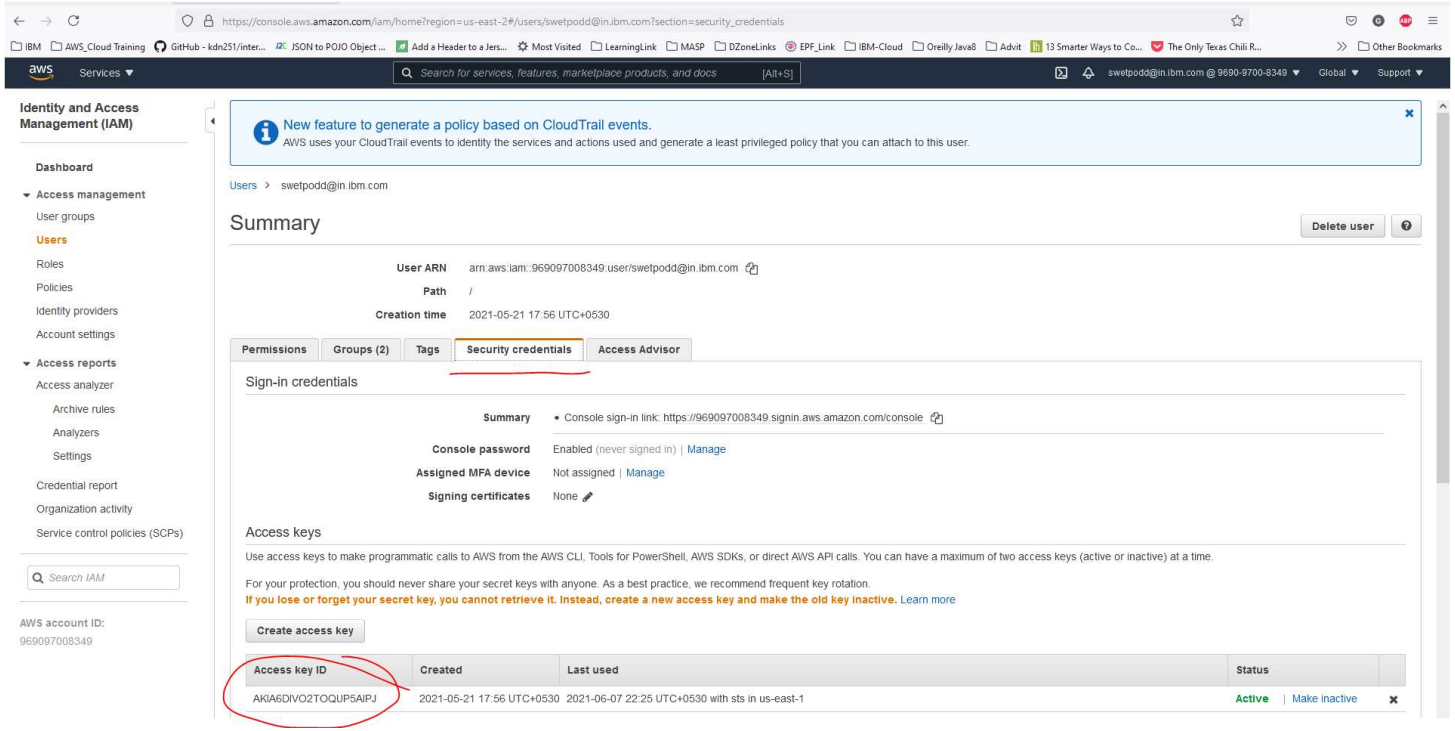
Deploy AWS Serverless Application Model (SAM)

Reference : https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-cli-install-windows.html

Get Security Credentials from AWS Console to login via local system



Login to AWS Console via local

$ aws configure

```
GMX+04828W744@DESKTOP-5KTEPAC MINGW64 ~/Desktop/AWS_Cloud/Assignments/SAM
$ aws configure
AWS Access Key ID [****************LKN6]: AKIA6DIVO2TOULIMRH62
AWS Secret Access Key [****************5ibO]: 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
Default region name [us-east-2]:
Default output format [json]:
```

