# Lesson 08 Demo 03

# Creating a Serverless Web App

**Objective:** To create a serverless web application on the Amazon Web Services (AWS) platform

**Tools required:** AWS WorkSpaces

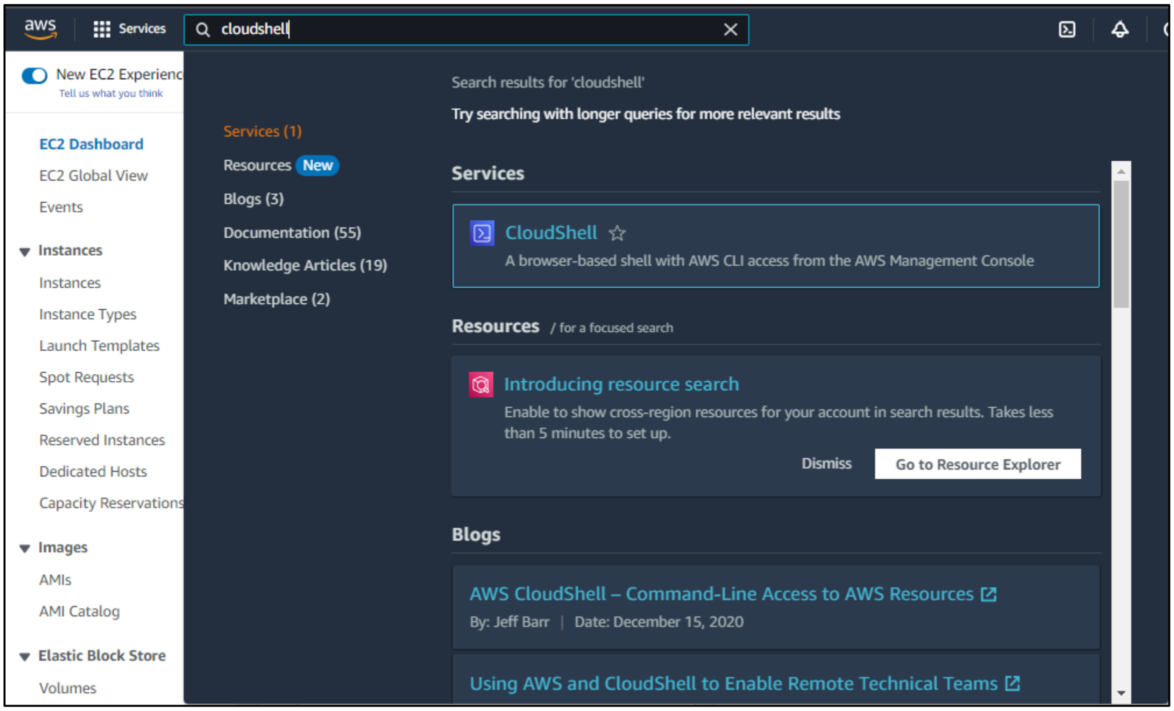
**Prerequisites:** None

Steps to be followed:

1. Develop a serverless web application

## Step 1: Develop a serverless web application

1.1 On the AWS portal home screen, search for and select **CloudShell**



Search results for 'cloudshell'

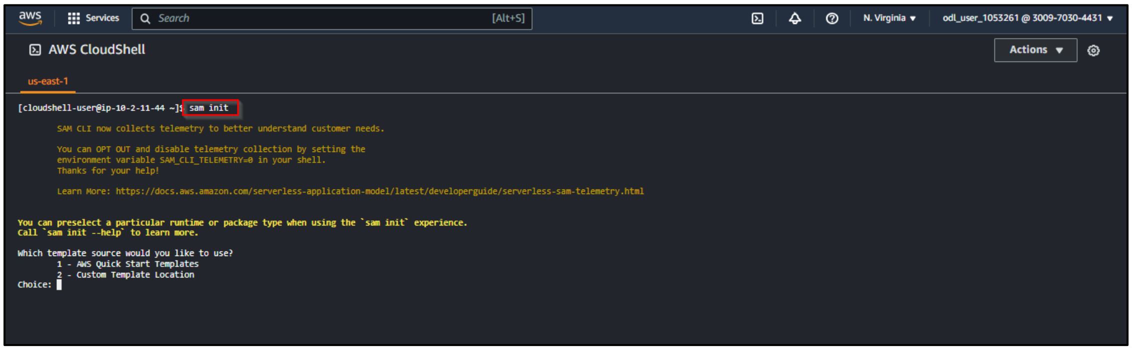
Try searching with longer queries for more relevant results

A browser-based shell with AWS CLI access from the AWS Management Console

Enable to show cross-region resources for your account in search results. Takes less than 5 minutes to set up.

