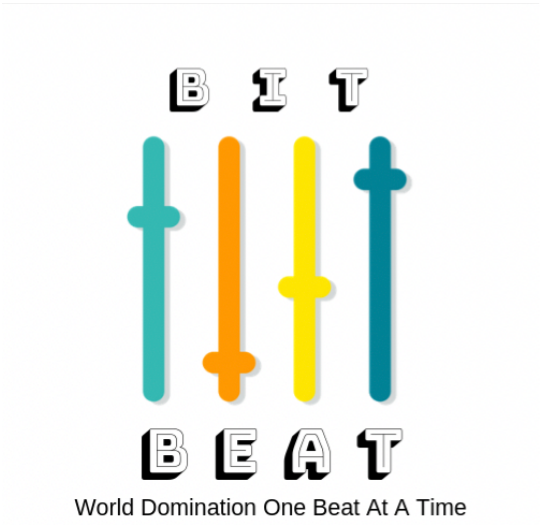
Lab 4: Measuring Latency: Time-to-first-byte via Jupyter in Chameleon

Version: 1.0 **Date: November 30,2020**

READ ME



BitBeat is a new startup that is planning to take the record industry and the world by storm with its new product **BitBanger**, a web-based music mixer app. As a new member of the **BitBeat** infrastructure team, you will need a variety of skills to assist in the growth of the startup. As the startup grows, they will be creating a larger web presence.

Company wants to use Jupyter interface to write python or bash code in chameleon cloud so it can be shared among teammates. Company wants to calculate TTFB for few hosts in networking which includes network latency in measuring the time it takes for a resource to begin loading.

That's where you come in. **BitBeat** has hired you to setup their infrastructure, you've already gathered their requirements and are ready to get started.

BEFORE GETTING STARTED

Here's some important information to know before starting this hands-on activity.

Activity time: 120 min

Requirements: You must have to be a part of a n active project in Chameleon cloud account. You can find the link for Chameleon Cloud portal here link.

Getting help: If you experience any issues as you complete this activity, please ask your instructor for assistance.

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DID YOU KNOW

TTFB measures the duration from the user or client making an HTTP request to the first byte of the page being received by the client's browser. This time is made up of the socket connection time, the time taken to send the HTTP request, and the time taken to get the first byte of the page. Although sometimes misunderstood as a post-DNS calculation, the original calculation of TTFB in networking always includes network latency in measuring the time it takes for a resource to begin loading.

Task overview:

Jupyter Notebooks are an excellent tool for prototyping, exploring, and ultimately documenting the entire experimental process. They combine the benefits of explanatory text, executable code, and rich visualization and interaction.

Task objectives:

- Creating Jupyter notebook interface
- Writing the code to measure Latency
- Writing code to plot latencies

Learning outcomes:

Once you complete this activity, you should be able to create:

- Create a Jupyter interface in Chameleon
- Write the python code to measure TTFB for two different hosts.
- Plot the latencies and comparing those.

Let's Get Started!

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DID YOU KNOW

The time difference recorded when a request leaves from a user's device to the moment it reaches the destination with the 'first' byte of data is known as Time To First Byte (TTFB). TTFB is a crucial measure of network latency and server responsiveness as well.

Tasks

1. **Creating Jupyter notebook**
   Open the Chameleon website.
   Click on **Jupyter Notebook** from the **Experiment**.
   Click on this button  to create a folder.
   Now select that folder and click on + to create a python file.
   Click on Python 3 and start writing the code.
   Select this created file and choose Rename to change the name.

2. **Writing the code to measure Latency**

   a. This is python code and Here's what this python code does:
      In this python code, you have taken two different hosts and calculated TTFB for both hosts. You can also use different host names and then calculate latencies by using curl command.

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```
print("Hello");

hosts=['www.uchicago.edu','www.unl.edu'
      ]
count= 10

print(len(hosts))

ms_latencies = {}
import subprocess
from tqdm.autonotebook import tqdm

for i in tqdm(range (count * len(hosts))):
    host = hosts[int(i / count)]
    out = subprocess.check_output(['curl', '-o', '/dev/null',
'-sw', '%{time_starttransfer}', 'https://{}'.format(host)])
    if not host in ms_latencies:
        ms_latencies[host] = []
    ms_latencies[host].append(float(out) * 1000)

print(len(hosts))
```

3. Writing code to plot latencies

Here is the code to plot the latencies of two different hosts.

This code uses matplotlib library for creating static and interactive visualization in Python. Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits.

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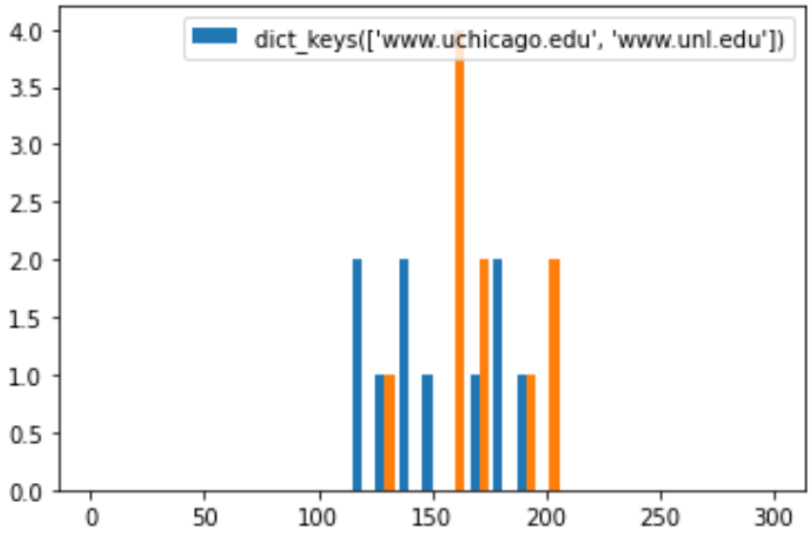
```
import matplotlib.pyplot as plt
import numpy as np

#Create bucket of size 30 ms from 0 ms to 300 ms
bins = np.linspace(0, 300, 30)

plt.hist(list (ms_latencies.values()), bins,
label=ms_latencies.keys())

plt.legend()
plt.show()

pass
```

You will get a plot as shown in below figure.



Great job!

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DID YOU KNOW

All Chameleon Notebook servers are built from a common base image. This means if your server is torn down (which can happen during an upgrade of the Jupyter server), you may have to re-do any changes to the underlying system you made since the server was created. For this reason it is a good idea to put this setup code in a script in your working directory. Your working directory is backed up and will persist across Jupyter server restarts.

Let's review

You have completed the activity and have successfully wrote a python to measure TTFB for few hosts via Chameleon's Jupyter interface.

In this activity you:

- Created Jupyter interface in Chameleon
- Written python code to calculate TTFB
- Written python code to plot these latencies.

Test Your Knowledge

1. What is the full form of TTFB? _____
2. What does TTFB measure? _____
3. Why should you put the setup code in your working directory? _____
4. Why the matplotlib library is used in python code? _____
5. Does Jupyter notebook deals with large files, what happens if you use large files? _____

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