Check if you logged-in successfuly

$ aws iam list-users

```
GMX+04828W744@DESKTOP-5KTEPAC MINGW64 ~/Desktop/AWS_Cloud/Assignments/SAM
$ aws iam list-users
{
    "Users": [
        {
            "Path": "/",
            "UserName": "swetpodd@in.ibm.com",
            "UserId": "AIDA6DIVO2TOYGPW52CK7",
            "Arn": "arn:aws:iam::969097008349:user/swetpodd@in.ibm.com",
            "CreateDate": "2021-05-21T12:26:00+00:00"
        }
    ]
}
```

Install AWS SAM CLI on Windows operating system and check the SAM version

$ sam –version

```
Microsoft Windows [Version 10.0.19042.985]
(c) Microsoft Corporation. All rights reserved.

C:\Users\SwetaPoddar>sam --version
SAM CLI, version 1.24.1
```

Step 1: Download a sample AWS SAM application

Run the below command to create the SAM template and enter corresponding template values

$ sam init

```
C:\Users\SwetaPoddar>sam init
Which template source would you like to use?
        1 - AWS Quick Start Templates
        2 - Custom Template Location
Choice: 1
What package type would you like to use?
        1 - Zip (artifact is a zip uploaded to S3)
        2 - Image (artifact is an image uploaded to an ECR image repository)
Package type: 1

Which runtime would you like to use?
        1 - nodejs14.x
        2 - python3.8
        3 - ruby2.7
        4 - go1.x
        5 - java11
        6 - dotnetcore3.1
        7 - nodejs12.x
        8 - nodejs10.x
        9 - python3.7
        10 - python3.6
        11 - python2.7
        12 - ruby2.5
        13 - java8.al2
        14 - java8
        15 - dotnetcore2.1
Runtime: 5

Which dependency manager would you like to use?
        1 - maven
        2 - gradle
Dependency manager: 1

Project name [sam-app]: wave-18

Cloning from https://github.com/aws/aws-sam-cli-app-templates

AWS quick start application templates:
        1 - Hello World Example: Maven
        2 - EventBridge Hello World: Maven
        3 - EventBridge App from scratch (100+ Event Schemas): Maven
        4 - Step Functions Sample App (Stock Trader): Maven
Template selection: 1

    -----------------------
    Generating application:
    -----------------------
    Name: wave-18
    Runtime: java11
    Dependency Manager: maven
    Application Template: hello-world
    Output Directory: .

    Next steps can be found in the README file at ./wave-18/README.md
```

Step 2: Build your application

To build the serverless application as a .zip file archive, declare PackageType: Zip for the serverless function.

- Go inside the *<wave-18>* folder & Run the below command

$ sam build

```
C:\Users\SwetaPoddar\wave-18>sam build
Building codeuri: C:\Users\SwetaPoddar\wave-18\HelloWorldFunction runtime: java11 metadata: {} functions: ['HelloWorldFunction']
Running JavaMavenWorkflow:CopySource
Running JavaMavenWorkflow:MavenBuild
Running JavaMavenWorkflow:MavenCopyDependency
Running JavaMavenWorkflow:MavenCopyArtifacts

Build Succeeded

Built Artifacts  : .aws-sam\build
Built Template   : .aws-sam\build\template.yaml

Commands you can use next
=========================
[*] Invoke Function: sam local invoke
[*] Deploy: sam deploy --guided
```

