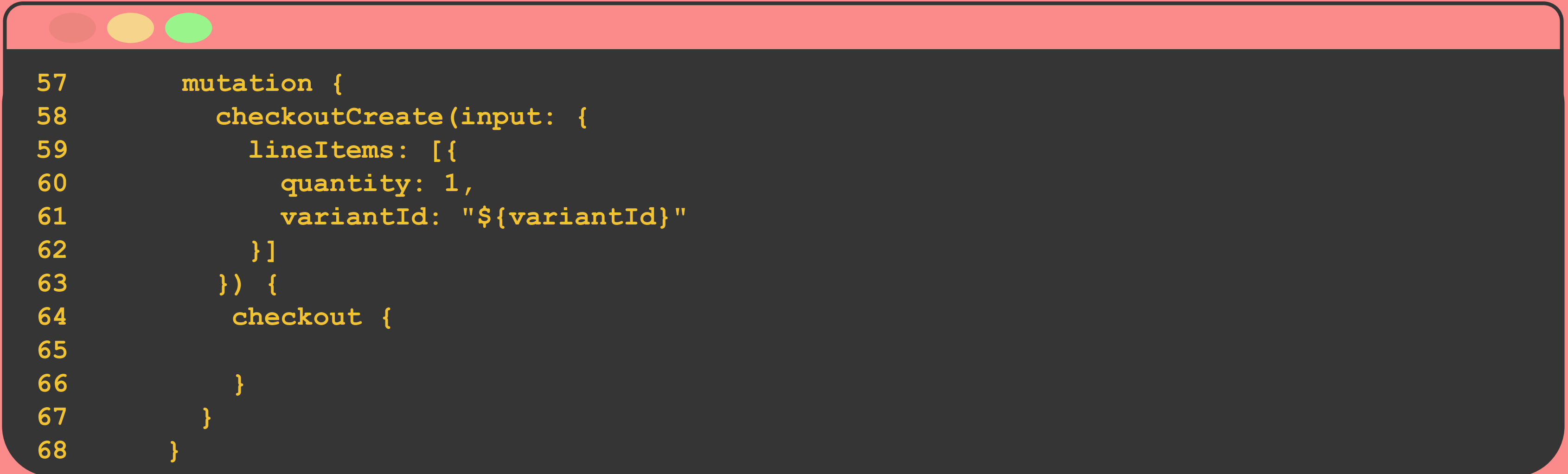
`lineItems` requires two arguments:

- `quantity`
- `variantId`

```
 mutation {
   checkoutCreate(input: {
     lineItems: [{

     }]
   }) {
    checkout {

    }
  }
}
```

Update your code

- On line 60, we added the `quantity` argument with a value of 1 which means the default number of power-ups to buy is 1.
- On line 61, we added the `variantId` argument with a value of "`${variantId}`" which takes the value we passed to the function on line 55 and puts into in the `query` variable.



```
57      mutation {
58        checkoutCreate(input: {
59          lineItems: [{
60            quantity: 1,
61            variantId: "${variantId}"
62          }]
63        }) {
64         checkout {
65
66         }
67       }
68      }
```

