SubQuery

Making the world's decentralised data more accessible.

Lab Exercise Guide

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SubQuery

Introduction

In this lab, students will have the opportunity to become familiar with SubQuery with some hands-on experience creating a simple Hello World SubQuery project. This project will use the subql CLI to create an empty project shell, and then code will be provided to query the Polkadot mainnet for the blockheight. A Docker environment will be used to run this example for simplicity.

Pre-requisites

You will require the following:

- NPM package manager
- SubQuery CLI (@subql/cli)
- Docker

Package manager

Run the following command in your terminal:

```
brew update
brew install node
```

SubQuery CLI

```
npm install -g @subql/cli
```

Docker

Please visit https://docs.docker.com/get-docker/ for instructions on how to install Docker for your specific operating system.

Exercise 1: Hello World

High level steps

1. Initialise a project
2. Update your mappings
3. Update your manifest file
4. Update your graphql schema file
5. Generate your code
6. Build your code
7. Deploy your code in Docker

Detailed steps

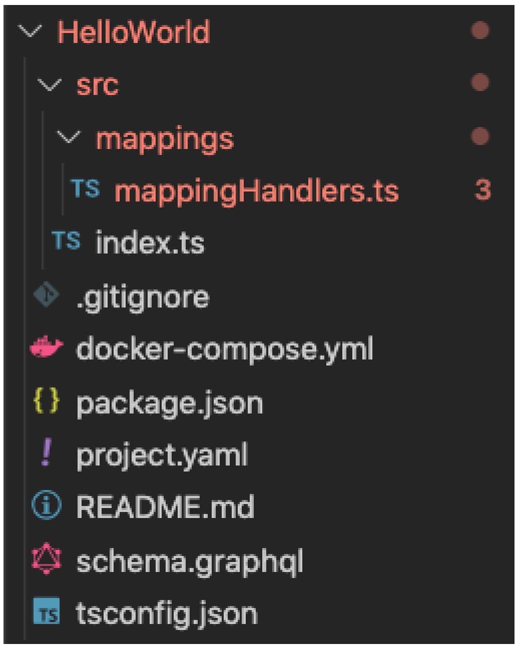
Step 1: Initialize your project

The first step in creating a SubQuery project is to create a project with the following command:

```
~/Code/subQuery$ subql init
Project name [subql-starter]: HelloWorld
Git repository:
RPC endpoint [wss://polkadot.api.onfinality.io/public-ws]:
Authors: sa
Description:
Version: [1.0.0]:
License: [Apache-2.0]:
Init the starter package... HelloWorld is ready
```

All the fields are optional except “author”. Also, note that any text in the square brackets are the default values that will be used if nothing is provided.

This creates a framework and the following directory structure saving you time.



```
HelloWorld
  src
    mappings
      mappingHandlers.ts   3
    index.ts
  .gitignore
  docker-compose.yml
  package.json
  project.yaml
  README.md
  schema.graphql
  tsconfig.json
```

Step 2: Update the mappings file

The initialisation command pre-creates a sample mappings file with 3 functions. HandleBlock, handleEvent and handleCall. For this exercise we will focus on the first function called handleBlock so delete the remaining functions. The mappingHandler.ts file should look like this:

```
import {SubstrateExtrinsic,SubstrateEvent,SubstrateBlock} from
"@subql/types";
import {StarterEntity} from "../types";
import {Balance} from "@polkadot/types/interfaces";


export async function handleBlock(block: SubstrateBlock):
Promise<void> {
    //Create a new starterEntity with ID using block hash
    let record = new
StarterEntity(block.block.header.hash.toString());
    //Record block number
    record.field1 = block.block.header.number.toNumber();
    await record.save();
}
```

Step 3: Update the manifest file (aka project.yaml)

The initialisation command also pre-creates a sample manifest file and defines 3 handlers. Because we have removed handleEvent and handleCall from the mappings file, we have to remove them from the manifest file as well.

The manifest file should look like this:

```
specVersion: 0.0.1
description: ''
repository: ''
schema: ./schema.graphql
network:
  endpoint: wss://polkadot.api.onfinality.io/public-ws
  dictionary:
https://api.subquery.network/sq/subquery/dictionary-polkadot
dataSources:
  - name: main
    kind: substrate/Runtime
    startBlock: 1
    mapping:
      handlers:
        - handler: handleBlock
          kind: substrate/BlockHandler
```

Step 4: Update the graphql schema

The default schema.graphql file will contain 5 fields. We can remove fields 2 through to 5 because the handleBlock function in the mappings file only uses “field1”.

