A Multifaceted Analysis of APIs

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Abstract – **Web APIs have become an important in mobile and web applications in today's world. Due to this, any type of decrease in performance, availability, or security will have a negative on many users that rely on these applications. Though this is true, there has not been much research up until this point on the APIs to analyze these qualities even though users can be affected differently based upon their location. In this paper, we will present a three-part analysis into 5 APIs that can serve as the basis for broader and more complex research in this field of study.**

I.   INTRODUCTION

In today's world, the web APIs are used heavily in the mobile and web applications to provide functionality to the applications. Though the APIs are relied upon by many developers there seems to still not be much research on the APIs themselves as far as their performance, availability, privacy, and security. By doing studies like this one, developers can greatly improve their choice of APIs to use and the service providers can find ways to improve their APIs

The purpose of this project was to analyze APIs based on their performance, availability, privacy and security. In this work, we show the following:
- The results of a week-long experiment with 5 APIs on different servers
- A measurement of the availability of the 5 APIs
- An observation of the security of each API

This paper will first describe our approach to the project and give a brief summary of the approach we took to our research. Then we will go into detail on our experiment and give our observations from it. Finally, we will give our conclusion and give an explanation and advocate for future work in the field.

II.   APPROACH

For our experiment, we chose certain ways to measure the categories of the Slack, Facebook, Twitter, Dropbox, and Google Maps APIs. To measure the availability of the APIs we describe it as being the success of a request going through and sending back a response through status codes. We then measured the performance of the APIs based upon the latency of the request which is the time in between the request and response at the client level. For security, we chose to focus on if the APIs supported HTTPS of HTTP connections. Those who supported HTTP

connections were deemed unsecure while those who supported HTTPS were deemed secure. This approach to our experiment makes our experiment repeatable on a larger scale.

III.   EXPERIMENT

A python script was written for each API that connected to each API through an existing account with each service. The scripts also tested 10 API calls and received the latency of each call and sent it to a text file to be used at a later time to create graphs. After testing the scripts to check to see if they functioned properly, the scripts were then run on an Amazon Web Services US – West server located in Oregon and the Rodimus server located at Duke University in Durham, North Carolina every 12 hours for a week.

IV.   OBSERVATIONS

This section will be devoted to the things we observed during our experiment of the including the graphs that were made from the data collected.

