

Git repo: <https://github.com/CharryWu/csen241>

Provide a screenshot of invoking the figlet function (5 pts)

```
charry@cyberpowerpc ~ ➤ faas-cli store deploy figlet
Deployed. 200 OK.
URL: http://127.0.0.1:8080/function/figlet

charry@cyberpowerpc ~ ➤ faas-cli store inspect figlet
Title:      figlet
Author:     openfaas
Description:
Generate ASCII logos with the figlet CLI

Image:      ghcr.io/openfaas/figlet:latest
Process:    figlet
Repo URL:   https://github.com/openfaas/store-functions
charry@cyberpowerpc ~ ➤ echo "Hello, FaaS, world" | faas-cli invoke figlet
Hello, FaaS, world

charry@cyberpowerpc ~ ➤
```

Provide a screenshot of running the following command (5 pts)

`sudo journalctl -u faasd --lines 40`

```

charry@cyberpowerpc ~$ sudo journalctl -u faasd --lines 40
Feb 16 21:20:23 cyberpowerpc faasd[29795]: Removing old container for: prometheus
Feb 16 21:20:23 cyberpowerpc faasd[29795]: Removing old container for: gateway
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 Start-up order:
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 - nats
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 - queue-worker
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 - prometheus
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 - gateway
Feb 16 21:20:23 cyberpowerpc faasd[29795]: Starting: nats
Feb 16 21:20:23 cyberpowerpc faasd[29795]: Creating local directory: /var/lib/faasd/nats
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 Running nats with user: "65534"
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 Created container: nats
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 nats has IP: 10.62.0.2
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 Task: nats Container: nats
Feb 16 21:20:23 cyberpowerpc faasd[29795]: Starting: queue-worker
Feb 16 21:20:23 cyberpowerpc faasd[29795]: 2024/02/16 21:20:23 Created container: queue-worker
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 queue-worker has IP: 10.62.0.3
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Task: queue-worker Container: queue-worker
Feb 16 21:20:24 cyberpowerpc faasd[29795]: Starting: prometheus
Feb 16 21:20:24 cyberpowerpc faasd[29795]: Creating local directory: /var/lib/faasd/prometheus
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Running prometheus with user: "65534"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Created container: prometheus
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 prometheus has IP: 10.62.0.4
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Task: prometheus Container: prometheus
Feb 16 21:20:24 cyberpowerpc faasd[29795]: Starting: gateway
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Created container: gateway
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 gateway has IP: 10.62.0.5
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Task: gateway Container: gateway
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Supervisor init done in: 15 seconds
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Looking up IP for: "gateway"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Looking up IP for: "prometheus"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver rebuilding map
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 faasd: waiting for SIGTERM or SIGINT
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "localhost"="127.0.0.1"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "faasd-provider"="10.62.0.1"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "nats"="10.62.0.2"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "queue-worker"="10.62.0.3"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "prometheus"="10.62.0.4"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Resolver: "gateway"="10.62.0.5"
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Proxy from: 127.0.0.1:9090, to: prometheus:9090 (10.62.0.4)
Feb 16 21:20:24 cyberpowerpc faasd[29795]: 2024/02/16 21:20:24 Proxy from: 0.0.0.0:8080, to: gateway:8080 (10.62.0.5)