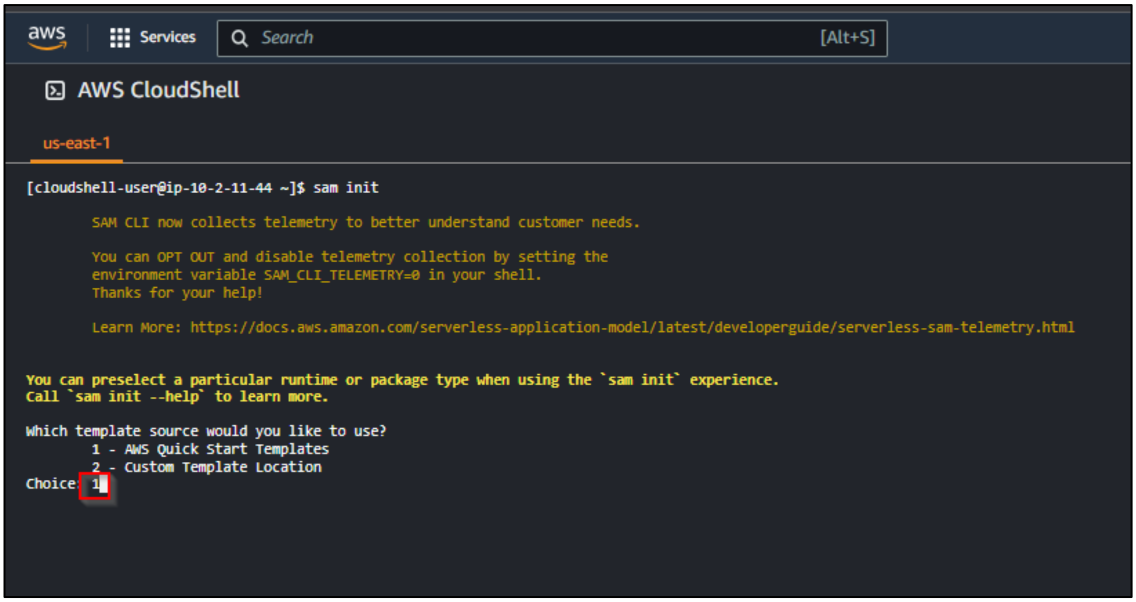
1.2 In the CloudShell, use the following command:

**sam init**



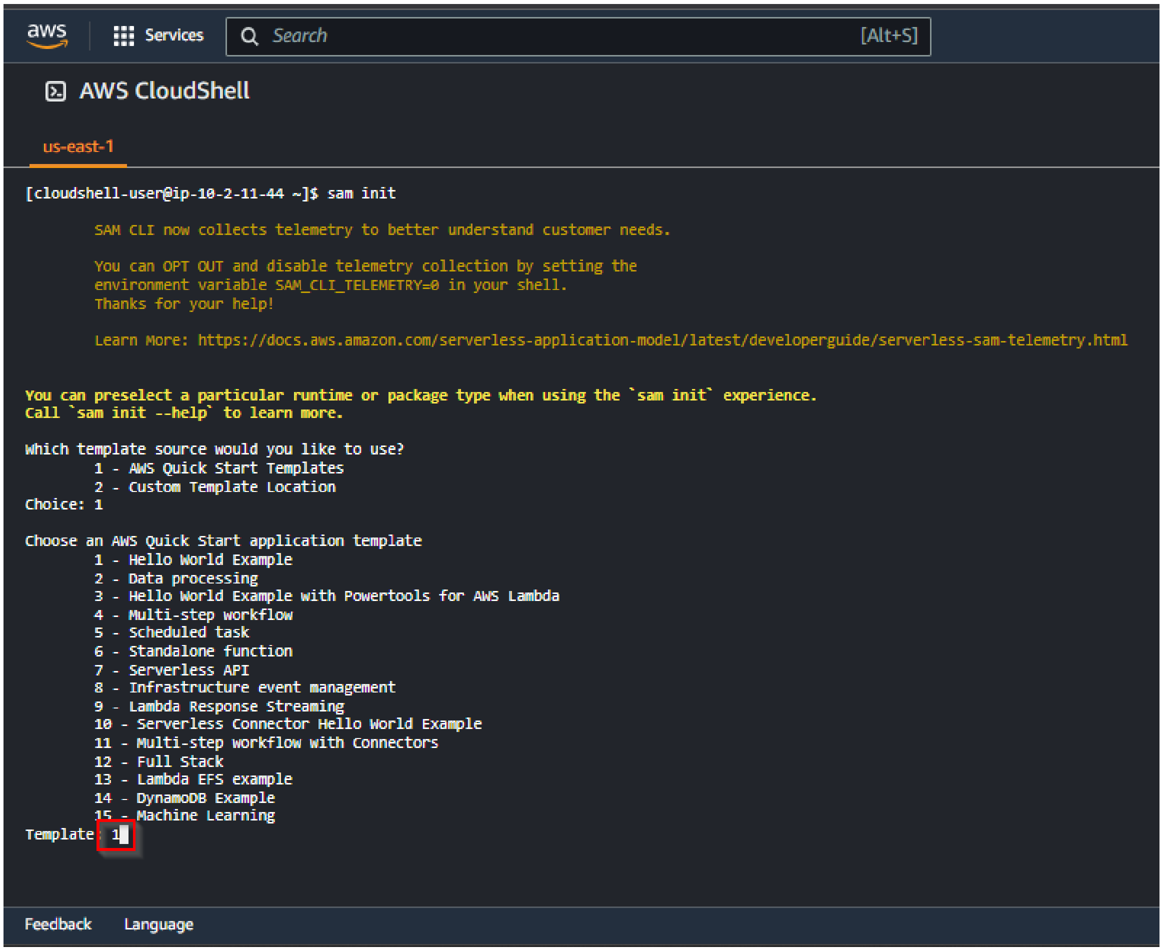
```
[cloudshell-user@ip-10-2-11-44 ~]$ sam init

        SAM CLI now collects telemetry to better understand customer needs.

        You can OPT OUT and disable telemetry collection by setting the
        environment variable SAM_CLI_TELEMETRY=0 in your shell.
        Thanks for your help!

        Learn More: https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-telemetry.html


You can preselect a particular runtime or package type when using the `sam init` experience.
Call `sam init --help` to learn more.

Which template source would you like to use?
        1 - AWS Quick Start Templates
        2 - Custom Template Location
Choice: 
```