> Extra: Rename field1 to something more meaningful. Eg blockHeight. Note that if you do this, don’t forget to update the reference to field1 in the mappings file appropriately.

The schema file should look like this:

```
type StarterEntity @entity {
  id: ID! #id is a required field
  blockHeight: Int!
}
```

Step 5: Install the dependencies

Install the node dependencies by running the following commands:

```
yarn install
```

OR

```
npm install
```

Step 6: Generate the associated typescript

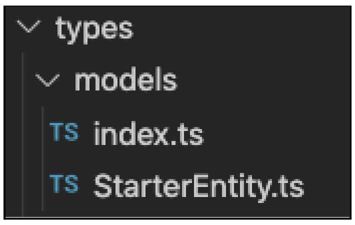
Next, we will generate the associated typescript with the following command:

```
yarn codegen
```

OR

```
npm run-script codegen
```

You should see a new folder appear with 2 new files.



```
types
  models
    index.ts
    StarterEntity.ts
```

Step 7: Build the project

The next step is to build the project with the following command:

```
yarn build
```

OR

```
npm run-script build
```

This bundles the app into static files for production.

Step 8: Start the Docker container

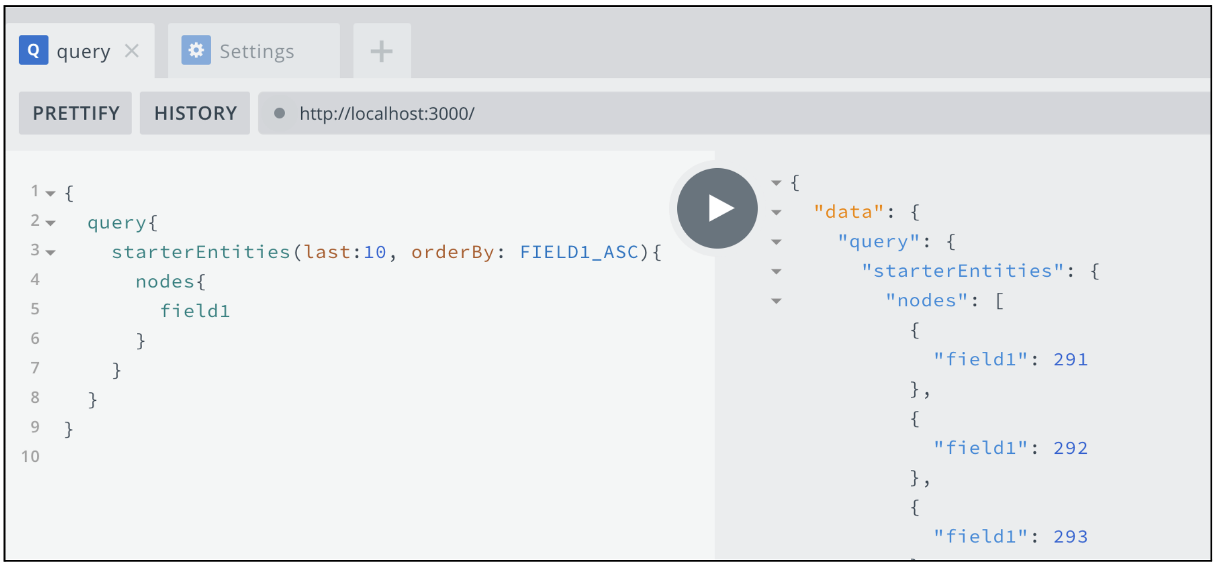
Run the docker command to pull the images and to start the container.

```
docker-compose pull && docker-compose up
```

> Note: You need to have Docker installed as noted in the prerequisite for this to work.

Step 9: Run a query

Once the docker container is up and running, which could take a few minutes, open up your browser and navigate to www.localhost:3000.



```
{
  query{
    starterEntities(last:10, orderBy: FIELD1_ASC){
      nodes{
        field1
      }
    }
  }
}
```

```
{
  "data": {
    "query": {
      "starterEntities": {
        "nodes": [
          {
            "field1": 291
          },
          {
            "field1": 292
          },
          {
            "field1": 293
```

This will open up a “playground” where you can create your query. Copy the example below.

```
{
  query{
    starterEntities(last:10, orderBy: FIELD1_ASC){
      nodes{
            field1
         }
      }
   }
}
```

Note: If you renamed field1 something else, modify this query appropriately.

