COEN 241 HW 2: Your Own Serverless Infrastructure

Xiongsheng Yi
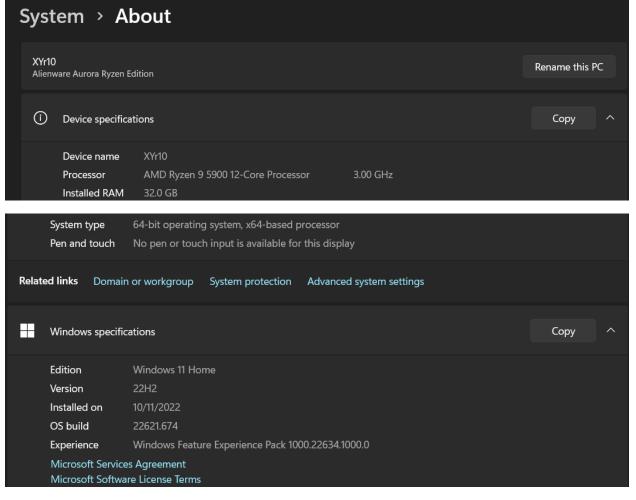
Host Machine

My Windows desktop:

Processor: AMD Ryzen 9 5900 12-Core Processor, 3.00 GHz

RAM: 32GB
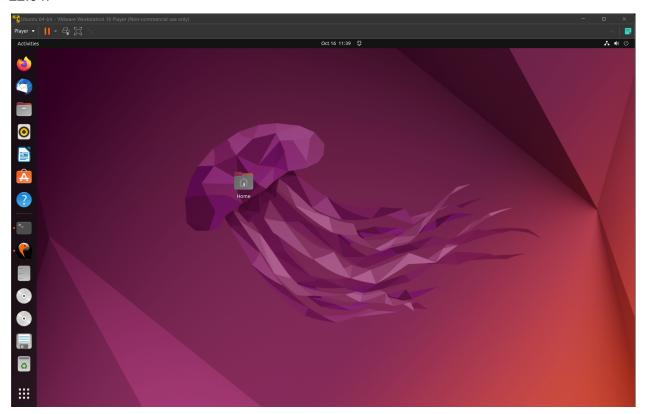
System type: 64-bit operating system, x64-based processor

Windows edition: Windows 11 Home

Storage: 700GB free of 936GB

Linux Environment Setup:

Since I was using Windows, I used VMware to create a Linux environment. I downloaded and installed VMware for Windows computer, and created a new Linux OS with the latest Ubuntu 22.04.

Reference Links:

https://www.vmware.com/products/workstation-player.html

https://ubuntu.com/download/desktop

Tasks

Here is the list of tasks to do. All of the code and images must be updated via github.

● Provide a screenshot of invoking the figlet function (10 pts)

● Complete slack-request/handler.py (20 pt)

```python
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": "Xiongsheng Yi",
            "author_icon": "",
            "image_url": "https://avatars.githubusercontent.com/OneBearr"
        },
        {
            "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)
```

"handler.py" 43L, 1366B   4,4   All

● Complete slack-interactive/handler.py (20 pt)

```python
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/OneBearr/SCU-COEN241",
                "author_icon": "https://avatars.githubusercontent.com/OneBearr",
                "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)
```

```
"handler.py" 29L, 1502B                                          7,12          All
```

