

COEN 241 HW 2

Your Own Serverless Infrastructure

Figlet Function Invoking:

FIGlet is a program that can turn normal text into larger letterforms. With the help of faas, it's possible to use FIGlet to create figures, like the one shown in the screenshot. To create and use this figlet function, it can be deployed and invoked using the faas-cli command. The necessary commands are provided below.

- To invoke: `echo "Hello, FaaS, world" | faas-cli invoke figlet`
- To inspect: `faas-cli store inspect figlet`
- To deploy: `faas-cli store deploy figlet`

```
sumit@sumitqemu:~/faasd$ faas-cli store deploy figlet
Deployed. 200 OK.
URL: http://127.0.0.1:8080/function/figlet

sumit@sumitqemu:~/faasd$ faas-cli store inspect figlet
Info for: Figlet

Name      figlet
Description Generate ASCII logos with the figlet CLI
Image     ghcr.io/openfaas/figlet:latest
Process   figlet
Repo URL  https://github.com/openfaas/store-functions

sumit@sumitqemu:~/faasd$ echo "Hello, FaaS, world" | faas-cli invoke figlet
 [REDACTED]
sumit@sumitqemu:~/faasd$ 
```

Slack-request/handler.py

Below is the screenshot of complete handler.py file

```
[sumit@sumitqemu:~/functions/slack-request$ cat handler.py
import json

def handle(req):
    data = {
        "text": "Serverless Message",
        "attachments": [
            {
                "title": "The Awesome world of Cloud Computing! COEN 241",
                "fields": [
                    {
                        "title": "Amazing Level",
                        "value": "100",
                        "short": True
                    }
                ],
                "author_name": "Sumit Agrawal",
                "author_icon": "https://github.com/sumit8698.png",
                "image_url": "https://github.com/sumit8698.png"
            },
            {
                "title": "About COEN 241",
                "text": "COEN 241 is the most awesome class ever!."
            },
            {
                "fallback": "Would you recommend COEN 241 to your friends?",
                "title": "Would you recommend COEN 241 to your friends?",
                "callback_id": "response123",
                "color": "#3AA3E3",
                "attachment_type": "default",
                "actions": [
                    {
                        "name": "recommend",
                        "text": "Of Course!",
                        "type": "button",
                        "value": "recommend"
                    },
                    {
                        "name": "definitely",
                        "text": "Most Definitely!",
                        "type": "button",
                        "value": "definitely"
                    }
                ]
            }]
        }
    return json.dumps(data)
sumit@sumitqemu:~/functions/slack-request$
```

Slack-interactive/handler.py

Below is the screenshot of complete handler.py file

```
sumit@sumitqemu:~/functions/slack-interactive$ cat handler.py
import json
import urllib.parse

def handle(req):
    urlstring = urllib.parse.unquote(req.strip('payload=')
    response = json.loads(urlstring)
    data = {
        "attachments": [
            {
                "replace_original": True,
                "response_type": "ephemeral",
                "fallback": "Required plain-text summary of the attachment.",
                "color": "#36a8af",
                "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!",
                "author_name": "",
                "author_link": "https://github.com/sumit8698",
                "author_icon": "https://github.com/sumit8698.png",
                "title": "COEN 241",
                "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
                "text": "Head over to COEN 241",
                "image_url": "https://www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-identity-toolkit/logos-amp-seals/Mission-Dont3.png",
                "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
                "footer": "Slack Apps built on OpenFaaS",
                "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png",
                "ts": 123456789
            }
        ]
    }
    return json.dumps(data)
sumit@sumitqemu:~/functions/slack-interactive$
```

OpenFaaS gateway after deploying figlet, Slack-interactive & Slack-request functions:

As part of this, we first need to deploy slack-request and slack-interactive functions using faas-cli and then we can see this functions on OpenFaaS gateway.

1. Slack-Interactive:

We need to execute three commands as a part of this:

To Build: **faas-cli build -f ./slack-interactive.yml**

To Push: **faas-cli push -f ./slack-interactive.yml**

To Deploy: **faas-cli deploy -f ./slack-interactive.yml**

Below are the screenshots for each of them:

1.1 Slack-interactive build

By executing the faas-cli build command, a Docker image is generated for both the function and its dependencies. Subsequently, this image is utilized to instantiate and run the container.

```

sumit@sumitqemu:~/functions$ sudo faas-cli build -f ./slack-interactive.yml
[0] > Building slack-interactive.
Clearing temporary build folder: ./build/slack-interactive/
Preparing: ./slack-interactive/ build/slack-interactive/function
Building: sumit8698/slack-interactive:latest with python3 template. Please wait..
#1 [internal] load .dockerignore
#1 transferring context: 2B done
#1 DONE 0.0s

#2 [internal] load build definition from Dockerfile
#2 transferring dockerfile: 1.34kB done
#2 DONE 0.0s

#3 [internal] load metadata for docker.io/library/python:3-alpine
#3 ...

#4 [auth] library/python:pull token for registry-1.docker.io
#4 DONE 0.0s

#5 [internal] load metadata for ghcr.io/openfaas/classic-watchdog:0.2.1
#5 ...

#3 [internal] load metadata for docker.io/library/python:3-alpine
#3 DONE 1.6s

#5 [internal] load metadata for ghcr.io/openfaas/classic-watchdog:0.2.1
#5 DONE 2.0s

#6 [internal] load build context
#6 transferring context: 2.25kB done
#6 DONE 0.0s

#7 [stage-1 1/18] FROM docker.io/library/python:3-alpine@sha256:84630610c68e7c97384bc6e10f5490ab7b8398c30...
#7 resolve docker.io/library/python:3-alpine@sha256:84630610c68e7c97384bc6e10f5490ab7b8398c30cdfffe...
#7 sha256:306098e014d097054e21956106f3cc85917ed842396335da9279aaa4a1fa9052 0B / 12.46MB 0.1s
#7 sha256:84630610c68e7c97384bc6e10f5490ab7b8398c30cdfffe...
#7 sha256:35f7180f53ca3767ccdacd83c25747de820600e62f8be3d755 1.65kB / 1.65kB done
#7 sha256:35f7180f53ca3767ccdacd83c25747de820600e62f8be3d755 1.37kB / 1.37kB done
#7 sha256:74ae234443823774b4fe052203bf8d852c359915747e2e01375c558a54626c3 7.34kB / 7.34kB done
#7 sha256:a76eaf76a39c2d3e7e0b8a0420486e3df33c4027d696c076a99a3d0ac09026af 0B / 3.26MB 0.1s
#7 sha256:cdba2f6867522ee9d2e8dcc9b1ad3ec5bafe75da976a3e613ff26cbc98738b48 0B / 624.86kB 0.1s
#7 sha256:a76eaf76a39c2d3e7e0b8a0420486e3df33c4027d696c076a99a3d0ac09026af 1.05MB / 3.26MB 0.3s
#7 sha256:cdba2f6867522ee9d2e8dcc9b1ad3ec5bafe75da976a3e613ff26cbc98738b48 471.04kB / 624.86kB 0.3s
#7 sha256:306098e014d097054e21956106f3cc85917ed842396335da9279aaa4a1fa9052 2.10MB / 12.46MB 0.5s
#7 sha256:a76eaf76a39c2d3e7e0b8a0420486e3df33c4027d696c076a99a3d0ac09026af 3.26MB / 3.26MB 0.4s done
#7 sha256:cdba2f6867522ee9d2e8dcc9b1ad3ec5bafe75da976a3e613ff26cbc98738b48 624.86kB / 624.86kB 0.3s done

```

1.2 Slack-interactive push

This command is used to upload the image to docker hub along with its dependencies and runtime libraries.

```

sumit@sumitqemu:~/functions$ sudo faas-cli push -f ./slack-interactive.yml
[0] > Pushing slack-interactive [sumit8698/slack-interactive:latest]
The push refers to repository [docker.io/sumit8698/slack-interactive]
26fc9c3470ae: Layer already exists
9f3aecdd0529: Layer already exists
5f70bf18a086: Layer already exists
4c53d0d87a19: Layer already exists
2ee23a5f631e: Layer already exists
1d09268fafd3: Layer already exists
b246d5855da3: Layer already exists
4963f58f97bc: Layer already exists
9b60adce28fb: Layer already exists
a8c2d7783f43: Layer already exists
f723740ddc2e: Layer already exists
352d8ead0faf1: Layer already exists
6d54277d9422: Layer already exists
63e438f59f62: Layer already exists
b0fb948b49d2: Layer already exists
f68fdca50619: Layer already exists
e4bb0a5ae091: Layer already exists
44fda71e555e: Layer already exists
2b6d33d15c9f: Layer already exists
edf70074bd40: Layer already exists
latest: digest: sha256:edc0c46feb39071082248e0b8147e8e8273455155d77135c4bc1e9413647cc4e size: 4900
[0] < Pushing slack-interactive [sumit8698/slack-interactive:latest] done.
[0] Worker done.
sumit@sumitqemu:~/functions$ 

```

1.3 Slack-interactive deploy

This command runs the container for the provided function.

```
sumit@sumitqemu:~/functions$ faas-cli deploy -f ./slack-interactive.yml
Deploying: slack-interactive.
Function slack-interactive already exists, attempting rolling-update.

Deployed. 200 OK.
URL: http://127.0.0.1:8080/function/slack-interactive

sumit@sumitqemu:~/functions$
```

2. Slack-request

We need to execute three commands as a part of this:

To Build: **faas-cli build -f ./slack-request.yml**
To Push: **faas-cli push -f ./slack-request.yml**
To Deploy: **faas-cli deploy -f ./slack-request.yml**

Below are the screenshots for each of them:

2.1 Slack request build

By executing the faas-cli build command, a Docker image is generated for both the function and its dependencies. Subsequently, this image is utilized to instantiate and run the container.

```
sumit@sumitqemu:~/functions$ sudo faas-cli build -f ./slack-request.yml
[0] > Building slack-request.
Clearing temporary build folder: ./build/slack-request/
Preparing: ./slack-request/ build/slack-request/function
Building: sumit8698/slack-request:latest with python3 template. Please wait..
#1 [internal] load .dockerignore
#1 transferring context: 2B done
#1 DONE 0.0s

#2 [internal] load build definition from Dockerfile
#2 transferring dockerfile: 1.34kB done
#2 DONE 0.0s

#3 [internal] load metadata for ghcr.io/openfaas/classic-watchdog:0.2.1
#3 ...

#4 [auth] library/python:pull token for registry-1.docker.io
#4 DONE 0.0s

#5 [internal] load metadata for docker.io/library/python:3-alpine
#5 DONE 0.8s

#3 [internal] load metadata for ghcr.io/openfaas/classic-watchdog:0.2.1
#3 DONE 0.8s

#6 [watchdog 1/1] FROM ghcr.io/openfaas/classic-watchdog:0.2.1@sha256:640de69b1d683cbfa73fd3b2d707d33a4e4570164c9795c3be028949688e5c61
#6 DONE 0.0s

#7 [stage-1 1/18] FROM docker.io/library/python:3-alpine@sha256:84630610c68e7c97384bc6e10f5490ab7b8398c30cdfffffa139ae20c3407cda
#7 DONE 0.0s

#8 [internal] load build context
#8 transferring context: 2.16kB done
#8 DONE 0.0s

#9 [stage-1 7/18] COPY index.py .
#9 CACHED

#10 [stage-1 14/18] COPY function/requirements.txt .
#10 CACHED

#11 [stage-1 15/18] RUN pip install -r requirements.txt --target=/home/app/python
#11 CACHED
```

2.2 slack request push

This command is used to upload the image to docker hub along with its dependencies and runtime libraries.

```
[sumit@sumitqemu:~/functions$ sudo faas-cli push -f ./slack-request.yml
[0] > Pushing slack-request [sumit8698/slack-request:latest]
The push refers to repository [docker.io/sumit8698/slack-request]
08946db7b32f: Pushed
cb6f3be0ebbb: Pushed
5f70bf18a086: Mounted from sumit8698/slack-interactive
4c53d0d87a19: Mounted from sumit8698/slack-interactive
2ee23a5f631e: Mounted from sumit8698/slack-interactive
1d09268fafd3: Mounted from sumit8698/slack-interactive
b246d5855da3: Mounted from sumit8698/slack-interactive
4963f58f97bc: Mounted from sumit8698/slack-interactive
9b60adce28fb: Mounted from sumit8698/slack-interactive
a8c2d7783f43: Mounted from sumit8698/slack-interactive
f723740ddc2e: Mounted from sumit8698/slack-interactive
352d8ead0fa1: Mounted from sumit8698/slack-interactive
6d54277d9422: Mounted from sumit8698/slack-interactive
63e438f59f62: Mounted from sumit8698/slack-interactive
b0fb948b49d2: Mounted from sumit8698/slack-interactive
f68fdca50619: Mounted from sumit8698/slack-interactive
e4bb0a5ae091: Mounted from sumit8698/slack-interactive
44fda71e555e: Mounted from sumit8698/slack-interactive
2b6d33d15c9f: Mounted from sumit8698/slack-interactive
edf70074bd40: Mounted from sumit8698/slack-interactive
latest: digest: sha256:0c88f059b5169debbb5679f0c16e3c7a5aa5fd85a484b96986cd4d123eb1615a size: 4900
[0] < Pushing slack-request [sumit8698/slack-request:latest] done.
[0] Worker done.
sumit@sumitqemu:~/functions$ ]
```

2.3 slack request deploy

This command runs the container for the provided function.

```
[sumit@sumitqemu:~/functions$ sudo faas-cli deploy -f ./slack-request.yml
Deploying: slack-request.

Deployed. 200 OK.
URL: http://127.0.0.1:8080/function/slack-request

sumit@sumitqemu:~/functions$
```

3. OpenFaas API Gateway snaps:

The OpenFaaS Gateway serves as an API gateway that receives and handles commands from various sources such as faas-cli, REST APIs, or programs. The gateway then passes these commands to other components such as Containerd, Prometheus, Kubernetes, NATFS, and others to execute their respective functions.

To initiate the Gateway UI, simply access `http://127.0.0.1:8080/ui/` from any web browser. The user interface displays all of the deployed functions, and it also enables us to execute these functions directly through the UI.

A screenshot of a Chrome browser window showing the OpenFaaS Portal at `http://localhost:8090/ui/`. The main heading is "OPENFAAS". Below it is a search bar with placeholder text "Search for Function" and a dropdown menu showing three function names: "figlet", "slack-interactive", and "slack-request". To the right of the search bar is a button labeled "DEPLOY NEW FUNCTION". Further down, there's a section titled "Or use faas-cli to build and deploy functions:" with a command line example: `$ curl -sSL https://cli.openfaas.com | sudo sh`.

Invoking figlet:

A screenshot of a Chrome browser window showing the OpenFaaS Portal at `http://127.0.0.1:8090/ui/`. The main heading is "figlet". On the left, there's a sidebar with function names: "Deploy New Function", "slack-interactive", "slack-request", and "figlet" (which is currently selected). The main area shows the function details: "Status: Ready", "Replicas: 1", "Invocation count: 1", "Image: gcr.io/openfaas/figlet:latest", and "URL: http://127.0.0.1:8090/function/figlet". Below this is an "Invoke" button. Under "Invoke function", there are options for "Text" (selected), "JSON", and "Download", with a "Request body" input field containing the value "Hello World". At the bottom, the "Response status" is shown as "200" and the "Response body" contains the output of the figlet command, which is a large, stylized "Hello World" in various fonts. A file icon at the bottom indicates a "handler.py" file is associated with this function.