Exercise 2: Publishing to SubQuery Projects

In the previous exercise, we ran our SubQuery project locally in a docker container. SubQuery also provides hosted infrastructure where users can publish their projects free of charge. In this exercise, we will demonstrate how to do this.

Prerequisites

You will need to have a GitHub account and have already created a repository and pushed your Hello World code in exercise 1 to this repository. This is because SubQuery Projects will read a designated repository and then automatically build and run the code.

This guide assumes you have a Github account and are familiar with creating repositories and committing code to that repository.

Note: If you did not manage to complete exercise 1 from above, you can clone the completed Hello World repository at https://github.com/subquery/subql-helloworld and then push this to your GitHub repository to continue this exercise.

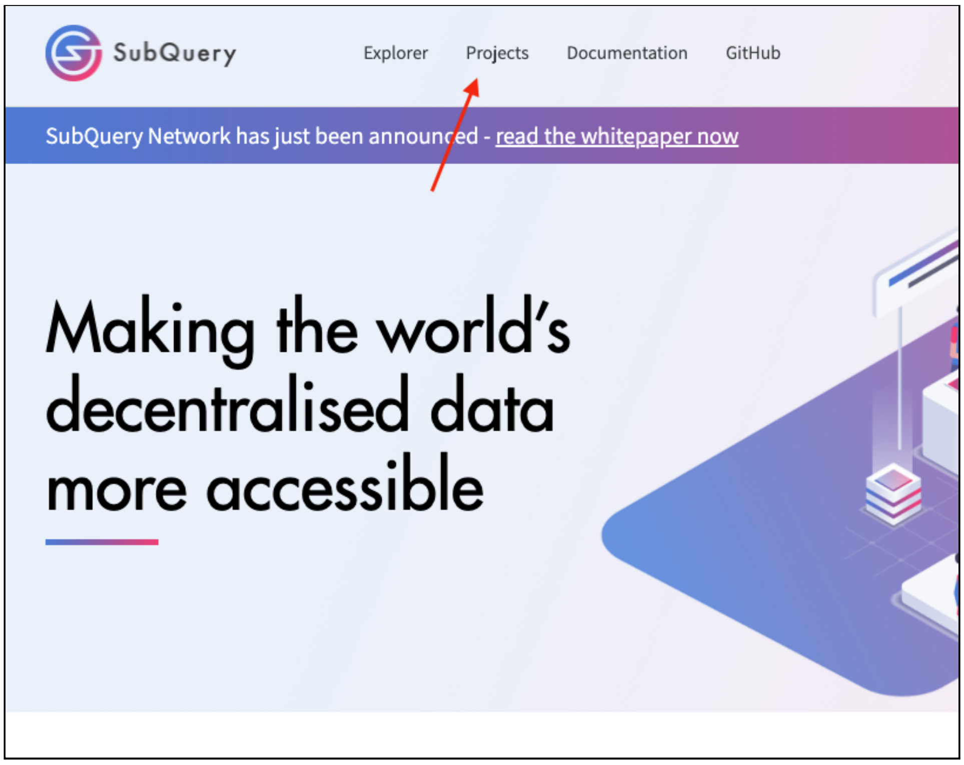
High level steps

1. Log into SubQuery Projects via GitHub
2. Create a new project
3. Deploy to the staging slot
4. View on SubQuery Explorer
5. Run query in the playground