● Provide a screenshot of running the following command (10 pts)
$ sudo journalctl -u faasd --lines 40

```
                                        xsyi@xsyi-VM2: ~/faasd

Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 faasd: waiting for SIGTERM or SIGINT
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Proxy from: 0.0.0.0:8080, to: gateway:8080 (10>
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Proxy from: 127.0.0.1:9090, to: prometheus:909>

xsyi@xsyi-VM2:~/faasd$ sudo systemctl status faasd-provider
● faasd-provider.service - faasd-provider
     Loaded: loaded (/lib/systemd/system/faasd-provider.service; enabled; vendor preset: enabled)
     Active: active (running) since Fri 2022-10-28 16:54:07 PDT; 19min ago
   Main PID: 4364 (faasd)
      Tasks: 5 (limit: 4584)
     Memory: 8.6M (limit: 500.0M)
        CPU: 280ms
     CGroup: /system.slice/faasd-provider.service
             └─4364 /usr/local/bin/faasd provider

Oct 28 16:54:07 xsyi-VM2 systemd[1]: Started faasd-provider.
Oct 28 16:54:07 xsyi-VM2 faasd[4364]: 2022/10/28 16:54:07 faasd-provider starting..         Service Timeo>
Oct 28 16:54:07 xsyi-VM2 faasd[4364]: faasd version: 0.16.7        commit: 282b05802cccd311678a73efaee78>
Oct 28 16:54:07 xsyi-VM2 faasd[4364]: 2022/10/28 16:54:07 Writing network config...
Oct 28 16:54:07 xsyi-VM2 faasd[4364]: 2022/10/28 16:54:07 Listening on TCP port: 8081
lines 1-15/15 (END)
xsyi@xsyi-VM2:~/faasd$ sudo journalctl -u faasd --lines 40
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 - prometheus
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 - gateway
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: Starting: nats
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: Creating local directory: /var/lib/faasd/nats
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Running nats with user: "65534"
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Created container: nats
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 nats has IP: 10.62.0.2
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Task: nats         Container: nats
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: Starting: queue-worker
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Created container: queue-worker
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 queue-worker has IP: 10.62.0.3
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Task: queue-worker       Container: queue-wor>
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: Starting: basic-auth-plugin
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 Created container: basic-auth-plugin
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 basic-auth-plugin has IP: 10.62.0.4
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Task: basic-auth-plugin       Container: basi>
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: Starting: prometheus
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: Creating local directory: /var/lib/faasd/prometheus
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Running prometheus with user: "65534"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Created container: prometheus
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 prometheus has IP: 10.62.0.5
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Task: prometheus       Container: prometheus
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: Starting: gateway
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Created container: gateway
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 gateway has IP: 10.62.0.6
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Task: gateway       Container: gateway
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Supervisor init done in: 34 seconds
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Looking up IP for: "gateway"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Looking up IP for: "prometheus"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver rebuilding map
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "localhost"="127.0.0.1"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "faasd-provider"="10.62.0.1"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "nats"="10.62.0.2"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "queue-worker"="10.62.0.3"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "basic-auth-plugin"="10.62.0.4"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "prometheus"="10.62.0.5"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Resolver: "gateway"="10.62.0.6"
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 faasd: waiting for SIGTERM or SIGINT
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Proxy from: 0.0.0.0:8080, to: gateway:8080 (10>
Oct 28 16:54:41 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:41 Proxy from: 127.0.0.1:9090, to: prometheus:909>
lines 1-40...skipping...
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 - prometheus
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: 2022/10/28 16:54:40 - gateway
Oct 28 16:54:40 xsyi-VM2 faasd[4369]: Starting: nats
```

● Provide a screenshot of your OpenFaaS gateway AFTER deploying figlet, slack-handler and slack-interactive functions (10 pts)

All the deployed functions:

```
xsyi@xsyi-VM2:~/faasd$ faas-cli list
Function                Invocations     Replicas
figlet                  0               0
slack-interactive       0               0
slack-request           0               0
xsyi@xsyi-VM2:~/faasd$ faas-cli help
```