Invoking slack-interactive:

The screenshot shows the OpenFaaS Portal interface in a web browser. The URL is `http://127.0.0.1:8090/`. On the left sidebar, the 'slack-interactive' function is selected. In the main area, under 'Invoke function', there is an 'INVOKER' button. Below it, a dropdown menu shows 'Text' is selected. The 'Request body' field contains the text 'Hello'. The response status is 200, and the response body is a JSON object representing a Slack message payload. The JSON includes fields like 'attachments', 'text', 'title', 'image_url', and 'fallback'. The response size is 0.14 kB.

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 0.14 kB

{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaaS",
      "author_link": "https://github.com/sumit8698",
      "color": "#8A8AE4",
      "text": "Welcome to COEN 241!",
      "title": "COEN 241",
      "ts": 123456789,
      "author_name": "Sumit Agrawal",
      "image_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions",
      "thumb_url": "https://a.slack-edge.com/49981MarketingImg/repo/meta/slack_hash_256.png",
      "replace_original": true,
      "fallback": "Required plain-text summary of the attachment.",
      "callback_id": "response123",
      "actions": [
        {
          "text": "Serverless Message",
          "title": "The Awesome world of Cloud Computing! COEN 241",
          "image_url": "https://github.com/sumit8698.png",
          "fallback": "Would you recommend COEN 241 to your friends?",
          "title": "Would you recommend COEN 241 to your friends?",
          "callback_id": "response123",
          "color": "#8A8AE4",
          "attachment_type": "default",
          "actions": [
            {
              "text": "About COEN 241",
              "text": "COEN 241 is the most awesome class ever!",
              "image_url": "https://github.com/sumit8698.png"
            }
          ]
        }
      ]
    }
  ]
}
```

Invoking slack-request:

The screenshot shows the OpenFaaS Portal interface in a web browser. The URL is `http://127.0.0.1:8090/`. On the left sidebar, the 'slack-request' function is selected. In the main area, under 'Invoke function', there is an 'INVOKER' button. Below it, a dropdown menu shows 'Text' is selected. The 'Request body' field contains the text 'Hello'. The response status is 200, and the response body is a JSON object representing a Slack message payload. The JSON includes fields like 'text', 'attachments', 'title', 'image_url', and 'fallback'. The response size is 0.11 kB.

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: 0.11 kB

{
  "text": "Serverless Message",
  "attachments": [
    {
      "title": "The Awesome world of Cloud Computing! COEN 241",
      "fields": [
        {
          "title": "Amazing Level",
          "value": "100",
          "short": true
        }
      ],
      "author_name": "Sumit Agrawal",
      "author_icon": "https://github.com/sumit8698.png",
      "image_url": "https://github.com/sumit8698.png"
    }
  ],
  "fallback": "Would you recommend COEN 241 to your friends?",
  "title": "Would you recommend COEN 241 to your friends?",
  "callback_id": "response123",
  "color": "#8A8AE4",
  "attachment_type": "default",
  "actions": [
    {
      "text": "About COEN 241",
      "text": "COEN 241 is the most awesome class ever!",
      "image_url": "https://github.com/sumit8698.png"
    }
  ]
}
```

Journalctl command logs snap

Command: sudo journalctl -u faasd --lines 40

Following are the logs for the same:

```
sumit1@sumitqemu:~/functions$ sudo journalctl -u faasd --lines 40
-- Logs begin at Fri 2023-02-17 01:05:09 UTC, end at Fri 2023-02-17 03:31:15 UTC.
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 - gateway
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 - queue-worker
Feb 17 02:28:31 sumitqemu faasd[642]: Starting: nats
Feb 17 02:28:31 sumitqemu faasd[642]: Creating local directory: /var/lib/faasd/>
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 Running nats with use>
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 Created container: na>
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 nats has IP: 10.62.0.2
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 Task: nats      Con>
Feb 17 02:28:31 sumitqemu faasd[642]: Starting: prometheus
Feb 17 02:28:31 sumitqemu faasd[642]: Creating local directory: /var/lib/faasd/>
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 Running prometheus wi>
Feb 17 02:28:31 sumitqemu faasd[642]: 2023/02/17 02:28:31 Created container: pr>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 prometheus has IP: 10>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Task: prometheus >
Feb 17 02:28:32 sumitqemu faasd[642]: Starting: basic-auth-plugin
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Created container: ba>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 basic-auth-plugin has>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Task: basic-auth-plug>
Feb 17 02:28:32 sumitqemu faasd[642]: Starting: gateway
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Created container: ga>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 gateway has IP: 10.62>
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Task: gateway      >
Feb 17 02:28:32 sumitqemu faasd[642]: Starting: queue-worker
Feb 17 02:28:32 sumitqemu faasd[642]: 2023/02/17 02:28:32 Created container: qu>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 queue-worker has IP: >
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Task: queue-worker >
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Supervisor init done >
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Looking up IP for: "g>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver rebuilding m>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "localhost">
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "faasd-prov>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "nats"="10.>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "prometheus">
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "basic-auth">
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "gateway"=>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Resolver: "queue-work>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Looking up IP for: "p>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Proxy from: 127.0.0.1>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 faasd: waiting for SI>
Feb 17 02:28:33 sumitqemu faasd[642]: 2023/02/17 02:28:33 Proxy from: 0.0.0.0:8>
```

Snaps of invoking slack-request and slack-interactive functions

We can invoke slack-interactive and slack-request functions using both faas-cli and OpenFaas gateway.