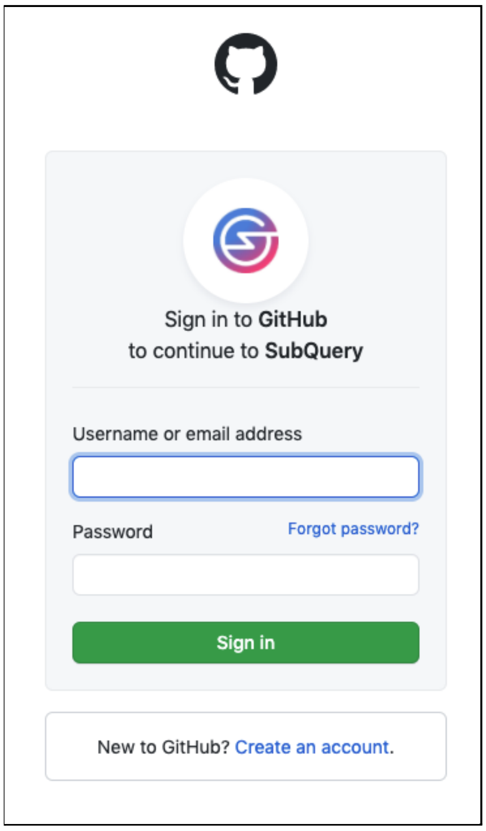
Detailed steps

Step 1: Log into SubQuery Projects

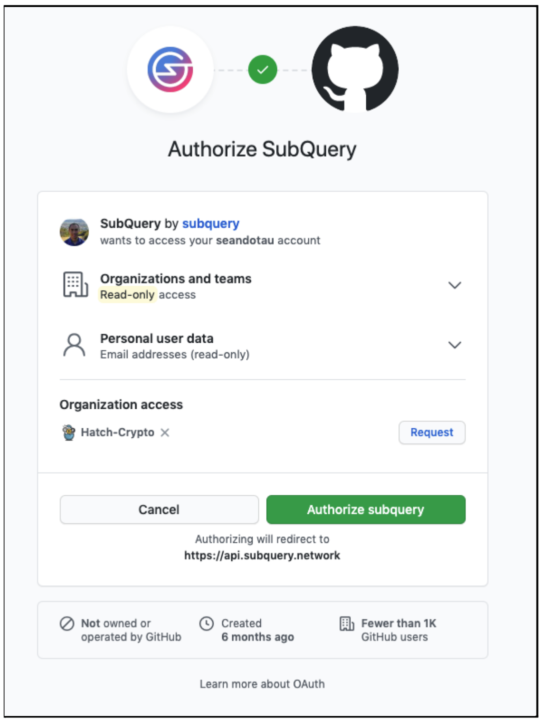
Open the SubQuery home page at https://www.subquery.network/ and click on the Projects link at the top navigation bar. Alternatively, visit: https://project.subquery.network/


SubQuery
Explorer
Projects
Documentation
GitHub
SubQuery Network has just been announced - read the whitepaper now
Making the world's decentralised data more accessible

You will need your GitHub credentials to Single Sign On (SSO).



You will then need to authorise SubQuery to access your GitHub account.



Authorize SubQuery

SubQuery by subquery
wants to access your seandotau account

Organizations and teams
Read-only access

Personal user data
Email addresses (read-only)