Step 3: Deploy your application to the AWS Cloud

$ sam deploy --guided

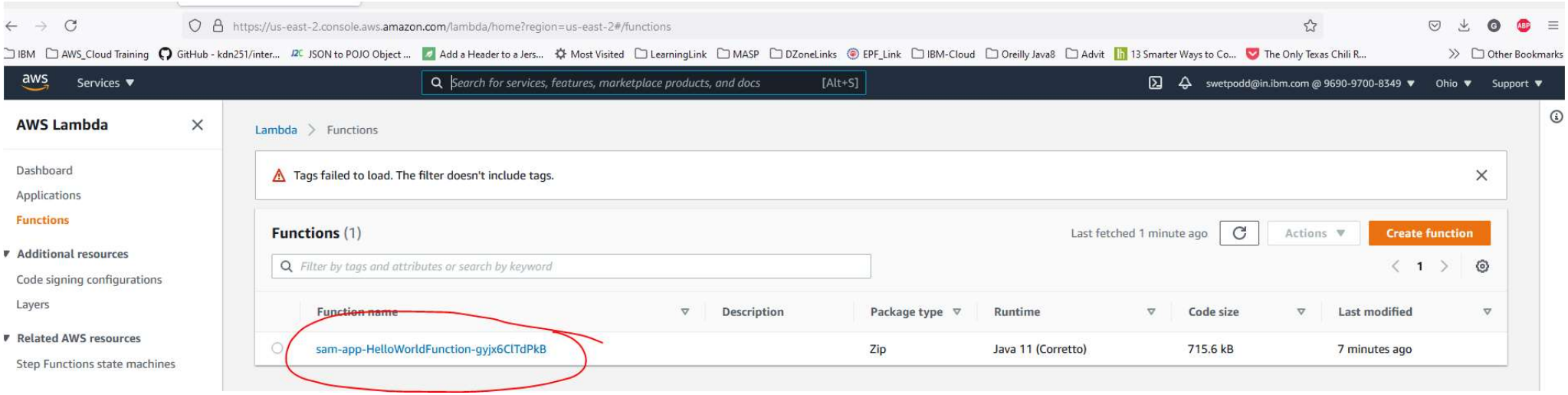
```
C:\Users\SwetaPoddar\wave-18>sam deploy --guided

Configuring SAM deploy
======================

        Looking for config file [samconfig.toml] :  Not found

        Setting default arguments for 'sam deploy'
        =========================================
        Stack Name [sam-app]:
        AWS Region [us-east-2]:
        #Shows you resources changes to be deployed and require a 'Y' to initiate deploy
        Confirm changes before deploy [y/N]: Y
        #SAM needs permission to be able to create roles to connect to the resources in your template
        Allow SAM CLI IAM role creation [Y/n]: Y
        HelloWorldFunction may not have authorization defined, Is this okay? [y/N]: Y
        Save arguments to configuration file [Y/n]: Y
        SAM configuration file [samconfig.toml]:
        SAM configuration environment [default]:

        Looking for resources needed for deployment: Not found.
        Creating the required resources...
        Successfully created!

                Managed S3 bucket: aws-sam-cli-managed-default-samclisourcebucket-t13kj0pq4at7
                A different default S3 bucket can be set in samconfig.toml

        Saved arguments to config file
        Running 'sam deploy' for future deployments will use the parameters saved above.
        The above parameters can be changed by modifying samconfig.toml
        Learn more about samconfig.toml syntax at
        https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-cli-config.html

Uploading to sam-app/476d62b39fcb245566d475781587145f  732820 / 732820  (100.00%)

        Deploying with following values
        ===============================
        Stack name                   : sam-app
        Region                       : us-east-2
        Confirm changeset            : True
        Deployment s3 bucket         : aws-sam-cli-managed-default-samclisourcebucket-t13kj0pq4at7
        Capabilities                 : ["CAPABILITY_IAM"]
        Parameter overrides          : {}
        Signing Profiles             : {}

Initiating deployment
=====================
Uploading to sam-app/57079b81f31b5e8efbf9c86d11bbd9b8.template  1226 / 1226  (100.00%)

Waiting for changeset to be created..

CloudFormation stack changeset
-----------------------------------------------------------------------------------------------------------------------------
Operation                       LogicalResourceId                              ResourceType                      Replacement
-----------------------------------------------------------------------------------------------------------------------------
+ Add                           HelloWorldFunctionHelloWorldPermissionProd     AWS::Lambda::Permission           N/A
+ Add                           HelloWorldFunctionRole                         AWS::IAM::Role                    N/A
+ Add                           HelloWorldFunction                             AWS::Lambda::Function             N/A
+ Add                           ServerlessRestApiDeployment47fc2d5f9d          AWS::ApiGateway::Deployment       N/A
+ Add                           ServerlessRestApiProdStage                     AWS::ApiGateway::Stage            N/A
+ Add                           ServerlessRestApi                              AWS::ApiGateway::RestApi          N/A
-----------------------------------------------------------------------------------------------------------------------------
```

```
Changeset created successfully. arn:aws:cloudformation:us-east-2:969097008349:changeSet/samcli-deploy1623339159/345c35e4-ff93-4511-97dd-b6a0427fb2e3


Previewing CloudFormation changeset before deployment
======================================================
Deploy this changeset? [y/N]: Y

2021-06-10 21:03:57 - Waiting for stack create/update to complete

CloudFormation events from changeset
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