1. Using faas-cli and curl command

1.1 Invoking slack-interactive function

We will be using following commands:

To invoke: **faas-cli invoke slack-interactive**

Curl Command: **curl -d '{"Hello":"COEN 241"}' <http://127.0.0.1:8080/function/slack-interactive>**

```
sumit1@sumitqemu:~/functions$ sudo faas-cli invoke slack-interactive
Reading from STDIN - hit (Control + D) to stop.
"Hello"
("attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/sumit8698", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https://www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-identity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_original": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png", "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!", "fallback": "Required plain-text summary of the attachment.", "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://github.com/sumit8698.png"}])
sumit1@sumitqemu:~/functions$ curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-interactive
("attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/sumit8698", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https://www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-identity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_original": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png", "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!", "fallback": "Required plain-text summary of the attachment.", "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://github.com/sumit8698.png"}])
sumit1@sumitqemu:~/functions$
```

1.2 Invoking slack-request function

We will be using following commands:

To invoke: **faas-cli invoke slack-request**

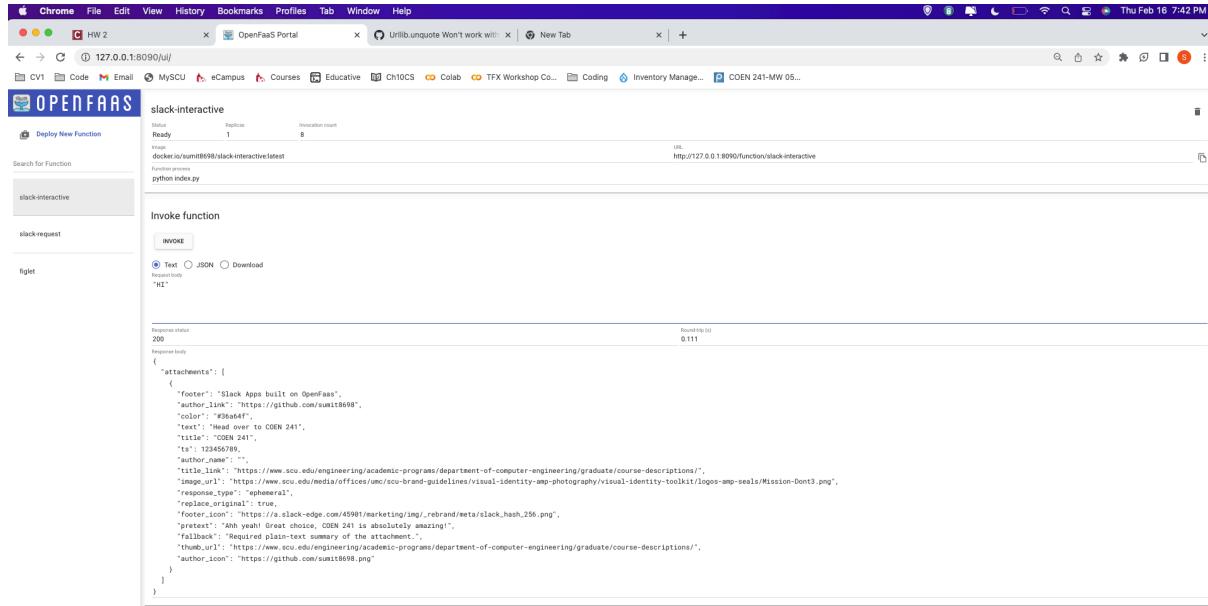
Curl Command: **curl -d '{"Hello":"COEN 241"}' \ http://127.0.0.1:8080/function/slack-request**

```
sumit1@sumitqemu:~/functions$ sudo faas-cli invoke slack-request
Reading from STDIN - hit (Control + D) to stop.
("text": "Serverless Message", "attachments": [{"title": "The Awesome world of Cloud Computing! COEN 241", "fields": [{"title": "Amazing Level", "value": "100", "short": true}], "author_name": "Sumit Agrawal", "author_icon": "https://github.com/sumit8698.png", "image_url": "https://github.com/sumit8698.png"}, {"title": "About COEN 241", "text": "COEN 241 is the most awesome class ever!."}, {"fallback": "Would you recommend COEN 241 to your friends?", "title": "Would you recommend COEN 241 to your friends?", "callback_id": "response123", "color": "#3AA3E3", "attachment_type": "default", "actions": [{"name": "recommend", "text": "Of Course!", "type": "button", "value": "recommend"}, {"name": "definitely", "text": "Most Definitely!", "type": "button", "value": "definitely"}]}])
sumit1@sumitqemu:~/functions$
```

