

BLG337E Principles of Computer Communication

Project 1

Naci Toygun Görmüş

150210719

1. Introduction

The aim of this project was to investigate internet infrastructure and the effects of delay on data transmission. In this report, we will outline the objectives, methodology, and the outcomes of the study.

2. Objectives

The primary objectives of this project were as follows:

- To assess the delays in internet communication across various geographical distances.
- To use the traceroute program to measure and analyze the delays from a source point to ten different destinations.
- To examine the impact of time of day and the number of measurements on internet delays.
- To determine the minimum, maximum, and average delay times for each measurement setup.
- To create graphical representations of delays against various parameters.
- To provide comments and insights based on the outcomes observed during the project.

3. Methodology

The project was executed in the following steps:

3.1 Destination Selection

Ten destinations were chosen based on their geographical distances from the source point, ensuring a diverse range of locations. These are the destinations selected:

hepsiburada.com - Turkey

abv.bg - Bulgaria

skroutz.gr - Greece

sinoptik.ua - Ukraine

mail.ru - Russia

spiegel.de - Germany

flipkart.com - India

redmart.lazada.sg - Singapore

baidu.com - China

mixi.jp – Japan

3.2 Measurement Setup

Due to the traceroute program taking much time to execute, the ping command was used to measure latency values. Both codes for traceroute program and ping command execution has been provided in the zip folder as traceroute.py and ping.py. For each destination, The tests were conducted over four different days, and for each day, measurements were taken at three different times.

3.3 Variation in Measurements

To assess the impact of the number of measurements, tests were repeated for various measurement counts, ranging from 10 to 100.

3.4 Data Analysis

For each setup, the minimum, maximum, and average delay times were calculated to evaluate the performance of the internet infrastructure.

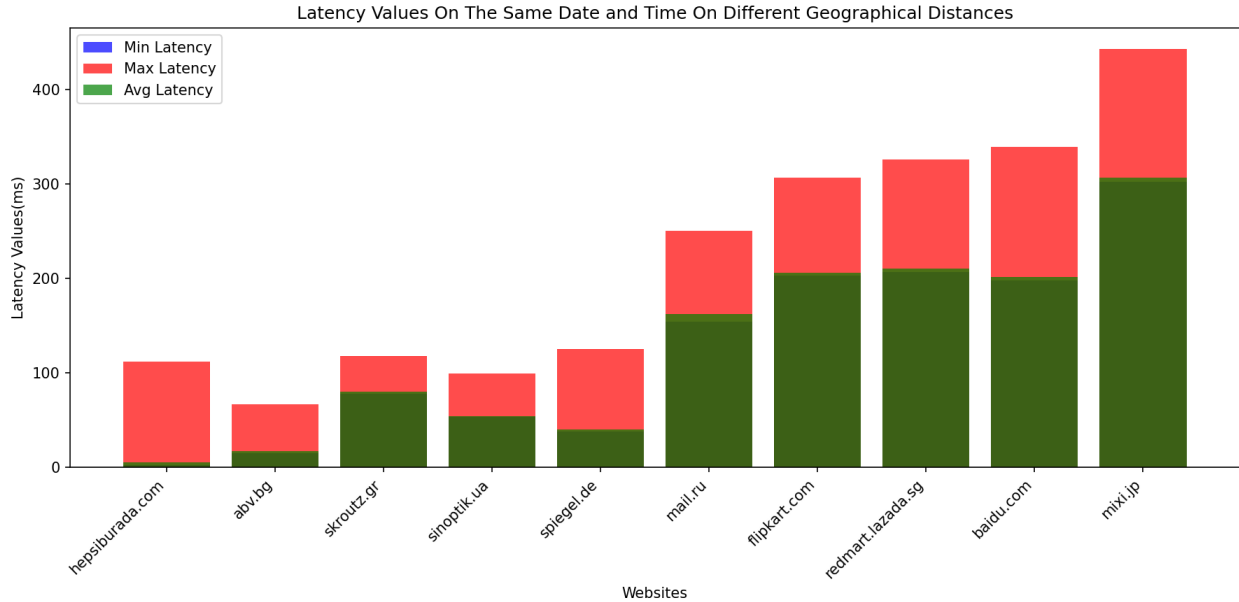
3.5 Graphical Representation

Graphs were generated, displaying delays against various parameters, with two parameters fixed at a time.