Organization access

Hatch-Crypto

Authorizing will redirect to
https://api.subquery.network

Not owned or operated by GitHub

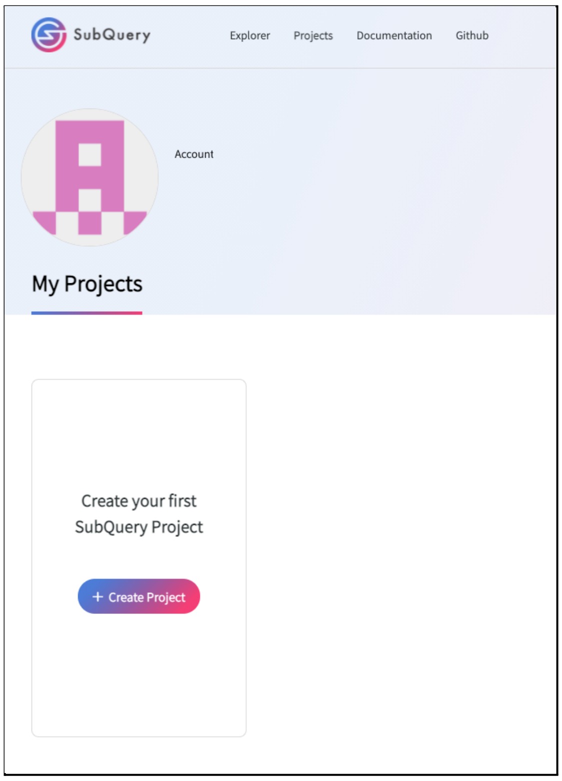
Created 6 months ago

Fewer than 1K GitHub users

Learn more about OAuth

Step 2: Create a new project

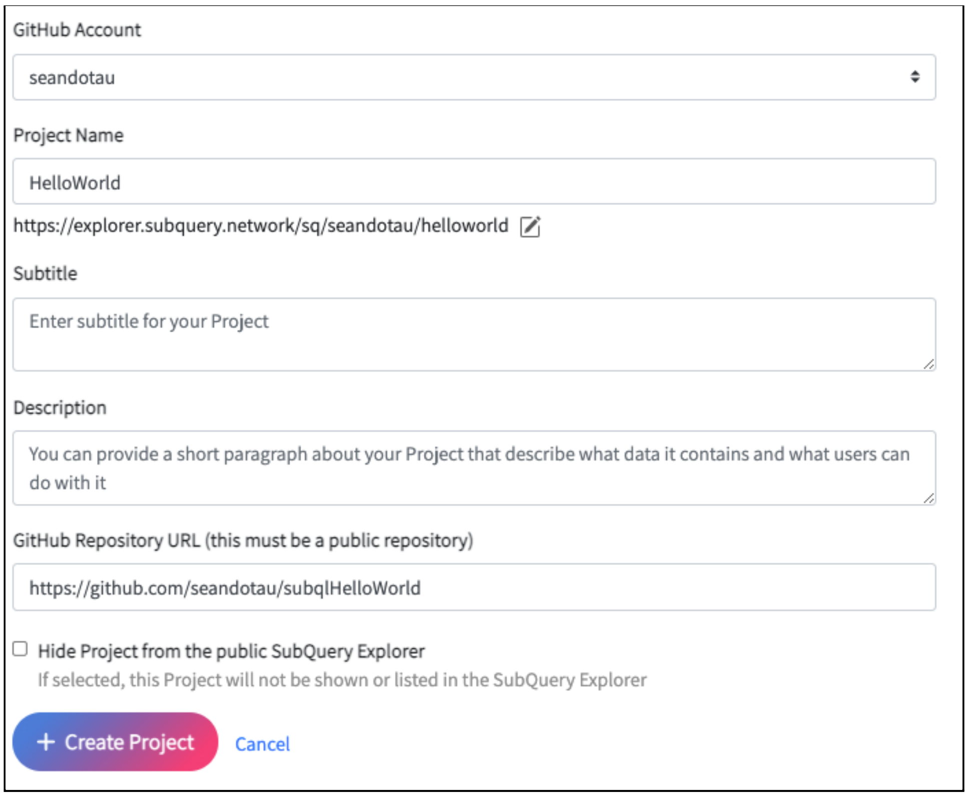
Select “Create Project” and fill in all the required fields. Note: The mandatory fields will be the Project Name and GitHub Repository URL.



My Projects

Create your first SubQuery Project

Below is an example of the completed form.


GitHub Account

seandotau

Project Name

HelloWorld

https://explorer.subquery.network/sq/seandotau/helloworld

Subtitle

Enter subtitle for your Project

Description

You can provide a short paragraph about your Project that describe what data it contains and what users can do with it

GitHub Repository URL (this must be a public repository)

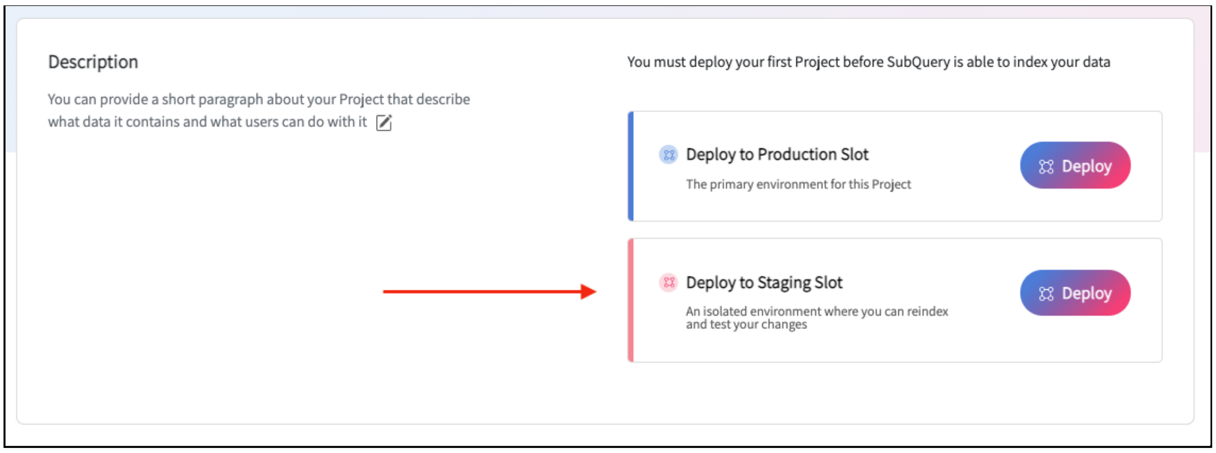
https://github.com/seandotau/subqlHelloWorld

☐ Hide Project from the public SubQuery Explorer

If selected, this Project will not be shown or listed in the SubQuery Explorer

Step 3: Deploy to the Staging Slot

Next, we have two deployment options. We can either deploy our SubQuery project to a production environment or a staging environment. We will first deploy to the staging slot by clicking deploy.