```

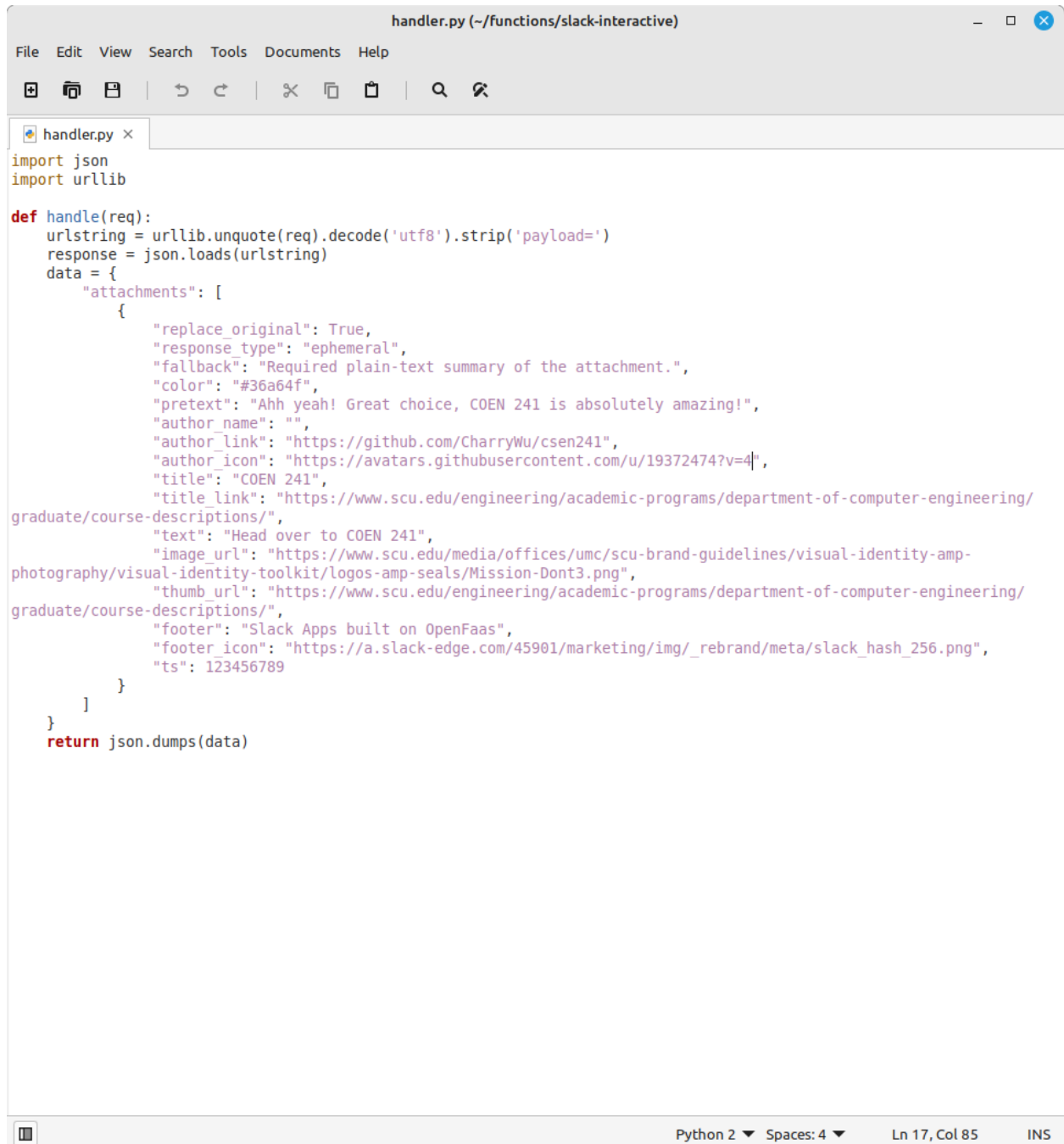
Complete slack-request/handler.py (10 pts)

```
handler.py (~/.functions/slack-request)
File Edit View Search Tools Documents Help
handler.py x
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": "Charry Wu",
            "author_icon": "https://avatars.githubusercontent.com/u/19372474?v=4",
            "image_url": "https://avatars.githubusercontent.com/u/19372474?v=4"
        },
        {
            "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)
```

Python 2 Spaces: 4 Ln 20, Col 11 INS

Complete slack-interactive/handler.py (10 pts)

