COEN 241 : CLOUD COMPUTING

Homework 2
Your Own Serverless Infrastructure

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Invoking the Figlet Function :

FIGlet is a software that can convert regular text into larger letterforms. By using faas, it is possible to utilize FIGlet to produce various graphical figures, such as the one demonstrated in the provided screenshot. The figlet function can be created, deployed, and activated through the faas-cli command. The required instructions for this process are presented 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**

Slack-request/handler.py :

```python
1 import json
2
3 def handle(req):
4     data = {
5         "text": "Serverless Message",
6         "attachments": [{
7             "title": "The Awesome world of Cloud Computing! COEN 241",
8             "fields": [{
9                 "title": "Amazing Level",
10                "value": "100",
11                "short": True
12            }],
13            "author_name": "Shubham",
14            "author_icon": "",
15            "image_url": "https://github.com/shubhammurkte.png"
16        },
17        {
18            "title": "About COEN 241",
19            "text": "COEN 241 is the most awesome class ever!."
20        },
21        {
22            "fallback": "Would you recommend COEN 241 to your friends?",
23            "title": "Would you recommend COEN 241 to your friends?",
24            "callback_id": "response123",
25            "color": "#3AA3E3",
26            "attachment_type": "default",
27            "actions": [
28                {
29                    "name": "recommend",
30                    "text": "Of Course!",
31                    "type": "button",
32                    "value": "recommend"
33                },
34                {
35                    "name": "definitely",
36                    "text": "Most Definitely!",
37                    "type": "button",
38                    "value": "definitely"
39                }
40            ]
41        }]
42    }
43    return json.dumps(data)
```

Slack-interactive/handler.py :

```python
1  import json
2  import urllib
3
4  def handle(req):
5      urlstring = urllib.unquote(req).decode('utf8').strip('payload=')
6      response = json.loads(urlstring)
7      data = {
8          "attachments": [
9              {
10                 "replace_original": True,
11                 "response_type": "ephemeral",
12                 "fallback": "Required plain-text summary of the attachment.",
13                 "color": "#36a64f",
14                 "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!",
15                 "author_name": "",
16                 "author_link": "https://github.com/shubham-murkute/cloud-computing-scu",
17                 "author_icon": "https://github.com/shubham-murkute/cloud-computing-scu",
18                 "title": "COEN 241",
19                 "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
20                 "text": "Head over to COEN 241",
21                 "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",
22                 "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
23                 "footer": "Slack Apps built on OpenFaas",
24                 "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png",
25                 "ts": 123456789
26             }
27         ]
28     }
29     return json.dumps(data)
```

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

We first need to deploy slack-request and slack-interactive functions using faas-cli and then we can these functions on OpenFaas gateway.

1. **Slack-Interactive :** The following three commands need to be executed
   - To Build: **faas-cli build -f ./slack-interactive.yml**