1.3 Choose option **1** for the **AWS Quick Start Templates**



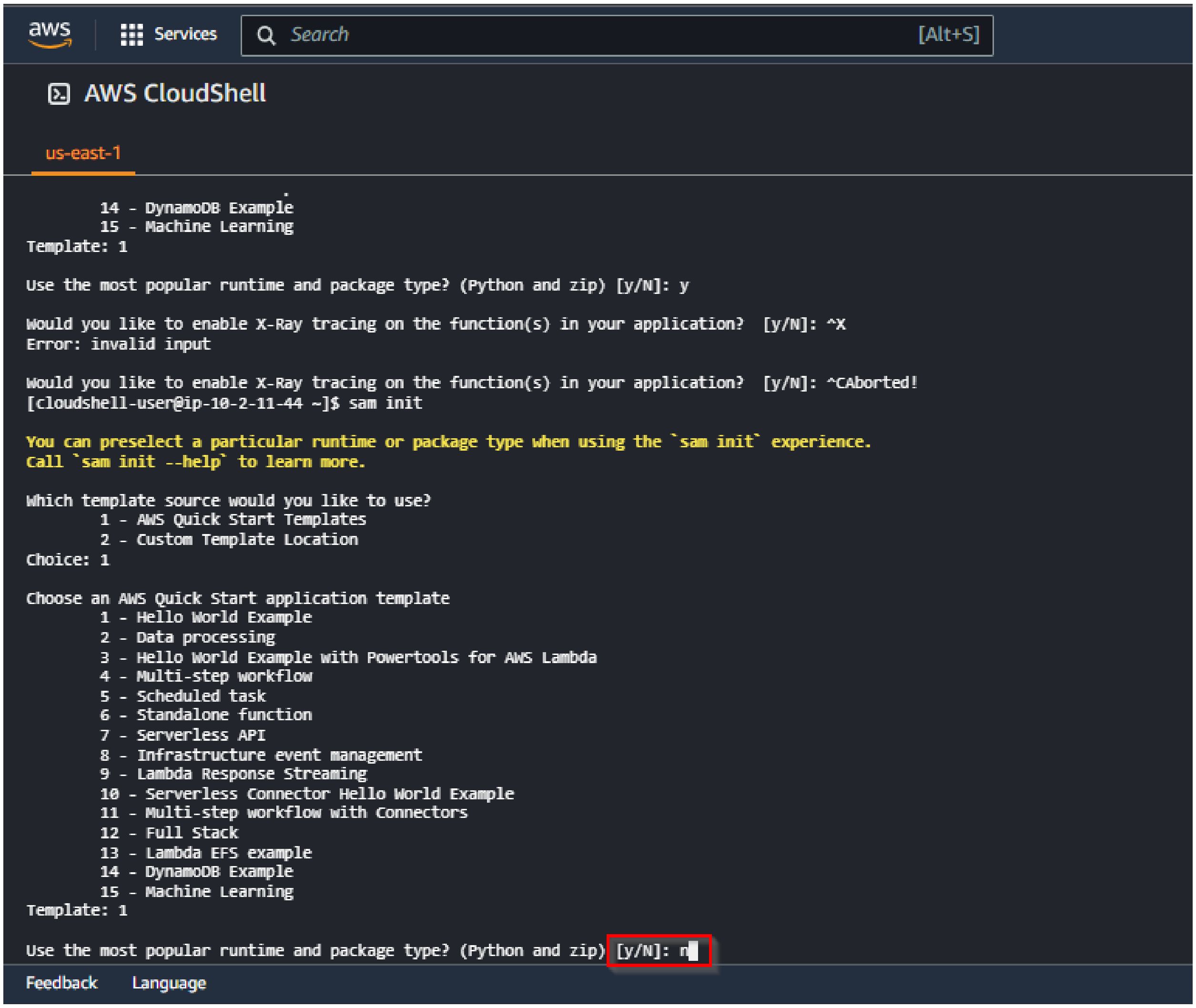
```
[cloudshell-user@ip-10-2-11-44 ~]$ sam init

        SAM CLI now collects telemetry to better understand customer needs.

        You can OPT OUT and disable telemetry collection by setting the
        environment variable SAM_CLI_TELEMETRY=0 in your shell.
        Thanks for your help!

        Learn More: https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-telemetry.html


You can preselect a particular runtime or package type when using the `sam init` experience.
Call `sam init --help` to learn more.

Which template source would you like to use?
        1 - AWS Quick Start Templates
        2 - Custom Template Location
Choice: 1
```

1.4 Select option **1** for the **Hello World Example** template



```
[cloudshell-user@ip-10-2-11-44 ~]$ sam init

        SAM CLI now collects telemetry to better understand customer needs.

        You can OPT OUT and disable telemetry collection by setting the
        environment variable SAM_CLI_TELEMETRY=0 in your shell.
        Thanks for your help!

        Learn More: https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-telemetry.html


You can preselect a particular runtime or package type when using the `sam init` experience.
Call `sam init --help` to learn more.

Which template source would you like to use?
        1 - AWS Quick Start Templates
        2 - Custom Template Location
Choice: 1

Choose an AWS Quick Start application template
        1 - Hello World Example
        2 - Data processing
        3 - Hello World Example with Powertools for AWS Lambda
        4 - Multi-step workflow
        5 - Scheduled task
        6 - Standalone function
        7 - Serverless API
        8 - Infrastructure event management
        9 - Lambda Response Streaming
        10 - Serverless Connector Hello World Example
        11 - Multi-step workflow with Connectors
        12 - Full Stack
        13 - Lambda EFS example
        14 - DynamoDB Example
        15 - Machine Learning
Template: 1
```