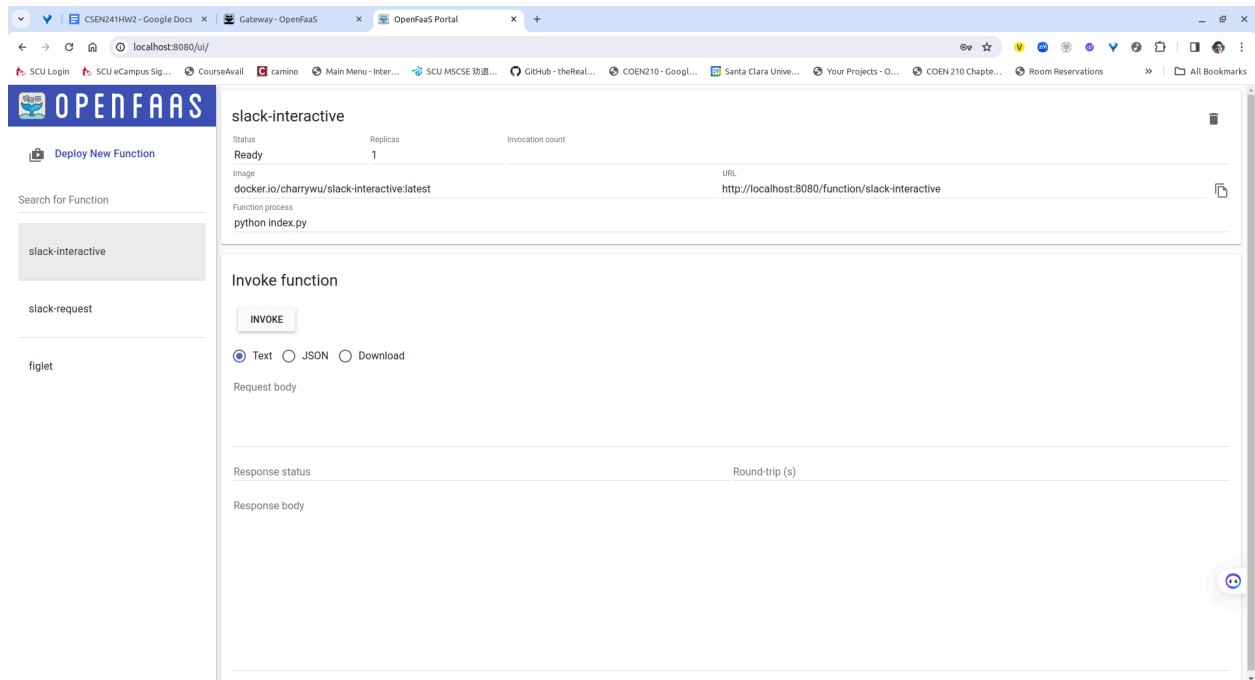


```
handler.py (~/.functions/slack-interactive)
File Edit View Search Tools Documents Help
handler.py x
import json
import urllib

def handle(req):
    urlstring = urllib.unquote(req).decode('utf8').strip('payload=')
    response = json.loads(urlstring)
    data = {
        "attachments": [
            {
                "replace_original": True,
                "response_type": "ephemeral",
                "fallback": "Required plain-text summary of the attachment.",
                "color": "#36a64f",
                "pretext": "Ahh yeah! Great choice, COEN 241 is absolutely amazing!",
                "author_name": "",
                "author_link": "https://github.com/CharryWu/csen241",
                "author_icon": "https://avatars.githubusercontent.com/u/19372474?v=4",
                "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-and-photography/visual-identity-toolkit/logos-and-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)
```

Python 2 Spaces: 4 Ln 17, Col 85 INS

Provide a screenshot of your OpenFaaS gateway AFTER deploying figlet, slack-handler and slack-interactive functions (5 pts)



Provide a screenshot of invoking slack-request and slack-interactive functions (5 pts)

Slack request:



 [Deploy New Function](#)

Search for Function

figlet

slack-interactive

## slack-request



Status

**Ready**

Replicas

**1**

Invocation count

**1**

Image

`docker.io/charrywu/slack-request:latest`

URL

`http://localhost:8080/function/slack-request`



Function process

`python index.py`

## Invoke function

INVOKE

☐ Text ☒ JSON ☐ Download

Request body

Response status

**200**

Round trip (s)

**0.043**

Response body

```

{
  "text": "Serverless Message",
  "attachments": [
    {
      "fields": [
        {
          "short": true,
          "value": "100",
          "title": "Amazing Level"
        }
      ],
      "author_icon": "https://avatars.githubusercontent.com/u/19372474?v=4",
      "image_url": "https://avatars.githubusercontent.com/u/19372474?v=4",
      "author_name": "Charry Wu",
      "title": "The Awesome world of Cloud Computing! COEN 241"
    },
    {
      "text": "COEN 241 is the most awesome class ever!.",
      "title": "About COEN 241"
    },
    {
      "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"
    }
  ]
}

```

Deploy New Function

search for Function

slack-interactive

figlet

slack-request

slack-interactive

Status: Ready

Replicas: 1

Invocation count: 4

Image: docker.io/charrywu/slack-interactive:latest

Function process: python index.py

URL: http://localhost:8080/function/slack-interactive

Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body: payload=1112222

Response status: 200

Roundtrip (s): 0.062

Response body:

```
{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaaS",
      "author_link": "https://github.com/CharryWu/csen241",
      "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://avatars.githubusercontent.com/u/1937247?v=4"
    }
  ]
}
```

Complete the chatbot with a yml file (25pt)

chatbot-1.yml
chatbot.yml

```

version: 1.0
provider:
  name: openfaas
  gateway: http://127.0.0.1:8080
functions:
  chatbot:
    lang: python
    handler: ./chatbot
    image: charrywu/chatbot:latest

```

Provide a screenshot of invoking three different cases of the chatbot (5 pts)

Case a: name



## Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body

name?

---

Response status

200

---

Response body

Hey! I am Zichao Wu!

## Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body

what is your name?

---

Response status

200

---

Response body

Zichao Wu!

Case b: date/time

# Invoke function

INVOKE

☒ Text   ☐ JSON   ☐ Download

Request body

date?

Response status

200

Response body

2024-02-27

## Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body

what is the current time?