   By running the build command, a Docker image is generated for both function and its dependencies. This image is then utilised to instantiate and run the container.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/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: slack-interactive:latest with python template. Please wait..
Sending build context to Docker daemon  10.24kB
Step 1/31 : FROM --platform=${TARGETPLATFORM:-linux/amd64} ghcr.io/openfaas/classic-watchdog:0.2.1 as watchdog
0.2.1: Pulling from openfaas/classic-watchdog
e1749af664ff: Pulling fs layer
e1749af664ff: Verifying Checksum
e1749af664ff: Download complete
e1749af664ff: Pull complete
Digest: sha256:640de69b1d683cbfa73fd3b2d707d33a4e4570164c9795c3be028949688e5c61
Status: Downloaded newer image for ghcr.io/openfaas/classic-watchdog:0.2.1
 ---> 021a98fdbddd
Step 2/31 : FROM --platform=${TARGETPLATFORM:-linux/amd64} python:2.7-alpine
2.7-alpine: Pulling from library/python
aad63a933944: Pulling fs layer
259d822268fb: Pulling fs layer
10ba96d218d3: Pulling fs layer
44ba9f6a4209: Pulling fs layer
44ba9f6a4209: Waiting
259d822268fb: Verifying Checksum
259d822268fb: Download complete
aad63a933944: Verifying Checksum
aad63a933944: Download complete
44ba9f6a4209: Verifying Checksum
44ba9f6a4209: Download complete
aad63a933944: Pull complete
10ba96d218d3: Verifying Checksum
10ba96d218d3: Download complete
259d822268fb: Pull complete
10ba96d218d3: Pull complete
44ba9f6a4209: Pull complete
Digest: sha256:724d0540eb56ffaa6dd770aa13c3bc7dfc829dec561d87cb36b2f5b9ff8a760a
Status: Downloaded newer image for python:2.7-alpine
 ---> 8579e446340f
```

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

  This command is used to upload image to docker hub.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$ sudo faas-cli push -f ./slack-interactive.yml
[0] > Pushing slack-interactive [nakulthombare64/slack-interactive:latest]
The push refers to repository [docker.io/nakulthombare64/slack-interactive]
3cd95fba1d77: Pushed
1596868b1e68: Pushed
b149cb5b042f: Pushed
66f0a212f36c: Pushed
57861e070a83: Pushed
c6bbf1608202: Pushed
d7b9f138fd3b: Pushed
1b46e139270c: Pushed
39bac60c9525: Pushed
2de861d5da61: Pushed
6007e312342c: Pushed
35812fe14a2f: Pushed
447d1068f759: Pushed
879c0d8666e3: Pushed
20a7b70bdf2f: Pushed
3fc750b41be7: Pushed
beee9f30bc1f: Pushed
latest: digest: sha256:ca742cdc628855b9a830a578b6b2cdc4b0c27943c155804e0f1c7e92557f0ff6 size: 4074
[0] < Pushing slack-interactive [nakulthombare64/slack-interactive:latest] done.
[0] Worker done.
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$
```

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

  This command runs the container for the provided function.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$ faas-cli deploy -f ./slack-interactive.yml
Deploying: slack-interactive.

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

ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$
```

2. **Slack-request:** The following three commands need to be executed
   ● To Build: **faas-cli build -f ./slack-request.yml**

   By running the build command, a Docker image is generated for both function and its dependencies. This image is then utilised to instantiate and run the container.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/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: nakulthombare64/slack-request:latest with python template. Please wait..
Sending build context to Docker daemon  10.24kB
Step 1/31 : FROM --platform=${TARGETPLATFORM:-linux/amd64} ghcr.io/openfaas/classic-watchdog:0.2.1 as watchdog
 ---> 021a98fdbddd
Step 2/31 : FROM --platform=${TARGETPLATFORM:-linux/amd64} python:2.7-alpine
 ---> 8579e446340f
Step 3/31 : ARG TARGETPLATFORM
 ---> Using cache
 ---> dd2d3bf81f5b
Step 4/31 : ARG BUILDPLATFORM
 ---> Using cache
 ---> 7b7e4caf1ef9
Step 5/31 : ARG ADDITIONAL_PACKAGE
 ---> Using cache
 ---> 6556bb29459a
Step 6/31 : COPY --from=watchdog /fwatchdog /usr/bin/fwatchdog
 ---> Using cache
 ---> f956b54fe98d
Step 7/31 : RUN chmod +x /usr/bin/fwatchdog
 ---> Using cache
 ---> 941b9a583484
Step 8/31 : RUN apk --no-cache add ca-certificates ${ADDITIONAL_PACKAGE}
 ---> Using cache
 ---> b07f3017e303
Step 9/31 : RUN addgroup -S app && adduser app -S -G app
 ---> Using cache
 ---> 13133ca01e0d
Step 10/31 : WORKDIR /home/app/
 ---> Using cache
 ---> 1ff496535120
Step 11/31 : COPY index.py          .
 ---> Using cache
 ---> 806a59e75e71
Step 12/31 : COPY requirements.txt   .
 ---> Using cache
 ---> 4cd7181c56f9
```