ResourceStatus                                  ResourceType                                LogicalResourceId                                ResourceStatusReason
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
CREATE_IN_PROGRESS                              AWS::IAM::Role                              HelloWorldFunctionRole                           Resource creation Initiated
CREATE_IN_PROGRESS                              AWS::IAM::Role                              HelloWorldFunctionRole                           -
CREATE_COMPLETE                                 AWS::IAM::Role                              HelloWorldFunctionRole                           -
CREATE_IN_PROGRESS                              AWS::Lambda::Function                       HelloWorldFunction                               -
CREATE_COMPLETE                                 AWS::Lambda::Function                       HelloWorldFunction                               -
CREATE_IN_PROGRESS                              AWS::Lambda::Function                       HelloWorldFunction                               Resource creation Initiated
CREATE_IN_PROGRESS                              AWS::ApiGateway::RestApi                    ServerlessRestApi                                -
CREATE_COMPLETE                                 AWS::ApiGateway::RestApi                    ServerlessRestApi                                -
CREATE_IN_PROGRESS                              AWS::ApiGateway::RestApi                    ServerlessRestApi                                Resource creation Initiated
CREATE_COMPLETE                                 AWS::ApiGateway::Deployment                 ServerlessRestApiDeployment47fc2d5f9d            -
CREATE_IN_PROGRESS                              AWS::ApiGateway::Deployment                 ServerlessRestApiDeployment47fc2d5f9d            Resource creation Initiated
CREATE_IN_PROGRESS                              AWS::Lambda::Permission                     HelloWorldFunctionHelloWorldPermissionProd       Resource creation Initiated
CREATE_IN_PROGRESS                              AWS::Lambda::Permission                     HelloWorldFunctionHelloWorldPermissionProd       -
CREATE_IN_PROGRESS                              AWS::ApiGateway::Deployment                 ServerlessRestApiDeployment47fc2d5f9d            -
CREATE_COMPLETE                                 AWS::ApiGateway::Stage                      ServerlessRestApiProdStage                       -
CREATE_IN_PROGRESS                              AWS::ApiGateway::Stage                      ServerlessRestApiProdStage                       Resource creation Initiated
CREATE_IN_PROGRESS                              AWS::ApiGateway::Stage                      ServerlessRestApiProdStage                       -
CREATE_COMPLETE                                 AWS::Lambda::Permission                     HelloWorldFunctionHelloWorldPermissionProd       -
CREATE_COMPLETE                                 AWS::CloudFormation::Stack                  sam-app                                          -
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

CloudFormation outputs from deployed stack
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Outputs
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Key                 HelloWorldFunctionIamRole
Description         Implicit IAM Role created for Hello World function
Value               arn:aws:iam::969097008349:role/sam-app-HelloWorldFunctionRole-17JFJEUCT09I3

Key                 HelloWorldApi
Description         API Gateway endpoint URL for Prod stage for Hello World function
Value               https://e8gpv6tq9d.execute-api.us-east-2.amazonaws.com/Prod/hello/

Key                 HelloWorldFunction
Description         Hello World Lambda Function ARN
Value               arn:aws:lambda:us-east-2:969097008349:function:sam-app-HelloWorldFunction-gyjx6ClTdPkB
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Successfully created/updated stack - sam-app in us-east-2
```

