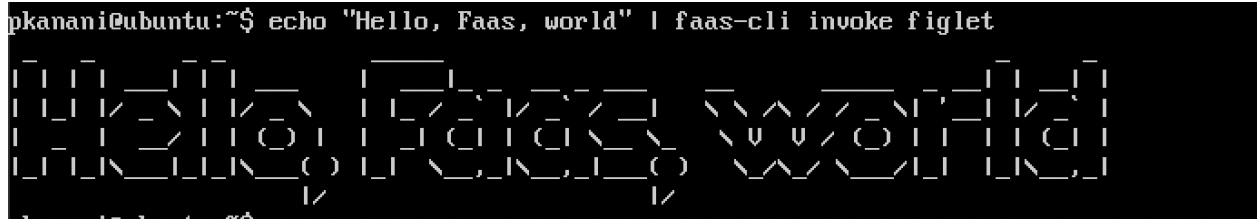


Screenshots of Invoking figlet

Invoking figlet prints banner of text that is given as input. In below screenshots I invoked figlet with text "Hello, Faas, world".

1. Using CLI

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



2. Using GUI

figlet

Status	Replicas	Invocation count
Ready	1	5
Image	URL	
ghcr.io/openfaas/figlet:latest	http://localhost:8080/function/figlet	
Function process		
figlet		

Invoke function

INVOKE

☒ Text ☐ JSON ☐ Download

Request body

Hello, FaaS, world

Response status	Round-trip (s)
200	0.469
Response body	

[illegible]

Complete slack-request/handler.py

To complete handler.py for slack-request I just entered name and git profile image url in given skeleton code. Changes made can be seen in following screenshot. Full code is in repository [here](#).

```
    },
    "author_name": "Poonam",
    "author_icon": "",
    "image_url": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4"
  },
}
```

Complete slack-interactive/handler.py

To complete handler.py for slack-interactive I just entered name, git repository url and git profile image url in given skeleton code. Changes made can be seen in following screenshot. Full code is in repository [here](#).

```
"author_name": "Poonam",  
"author_link": "https://github.com/pbkanani/COEN241_CC",  
"author_icon": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4",  
"title": "COEN 241"
```

Screenshot for logs

This command prints logs for various components of faas. In screenshot below we can see logs includes queue-worker, gateway, prometheus, nats and basic-auth-plugin.

```
$ sudo journalctl -u faasd --lines 40
```

```
May 08 19:25:19 ubuntu faasd[1491]: 2022/05/08 19:25:19 - gateway  
May 08 19:25:19 ubuntu faasd[1491]: 2022/05/08 19:25:19 - queue-worker  
May 08 19:25:19 ubuntu faasd[1491]: Starting: basic-auth-plugin  
May 08 19:25:22 ubuntu faasd[1491]: 2022/05/08 19:25:22 Created container: basic-auth-plugin  
May 08 19:25:38 ubuntu faasd[1491]: 2022/05/08 19:25:37 basic-auth-plugin has IP: 10.62.0.2  
May 08 19:25:38 ubuntu faasd[1491]: 2022/05/08 19:25:38 Task: basic-auth-plugin Container: ba  
May 08 19:25:38 ubuntu faasd[1491]: Starting: nats  
May 08 19:25:38 ubuntu faasd[1491]: Creating local directory: /var/lib/faasd/nats  
May 08 19:25:38 ubuntu faasd[1491]: 2022/05/08 19:25:38 Running nats with user: "65534"  
May 08 19:25:39 ubuntu faasd[1491]: 2022/05/08 19:25:39 Created container: nats  
May 08 19:25:46 ubuntu faasd[1491]: 2022/05/08 19:25:46 nats has IP: 10.62.0.3  
May 08 19:25:46 ubuntu faasd[1491]: 2022/05/08 19:25:46 Task: nats Container: nats  
May 08 19:25:47 ubuntu faasd[1491]: Starting: prometheus  
May 08 19:25:47 ubuntu faasd[1491]: Creating local directory: /var/lib/faasd/prometheus  
May 08 19:25:47 ubuntu faasd[1491]: 2022/05/08 19:25:47 Running prometheus with user: "65534"  
May 08 19:25:48 ubuntu faasd[1491]: 2022/05/08 19:25:48 Created container: prometheus  
May 08 19:25:57 ubuntu faasd[1491]: 2022/05/08 19:25:57 prometheus has IP: 10.62.0.4  
May 08 19:25:57 ubuntu faasd[1491]: 2022/05/08 19:25:57 Task: prometheus Container: prometheu  
May 08 19:25:59 ubuntu faasd[1491]: Starting: gateway  
May 08 19:26:03 ubuntu faasd[1491]: 2022/05/08 19:26:03 Created container: gateway  
May 08 19:26:16 ubuntu faasd[1491]: 2022/05/08 19:26:16 gateway has IP: 10.62.0.5  
May 08 19:26:16 ubuntu faasd[1491]: 2022/05/08 19:26:16 Task: gateway Container: gateway  
May 08 19:26:16 ubuntu faasd[1491]: Starting: queue-worker  
May 08 19:26:17 ubuntu faasd[1491]: 2022/05/08 19:26:17 Created container: queue-worker  
May 08 19:26:24 ubuntu faasd[1491]: 2022/05/08 19:26:23 queue-worker has IP: 10.62.0.6  
May 08 19:26:24 ubuntu faasd[1491]: 2022/05/08 19:26:24 Task: queue-worker Container: queue-w  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Supervisor init done in: About a minute  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Looking up IP for: "gateway"  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Resolver rebuilding map  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Resolver: "localhost"="127.0.0.1"  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 faasd: waiting for SIGTERM or SIGINT  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Looking up IP for: "prometheus"  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Resolver: "faasd-provider"="10.62.0.1"  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Resolver: "basic-auth-plugin"="10.62.0.2"  
May 08 19:26:26 ubuntu faasd[1491]: 2022/05/08 19:26:26 Resolver: "nats"="10.62.0.3"  
lines 1-36
```