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

   This command is used to upload image to docker hub.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$ sudo faas-cli  push -f ./slack-request.yml
[0] > Pushing slack-request [nakulthombare64/slack-request:latest]
The push refers to repository [docker.io/nakulthombare64/slack-request]
0fbcfc3c0eec: Pushed
de2e6e22e546: Pushed
b149cb5b042f: Mounted from nakulthombare64/slack-interactive
56f0a212f36c: Mounted from nakulthombare64/slack-interactive
57861e070a83: Mounted from nakulthombare64/slack-interactive
c6bbf1608202: Mounted from nakulthombare64/slack-interactive
d7b9f138fd3b: Mounted from nakulthombare64/slack-interactive
1b46e139270c: Mounted from nakulthombare64/slack-interactive
39bac60c9525: Mounted from nakulthombare64/slack-interactive
2de861d5da61: Mounted from nakulthombare64/slack-interactive
6007e312342c: Mounted from nakulthombare64/slack-interactive
35812fe14a2f: Mounted from nakulthombare64/slack-interactive
447d1068f759: Mounted from nakulthombare64/slack-interactive
379c0d8666e3: Mounted from nakulthombare64/slack-interactive
20a7b70bdf2f: Mounted from nakulthombare64/slack-interactive
3fc750b41be7: Mounted from nakulthombare64/slack-interactive
beee9f30bc1f: Mounted from nakulthombare64/slack-interactive
latest: digest: sha256:13db7584ede93f7f03d40eb5d1a89eb2b2697910db37ced5ce45e3b6c8835a2e size: 4074
[0] < Pushing slack-request [nakulthombare64/slack-request:latest] done.
[0] Worker done.
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$
```

This command is used to upload image to docker hub.

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

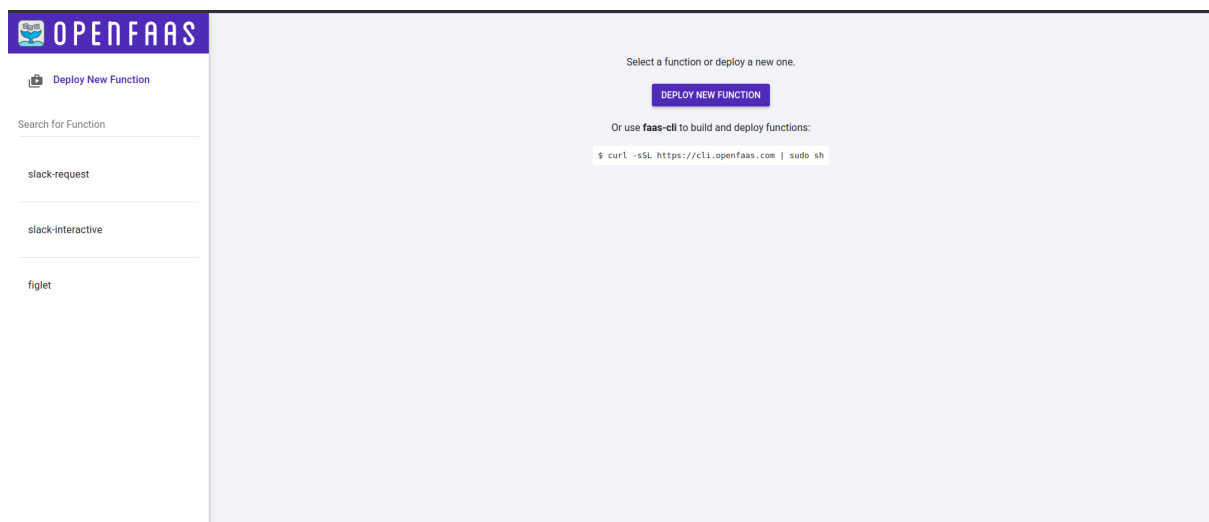This command runs the container for the provided function.

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/functions$ faas-cli deploy -f ./slack-request.yml
Deploying: slack-request.

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

3. **OpenFaas API Gateway snapshot:**
   The OpenFaaS Gateway acts as a middleman between different sources, including faas-cli, REST APIs, and programs, by receiving and processing commands. These commands are then forwarded to other components like Containerd, Prometheus, Kubernetes, and NATFS for executing their specific 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.

Invoking figlet:

Invoking slack-interactive:

Invoking slack-request:

Journalctl command logs snap:

sudo journalctl -u faasd –lines 40

Step 6:

1. What is the command to invoke the slack-request function?
   a. Via curl
   –--> curl -d '{"Hello World":"COEN241"}'
      http://127.1.0.1:8080/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?
 –--> ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx
$ faas-cli invoke slack-request
Reading from STDIN - hit (Control + D) to stop.

