# CSCI 466: Networks

Cloud Computing, Building a basic API

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Fall 2024

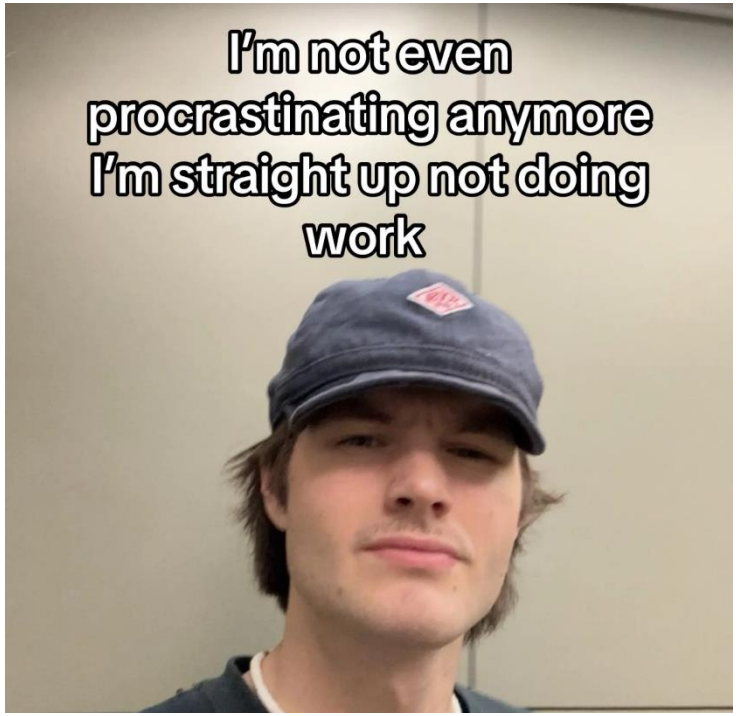
# Announcements

Wireshark Lab 4 due **Wednesday** at 11:59 PM

PA4 due Sunday 11/24 @ 11:59 PM

Wednesday will also be lecture recording (no in-person lecture)

Friday will be a work day for PA4 (no lecture)