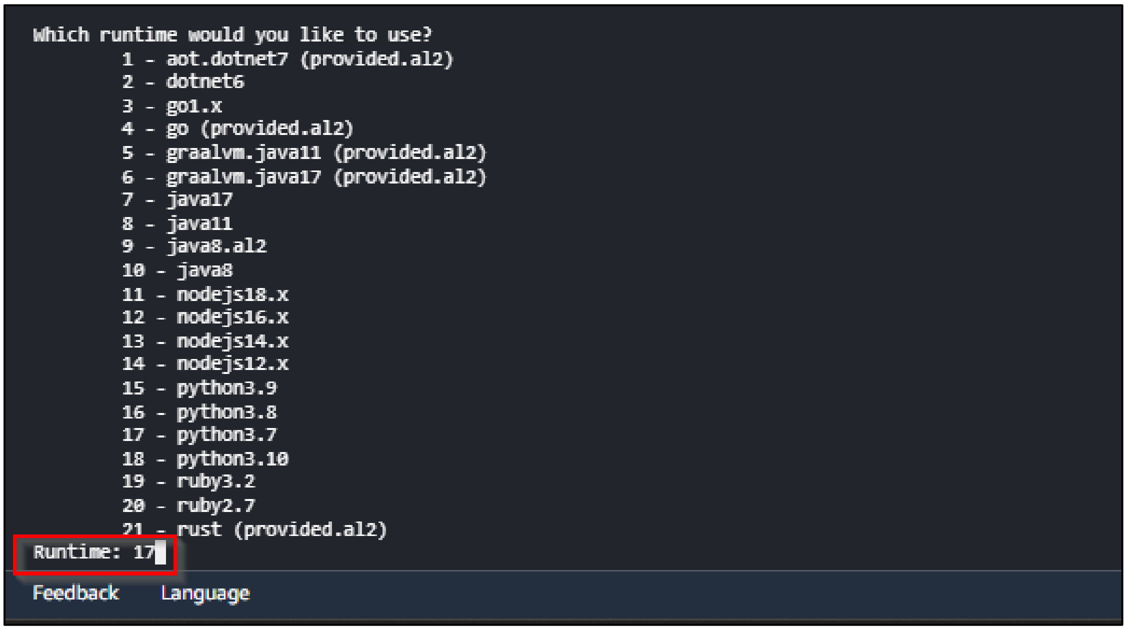
1.5 Enter **n** for Python and the zip package



```
        14 - DynamoDB Example
        15 - Machine Learning
Template: 1

Use the most popular runtime and package type? (Python and zip) [y/N]: y

Would you like to enable X-Ray tracing on the function(s) in your application?  [y/N]: ^X
Error: invalid input

Would you like to enable X-Ray tracing on the function(s) in your application?  [y/N]: ^CAborted!
[cloudshell-user@ip-10-2-11-44 ~]$ sam init

You can preselect a particular runtime or package type when using the `sam init` experience.
Call `sam init --help` to learn more.

Which template source would you like to use?
        1 - AWS Quick Start Templates
        2 - Custom Template Location
Choice: 1

Choose an AWS Quick Start application template
        1 - Hello World Example
        2 - Data processing
        3 - Hello World Example with Powertools for AWS Lambda
        4 - Multi-step workflow
        5 - Scheduled task
        6 - Standalone function
        7 - Serverless API
        8 - Infrastructure event management
        9 - Lambda Response Streaming
        10 - Serverless Connector Hello World Example
        11 - Multi-step workflow with Connectors
        12 - Full Stack
        13 - Lambda EFS example
        14 - DynamoDB Example
        15 - Machine Learning
Template: 1

Use the most popular runtime and package type? (Python and zip) [y/N]: n
```

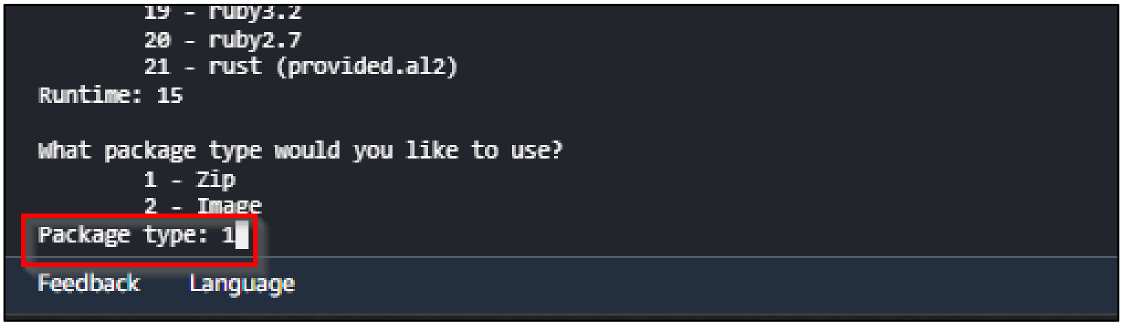
Opt for the non-zipped package and choose Python when prompted.