Deploy the figlet:

```
xsyi@xsyi-VM2:~/faasd$ faas-cli store list

FUNCTION                              DESCRIPTION
NodeInfo                              Get info about the machine that you'r...
alpine                                An Alpine Linux shell, set the "fproc...
env                                   Print the environment variables prese...
sleep                                 Simulate a 2s duration or pass an X-S...
shasum                                Generate a shasum for the given input
Figlet                                Generate ASCII logos with the figlet CLI
curl                                  Use curl for network diagnostics, pas...
SentimentAnalysis                     Python function provides a rating on ...
hey                                   HTTP load generator, ApacheBench (ab)...
nslookup                              Query the nameserver for the IP addre...
SSL/TLS cert info                     Returns SSL/TLS certificate informati...
Colorization                          Turn black and white photos to color ...
Inception                             This is a forked version of the work ...
Have I Been Pwned                     The Have I Been Pwned function lets y...
Face Detection with Pigo              Detect faces in images using the Pigo...
Tesseract OCR                         This function brings OCR - Optical Ch...
Dockerhub Stats                       Golang function gives the count of re...
QR Code Generator - Go                QR Code generator using Go
Nmap Security Scanner                 Tool for network discovery and securi...
ASCII Cows                            Generate a random ASCII cow
YouTube Video Downloader              Download YouTube videos as a function
OpenFaaS Text-to-Speech               Generate an MP3 of text using Google'...
Docker Image Manifest Query           Query an image on the Docker Hub for ...
face-detect with OpenCV               Detect faces in images. Send a URL as...
Face blur by Endre Simo               Blur out faces detected in JPEGs. Inv...
Left-Pad                              left-pad on OpenFaaS
normalisecolor                        Automatically fix white-balance in ph...
mememachine                           Turn any image into a meme.
Business Strategy Generator           Generates a Business Strategy (using ...
Line Drawing Generator from a photograph Automatically generates a sketch like...
Image EXIF Reader                     Reads EXIF information from an URL or...
Open NSFW Model                       Score images for NSFW (nudity) content.
Identicon Generator                   Create an identicon from a provided s...

xsyi@xsyi-VM2:~/faasd$ faas-cli store deploy figlet

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

xsyi@xsyi-VM2:~/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

xsyi@xsyi-VM2:~/faasd$
```

Deploy the slack-request:

```
Step 30/31 : HEALTHCHECK --interval=3s CMD [ -e /tmp/.lock ] || exit 1
 ---> Running in 3e9b5e6f33c2
Removing intermediate container 3e9b5e6f33c2
 ---> b947f81d449e
Step 31/31 : CMD ["fwatchdog"]
 ---> Running in 3002bb0d807f
Removing intermediate container 3002bb0d807f
 ---> 00a2103ba7ba
Successfully built 00a2103ba7ba
Successfully tagged onebear/slack-request:latest
Image: onebear/slack-request:latest built.
[0] < Building slack-request done in 0.89s.
[0] Worker done.

Total build time: 0.89s
xsyi@xsyi-VM2:~/functions$ faas-cli push -f ./slack-request.yml
[0] > Pushing slack-request [onebear/slack-request:latest]
The push refers to repository [docker.io/onebear/slack-request]
c1a8b3d83893: Pushed
5cdd74fde5e5: Pushed
9ca6dec640a6: Mounted from onebear/slack-interactive
ec2e757acded: Mounted from onebear/slack-interactive
bf9926370a35: Mounted from onebear/slack-interactive
aa4a13f97b98: Mounted from onebear/slack-interactive
1169a298e45f: Mounted from onebear/slack-interactive
b6a4e248b22b: Mounted from onebear/slack-interactive
f5d943d89280: Mounted from onebear/slack-interactive
3ee765de2b18: Mounted from onebear/slack-interactive
93bdecee2d93: Mounted from onebear/slack-interactive
a5b915e441b7: Mounted from onebear/slack-interactive
0a7a64589caa: Mounted from onebear/slack-interactive
879c0d8666e3: Mounted from onebear/slack-interactive
20a7b70bdf2f: Mounted from onebear/slack-interactive
3fc750b41be7: Mounted from onebear/slack-interactive
beee9f30bc1f: Mounted from onebear/slack-interactive
latest: digest: sha256:8f92ec995521f7bd0b1fd96436e2d18233f2a9f6febaadd9c547ed8937ee6d90 size: 4074
[0] < Pushing slack-request [onebear/slack-request:latest] done.
[0] Worker done.
xsyi@xsyi-VM2:~/functions$ faas-cli deploy -f ./slack-request.yml
Deploying: slack-request.

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

xsyi@xsyi-VM2:~/functions$
```