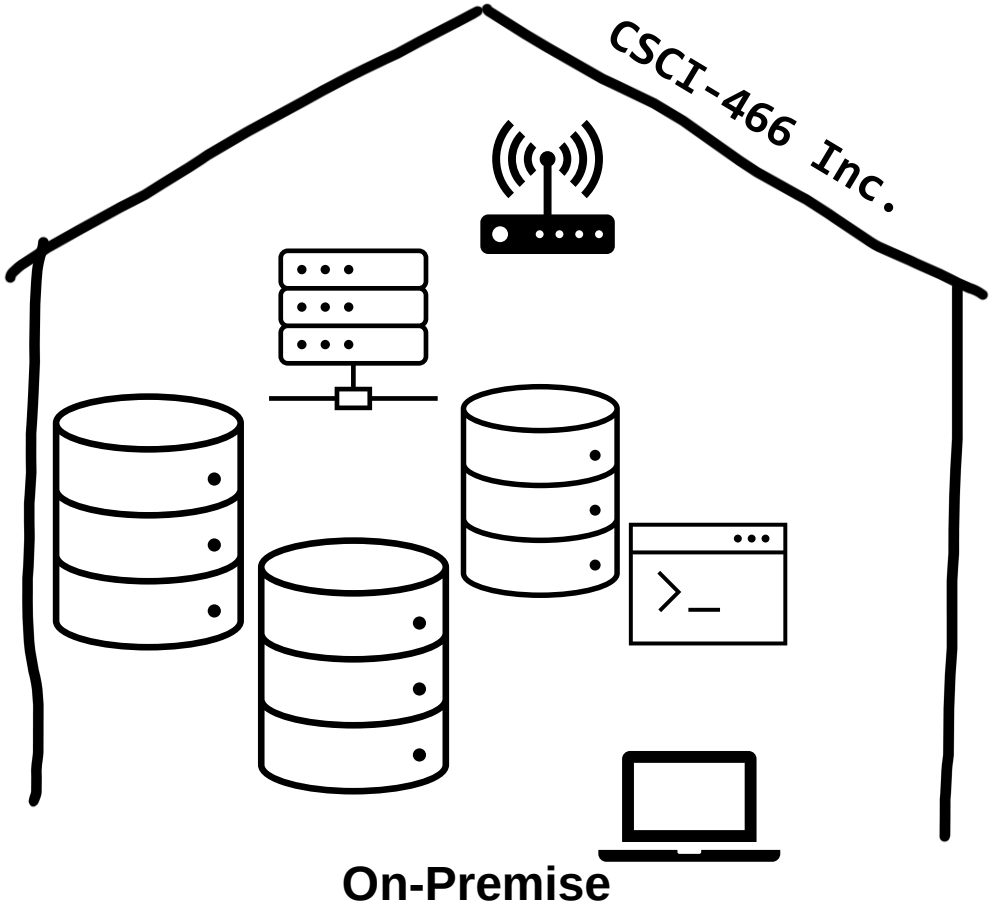



| | |
|---|---|
| Monday December 2nd | PA5 work day (No lecture) |
| Wednesday December 4th | Wrap Up + Review |
| Friday December 6th | Final Quiz (**in person**) |