Description

You can provide a short paragraph about your Project that describe what data it contains and what users can do with it

You must deploy your first Project before SubQuery is able to index your data

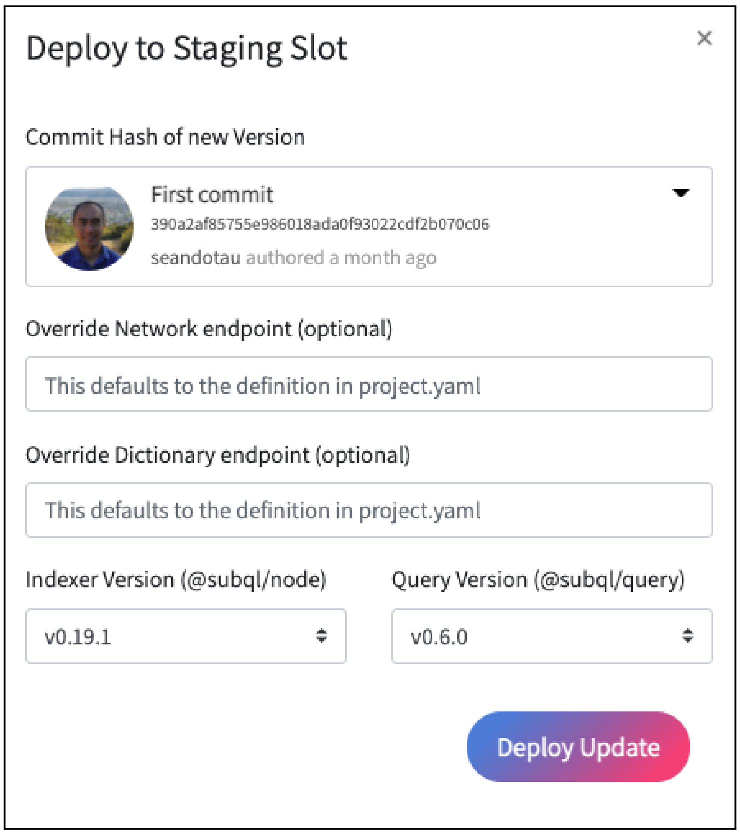
Deploy to Production Slot

The primary environment for this Project

Deploy to Staging Slot

An isolated environment where you can reindex and test your changes

Several fields that can be overridden but we'll leave these empty for now. We can also choose a particular GitHub commit but again, we'll accept the default for now. Select "Deploy Update"



Deploy to Staging Slot

Commit Hash of new Version

First commit
390a2af85755e986018ada0f93022cdf2b070c06
seandotau authored a month ago

Override Network endpoint (optional)

This defaults to the definition in project.yaml

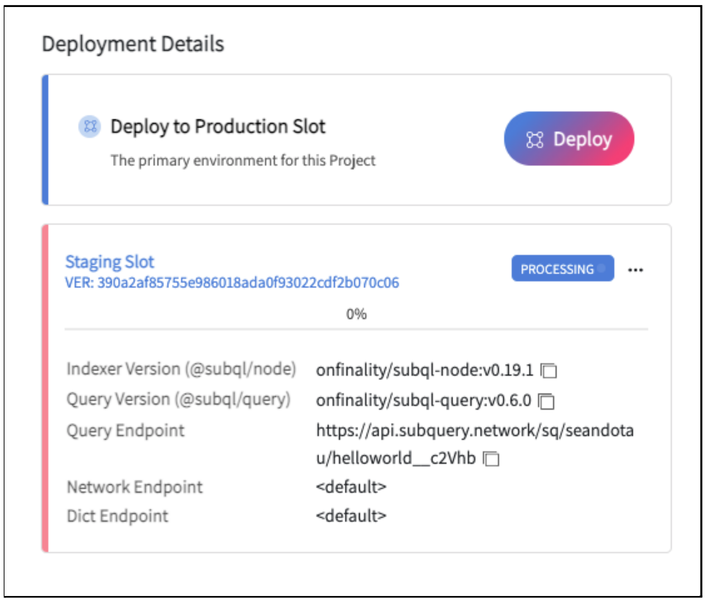
Override Dictionary endpoint (optional)

This defaults to the definition in project.yaml

Indexer Version (@subql/node): v0.19.1

Query Version (@subql/query): v0.6.0

This will then deploy the code and a status of processing will appear. It will take a few minutes before the status changes to “running”.

