amazon web services | Certified

Developer - Associate

lab

lab title

Programming AWS DynamoDB using the AWS NodeJS SDK V1.02

Course title

AWS Certified Associate

BackSpace

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About the Lab

These lab notes are to support the instructional videos on Programming Amazon DynamoDB using the AWS NodeJS SDK in the BackSpace AWS Certified Developer course.

We will first create a DynamoDB table using the console and then add items to the table.

We will then:

- Connect to DynamoDB through our NodeJS EC2 instance.
- Upload a JSON file containing items using the SDK batchWriteItem method.
- Query the data using the SDK.

Please refer to the AWS JavaScript SDK documentation at:

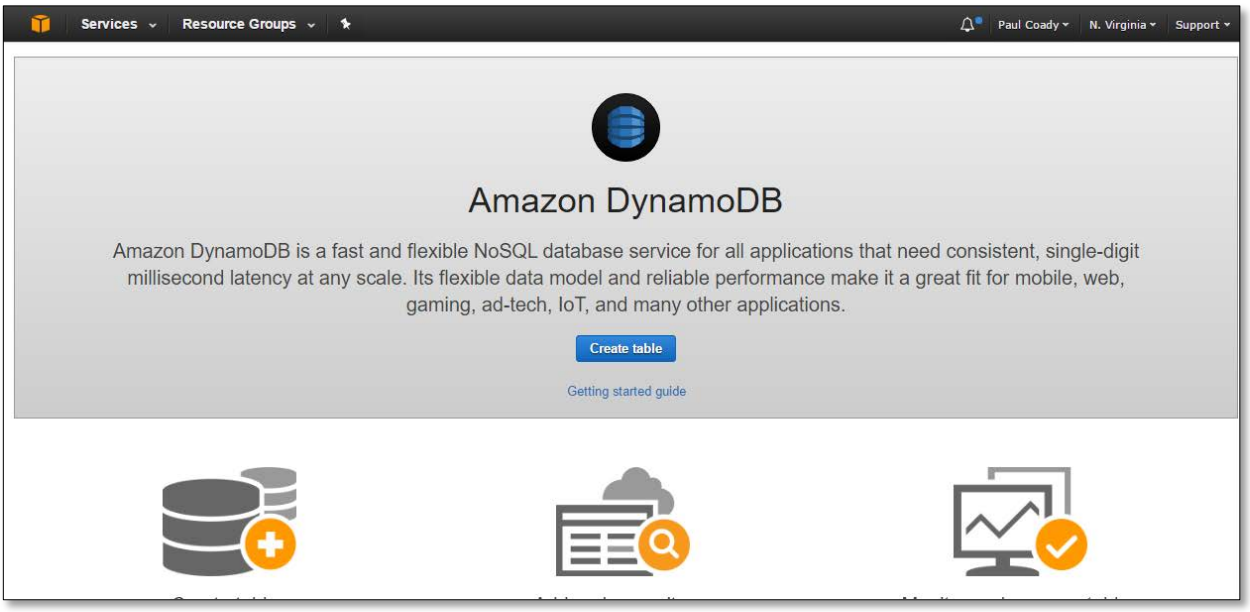
http://docs.aws.amazon.com/AWSJavaScriptSDK/latest/AWS/DynamoDB.html

Please note that AWS services change on a weekly basis and it is extremely important you check the version number on this document to ensure you have the lastest version with any updates or corrections.

Creating a DynamoDB Table using the Console

In this section we will use the DynamoDB console to create a table and then add items individually using the console.

Select the DynamoDB Console



Click “Create Table”

Enter the following details (enter exactly with correct case)

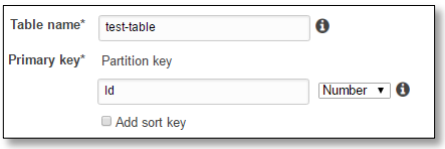
BE CAREFUL IF USING COPY/PASTE NOT TO INCLUDE ANY EXTRA SPACES ON THE END.

Table Name: test-table

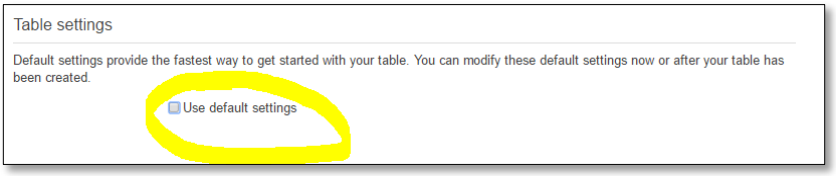
Primary Key Type: hash

Hash Attribute Type: Number

Hash Attribute Name: Id (case sensitive - make sure the first letter is capitalised)



Uncheck *Use Default Settings*

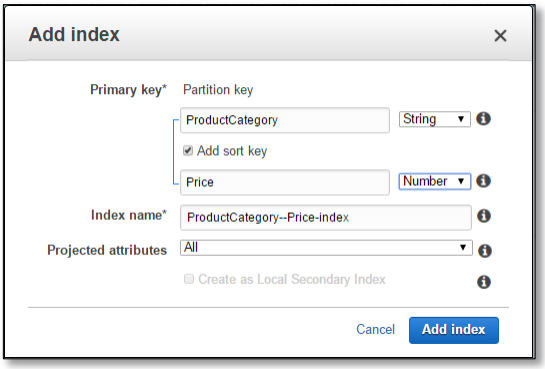


Now create a global secondary index with hash key string ProductCategory and sort key number Price.