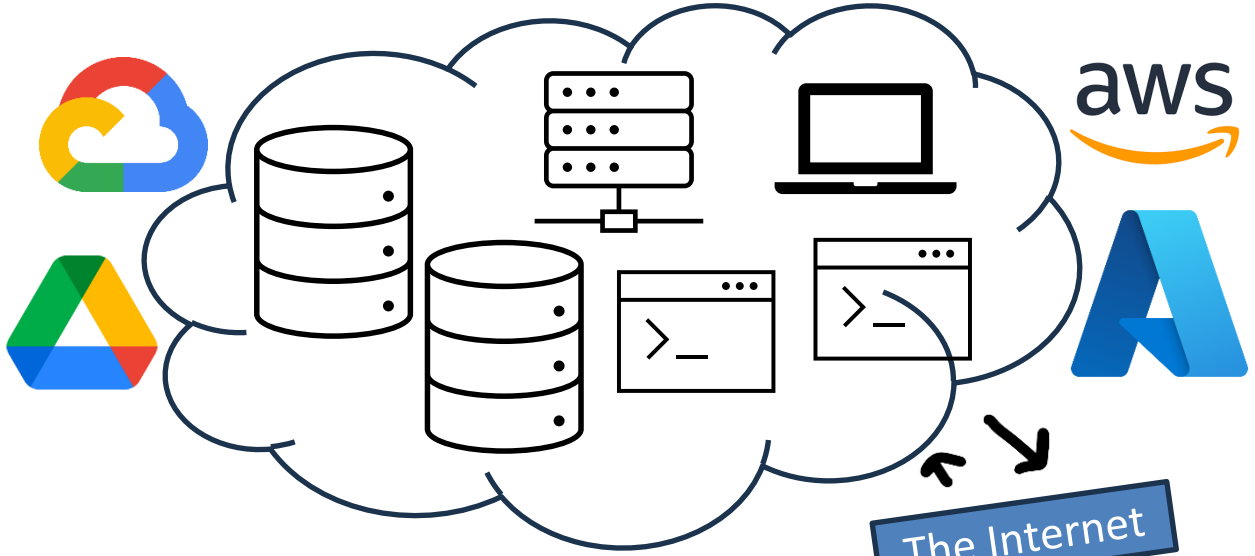
**Final week of CSCI 466**

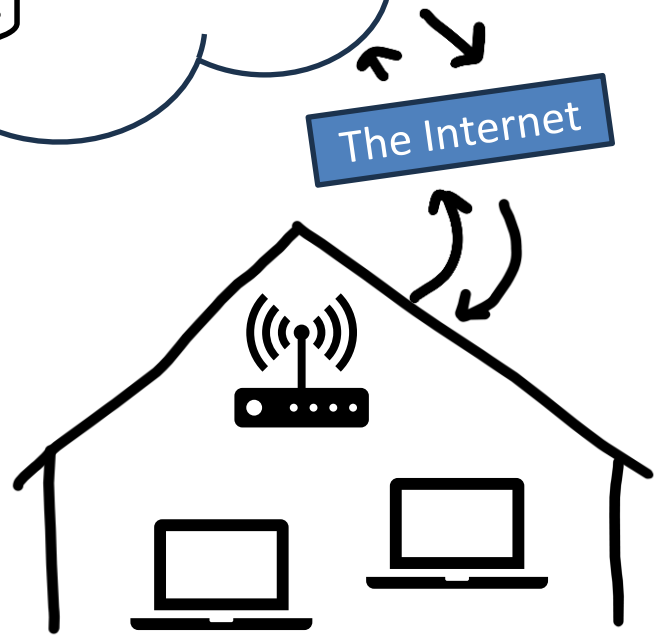
# Wireshark Lab 4

**Cloud computing** is the on-demand service of computing resources over the internet instead of **on-premise**




On-Premise




Cloud Computing

# Benefits of Cloud Computing

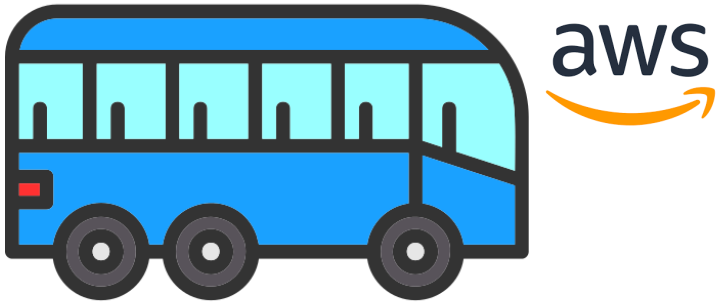
- **Cost Efficiency** – Hosting your services on a cloud system will generally be less expensive than purchasing and maintaining your own servers
  → *Pay-as-you-go* model
- **Scalability**- Resources can quickly be scaled up or down based on demand
- **Accessibility** – Cloud providers offer high uptime guarantees across multiple data centers
- **Backups** – Cloud services provide regular backups in case of hardware failures or accidents
- **Security + Compliance** – Trusted cloud providers generally provide solid security + guarantees on *compliance*

# Cons of Cloud Computing

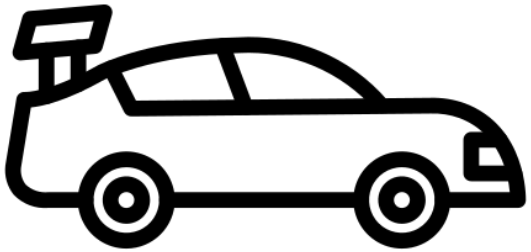
- **Control**– less control over infrastructure and configuration
- **Security-** Cloud systems are a common target in cyber attacks
- **Unexpected Costs**

# Deployment Types

**Public Cloud-** shared environment where resources are owned and operated by third-party cloud provider and accessible through the public internet



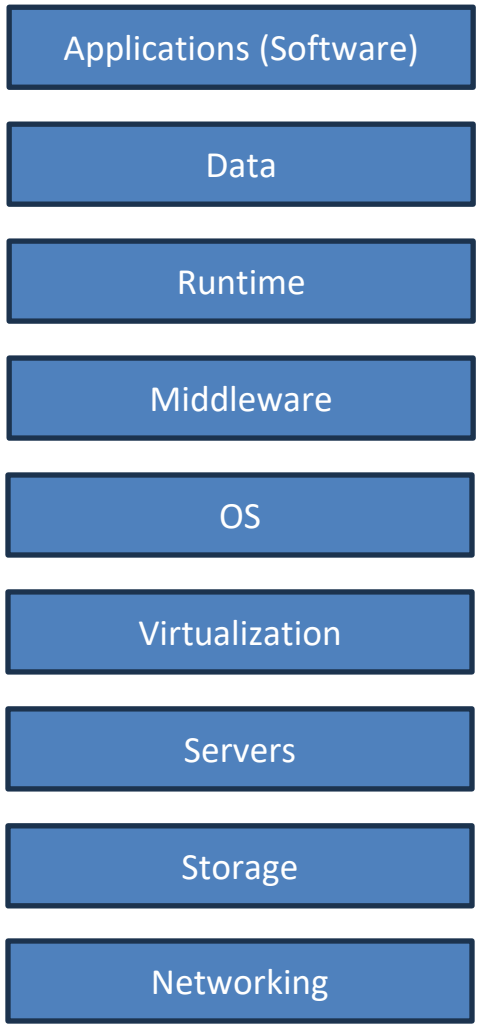

**Private Cloud-** computing resources are exclusively dedicated to one organization. Not accessible through the public internet