Deploy the slack-interactive:

```
> 1c177d2c522e
Successfully built 1c177d2c522e
Successfully tagged onebear/slack-interactive:latest
Image: onebear/slack-interactive:latest built.
[0] < Building slack-interactive done in 55.55s.
[0] Worker done.

Total build time: 55.55s
xsyi@xsyi-VM2:~/functions$ faas-cli push -f ./slack-interactive.yml
[0] > Pushing slack-interactive [onebear/slack-interactive:latest]
The push refers to repository [docker.io/onebear/slack-interactive]
61d049e1a7d8: Pushed
1c00e90dd5bb: Pushed
9ca6dec640a6: Pushed
ec2e757acded: Pushed
bf9926370a35: Pushed
aa4a13f97b98: Pushed
1169a298e45f: Pushed
b6a4e248b22b: Pushed
f5d943d89280: Pushed
3ee765de2b18: Pushed
93bdecee2d93: Pushed
a5b915e441b7: Pushed
0a7a64589caa: Pushed
879c0d8666e3: Mounted from library/python
20a7b70bdf2f: Mounted from library/python
3fc750b41be7: Mounted from library/python
beee9f30bc1f: Mounted from library/python
latest: digest: sha256:60e16079ddb7916243eef159eb69efc28ba1c73394a49969614703a512895530 size: 4074
[0] < Pushing slack-interactive [onebear/slack-interactive:latest] done.
[0] Worker done.
xsyi@xsyi-VM2:~/functions$ faas-cli deploy -f ./slack-interactive.yml
Deploying: slack-interactive.

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

xsyi@xsyi-VM2:~/functions$
```

● Provide a screenshot of invoking slack-request and slack-interactive functions (10 pts)
Invoking slack-request:

```
xsyi@xsyi-VM2:~/functions$ curl localhost:8080/function/slack-request
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "tit
le": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/
OneBearr", "author_name": "Xiongsheng Yi", "title": "The Awesome world of Cloud Computing! COEN
 241"}, {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"tit
le": "Would you recommend COEN 241 to your friends?", "color": "#3AA3E3", "actions": [{"text":
"Of Course!", "type": "button", "name": "recommend", "value": "recommend"}, {"text": "Most Defi
nitely!", "type": "button", "name": "definitely", "value": "definitely"}], "callback_id": "resp
onse123", "fallback": "Would you recommend COEN 241 to your friends?", "attachment_type": "defa
ult"}]}
xsyi@xsyi-VM2:~/functions$ faas-cli invoke slack-request
Reading from STDIN - hit (Control + D) to stop.
^C
xsyi@xsyi-VM2:~/functions$ echo "" | faas-cli invoke slack-request
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "tit
le": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/
OneBearr", "author_name": "Xiongsheng Yi", "title": "The Awesome world of Cloud Computing! COEN
 241"}, {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"tit
le": "Would you recommend COEN 241 to your friends?", "color": "#3AA3E3", "actions": [{"text":
"Of Course!", "type": "button", "name": "recommend", "value": "recommend"}, {"text": "Most Defi
nitely!", "type": "button", "name": "definitely", "value": "definitely"}], "callback_id": "resp
onse123", "fallback": "Would you recommend COEN 241 to your friends?", "attachment_type": "defa
ult"}]}
xsyi@xsyi-VM2:~/functions$ echo "Hi Xiongsheng" | faas-cli invoke slack-request
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "tit
le": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/
OneBearr", "author_name": "Xiongsheng Yi", "title": "The Awesome world of Cloud Computing! COEN
 241"}, {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"tit
le": "Would you recommend COEN 241 to your friends?", "color": "#3AA3E3", "actions": [{"text":
"Of Course!", "type": "button", "name": "recommend", "value": "recommend"}, {"text": "Most Defi
nitely!", "type": "button", "name": "definitely", "value": "definitely"}], "callback_id": "resp
onse123", "fallback": "Would you recommend COEN 241 to your friends?", "attachment_type": "defa
ult"}]}
```