---

Response status

200

---

Response body

2024-02-27 20:32:36.650650

Case c: figlet

Image

[docker.io/charrywu/chatbot:latest](https://hub.docker.io/r/charrywu/chatbot:latest)

Function process

python index.py

## Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body

figlet test

Response status

200

Response body

```
  _          _
| | _ _ _ _ | |
| _/_ _ \/_ _ |
| | _ _/_ _ \ |
\_ _\_ _ _ | _/_ _ |
```

1. What is the command to invoke the slack-request function (2 pts)?

a. Via Curl

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

The HTTP response is JSON format

```
{
  "text": "Serverless Message",
  "attachments": [
```

```

{
  "fields": [
    {
      "short": true,
      "value": "100",
      "title": "Amazing Level"
    }
  ],
  "author_icon": "https://avatars.githubusercontent.com/u/19372474?v=4",
  "image_url": "https://avatars.githubusercontent.com/u/19372474?v=4",
  "author_name": "Charry Wu",
  "title": "The Awesome world of Cloud Computing! COEN 241"
},
{
  "text": "COEN 241 is the most awesome class ever!.",
  "title": "About COEN 241"
},
{
  "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? (2 pts)

a. Via curl

4. What is the output you see when you invoke the slack-interactive function? (2 pts)

```
{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaas",
      "author_link": "https://github.com/CharryWu/csen241",
      "color": "#36a64f",
      "text": "Head over to COEN 241",
      "title": "COEN 241",
      "ts": 123456789,
      "author_name": "Charry Wu",
      "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://avatars.githubusercontent.com/u/19372474?v=4"
    }
  ]
}
```

5. How would you pass different arguments to the functions? (3 pts)

Change the http request body's content as different argument, the handler will be able to access the content from its first argument    `def handle(req):`

### Invoke function

☒ Text
 ☐ JSON
 ☐ Download

Request body

payload=222222

---

6. How would you change the slack-interactive function to react to different inputs? (3 pts)  
 Change the function logic of the handle() function. First, get the http request body as argument, then change the code logic to return different values based on the user input

7. How long does it take for the chat response to come back? (10pts)

- a. For the first request that does not call figlet  
0.1585913460003212 second
- b. For the second request that does not call figlet  
0.1258621070010122 second
- c. Average over 10 requests that do not call figlet  
 $(1.3520054900000105)/10 = 0.135$  second
- d. For the first request that calls figlet  
0.17397802899358794 second
- e. For the second request that calls figlet  
0.1368204960017465 second
- f. For the second request that calls figlet that follows the first request that does not call figlet  
0.1414563940052176 second
- g. Average over 10 requests that do call figlet  
 $1.2588454200013075 / 10 = 0.126$  second


8. Now try sending a series of requests to the chatbot in parallel. At what queries per second does OpenFaaS add a new instance of the function? (6 pts)

20 queries per second




## Extra credit:

<https://hooks.slack.com/services/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>

**csc241** APP 3:34 PM

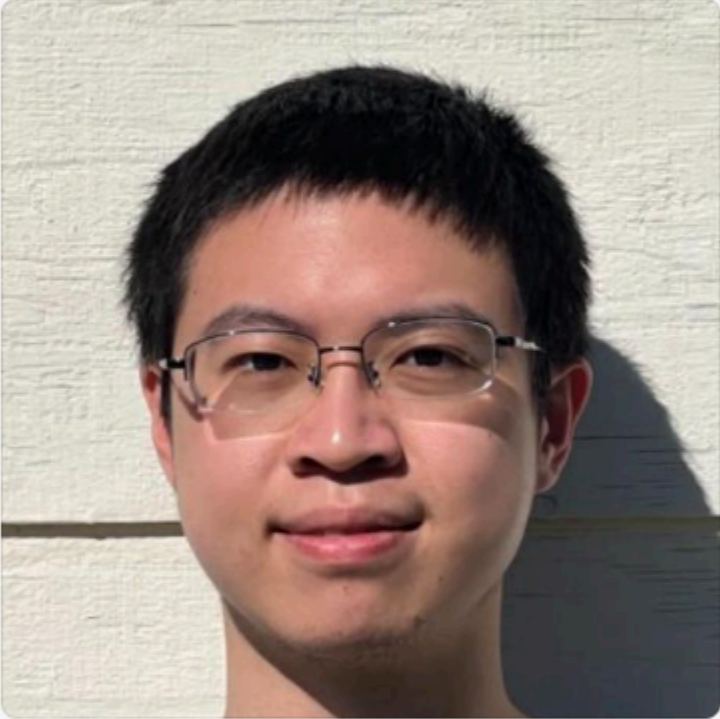
Serverless Message

 **Charry Wu**

The Awesome world of Cloud Computing! COEN 241 (29 kB) ▾

Amazing Level

100



About COEN 241

COEN 241 is the most awesome class ever!.

Would you recommend COEN 241 to your friends?

Of Course!

Most Definitely!