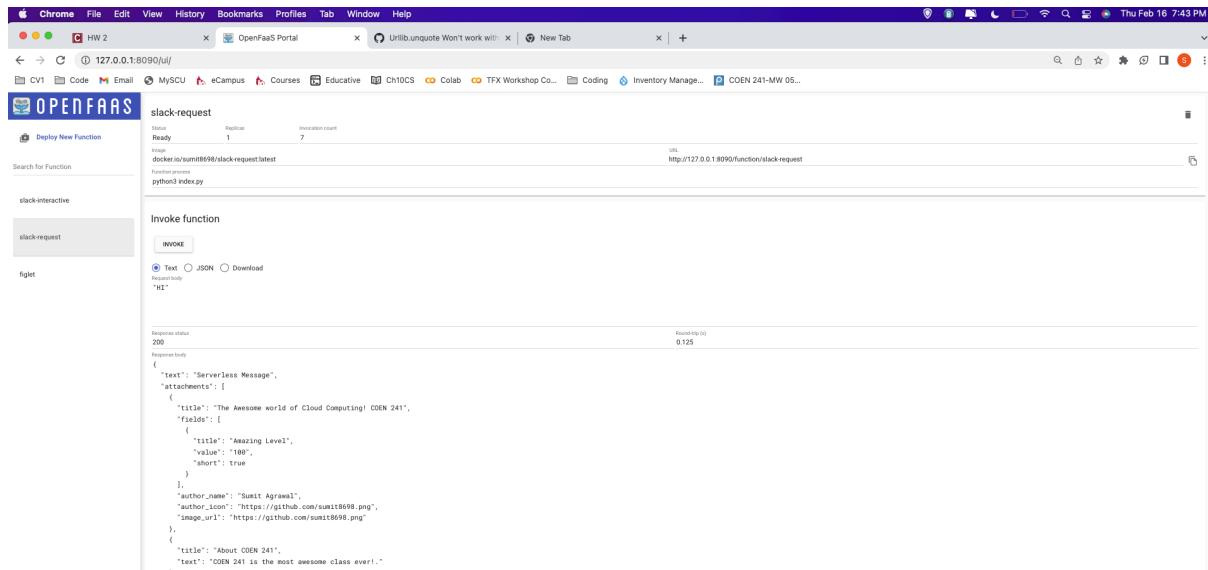
```
sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$ curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-request
("text": "Serverless Message", "attachments": [{"title": "The Awesome world of Cloud Computing! COEN 241", "fields": [{"title": "Amazing Level", "value": "100", "short": true}], "author_name": "Sumit Agrawal", "author_icon": "https://github.com/sumit8698.png", "image_url": "https://github.com/sumit8698.png"}, {"title": "About COEN 241", "text": "COEN 241 is the most awesome class ever!."}, {"fallback": "Would you recommend COEN 241 to your friends?", "title": "Would you recommend COEN 241 to your friends?", "callback_id": "response123", "color": "#3AA3E3", "attachment_type": "default", "actions": [{"name": "recommend", "text": "Of Course!", "type": "button", "value": "recommend"}, {"name": "definitely", "text": "Most Definitely!", "type": "button", "value": "definitely"}]}])
sumit1@sumitqemu:~/functions$
```

2. Using invoke button on OpenFaas API Gateway

2.1 Invoking slack-interactive functions



2.2 Invoking slack-request function



Questions

1. What is the command to invoke the slack-request function?

- a. via curl:

```
curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-request
```

- b. via faas-cli:

```
faas-cli invoke slack-request
```

2. What is the output you see when you invoke the slack-request function?

```
sumit1@sumitqemu:~/functions$ sudo faas-cli invoke slack-request
Reading from STDIN - hit (Control + D) to stop.
{"text": "Serverless Message", "attachments": [{"title": "The Awesome World of Cloud Computing! COEN 241", "fields": [{"title": "Amazing Level", "value": "100", "short": true}, {"author_name": "Sumit Agrawal", "author_icon": "https://github.com/sumit8698.png", "image_url": "https://github.com/sumit8698.png"}, {"title": "About COEN 241", "text": "COEN 241 is the most awesome class ever!."}, {"fallback": "Would you recommend COEN 241 to your friends?", "title": "Would you recommend COEN 241 to your friends?", "callback_id": "response123", "color": "#3AA3E3", "attachment_type": "default", "actions": [{"name": "recommend", "text": "Of Course!", "type": "button", "value": "recommend"}, {"name": "definitely", "text": "Most Definitely!", "type": "button", "value": "definitely"}]}]}
sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$ curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-request
{"text": "Serverless Message", "attachments": [{"title": "The Awesome World of Cloud Computing! COEN 241", "fields": [{"title": "Amazing Level", "value": "100", "short": true}, {"author_name": "Sumit Agrawal", "author_icon": "https://github.com/sumit8698.png", "image_url": "https://github.com/sumit8698.png"}, {"title": "About COEN 241", "text": "COEN 241 is the most awesome class ever!."}, {"fallback": "Would you recommend COEN 241 to your friends?", "title": "Would you recommend COEN 241 to your friends?", "callback_id": "response123", "color": "#3AA3E3", "attachment_type": "default", "actions": [{"name": "recommend", "text": "Of Course!", "type": "button", "value": "recommend"}, {"name": "definitely", "text": "Most Definitely!", "type": "button", "value": "definitely"}]}]}
sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$
```