**Hybrid Cloud-** Combination of public and private. Information and Data flows between public and private cloud servers

# Cloud Computing Services

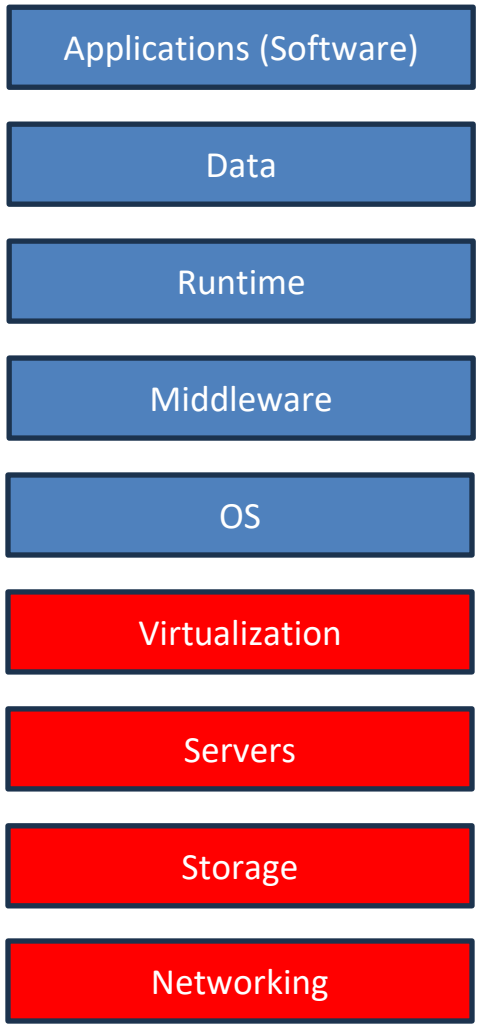
These are all the computing resources in a normal tech stack




*In an on-premise model, the organization is responsible for managing all of these*

# Cloud Computing Services

These are all the computing resources in a normal tech stack




**Infrastructure as a Service (IaaS)** provides virtualized computing resources and foundational IT building blocks over the internet

aws will manage these

# Cloud Computing Services

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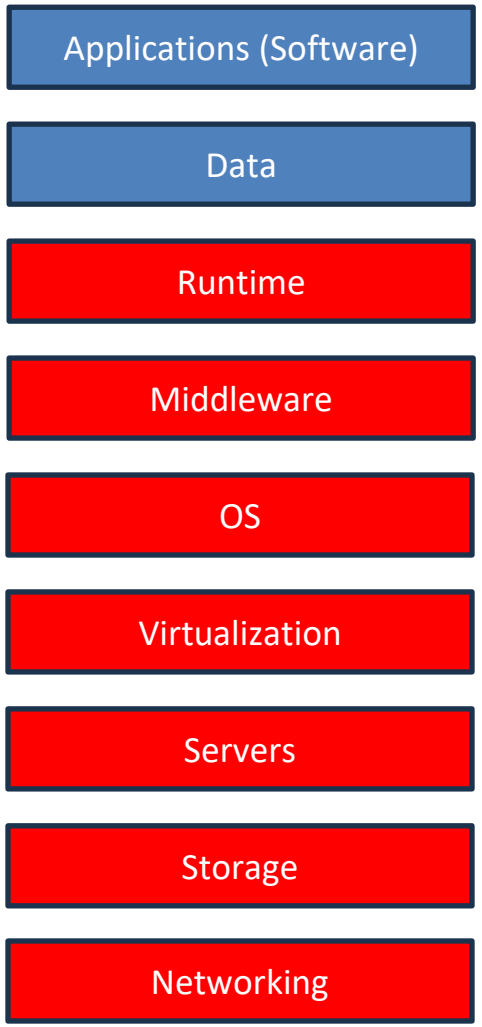



**Platform as a Service (PaaS)** provides hardware and software tools needed for application development

Write code without having to worry about underlying infrastructure

aws will manage these

# Cloud Computing Services

These are all the computing resources in a normal tech stack

- Applications (Software)
- Data
- Runtime
- Middleware
- OS
- Virtualization
- Servers
- Storage
- Networking

