

# Web APIs

## *Software Architecture*

Brae Webb

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## *Goals*

- Review existing networking knowledge.

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- Review existing networking knowledge.
- Understand *URLs*.
- Understand *HTTP* protocol and methods.
- Understand *RESTful* APIs.
- *Build* a basic RESTful API.

*§ Networking*

# OSI Model





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# OSI Model



*TCP/UDP*

Low-level with *minimal abstraction*.

*TCP/UDP*

*Impractical* for building web APIs.

# OSI Model



# OSI Model



HTTP/HTTPS (CSSE6400)

§ *URLs*

*The anatomy of*  
URLs









*§ HTTP*

*HTTP*

A *request-response* abstraction for networking.

## *HTTP Request*

**URL** An endpoint to send request to.

**Method** Described later.

**Headers** Specify type of data, e.g. JSON, HTML, etc.

**Body** Optional extra data to include.

## *HTTP Response*

**Status Code** A number between 100 and 599 giving details about the response.

**Headers** Specify type of response data, e.g. JSON, HTML, etc.

**Body** Content of the response.

## *Status Codes*

200s Indicate the request was *successful*, 200 is most common.

300s *Redirects* the client to another location.

400s Indicates that the *request was wrong*

e.g. 404 meaning that the request was for something that doesn't exist.

500s Indicates that the *server had a problem* fulfilling the request.



*Types of HTTP communication*

## HTTP Methods

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GET *Query* for information.

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PUT *Update* resource.

## HTTP Methods

GET *Query* for information.

POST *Create* resource.

PUT *Update* resource.

DELETE *Delete* resource.

## *§ API Examples*

```
>> cat app.py
```

```
1  from flask import Flask
```

```
3  app = Flask(__name__)
```

```
5  @app.route("/")
```

```
6  def hello_world():
```

```
7      return "Hello, World!"
```

```
9  if __name__ == "__main__":
```

```
10     app.run(port=6400)
```

## Result





```
>> cat app.js
```

```
1  const express = require('express')
2  const app = express()
3  const port = 6400

5  app.get('/', (req, res) => {
6      res.send('Hello, World!')
7  })

9  app.listen(port, () => {
10     console.log(`Example app listening on port ${port}`)
11 })
```

```
>> cat app.py
```

```
1  from flask import Flask
```

```
3  app = Flask(__name__)
```

```
5  @app.route("/health")
```

```
6  def hello_world():
```

```
7      return {"status": "okay!"}
```

```
9  if __name__ == "__main__":
```

```
10     app.run(port=6400)
```

## Result



```
>> cat app.js
```

```
1  const express = require('express')
2  const app = express()
3  const port = 6400

5  app.get('/', (req, res) => {
6      res.send({"status": "okay!"})
7  })

9  app.listen(port, () => {
10     console.log(`Example app listening on port ${port}`)
11 })
```

```
>> cat app.py
```

```
1  from flask import Flask
2  from flask import request

4  app = Flask(__name__)

6  @app.route("/echo", methods=["POST"])
7  def hello_world():
8      return request.json.say

10 if __name__ == "__main__":
11     app.run(port=6400)
```

```
1 >>> curl -X POST \  
2 -H "Accept: application/json" \  
3 -H "Content-Type: application/json" \  
4 "http://localhost:6400" \  
5 -d '{  
6     "say" : "Hello, World",  
7 }'  
8 Hello, World
```

```
>> cat app.js
```

```
1  const express = require('express')
2  const app = express()
3  const port = 6400

5  app.post('/', express.json(), (req, res) => {
6      res.send(req.body.say)
7  })

9  app.listen(port, () => {
10     console.log(`Example app listening on port ${port}`)
11 })
```