Screenshot of Faas after deployment

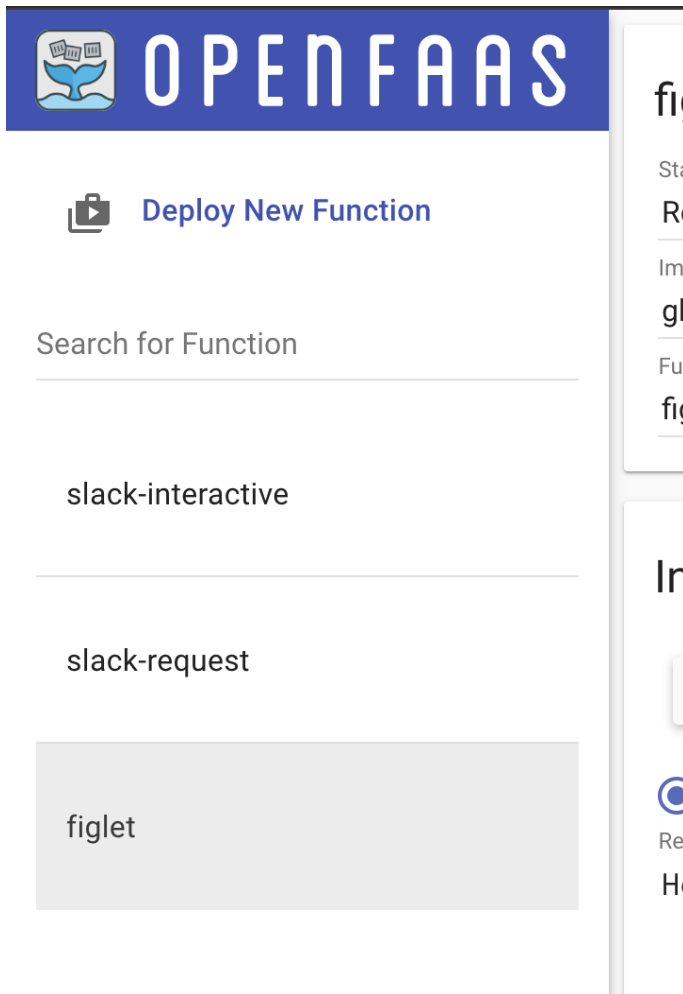
After deploying slack-request and slack-interactive, faas lists all three functions as shown in screenshots below:

1. Using CLI

```
$ faas-cli list
```

```
pkananani@ubuntu:~$ faas-cli list
Function              Invocations  Replicas
figlet                 1            1
slack-interactive      0            0
slack-request          0            0
```

2. Using GUI



Screenshots of invoking functions

As shown in below screenshots, invoking these functions returns 200 status code for success and returns JSON data.

1. Slack-request

The screenshot displays the OpenFaaS web interface. On the left sidebar, the 'slack-request' function is selected. The main panel shows the function's details and an 'Invoke function' section.

Function Details:

Status	Replicas	Invocation count
Ready	1	22

Image: docker.io/pkanani/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): 2.278

Response body:

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

```

2. Slack-interactive

Search for Function

slack-interactive

slack-request

figlet

docker.io/pkanani/slack-interactive:latest

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

Function process

python index.py

Invoke function

INVOKE

☐ Text ☒ JSON ☐ Download

Request body

```
{
  "actions" : [
    {
      "text": "Of Course!",
      "type": "button",
      "name": "recommend",
      "value": "recommend"
    }
  ]
}
```

Response status

200

Round-trip (s)

2.862

Response body

```
{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaas".
    }
  ]
}
```

Questions

1. Invoking slack-request function

a. Via curl

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

```
pkanani@ubuntu:~/functions$ curl localhost:8080/function/slack-request
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "title": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4", "author_name": "Poonam", "title": "The Awesome world of Cloud Computing! COEN 241", {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"text": "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"}]}
```

b. Via faas-cli

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