- The 5 APIs were tested on performance based upon their response times and the data taken from each server was put into a CDF of distributed latency and these results are shown in figures 1 and 2.
- In the first graph, the Dropbox and Google Maps APIs seem to have the overlapping paths because they have similar response times during our experiment.
- The APIs in the experiment were tested on their availability every 12 hours by our code and each API was expected to have 140 timestamps. The results from this are shown in figure 3.
- We also researched the security of each of the APIs and the information we found is found in figure 4.
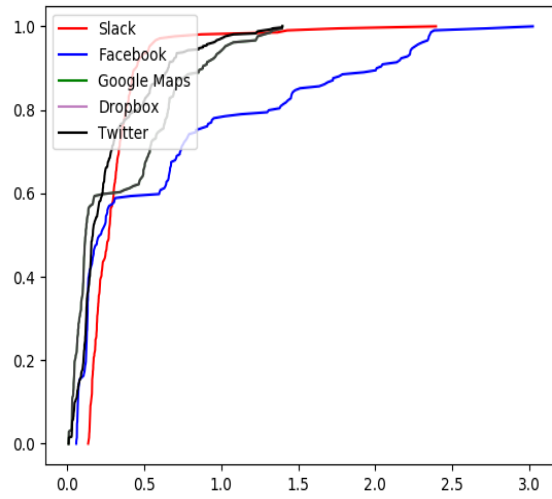
Figure 1
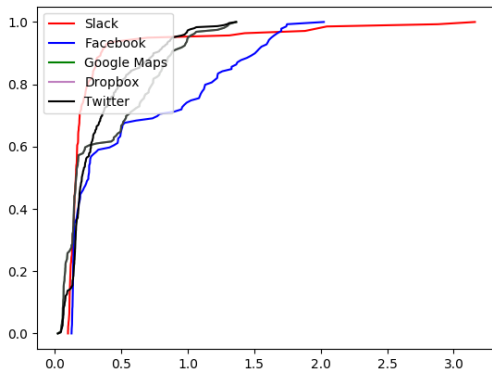
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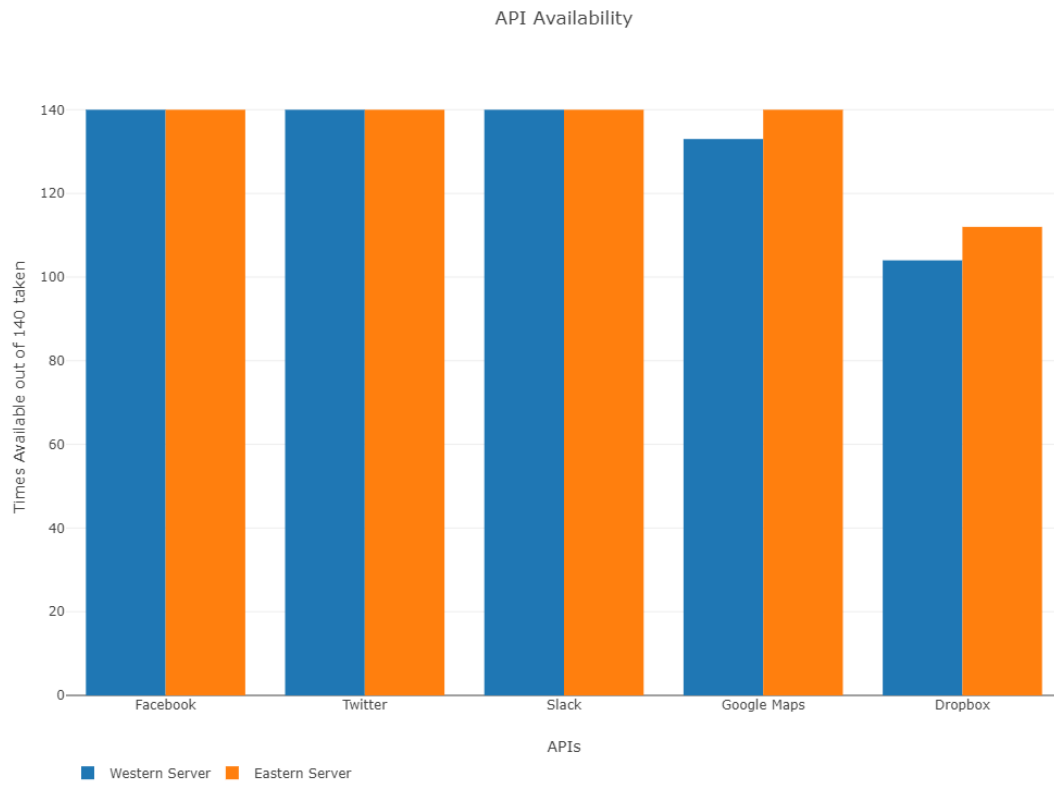
Figure 3: bar chart detailing availabilties

API	Connection	Security Status
Facebook:	HTTP	Unsecure
Twitter	HTTP	Unsecure
Dropbox:	HTTP	Unsecure
Slack:	HTTPS	Secure
Google Maps:	HTTPS	Secure

Figure 4: table of security statuses

V.   **CONCLUSION**

The purpose of this project was to analyze the performance, security, and availability of the 5 APIs. These APIs included the Facebook, Twitter, Google Maps, Slack, and Dropbox APIs. This was achieved through our study of the APIs and our week-long experiment done at two different locations that spanned the United States. Overall the Slack API was the best since it had the highest availability of the secure APIs. Google Maps was also secure but it had a lower availability than the Slack API. The Dropbox API was the worst in the aspects of security and availability on each server. This experiment demonstrated how the location of the server can change the performance, availability, and security of APIs. Also, future research can expand the research to a higher and broader level.

VI. FUTURE WORK

This research should be continued on a larger scale so that different APIs can be studied for longer periods of time than this one. The research done already serves as a basis for more research in the future. Though this research already conducted in this paper has helped in the research of APIs, a broader and more in-depth study is needed in this field of research so that there is more benefits to the users of APIs and their creators.

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