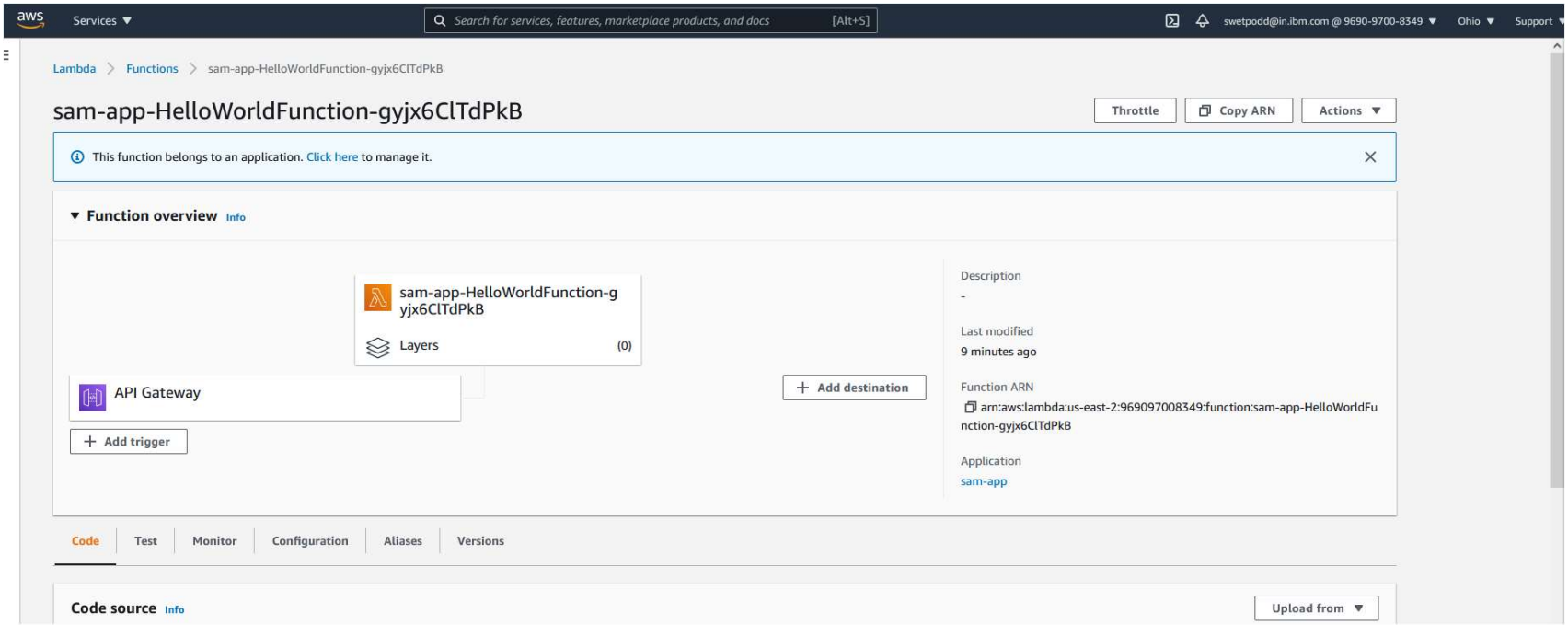
Now back to AWS Console..