```
{
  "text": "Serverless Message",
  "attachments": [
   {
    "fields": [
     {
       "short": true,
       "value": "100",
       "title": "Amazing Level"
     }
    ],
    "author_icon": "",
    "image_url": "https://github.com/shubham-murkute/COEN241",
    "author_name": "Shubham Murkute",
    "title": "The Awesome world of Cloud Computing! COEN 241"
   },
   {
    "text": "COEN 241 is the most awesome class ever!.",
    "title": "About COEN 241"
   },
```

```json
    {
      "title": "Would you recommend COEN 241 to your friends?",
      "color": "#3AA3E3",
      "actions": [
        {
          "text": "Of Course!",
          "type": "button",
          "name": "recommend",
          "value": "recommend"
        },
        {
          "text": "Most Definitely!",
          "type": "button",
          "name": "definitely",
          "value": "definitely"
        }
      ],
      "callback_id": "response123",
      "fallback": "Would you recommend COEN 241 to your friends?",
      "attachment_type": "default"
'   }
 ]
}
```

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

     a. Via curl
    —--> curl -d '{"Hello World":"COEN241"}'
http://127.1.0.1:8080/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?

—> ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx $ 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/shubham-murkute/COEN241",
      "color": "#36a64f",
      "text": "Head over to COEN 241",
      "title": "COEN 241",
      "ts": 123456789,
      "author_name": "Shubham Murkute",
      "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/shubham-murkute"
    }
  ]
}
```

5.   How would you pass different arguments to the functions?
—> We can pass the arguments to the function using the keyword **echo**
Command: echo "Open Faas" | faas-cli invoke figlet

```
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~$ echo "Open Faas" | faas-cli invoke figlet
  ___                  _____
 / _ \ _ __   ___ _ __ |  ___|_ _  __ _ ___
| | | | '_ \ / _ \ '_ \| |_ / _` |/ _` / __|
| |_| | |_) |  __/ | | |  _| (_| | (_| \__ \
 \___/| .__/ \___|_| |_|_|  \__,_|\__,_|___/
      |_|
ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~$ 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

ubuntu-user@ubuntuuser-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~$ faas-cli store deploy figlet
Function figlet already exists, attempting rolling-update.

Deployed. 200 OK.
URL: http://127.0.0.1:8080/function/figlet
```

6.   How would you change the slack-interactive function to react to different inputs?
—> In order to make the slack-interactive function capable of handling various inputs, changes must be made to its code. This would entail adding code that examines the type of input received and performs the necessary actions accordingly. Suppose you wish to allow the function to receive JSON inputs. In that case, you can adjust the code by introducing a step that employs the json.loads() method to interpret the incoming JSON. This step would convert the JSON input into a Python dictionary, which can be processed accordingly by the function.

To allow the slack-interactive function to handle various inputs, you may need to make adjustments to the OpenFaaS gateway user interface or command line used to trigger the function, including passing the JSON input as an argument. This would enable the function to receive the input as a parameter, which can then be processed accordingly.

In summary, customizing the slack-interactive function to handle different types of inputs involves modifying its code and ensuring that the input is correctly processed within the function.

EXTRA CREDIT :