1.6 Set the runtime to **Python 3.7 (Choose 17)**



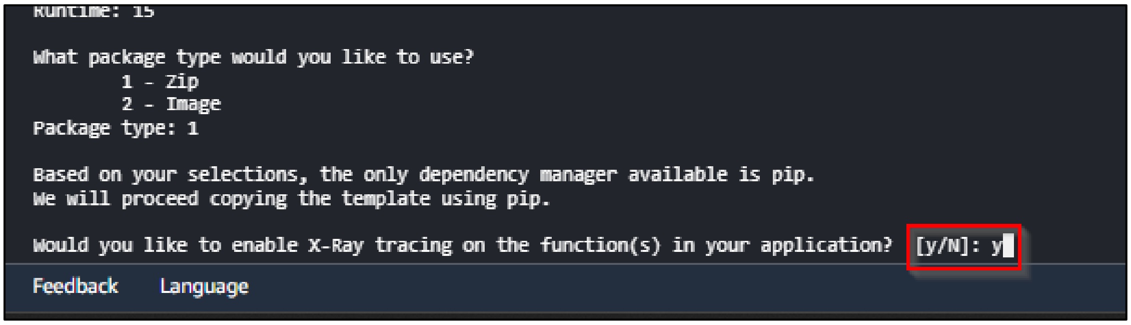
```
Which runtime would you like to use?
        1 - aot.dotnet7 (provided.al2)
        2 - dotnet6
        3 - go1.x
        4 - go (provided.al2)
        5 - graalvm.java11 (provided.al2)
        6 - graalvm.java17 (provided.al2)
        7 - java17
        8 - java11
        9 - java8.al2
        10 - java8
        11 - nodejs18.x
        12 - nodejs16.x
        13 - nodejs14.x
        14 - nodejs12.x
        15 - python3.9
        16 - python3.8
        17 - python3.7
        18 - python3.10
        19 - ruby3.2
        20 - ruby2.7
        21 - rust (provided.al2)
Runtime: 17
```

1.7 Choose package type **1**, which is **Zip**



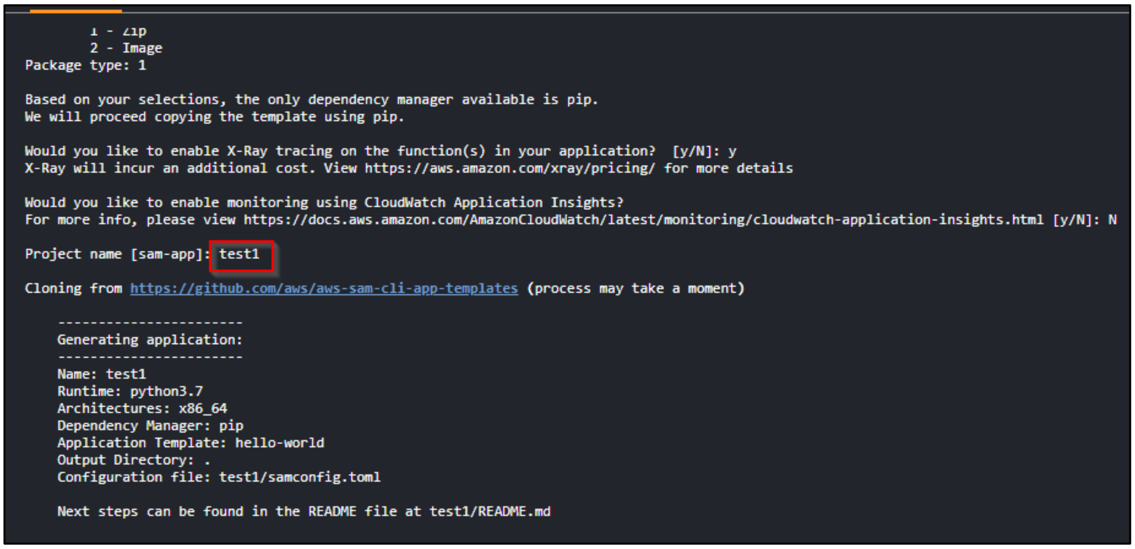
```
        19 - ruby3.2
        20 - ruby2.7
        21 - rust (provided.al2)
Runtime: 15

What package type would you like to use?
        1 - Zip
        2 - Image
Package type: 1
```

1.8 Enable X-ray tracing by entering **y**



```
Runtime: 15

What package type would you like to use?
        1 - Zip
        2 - Image
Package type: 1

Based on your selections, the only dependency manager available is pip.
We will proceed copying the template using pip.

Would you like to enable X-Ray tracing on the function(s) in your application?  [y/N]: y
```