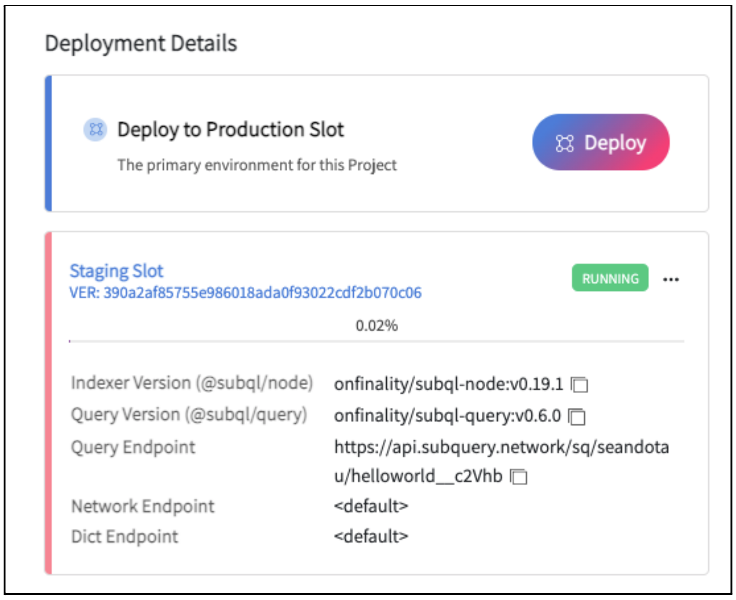


Deployment Details

Deploy to Production Slot
The primary environment for this Project

Staging Slot
VER: 390a2af85755e986018ada0f93022cdf2b070c06

Indexer Version (@subql/node)	onfinality/subql-node:v0.19.1
Query Version (@subql/query)	onfinality/subql-query:v0.6.0
Query Endpoint	https://api.subquery.network/sq/seandotau/helloworld__c2Vhb
Network Endpoint	<default>
Dict Endpoint	<default>


Deployment Details

Deploy to Production Slot
The primary environment for this Project

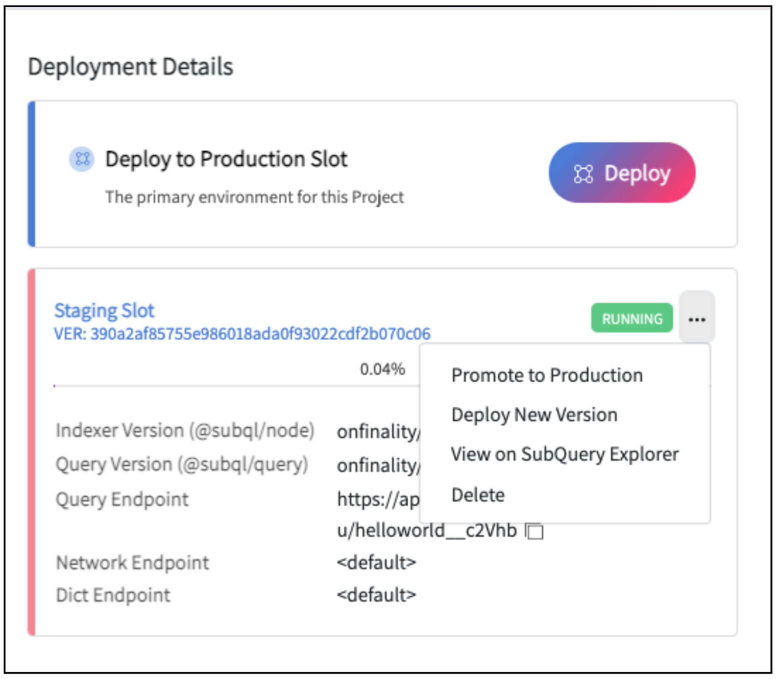
Deploy

Staging Slot
VER: 390a2af85755e986018ada0f93022cdf2b070c06
RUNNING
0.02%

Indexer Version (@subql/node)	onfinality/subql-node:v0.19.1
Query Version (@subql/query)	onfinality/subql-query:v0.6.0
Query Endpoint	https://api.subquery.network/sq/seandotau/helloworld__c2Vhb
Network Endpoint	<default>
Dict Endpoint	<default>

Step 4: View on SubQuery Explorer

Once your project is running, select the 3 ellipsis and click on "View on SubQuery Explorer". Note the other options available as well such as deleting the project, deploying a new version, and promoting to production.