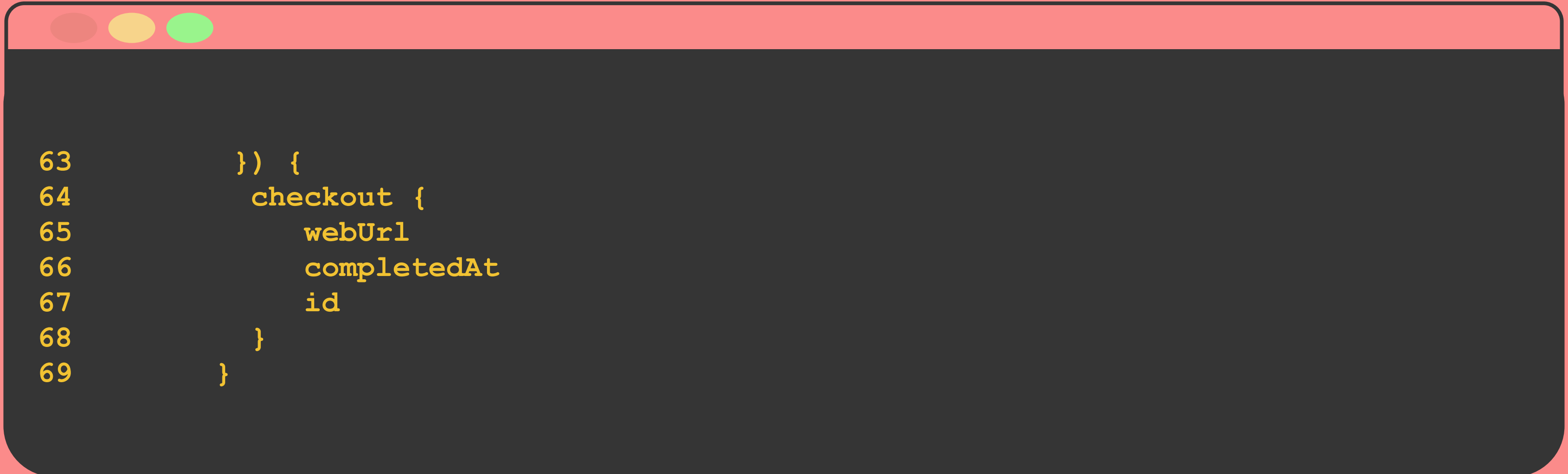
Challenge

- The `checkout` return field (line 62) has no input fields.
- We're going to add three. The first is `webUrl`.
- Look at the `checkCompletedPurchases()` function at the bottom of **queries.js** and compare it to the documentation for `checkout` to see if you can determine the other two input fields!

```
57        mutation {
58          checkoutCreate(input: {
59            lineItems: [{
60              quantity: 1,
61              variantId: "${variantId}"
62            }]
63          }) {
64           checkout {
65
66           }
67         }
68       }
```

Solution

The three fields are `webUrl`, `completedAt`, and `id`.

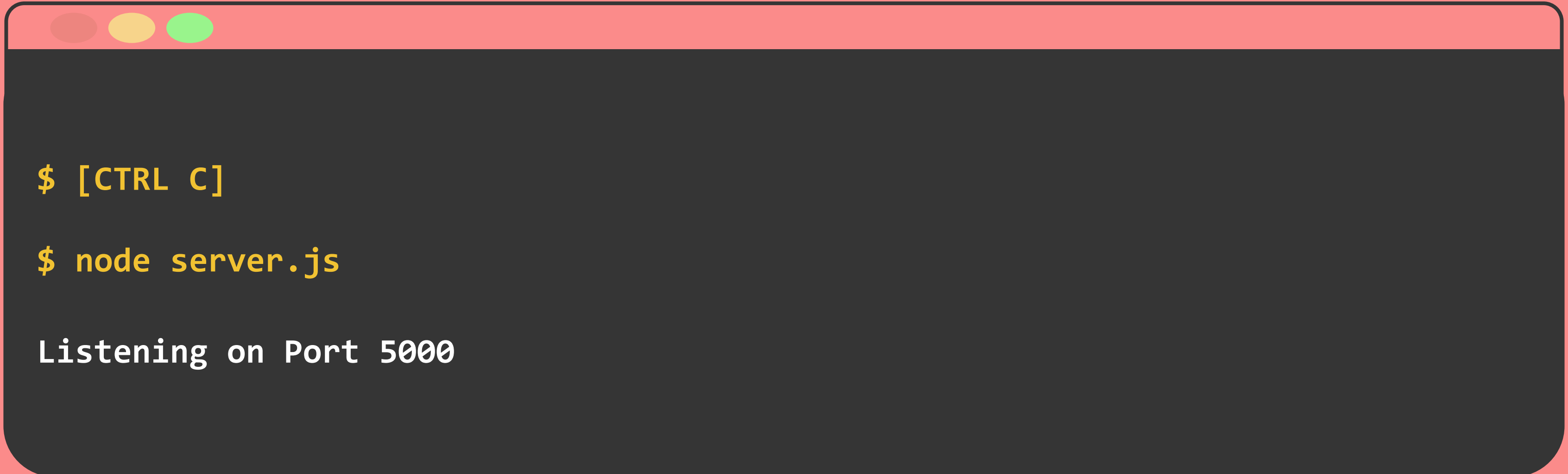


```
 }) {
  checkout {
     webUrl
     completedAt
     id
  }
}
```