- **Link for application:**
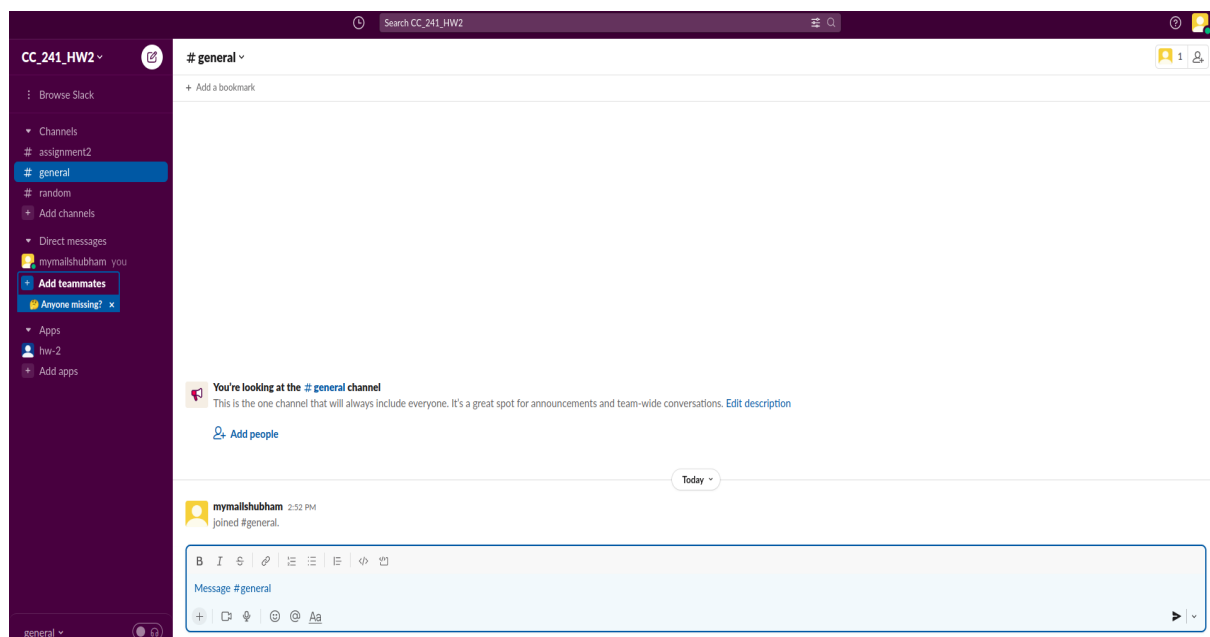 https://app.slack.com/client/T04QA8PL61J/C04PT8PE5U7

- **Invite link to join the workspace:**
  https://join.slack.com/t/newworkspace-3n26584/shared_invite/zt-1pd8ueduf-uJh~dexR3l5bbhUw5aLjjQ

- **Slash-command url:**
  https://1f9b-2601-647-5f01-88d0-fe34-e401-2449-3caf.ngrok.io//function/slack-request

Snaphots -

Any interactions with shortcuts, modals, or interactive components (such as buttons, select menus, and datepickers) will be sent to a URL you specify. Learn more.

Request URL

| https://1f9b-2601-647-5f01-88d0-fe34-e401-2449-3caf.ngrok.io/function/slack-req |

Slack will send an HTTP POST request with information to this URL when users interact with a shortcut or interactive component.

Shortcuts

Let people take actions — like filing a bug or adding a new sales lead — while using your app in Slack. Learn more.

Name	Location	Callback ID

[Create New Shortcut]

Select Menus

If you want to load external data in your select menus, you need to provide an options load URL. Learn more.

Options Load URL

| https://my.app.com/slack/options-load-endpoint |

For interactions with select menus where `type` is set to `external_select`, Slack will send an HTTP POST request with information to load options from this URL upon user invocation.

[Discard Changes] [Save Changes]

---

hw-2 ▼

Settings
Basic Information
Collaborators
Socket Mode
Install App
Manage Distribution

Features
App Home
Org Level Apps
Incoming Webhooks
Interactivity & Shortcuts
Slash Commands
Workflow Steps
OAuth & Permissions
Event Subscriptions
User ID Translation
App Manifest NEW
Beta Features

Submit to App Directory
Review & Submit

Give feedback

Slash Commands

Commands enable users to interact with your app from within Slack. Learn more.

Adding commands requires a bot user. If your app doesn't have a bot user, we'll add one for you.

Name	Description		
/coen241	Launch !!	✏️	🗑️

[Create New Command]

Edit Command

Command
/coen241 ⓘ

Request URL
https://1f9b-2601-647-5f01-88d0-... ⓘ

Short Description
Launch !!