Use index name ProductCategory-Price-index

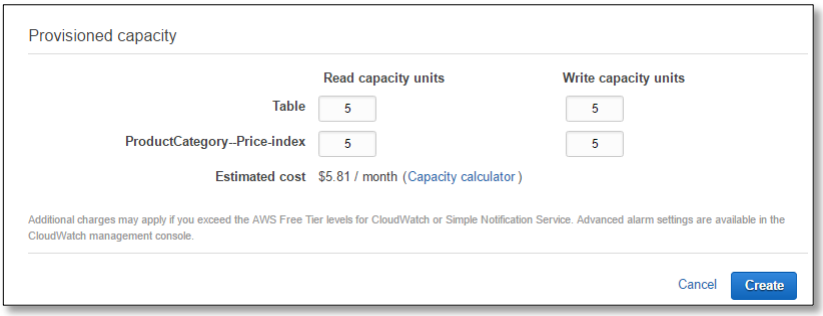
Click Add index to table.

Enter index details



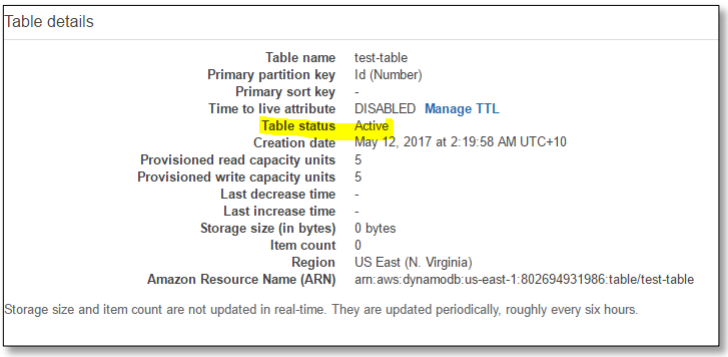
Click *Add Index*

Continue using default settings.



Click Create.

Press refresh until table status is listed as active.



Click on Items tab

Click on Create Item

BE CAREFUL IF USING COPY/PASTE NOT TO INCLUDE ANY EXTRA SPACES ON THE END.

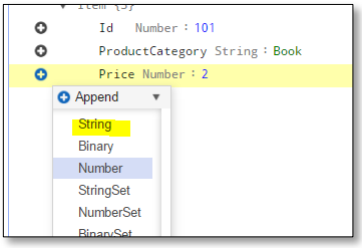
Enter the Id as 101

ProductCategory- String: Book

Price - Number:-2

and then click on the action menus box on the left of the entry.

Select Append then String



Enter field *Title* and value *Book 101 Title*

Enter the rest of the details for the item. Make sure you select the right data type of string or number or boolean:

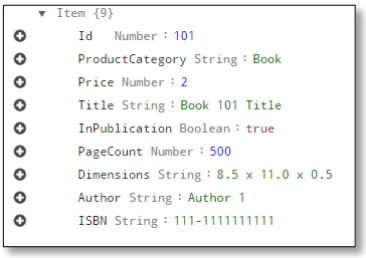
InPublication - Boolean:true

PageCount - Number:500

Dimensions - String: 8.5 x 11.0 x 0.5

Authors - String: Author 1

ISBN- String: 111-1111111111



Click Save

Importing Items into DynamoDB using batchWriteItem

In this section we will use our NodeJS EC2 instance to import items from a JSON file into a DynamoDB table.

Make sure you have set up your NodeJS development environment as detailed in the introduction lab.

Open Atom IDE.