Step 01: Search for "*Lambda*"

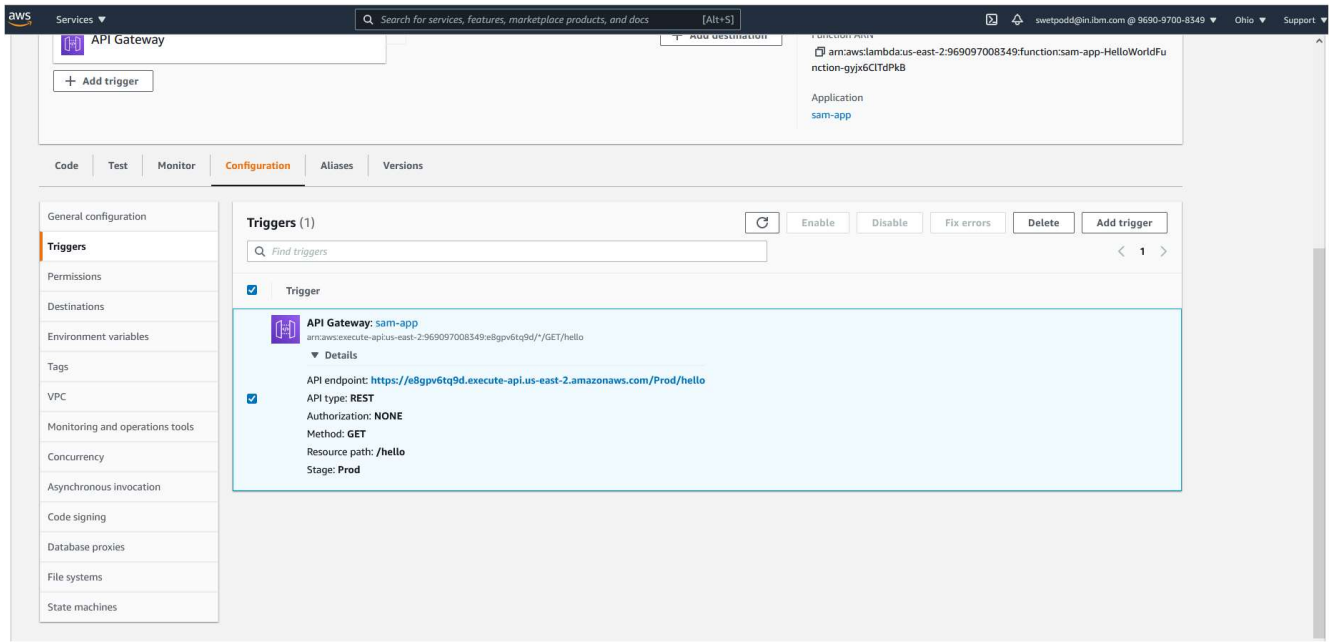
This will show you the console where application is deployed..