**Software as a Service (SaaS)** delivers fully-functional applications over the internet

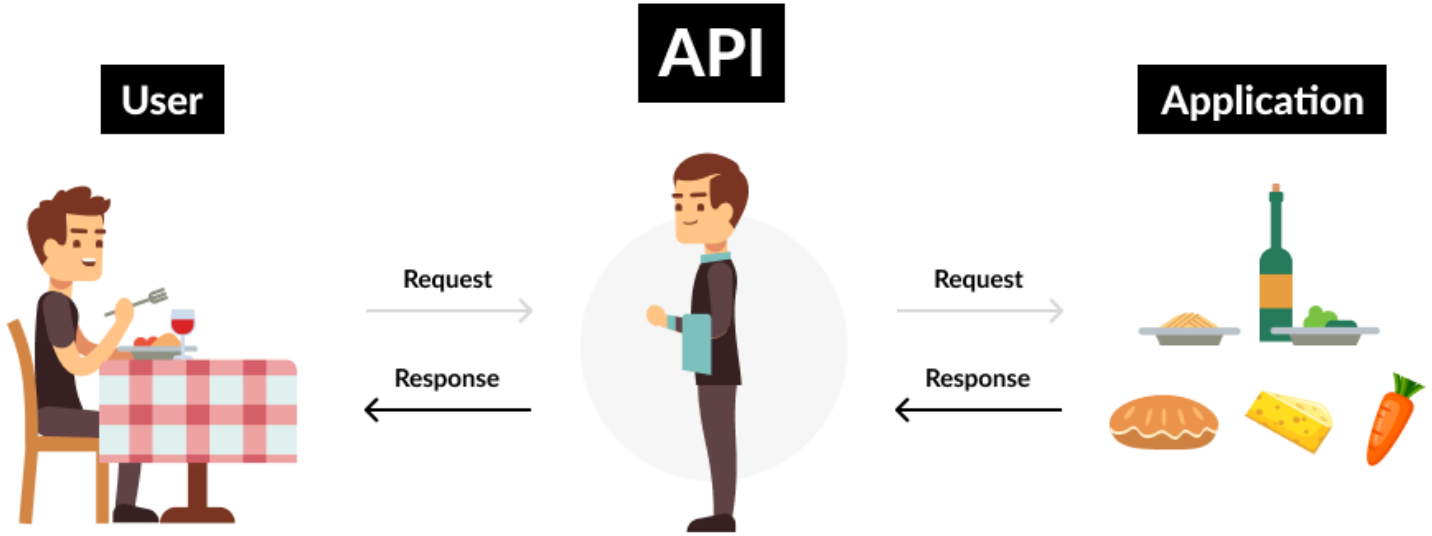
Most commonly used for web applications (Google Drive)


will manage these

# API

An **Application Programming Interface (API)** is a very common application to deploy on the cloud

An API accepts requests, and communicates with a backend service to retrieve/update/delete data

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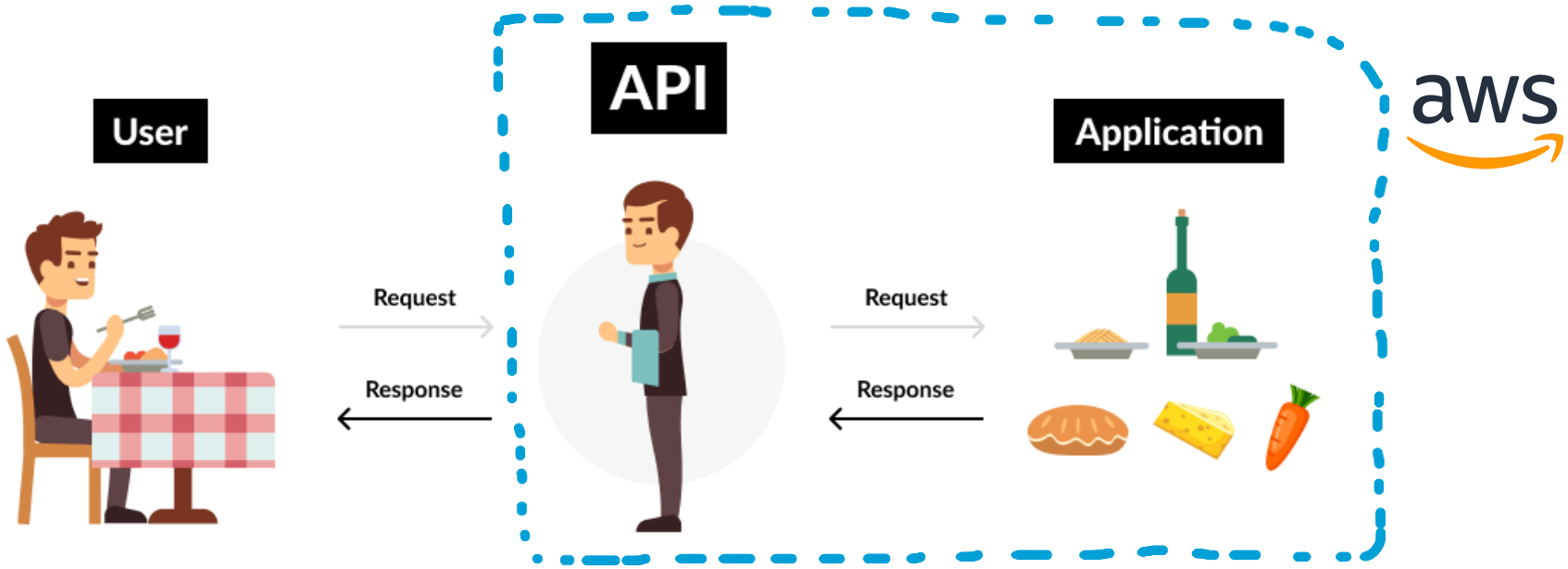