1.9 Enter **test1** as the **Project name** (the default is **sam-app**)

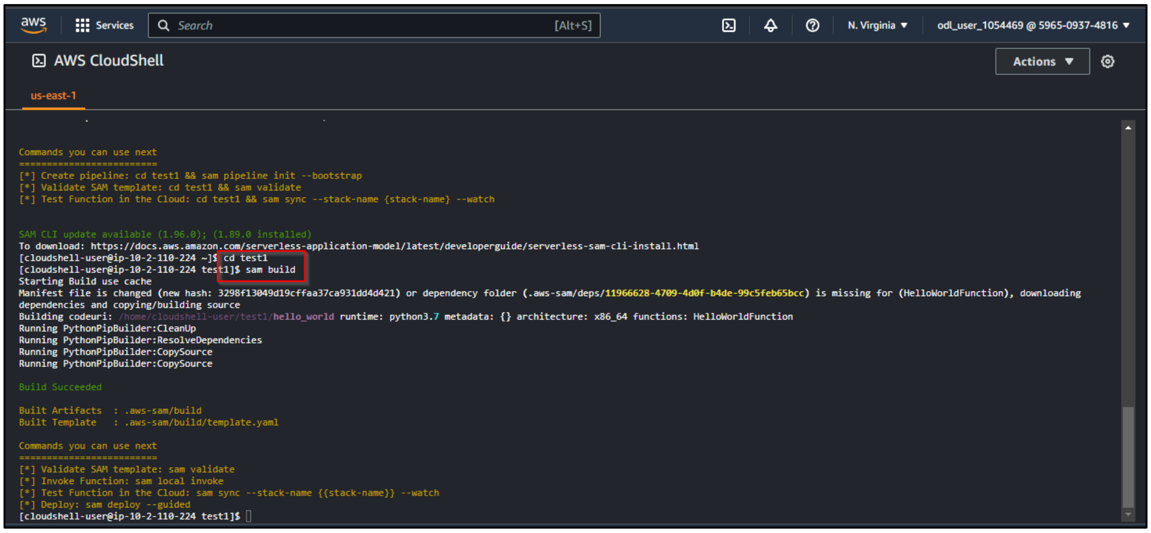


```
        1 - Zip
        2 - Image
Package type: 1

Based on your selections, the only dependency manager available is pip.
We will proceed copying the template using pip.

Would you like to enable X-Ray tracing on the function(s) in your application?  [y/N]: y
X-Ray will incur an additional cost. View https://aws.amazon.com/xray/pricing/ for more details

Would you like to enable monitoring using CloudWatch Application Insights?
For more info, please view https://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/cloudwatch-application-insights.html [y/N]: N

Project name [sam-app]: test1

Cloning from https://github.com/aws/aws-sam-cli-app-templates (process may take a moment)

    -----------------------
    Generating application:
    -----------------------
    Name: test1
    Runtime: python3.7
    Architectures: x86_64
    Dependency Manager: pip
    Application Template: hello-world
    Output Directory: .
    Configuration file: test1/samconfig.toml

    Next steps can be found in the README file at test1/README.md
```

1.10 Run the below command:

**cd test1**

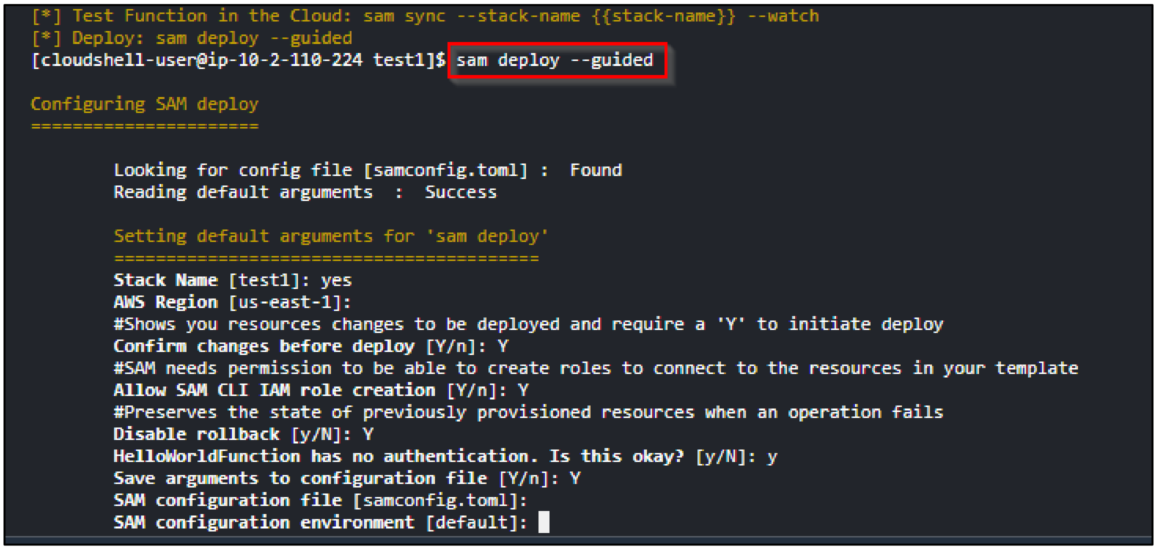
**Sam build**



```
Commands you can use next
=========================
[*] Create pipeline: cd test1 && sam pipeline init --bootstrap
[*] Validate SAM template: cd test1 && sam validate
[*] Test Function in the Cloud: cd test1 && sam sync --stack-name {stack-name} --watch


SAM CLI update available (1.96.0); (1.89.0 installed)
To download: https://docs.aws.amazon.com/serverless-application-model/latest/developerguide/serverless-sam-cli-install.html
[cloudshell-user@ip-10-2-110-224 ~]$ cd test1
[cloudshell-user@ip-10-2-110-224 test1]$ sam build
Starting Build use cache
Manifest file is changed (new hash: 3298f13049d19cffaa37ca931dd4d421) or dependency folder (.aws-sam/deps/11966628-4709-4d0f-b4de-99c5feb65bcc) is missing for (HelloWorldFunction), downloading
dependencies and copying/building source
Building codeuri: /home/cloudshell-user/test1/hello_world runtime: python3.7 metadata: {} architecture: x86_64 functions: HelloWorldFunction
Running PythonPipBuilder:CleanUp
Running PythonPipBuilder:ResolveDependencies
Running PythonPipBuilder:CopySource
Running PythonPipBuilder:CopySource

Build Succeeded

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

Commands you can use next
=========================
[*] Validate SAM template: sam validate
[*] Invoke Function: sam local invoke
[*] Test Function in the Cloud: sam sync --stack-name {{stack-name}} --watch
[*] Deploy: sam deploy --guided
[cloudshell-user@ip-10-2-110-224 test1]$ 
```