Go to Packages – Remote Edit – Browse Hosts

Select your EC2 instance

Wait for the EC2 instance to connect then select the index.js file

Replace it with the following code:

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');

/**
 * Don't hard-code your credentials!
 * Create an IAM role for your EC2 instance instead.
 */

// Set your region
AWS.config.region = 'us-east-1';

var db = new AWS.DynamoDB();
db.listTables(function(err, data) {
  console.log(data.TableNames);
});
```

Click 

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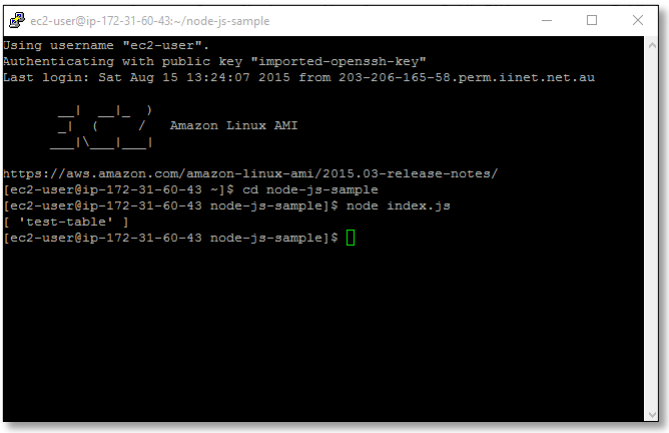
to save to the EC2 instance.

Now open Putty and connect to your instance

Change to the node-js-sample directory

Run node index.js

You will see the results of the db.listTables method showing our test-table



Download the following file:

http://cdn.backspace.academy/public/classroom/aws-csa-a/test-table-items.json

Go to the S3 console and create a folder in your bucket called lab-data

Upload the file to the lab-data folder

Now go back to Atom IDE

Change our listTables call and add a downloadData function call in our callback:

```
db.listTables(function(err, data) {
  console.log(data.TableNames);
  downloadData();
});
```

Add the downloadData function (remember to change YOUR_BUCKET_NAME):

```
function downloadData(){
  // Get JSON file from S3
  var s3 = new AWS.S3();
```

```
  var params = {Bucket: 'YOUR_BUCKET_NAME', Key: 'lab-data/test-table-items.json'};
  s3.getObject(params, function(error, data) {
    if (error) {
      console.log(error); // error is Response.error
    } else {
      var dataJSON = JSON.parse(data.Body);
      console.log(JSON.stringify(dataJSON));
    }
  });
};
```

Click 

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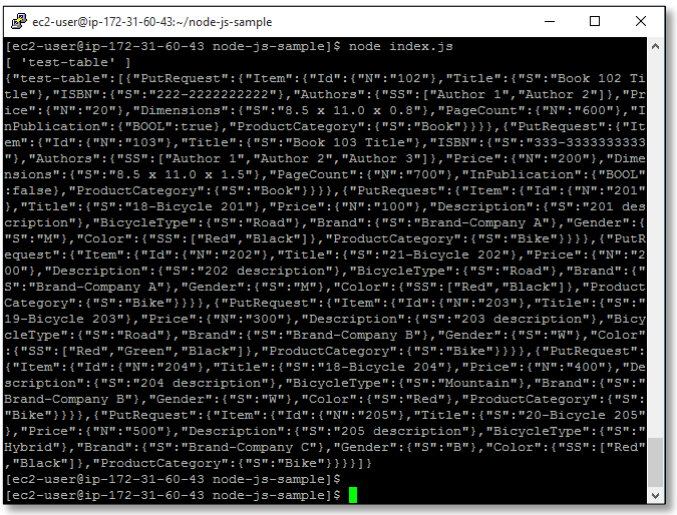
to save to the EC2 instance.

Run your application again and you will see the contents of the JSON file output to the console.



Now we will add these items to our DynamoDB database.

Change our downloadData function and add a writeDynamoDB function call in our callback:

```
function downloadData(){
  // Get JSON file from S3
  var s3 = new AWS.S3();
  var params = {Bucket: 'YOUR_BUCKET_NAME', Key: 'lab-data/test-table-items.json'};
  s3.getObject(params, function(error, data) {
    if (error) {
      console.log(error); // error is Response.error
    } else {
      var dataJSON = JSON.parse(data.Body);
```

```
      console.log(JSON.stringify(dataJSON));
      writeDynamoDB(dataJSON);
    }
  });
}
```

Now add the writeDynamoDB function:

```
function writeDynamoDB(dataJSON){
  // Write items from object to DynamoDB
  var params = { RequestItems: dataJSON };
  db.batchWriteItem(params, function(err, data) {
    if (err) console.log(err, err.stack); // an error occurred
    else     console.log(data);           // successful response
  });
}
```

Click 

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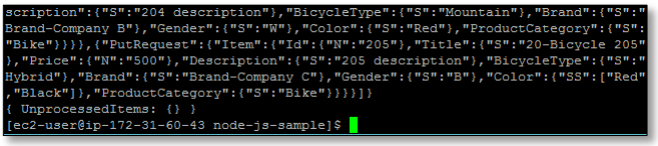
to save to the EC2 instance.

Now run the app again.

You should get the output “UnprocessedItems: {}” meaning no problems.



NOTE: If you get an error “*ValidationException: The provided key element does not match the schema*” this means there is a mismatch between the keys in the JSON file and the actual keys created in the database. Check the keys in the database are spelled correctly and the case is correct.

Now go to the DynamoDB console and view the added items:

Id	Author	Dimensions	ISBN	InPublication	PageCount	Price	ProductCategor	Title	BicycleType	Brand	Color	Description
205						500	Bike	20-Bicycle 205	Hybrid	Brand-Compa...	{ "Black", "Re...	205 descripti
203						300	Bike	19-Bicycle 203	Road	Brand-Compa...	{ "Black", "Gre...	203 descripti
202						200	Bike	21-Bicycle 202	Road	Brand-Compa...	{ "Black", "Re...	202 descripti
201						100	Bike	18-Bicycle 201	Road	Brand-Compa...	{ "Black", "Re...	201 descripti
204						400	Bike	18-Bicycle 204	Mountain	Brand-Compa...	Red	204 descripti
102		8.5 x 11.0 x 0.8	222-2222222...	true	600	20	Book	Book 102 Title				
103		8.5 x 11.0 x 1.5	333-3333333...	false	700	200	Book	Book 103 Title				
101	Author 1	8.5 x 11.0 x 0.5	111-1111111111	true	500	2	Book	Book 101 Title				

Querying DynamoDB Tables using the NodeJS SDK

In this section we will use NodeJS SDK to query items in a DynamoDB table.

We will now use our Global Secondary Index to find all bikes $300 or less.

Change writeDynamoDB in index.js to add queryDynamoDB() to the callback:

```
function writeDynamoDB(dataJSON){
  // Write items from object to DynamoDB
  console.log(JSON.stringify(dataJSON));
  var params = { RequestItems: dataJSON };
  db.batchWriteItem(params, function(err, data) {
    if (err) console.log(err, err.stack); // an error occurred
    else{
      console.log(data);           // successful response
      queryDynamoDB();
    }
  });
}
```

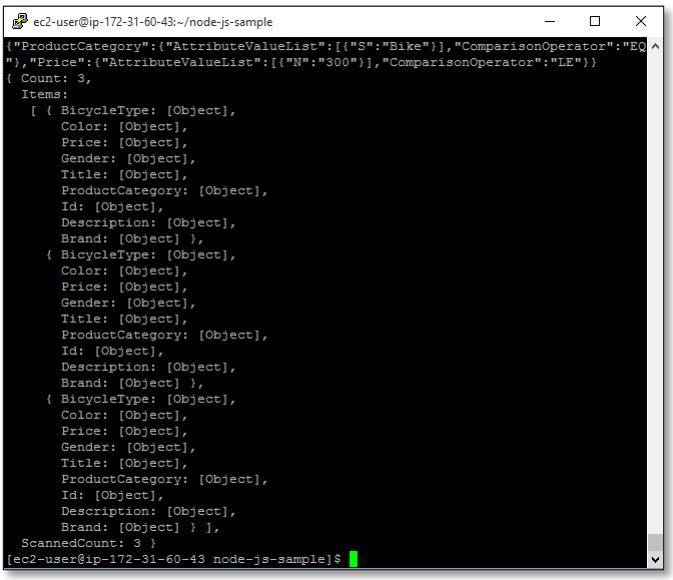
Now add the queryDynamoDB () function:

```
function queryDynamoDB(){
  // Query DynamoDB table using JSON data
  var params = {
    TableName:  'test-table', /* required */
    IndexName:  'ProductCategory-Price-index',
    KeyConditions:  {
        "ProductCategory": {
                "AttributeValueList": [{ "S": "Bike" }],
                "ComparisonOperator": "EQ"
        },
        "Price": {
                "AttributeValueList": [{ "N": "300" }],
                "ComparisonOperator": "LE"
        }
    }
```

```
  }
  db.query(params, function(err, data) {
    if (err) console.log(err, err.stack); // an error occurred
    else     console.log(data.Items);           // successful response
  });
}
```

Run your application.

You will have the three bikes $300 or less output to the console.



NOTE: If you get an error message such as *'Query condition missed key schema element: ProductCategory* ' it means you have misspelled the index when creating the table. In this case a space is on the end of ProductCategory which caused an error.

We will now use another method, KeyConditionExpression to achieve the same thing.

Change queryDynamoDB to the following code:

```
function queryDynamoDB(){
  // Query DynamoDB table using JSON data
  var params = {
    TableName:  'test-table', /* required */
    IndexName:  'ProductCategory-Price-index',
    KeyConditionExpression: "ProductCategory = :prod_cat AND Price <= :price",
    ExpressionAttributeValues: {
```

```
        ":prod_cat": {"S": "Bike"},
        ":price": {"N": "300"}
    }
  }
  db.query(params, function(err, data) {
    if (err) console.log(err, err.stack); // an error occurred
    else     console.log(data.Items);           // successful response
  });
}
```

Run your application.

You will have the three bikes $300 or less output to the console.