APIs typically listen for HTTP requests, perform some actions, and then send data back in an HTTP response

If our API is on the cloud, it will be accessible 24/7 and it doesn't have to use *our* computational resources

# API

Today and Wednesday (and on Programming Assignment 5), our goal will be to build a basic API, and then deploy it to the cloud

We will first build it locally, and then deploy to Amazon Web Service (**AWS**)

**3.127.45.8**

**API**

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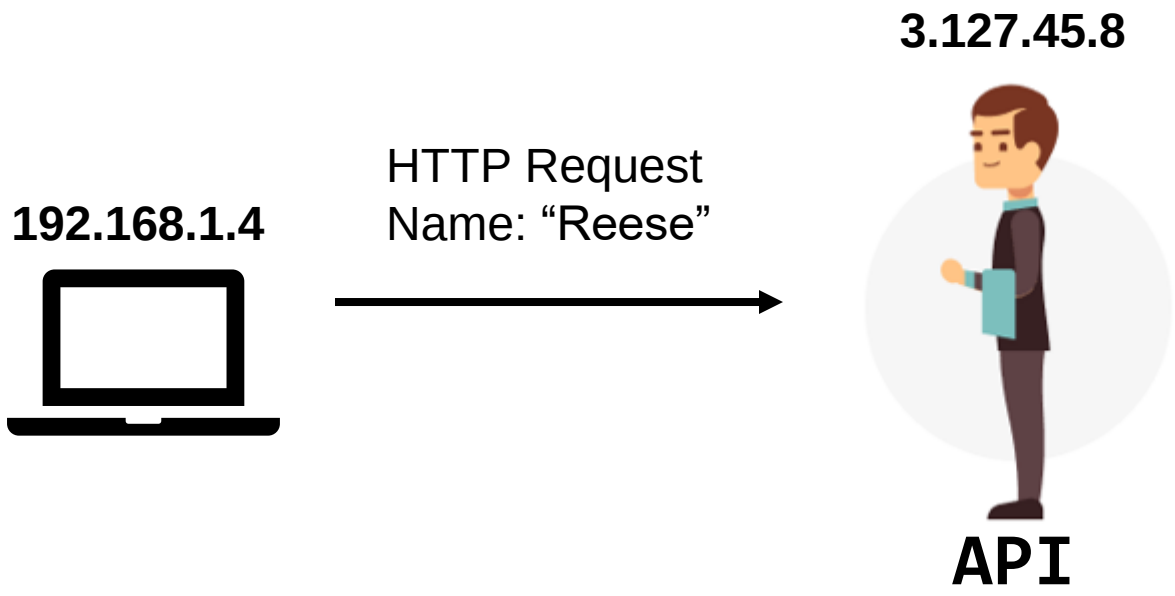