Usage Hint
[which rocket to launch]

Optionally list any parameters that can be passed.

Escape channels, users, and links sent to your app ☐

Unescaped: @user #general

Preview of Autocomplete Entry

Commands matching "**coen241**"

hw-2
/coen241   Launch !!

＋ /coen241

---

app.slack.com/client/T04QA8PL61J/C04Q7M38Q3V

Search CC_241_HW2

CC_241_HW2 ⌄

⋮ Browse Slack

▼ Channels
＃ **assignment2**
＃ general
＃ random
＋ Add channels

▼ Direct messages
🟨 mymailshubham you
＋ Add teammates

▼ Apps
🔷 hw-2

Talk it out in real time
Have a quick chat, just like you would in an office. Huddles are voice first, so no need to be camera ready.

assignment2 ⌄

 # assignment2 ⌄

＋ Add a bookmark

💡 **This is the very beginning of the # assignment2 channel**
This channel is for everything #assignment2. Hold meetings, share docs, and make decisions together with your team. Edit description

👤₊ **Add people**

Today ⌄

🟨 **mymailshubham** 2:53 PM
joined #assignment2.

👁 Only visible to you
🔷 **hw-2** APP 3:00 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)** ▸

👋 **Start here**

B I S ｜ 🔗 ｜ ≔ ≡ ｜ ≣ ｜ </> ⊡

Message #assignment2

＋ ▢ 🎤 😊 @ Aa
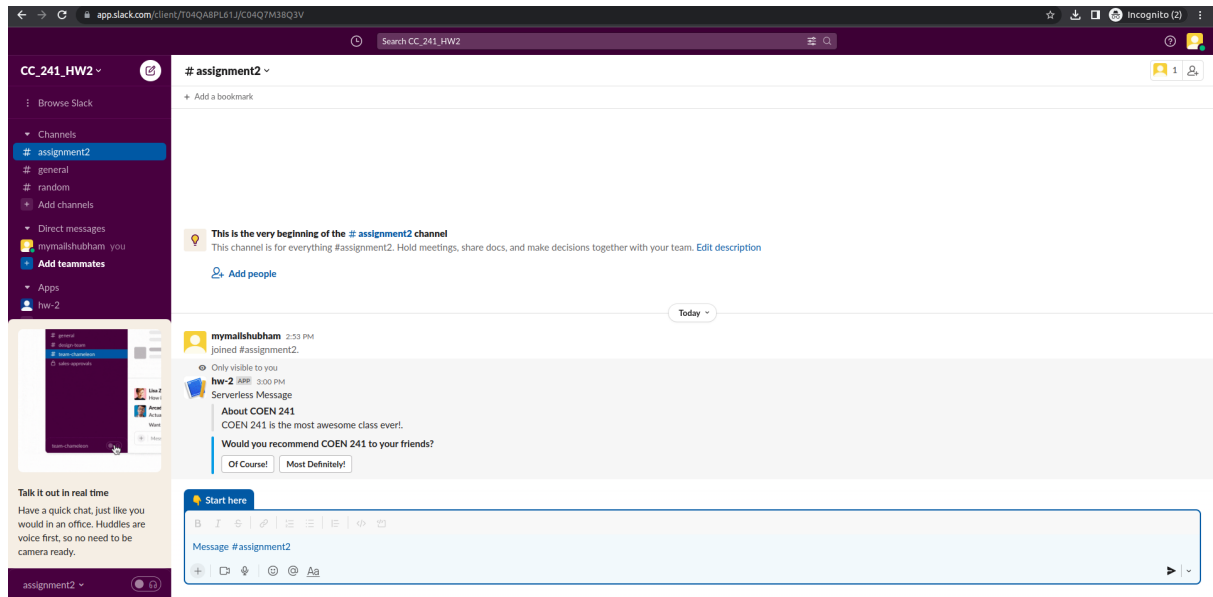
Git Repository Information:

Account name	shubham-murkute
Student ID	W1648631
Repository Name	COEN241_cloud_computing
Folder that contains Homework2	homework2
Link to Repository	https://github.com/shubham-murkute/COEN241_cloud_computing