Invoking slack-interactive:

```
xsyi@xsyi-VM2:~/functions$ curl localhost:8080/function/slack-interactive -d '{"Hi": "Xiongshen
g"}'
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/
OneBearr/SCU-COEN241", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241"
, "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-p
rograms/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https:
//www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-ide
ntity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_origin
al": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_has
h_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_ic
on": "https://avatars.githubusercontent.com/OneBearr"}]}
xsyi@xsyi-VM2:~/functions$ echo '{"Hi": "Xiongsheng"}' | faas-cli invoke slack-interactive
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/
OneBearr/SCU-COEN241", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241"
, "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-p
rograms/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https:
//www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-ide
ntity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_origin
al": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_has
h_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_ic
on": "https://avatars.githubusercontent.com/OneBearr"}]}
```

Questions

After performing the tasks in step 5 answer the following questions.

1. What is the command to invoke the slack-request function (4 pts)?
a. Via Curl

$ curl 127.0.0.1:8080/function/slack-request
$ curl localhost:8080/function/slack-request

b. Via faas-cli

$ echo "" | faas-cli invoke slack-request

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

```
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "tit
le": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/
OneBearr", "author_name": "Xiongsheng Yi", "title": "The Awesome world of Cloud Computing! COEN
 241"}, {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"tit
le": "Would you recommend COEN 241 to your friends?", "color": "#3AA3E3", "actions": [{"text":
"Of Course!", "type": "button", "name": "recommend", "value": "recommend"}, {"text": "Most Defi
nitely!", "type": "button", "name": "definitely", "value": "definitely"}], "callback_id": "resp
onse123", "fallback": "Would you recommend COEN 241 to your friends?", "attachment_type": "defa
ult"}]}
```

3. What is the command to invoke the slack-interactive function? (4 pts)
a. Via curl

$ curl localhost:8080/function/slack-interactive -d '{"Hi": "Xiongsheng"}'

b. Via faas-cli

$ echo '{"Hi": "Xiongsheng"}' | faas-cli invoke slack-interactive

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

```
xsyi@xsyi-VM2:~/functions$ curl localhost:8080/function/slack-interactive -d '{"Hi": "Xiongshen
g"}'
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/
OneBearr/SCU-COEN241", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241"
, "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-p
rograms/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https:
//www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-ide
ntity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_origin
al": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_has
h_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_ic
on": "https://avatars.githubusercontent.com/OneBearr"}]}
xsyi@xsyi-VM2:~/functions$ echo '{"Hi": "Xiongsheng"}' | faas-cli invoke slack-interactive
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/
OneBearr/SCU-COEN241", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241"
, "ts": 123456789, "author_name": "", "title_link": "https://www.scu.edu/engineering/academic-p
rograms/department-of-computer-engineering/graduate/course-descriptions/", "image_url": "https:
//www.scu.edu/media/offices/umc/scu-brand-guidelines/visual-identity-amp-photography/visual-ide
ntity-toolkit/logos-amp-seals/Mission-Dont3.png", "response_type": "ephemeral", "replace_origin
al": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_has
h_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_ic
on": "https://avatars.githubusercontent.com/OneBearr"}]}
```

5. How would you pass different arguments to the functions? (4 pts)

    a. STDIN by using '-d' for curl
        For example:
        $ curl localhost:8080/function/slack-interactive -d '{"Hi": "Xiongsheng"}'

    b. Using 'echo' for faas-cli
        For example:
        $ echo '{"Hi": "Xiongsheng"}' | faas-cli invoke slack-interactive

6. How would you change the slack-interactive function to react to different inputs? (4 pts)

The handle() function needs to parse the 'req' object accordingly and return different outputs based on what is contained in the 'req' object.