Deployment Details

Deploy to Production Slot
The primary environment for this Project

Deploy

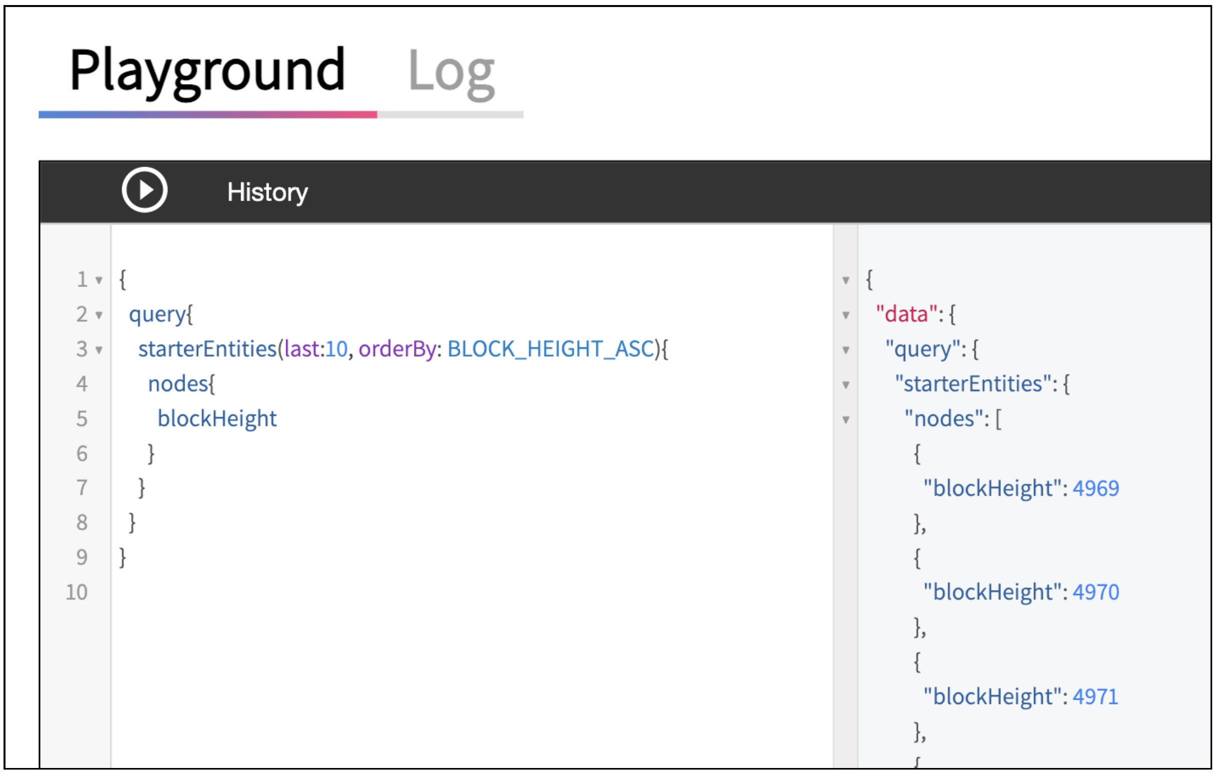
Staging Slot
VER: 390a2af85755e986018ada0f93022cdf2b070c06
RUNNING
0.04%

Indexer Version (@subql/node)	onfinality/
Query Version (@subql/query)	onfinality/
Query Endpoint	https://ap u/helloworld__c2Vhb
Network Endpoint	<default>
Dict Endpoint	<default>

Step 5: Run a query

In the playground, run the following GraphQL query to test that your project works.

```
{
  query{
    starterEntities(last:10, orderBy: BLOCK_HEIGHT_ASC){
      nodes{
        blockHeight
      }
    }
  }
}
```



```
{
 query{
  starterEntities(last:10, orderBy: BLOCK_HEIGHT_ASC){
   nodes{
    blockHeight
   }
  }
 }
}
```

```
{
 "data": {
  "query": {
   "starterEntities": {
    "nodes": [
     {
      "blockHeight": 4969
     },
     {
      "blockHeight": 4970
     },
     {
      "blockHeight": 4971
     },
```

Note: The model answer uses the field “blockHeight” instead of field1.