3. What is the command to invoke the slack-interactive function?

- a. via curl

```
curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-interactive
```

- b. via faas-cli

```
faas-cli invoke slack-interactive
```

4. What is the output you see when you invoke the slack-interactive function?

```
sumit1@sumitqemu:~/functions$ sudo faas-cli invoke slack-interactive
Reading from STDIN - hit (Control + D) to stop.
"HI"
("attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/sumit8698", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https://www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-identity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_original": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png", "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!", "fallback": "Required plain-text summary of the attachment.", "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://github.com/sumit8698.png"}]}
sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$ curl -d '{"Hello":"COEN 241"}' http://127.0.0.1:8080/function/slack-interactive
("attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/sumit8698", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https://www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-identity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_original": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png", "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!", "fallback": "Required plain-text summary of the attachment.", "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://github.com/sumit8698.png"}]}
sumit1@sumitqemu:~/functions$ sumit1@sumitqemu:~/functions$
```

5. How would you pass different arguments to the functions?

There are many ways of passing arguments to functions.

a. The way we invoke the figlet function using faas-cli along with echo command and we pass the argument "Hello, FaaS World" to the function:

```
echo "Hello, FaaS World" | faas-cli invoke figlet
```

b. In the slack request curl command below, we send the specified data in a POST request to the HTTP server:

```
curl -d '{"Hello":"COEN 241"}' https://127.1.0.1:8080/function/slack-request
```

c. We can also pass arguments via the OpenFaas API Gateway UI

6. How would you change the slack-interactive function to react to different inputs?

Within the handler.py file, we have defined an unquote function sourced from the urllib package, which can be utilized to decode any string into a URL, with UTF-8 being the default encoding. Next, we have used the json.load() method to transform a valid JSON string, namely urlstring, into a Python dictionary, and its contents are stored within the response variable. However, it appears that response is not being employed anywhere after being saved. To enable the slack-interactive function to react to various inputs, we can modify it accordingly. Given that response is also a Python dictionary, it can be incorporated into the data. This enables the function to start responding to different inputs. Subsequently, upon returning json.dumps(data), the slack-interactive function will be able to respond to a diverse range of inputs.

Extra Credit:

Link for the application: <https://api.slack.com/apps/A04Q0CAEV70>

Sharable URL for App: https://join.slack.com/t/scu-cloud-computing/shared_invite/zt-1pgmfvfmu-zkjTPmyQ0axfT96NkPUoRA

Go to channel # **coen-241** and enter **/coen241** command.

Slash Command URL: <https://4094-73-15-53-248.ngrok.io/function/slack-request>

Interactive Component: <https://4094-73-15-53-248.ngrok.io/function/slack-interactive>

Running Ngrok on local System:

```
sumit — ngrok http 8090 — 122x27
~ — ngrok http 8090
...ga none ~device ramfb -device usb-ehci -device usb-kbd -device usb-mouse -usb -nographic
(Ctrl+C to quit)

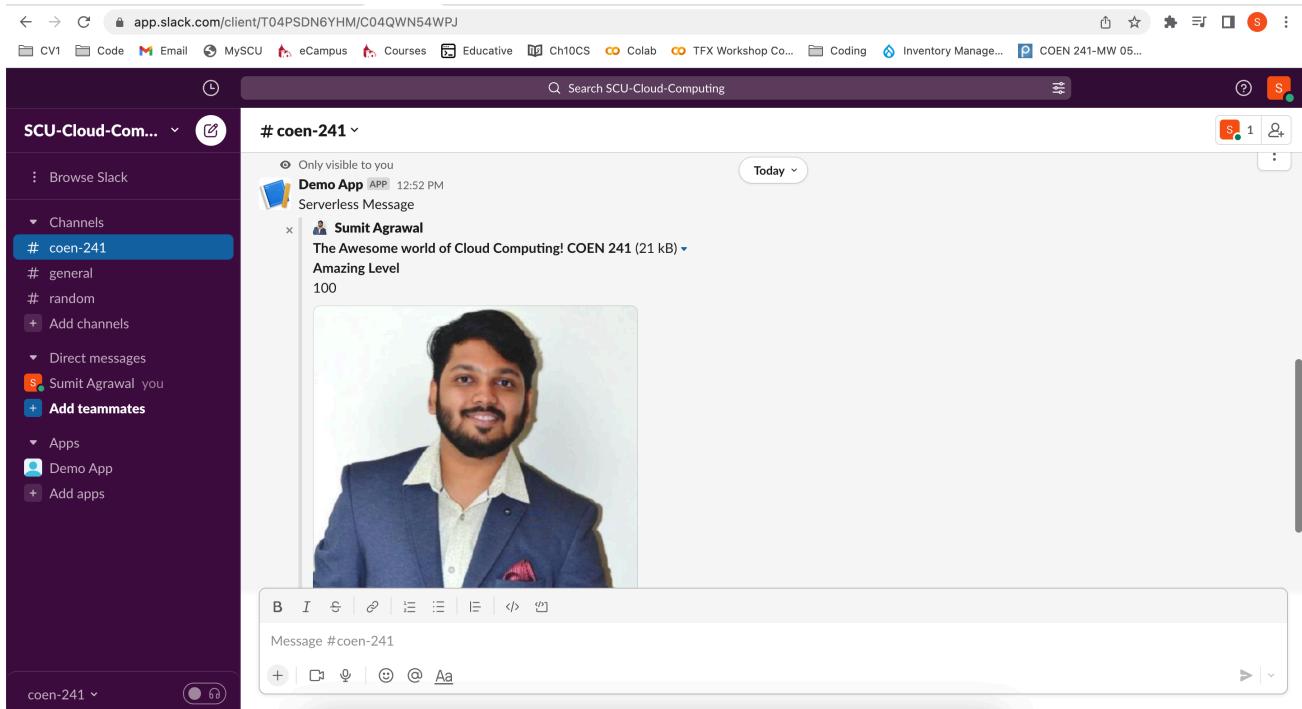
ngrok
We added a plan for ngrok hobbyists @ https://ngrok.com/personal

Session Status          online
Account                 Sumit Agrawal (Plan: Free)
Version                 3.1.1
Region                  United States (us)
Latency                 78ms
Web Interface           http://127.0.0.1:4040
Forwarding              https://4094-73-15-53-248.ngrok.io -> http://localhost:8090

Connections             ttl     opn      r1t      rt5      p50      p90
                        101      0       0.03    0.01    60.11    65.57

HTTP Requests
-----
GET /system/functions      200 OK
GET /system/function/slack-interactive 200 OK
GET /system/functions      200 OK
GET /system/function/slack-interactive 200 OK
GET /system/functions      200 OK
GET /system/function/slack-interactive 200 OK
GET /system/function/slack-interactive 200 OK
GET /system/functions      200 OK
GET /system/function/slack-interactive 200 OK
GET /system/functions      200 OK
GET /system/function/slack-interactive 200 OK
```