```

pkanani@ubuntu:~/functions$ echo "Hi" | faas-cli invoke slack-request
{"text": "Serverless Message", "attachments": [{"fields": [{"short": true, "value": "100", "title": "Amazing Level"}], "author_icon": "", "image_url": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4", "author_name": "Poonam", "title": "The Awesome world of Cloud Computing! COEN 241"}, {"text": "COEN 241 is the most awesome class ever!.", "title": "About COEN 241"}, {"text": "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"}]}
pkanani@ubuntu:~/functions$

```

2. Output of slack-request

Slack-request gives JSON as an output. It has three attachments :

- I. with title “The Awesome world of Cloud Computing! COEN 241”
- II. with title “About COEN 241”
- III. with tile “Would you recommend COEN 241 to your friends?”

3. Invoking slack-interactive

a. Via CLI

```

$ curl -H "content-type:application/json" -X POST -d '{}' localhost:8080/function/slack-request

```

```

pkanani@ubuntu:~/functions$ curl -H "Content-type:pplication/json" -X POST -d '{}' localhost:8080/function/slack-interactive
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/pbkanani/COEN241_CC", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "Poonam", "title_link": "https://www.scu.edu/engineering/academic-programs/departments-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/departments-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4"}]}

```

b. Via GUI

```

$ echo '{}' | faas-cli invoke slack-interactive

```

```

pkanani@ubuntu:~/functions$ echo '{}' | faas-cli invoke slack-interactive
{"attachments": [{"footer": "Slack Apps built on OpenFaas", "author_link": "https://github.com/pbkanani/COEN241_CC", "color": "#36a64f", "text": "Head over to COEN 241", "title": "COEN 241", "ts": 123456789, "author_name": "Poonam", "title_link": "https://www.scu.edu/engineering/academic-programs/departments-of-computer-engineering/graduate/course-descriptions/", "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", "response_type": "ephemeral", "replace_original": true, "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png", "pretext": "Ahh ye ah! Great choice, COEN 241 is absolutely amazing!", "fallback": "Required plain-text summary of the attachment.", "thumb_url": "https://www.scu.edu/engineering/academic-programs/departments-of-computer-engineering/graduate/course-descriptions/", "author_icon": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4"}]}

```

4. Output of slack-interactive

Output of slack-interactive is also JSON.

Slack-interactive needs JSON input but output remains the same, irrespective of values of arguments passed to it.

5. Passing arguments to functions

When using curl command -d can be used to pass any argument. Data can be sent in various formats, which can be declared in the header.

When using faas-cli, simply we can echo and pipe it to faas-cli command or even output from other commands can also be sent to faas-cli using pipe.

6. Various input to slack-interactive

I added line 7 & 8 to parse the input and made changes to line 16 to print text based on input. Updated code can be seen in screenshot below:


```

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     inp = response["actions"][0]["value"]
8     selected = "You selected Of course!" if inp == 'recommend' else "You selected most Definitely!"
9
10    data = {
11        "attachments": [
12            {
13                "replace_original": True,
14                "response_type": "ephemeral",
15                "fallback": "Required plain-text summary of the attachment.",
16                "color": "#36a64f",
17                "pretext": selected + "Ahh yeah! Great choice, COEN 241 is absolutely amazing!",
18                "author_name": "Poonam",
19                "author_link": "https://github.com/pbkanani/COEN241_CC",
20                "author_icon": "https://avatars.githubusercontent.com/u/92608195?s=400&v=4",
21                "title": "COEN 241",
22                "title_link": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
23                "text": "Head over to COEN 241",
24                "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",
25                "thumb_url": "https://www.scu.edu/engineering/academic-programs/department-of-computer-engineering/graduate/course-descriptions/",
26                "footer": "Slack Apps built on OpenFaas",
27                "footer_icon": "https://a.slack-edge.com/45901/marketing/img/_rebrand/meta/slack_hash_256.png",
28                "ts": 123456789
29            }
30        ]
31    }
32    return json.dumps(data)

```

After changes when the following input is given we can see that text is added in output. As shown below, when the button with text = “Most definitely” is selected, output has “You selected Most Definitely” and when button with Of Course is selected, output has “You selected Of Course!”

Input 1:

```

{
  "actions": [
    {
      "text": "Most Definitely!",
      "type": "button",
      "name": "definitely",
      "value": "definitely"
    }
  ]
}

```

Output 1:

Response body

```
{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaas",
      "author_link": "https://github.com/pbkanani/COEN241_CC",
      "color": "#36a64f",
      "text": "Head over to COEN 241",
      "title": "COEN 241",
      "ts": 123456789,
      "author_name": "Poonam",
      "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-and-photography/visual-identity-toolkit/logos-and-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": "You selected most Definitely!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/92608195?s=400&v=4"
    }
  ]
}
```

Input 2:

```
{
  "actions": [
    {
      "text": "Of Course!",
      "type": "button",
      "name": "recommend",
      "value": "recommend"
    }
  ]
}
```

Output 2:

Response body

```
{
  "attachments": [
    {
      "footer": "Slack Apps built on OpenFaas",
      "author_link": "https://github.com/pbkanani/COEN241_CC",
      "color": "#36a64f",
      "text": "Head over to COEN 241",
      "title": "COEN 241",
      "ts": 123456789,
      "author_name": "Poonam",
      "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": "You selected Of course!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/92608195?s=400&v=4"
    }
  ]
}
```