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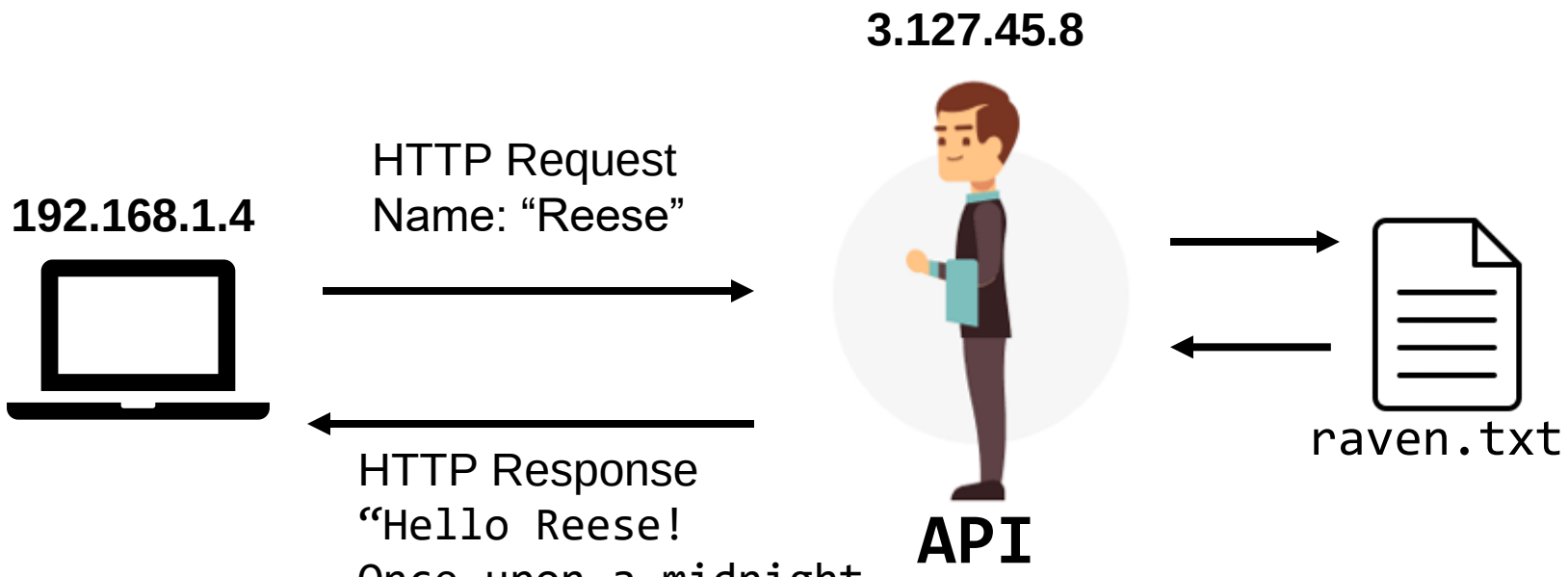

# Flask


**Flask** is a popular python framework for creating basic web applications and API

- Easy to learn (maybe too easy?)
- Powerful routing system for different endpoints
- Built-in handling and templating of HTTP requests/responses
- RESTful API support
- Can be combined with many other web frameworks

# Anatomy of Flask Program

```
from flask import Flask

app = Flask(__name__)


@app.route('/')
def hello_world():
    return 'Hello World'

if __name__ == '__main__':
    app.run()
```

```
* Running on http://127.0.0.1:5000
```

If I visit this IP in my web browser, or send an HTTP request to it, I will get “Hello World” returned

```
from flask import Flask

app = Flask(__name__)


@app.route('/')
def hello_world():
    return 'Hello World'

@app.route('/reese')
def reese_page():
    return 'Reese page'


if __name__ == '__main__':
    app.run()
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This app now has two endpoints you can send requests

`http://127.0.0.1:5000/reese` will return “Reese page”

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Creates a new endpoint

value that gets returned when HTTP request is sent to that endpoint

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`http://127.0.0.1:5000/reese` will return “Reese page”

# Nevermore API

```python
from flask import Flask, request

app = Flask(__name__)

@app.route('/')
def example():
    file = open("raven.txt","r",encoding="utf8")
    filetext = file.read()
    name = request.headers["name"]
    answer = "Hello, " + name + "\n \n" + filetext
    return answer

@app.route('/reese')
def reese():
    return "this is the reese page!"


if __name__ == '__main__':
    app.run()
```

Sending HTTP requests to API

```
C:\Users\reese>curl --header "name: reese" 127.0.0.1:5000
Hello, reese

Once upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore—
    While I nodded, nearly napping, suddenly there came a tapping,
As of some one gently rapping, rapping at my chamber door.
“’Tis some visitor,” I muttered, “tapping at my chamber door—
```