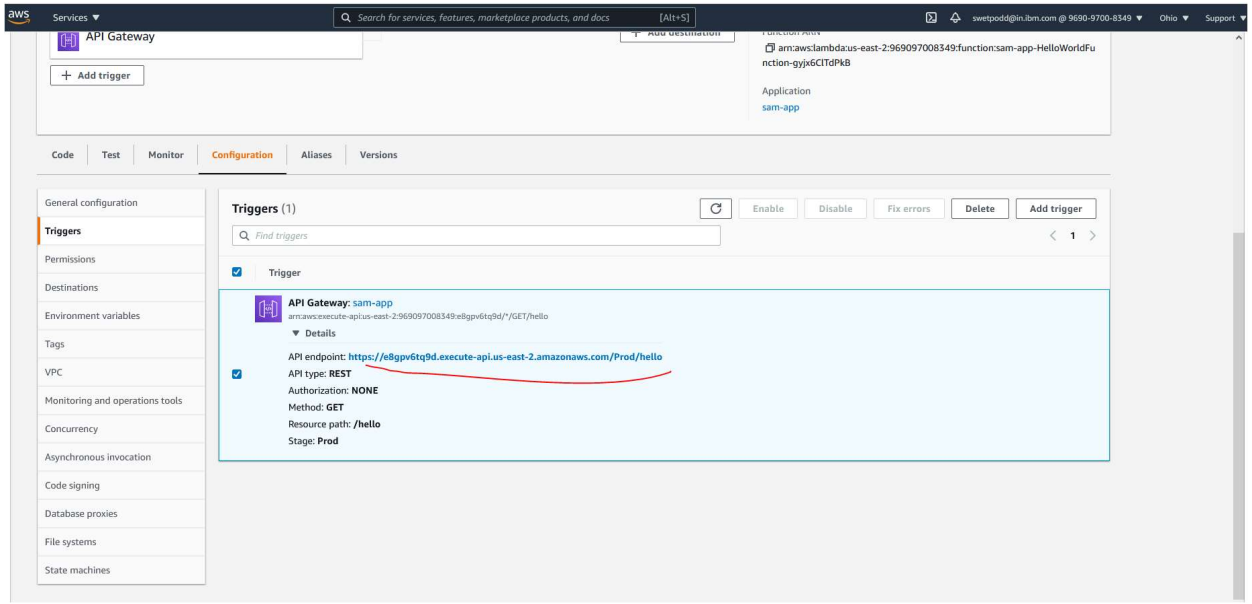
Step 02 : Click on the application



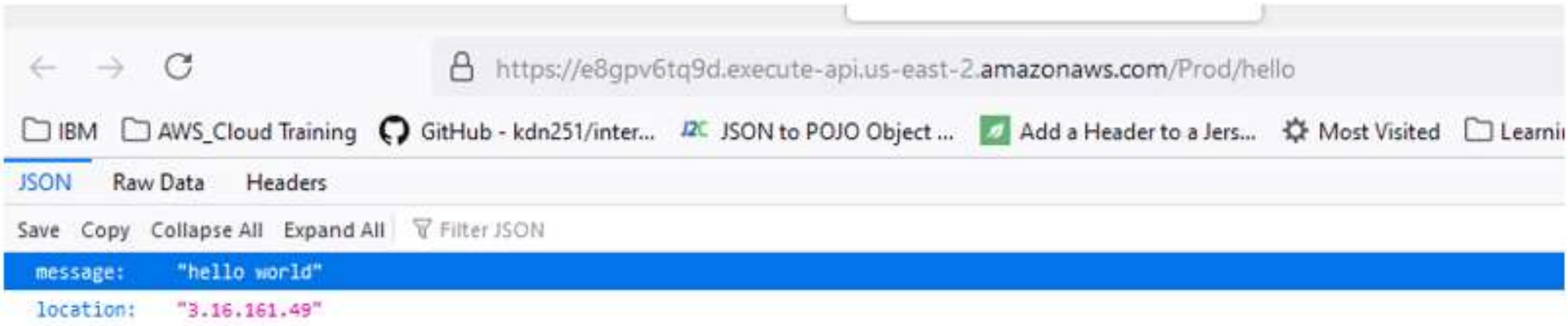
Step 03 : Click on ”Configuration” tab.



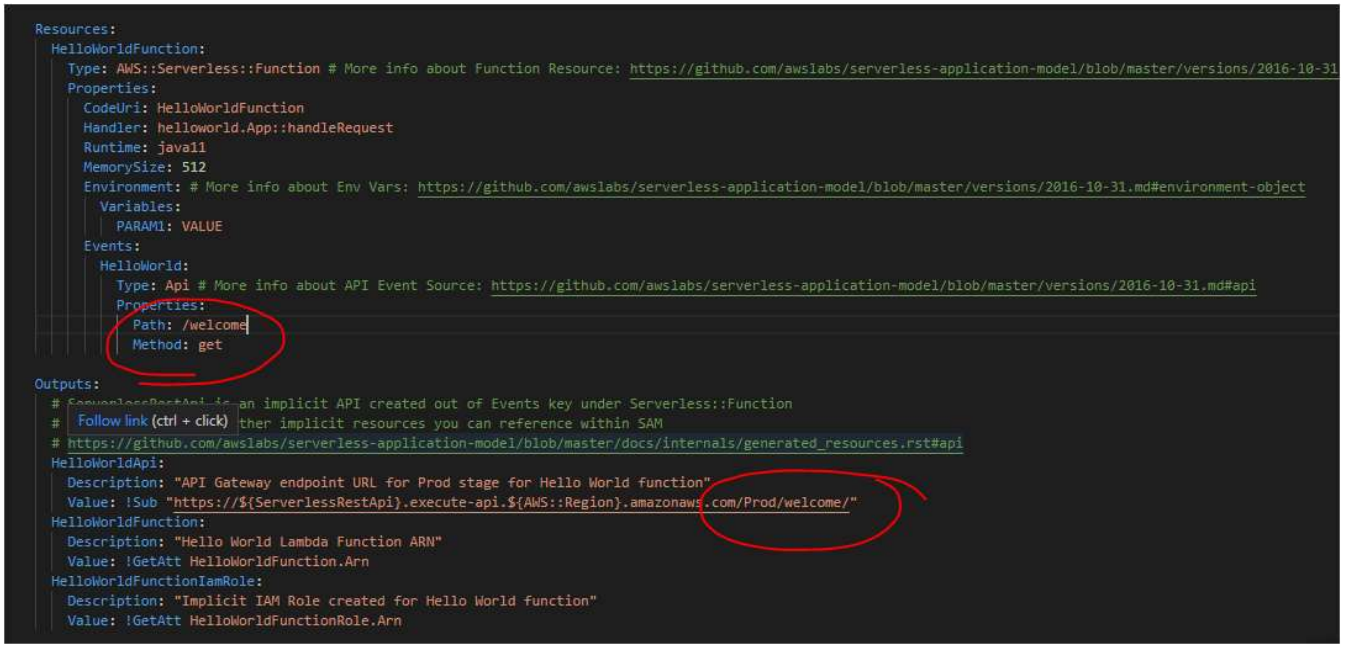
Step 04 : Now open –"*API endpoint*" in the browser.