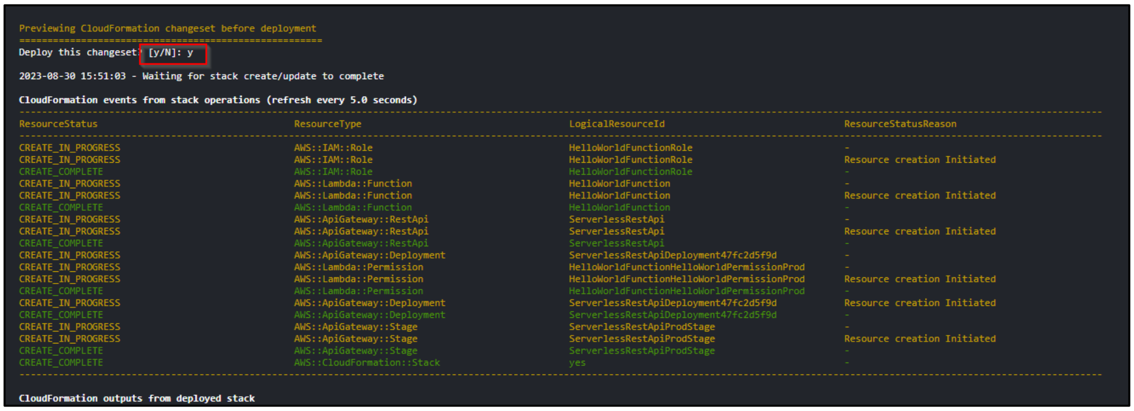
1.11 Execute the command below and provide the values as shown in the screenshot:

**sam deploy --guided**



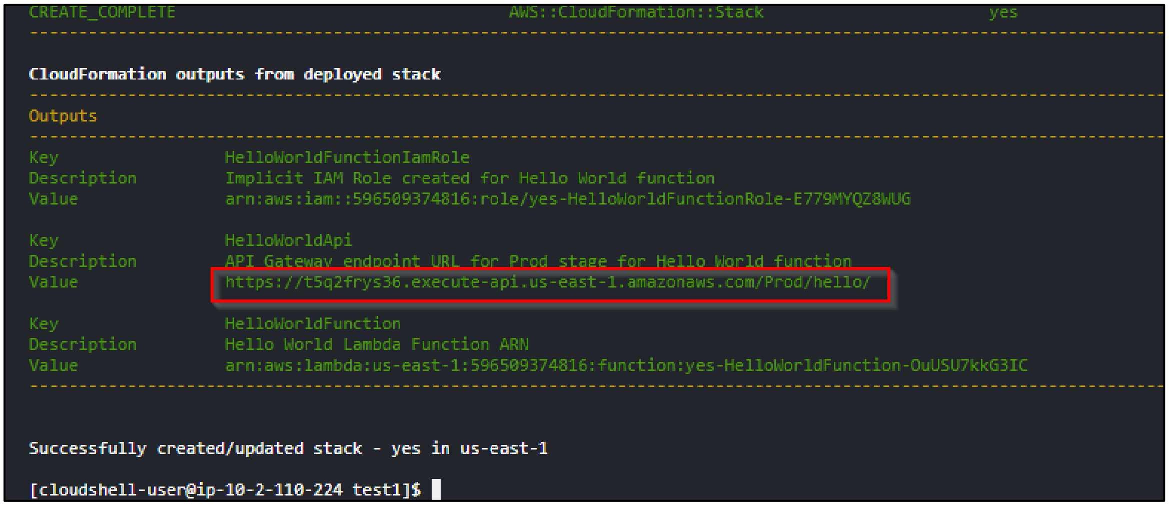
```
[*] Test Function in the Cloud: sam sync --stack-name {{stack-name}} --watch
[*] Deploy: sam deploy --guided
[cloudshell-user@ip-10-2-110-224 test1]$ sam deploy --guided

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

        Looking for config file [samconfig.toml] :  Found
        Reading default arguments  :  Success

        Setting default arguments for 'sam deploy'
        =========================================
        Stack Name [test1]: yes
        AWS Region [us-east-1]:
        #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
        #Preserves the state of previously provisioned resources when an operation fails
        Disable rollback [y/N]: Y
        HelloWorldFunction has no authentication. Is this okay? [y/N]: y
        Save arguments to configuration file [Y/n]: Y
        SAM configuration file [samconfig.toml]:
        SAM configuration environment [default]: 
```