Let’s test the game

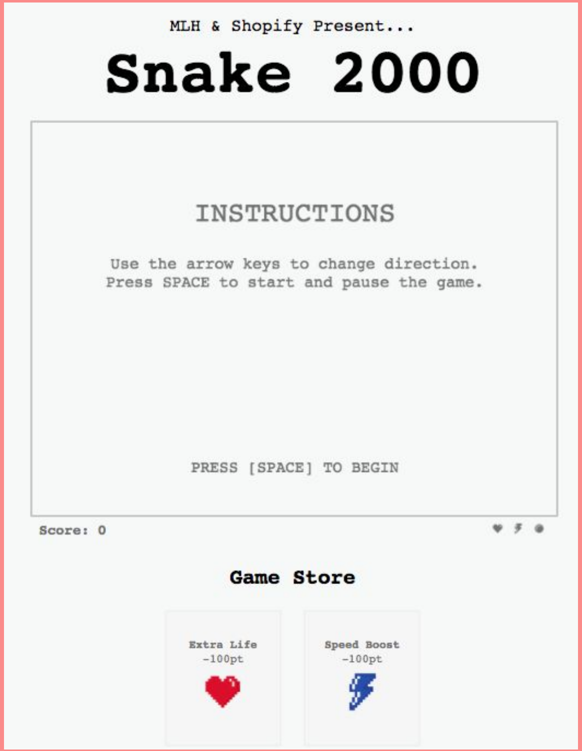
- Type [CTRL] [C] in the command line to kill the server.
- Type `node server.js` to restart the server.

Mac and Windows



```
$ [CTRL C]

$ node server.js

Listening on Port 5000
```

Test your game!



MLH & Shopify Present...

Snake 2000

INSTRUCTIONS

Use the arrow keys to change direction.
Press SPACE to start and pause the game.

PRESS [SPACE] TO BEGIN

Score: 0

Game Store

Extra Life
-100pt

Speed Boost
-100pt

Table of contents

Let’s recap quickly...

1. GraphQL is a new specification for interacting with APIs
2. GraphQL calls fall into two groups - queries and mutations
3. GraphQL allows you to request only the information you need, making it easy to create a Shopify storefront in your app while avoiding data overload.

Table of contents

Keep learning

Practice problems for later

1. **Categories**

Challenge: Reorganize your products into categories, which will require you to update the requests you make.

2. **Subscriptions**

Challenge: Learn about the third type of GraphQL query - a subscription - and try to recreate the 3rd GraphQL call in queries.js from scratch, with help from the documentation

Continue your learning

shopify

- Read the GraphQL documentation:
  http://graphql.org/learn/
- Read the Shopify Storefront documentation:
  https://help.shopify.com/api/storefront-api
- Read the Shopify Admin documentation:
  https://help.shopify.com/en/api/graphql-admin-api
- Discover other APIs using GraphQL
  http://graphql.org/users/

Shopify developer program

shopify developers

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- Keep 80% of any app revenue you generate
- Refer stores and generate ongoing income
- Help build the future of commerce!

http://developers.shopify.com
@ShopifyDevs

Have a couple minutes?

Please take this super short survey! Your feedback is a gift. 👋

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Thank you! Don’t be a stranger!

And don’t forget your socks 👣

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