After successfully deploying the application, below output will show on browser



Step 05 : Now change path in “*template.yml*”



```yaml
Resources:
  HelloWorldFunction:
    Type: AWS::Serverless::Function # More info about Function Resource: https://github.com/awslabs/serverless-application-model/blob/master/versions/2016-10-31
    Properties:
      CodeUri: HelloWorldFunction
      Handler: helloworld.App::handleRequest
      Runtime: java11
      MemorySize: 512
      Environment: # More info about Env Vars: https://github.com/awslabs/serverless-application-model/blob/master/versions/2016-10-31.md#environment-object
        Variables:
          PARAM1: VALUE
      Events:
        HelloWorld:
          Type: Api # More info about API Event Source: https://github.com/awslabs/serverless-application-model/blob/master/versions/2016-10-31.md#api
          Properties:
            Path: /welcome
            Method: get

Outputs:
  # ServerlessRestApi is an implicit API created out of Events key under Serverless::Function
  # Follow link (ctrl + click) ther implicit resources you can reference within SAM
  # https://github.com/awslabs/serverless-application-model/blob/master/docs/internals/generated_resources.rst#api
  HelloWorldApi:
    Description: "API Gateway endpoint URL for Prod stage for Hello World function"
    Value: !Sub "https://${ServerlessRestApi}.execute-api.${AWS::Region}.amazonaws.com/Prod/welcome/"
  HelloWorldFunction:
    Description: "Hello World Lambda Function ARN"
    Value: !GetAtt HelloWorldFunction.Arn
  HelloWorldFunctionIamRole:
    Description: "Implicit IAM Role created for Hello World function"
    Value: !GetAtt HelloWorldFunctionRole.Arn
```

Step 06: Make changes in "*HelloWorldFunction\src\main\java\helloworld*"

```java
/**
 * Handler for requests to Lambda function.
 */
public class App implements RequestHandler<APIGatewayProxyRequestEvent, APIGatewayProxyResponseEvent> {

    public APIGatewayProxyResponseEvent handleRequest(final APIGatewayProxyRequestEvent input, final Context context) {
        Map<String, String> headers = new HashMap<>();
        headers.put("Content-Type", "application/json");
        headers.put("X-Custom-Header", "application/json");

        APIGatewayProxyResponseEvent response = new APIGatewayProxyResponseEvent()
                .withHeaders(headers);
        try {
            final String pageContents = this.getPageContents("https://checkip.amazonaws.com");
            String output = String.format("{ \"message\": \"Sweta- welcome to the Stack Route\", \"location\": \"%s\" }", pageContents);

            return response
                    .withStatusCode(200)
                    .withBody(output);
        } catch (IOException e) {
            return response
                    .withBody("{}")
                    .withStatusCode(500);
        }
    }

    private String getPageContents(String address) throws IOException{
        URL url = new URL(address);
        try(BufferedReader br = new BufferedReader(new InputStreamReader(url.openStream()))) {
            return br.lines().collect(Collectors.joining(System.lineSeparator()));
        }
    }
}
```

Step 07: Now "*build*" & "*deploy*" application like before to apply changes.
Step 08 : Run it with changed URL path

The End

Compiled By,

SWETA PODDAR