1.12 Confirm the deployment of the changeset by entering **y**



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

2023-08-30 15:51:03 - Waiting for stack create/update to complete

CloudFormation events from stack operations (refresh every 5.0 seconds)
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
ResourceStatus                                   ResourceType                                     LogicalResourceId                                ResourceStatusReason
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
CREATE_IN_PROGRESS                               AWS::IAM::Role                                   HelloWorldFunctionRole                           -
CREATE_IN_PROGRESS                               AWS::IAM::Role                                   HelloWorldFunctionRole                           Resource creation Initiated
CREATE_COMPLETE                                  AWS::IAM::Role                                   HelloWorldFunctionRole                           -
CREATE_IN_PROGRESS                               AWS::Lambda::Function                            HelloWorldFunction                               -
CREATE_IN_PROGRESS                               AWS::Lambda::Function                            HelloWorldFunction                               Resource creation Initiated
CREATE_COMPLETE                                  AWS::Lambda::Function                            HelloWorldFunction                               -
CREATE_IN_PROGRESS                               AWS::ApiGateway::RestApi                         ServerlessRestApi                                -
CREATE_IN_PROGRESS                               AWS::ApiGateway::RestApi                         ServerlessRestApi                                Resource creation Initiated
CREATE_COMPLETE                                  AWS::ApiGateway::RestApi                         ServerlessRestApi                                -
CREATE_IN_PROGRESS                               AWS::ApiGateway::Deployment                      ServerlessRestApiDeployment47fc2d5f9d            -
CREATE_IN_PROGRESS                               AWS::Lambda::Permission                          HelloWorldFunctionHelloWorldPermissionProd       -
CREATE_IN_PROGRESS                               AWS::Lambda::Permission                          HelloWorldFunctionHelloWorldPermissionProd       Resource creation Initiated
CREATE_COMPLETE                                  AWS::Lambda::Permission                          HelloWorldFunctionHelloWorldPermissionProd       -
CREATE_IN_PROGRESS                               AWS::ApiGateway::Deployment                      ServerlessRestApiDeployment47fc2d5f9d            Resource creation Initiated
CREATE_COMPLETE                                  AWS::ApiGateway::Deployment                      ServerlessRestApiDeployment47fc2d5f9d            -
CREATE_IN_PROGRESS                               AWS::ApiGateway::Stage                           ServerlessRestApiProdStage                       -
CREATE_IN_PROGRESS                               AWS::ApiGateway::Stage                           ServerlessRestApiProdStage                       Resource creation Initiated
CREATE_COMPLETE                                  AWS::ApiGateway::Stage                           ServerlessRestApiProdStage                       -
CREATE_COMPLETE                                  AWS::CloudFormation::Stack                       yes                                              -
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

CloudFormation outputs from deployed stack
```

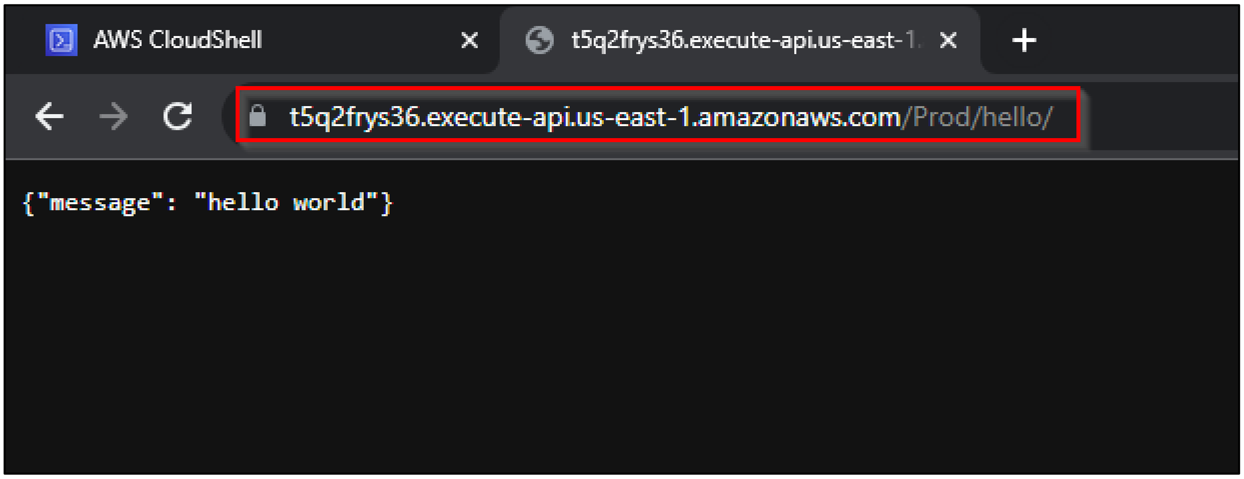
1.13 Copy the URL from the **Outputs** field, specifically the **Value** of **HelloWorldApi**



```
CREATE_COMPLETE                                  AWS::CloudFormation::Stack                       yes
-------------------------------------------------------------------------------------------------------------------

CloudFormation outputs from deployed stack
-------------------------------------------------------------------------------------------------------------------
Outputs
-------------------------------------------------------------------------------------------------------------------
Key                 HelloWorldFunctionIamRole
Description         Implicit IAM Role created for Hello World function
Value               arn:aws:iam::596509374816:role/yes-HelloWorldFunctionRole-E779MYQZ8WUG

Key                 HelloWorldApi
Description         API Gateway endpoint URL for Prod stage for Hello World function
Value               https://t5q2frys36.execute-api.us-east-1.amazonaws.com/Prod/hello/

Key                 HelloWorldFunction
Description         Hello World Lambda Function ARN
Value               arn:aws:lambda:us-east-1:596509374816:function:yes-HelloWorldFunction-OuUSU7kkG3IC
-------------------------------------------------------------------------------------------------------------------


Successfully created/updated stack - yes in us-east-1

[cloudshell-user@ip-10-2-110-224 test1]$
```

1.14 Open a new browser tab and paste the URL to access the output:

**https://t5q2frys36.execute-api.us-east-1.amazonaws.com/Prod/hello/**


AWS CloudShell
t5q2frys36.execute-api.us-east-1.
t5q2frys36.execute-api.us-east-1.amazonaws.com/Prod/hello/

```
{"message": "hello world"}
```

By following these steps, you have successfully created a serverless web application on AWS.