Screenshot of application running inside slack:



app.slack.com/client/T04PSDN6YHM/C04QWN54WPJ

CV1 Code Email MySCU eCampus Courses Educative Ch10CS Colab TFX Workshop Co... Coding Inventory Manage... COEN 241-MW 05...

SCU-Cloud-Com... # coen-241

Browse Slack Channels Direct messages Add channels Add teammates Apps Demo App Add apps

coen-241

+ Add a bookmark

Sumit Agrawal you Add teammates

About COEN 241 COEN 241 is the most awesome class ever! Would you recommend COEN 241 to your friends? Of Course! Most Definitely!

Message #coen-241

COEN 241 Head over to COEN 241 Ahh yeah! Great choice, COEN 241 is absolutely amazing!

COEN 241 Santa Clara University

Once you click on any of button, you get the following response.

app.slack.com/client/T04PSDN6YHM/C04QWN54WPJ

CV1 Code Email MySCU eCampus Courses Educative Ch10CS Colab TFX Workshop Co... Coding Inventory Manage... COEN 241-MW 05...

SCU-Cloud-Com... # coen-241

Drafts & sent Browse Slack Channels Direct messages Add channels Add teammates Apps Demo App Add apps

coen-241

+ Only visible to you Demo App APP 1:52 PM Ahh yeah! Great choice, COEN 241 is absolutely amazing!

COEN 241 Head over to COEN 241 Slack Apps built on OpenFaaS · Nov 29th, 1973 (16 kB)

COEN 241 Santa Clara University

Message #coen-241

https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/

← → C 4094-73-15-53-248.ngrok.io/ui/

YT rare Books LC150 InternR InternS New-Grad-Position... GitHub - pittcsc/S... R Welcome to Pro ... seampatterns glassdoor Amazon Student... Homeworkify.Net... »

slack-request

Status Ready Replicas 3 Invocation count 3

Image docker.io/sumit8698/slack-request:latest URL https://4094-73-15-53-248.ngrok.io/function/slack-request

Function process python3 index.py

Invoke function

INVOKE

Text JSON Download

Request body

Response status 200 Round-trip (s) 0.314

Response body

```
{ "text": "Serverless Message", "attachments": [ { "title": "The Awesome world of Cloud Computing! COEN 241", "fields": [ { "title": "Amazing Level", "value": "100", "short": true } ] } ] }
```

← → C 4094-73-15-53-248.ngrok.io/ui/

YT rare Books LC150 InternR InternS New-Grad-Position... GitHub - pittcsc/S... R Welcome to Pro ... seampatterns glassdoor Amazon Student... Homeworkify.Net... »

slack-interactive

Status Ready Replicas 1 Invocation count 28

Image docker.io/sumit8698/slack-interactive:latest URL https://4094-73-15-53-248.ngrok.io/function/slack-interactive

Function process python index.py

Invoke function

INVOKE

Text JSON Download

Request body

```
"Hello"
```

Response status 200 Round-trip (s) 0.332

Response body

```
{ "attachments": [ { "footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/sumit8698", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "" } ] }
```

Git Repository Information:

Account name	sumit8698
Student ID	W1631657
Repository name	COEN241-Cloud-Computing
Folder which contains HW2	HW2
Link to repository	https://github.com/sumit8698/COEN241-Cloud-Computing