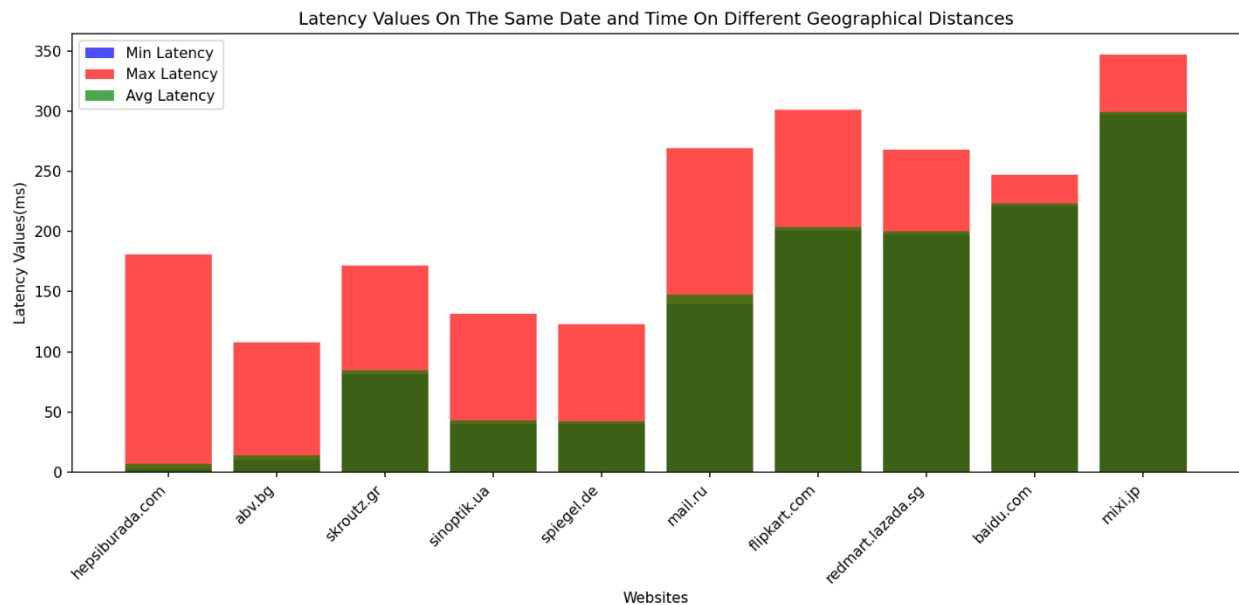
4. Results

The project revealed the following key findings:

4.1 Geographical Distance



Recorded at 27-10-2023_09-02-48

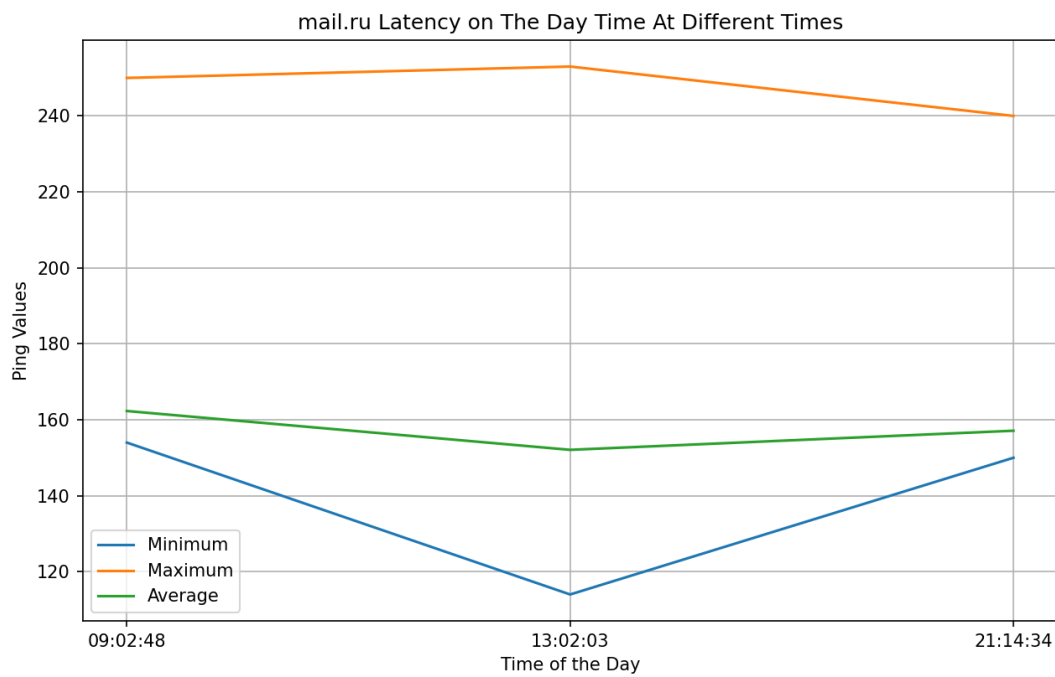


Recorded at 29-10-2023_21-24-31

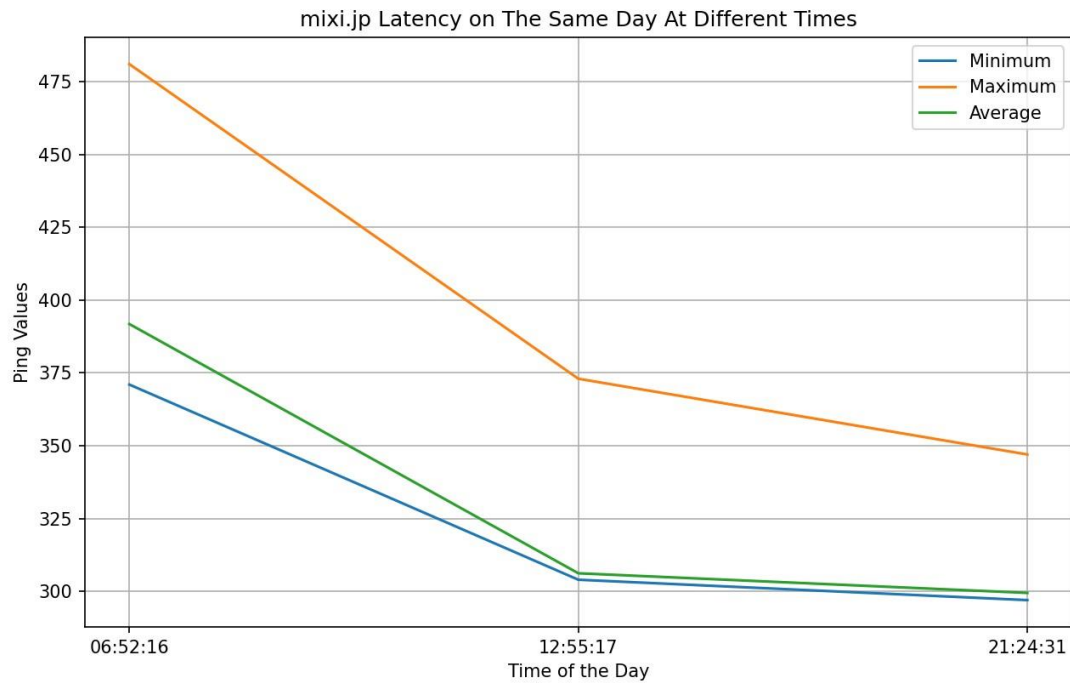
From these graph the comment can be made that there is a tendency to increase in the delay values as the distance increases. This is consistent with the fact that data must traverse longer

routes, encountering more network nodes and potentially congested links. But the observation that the delays do not increase directly proportional to distance should be noted. For example, a website hosted in Greece has higher latency than a website hosted in Germany.

4.2 Time of Day



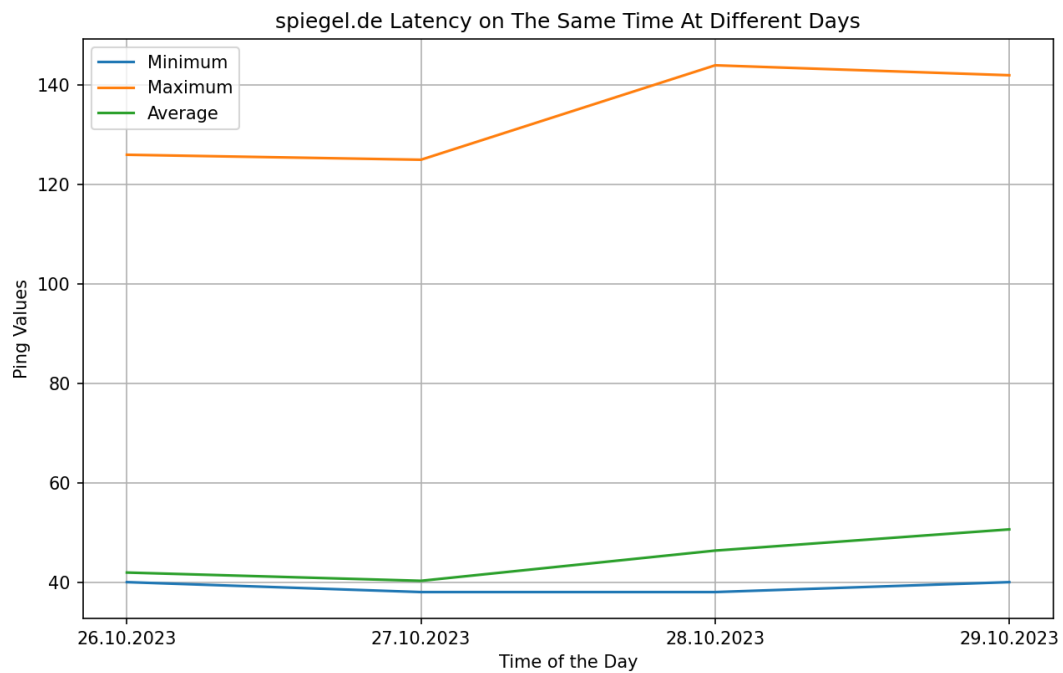
Recorded at 27.10.2023 with mail.ru



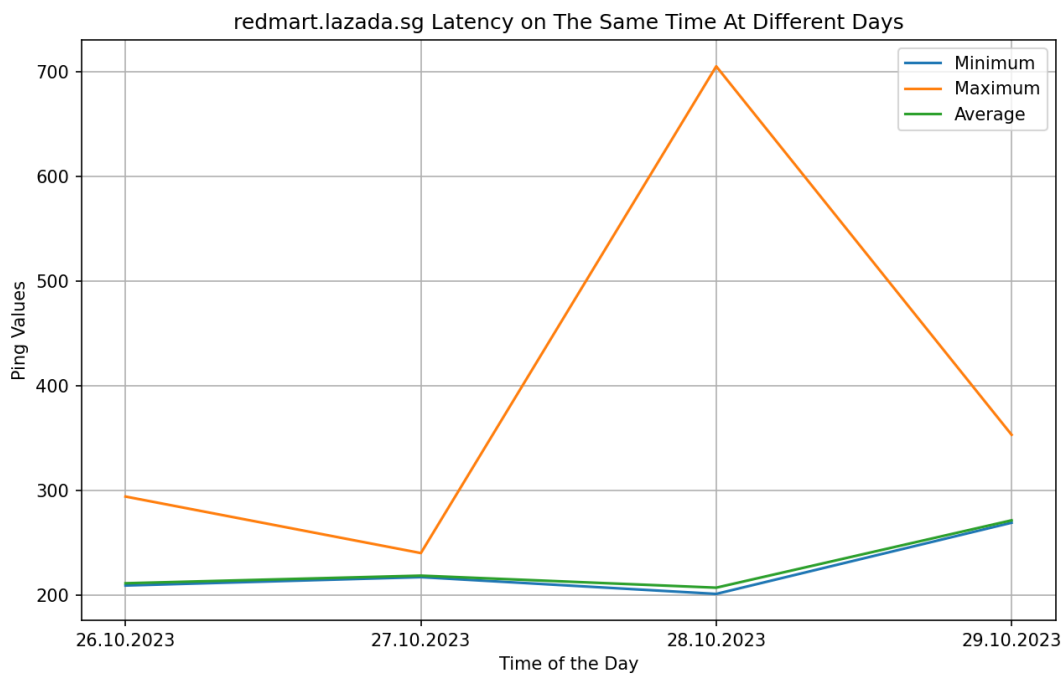
Recorded at 29.10.2023 with mixi.jp

Delays exhibited fluctuations during the day. The evening hours generally experienced higher delays, possibly due to increased internet usage during those times. One important thing here is that because the measurements were conducted in Istanbul time zone, the two graphs show conflicting delay times. Latencies in requests to Japan decreased in the evening, but increased in requests to Russia.

4.3 Day of Week



Recorded in the mornings of 4 days



Recorded in the noons of 4 days

One noticeable trend was the distinction between weekdays and weekends. On weekends, when internet usage tends to be higher due to free time, delays were often more pronounced during peak hours. This can be attributed to increased network congestion, as more users are simultaneously accessing online resources.

4.4 Number of Measurements

- As the number of measurements increased, the average delay times became more stable and accurate representations of network performance.

5. Conclusion

In conclusion, this project provided valuable insights into internet infrastructure and delay effects. It highlighted the impact of geographical distance, time of day, and the number of measurements on internet delays. The graphical representations visually confirmed the trends observed in the data.