

# KATHMANDU UNIVERSITY

DHULIKHEL, NEPAL

Department of Computer Science & Engineering (DoCSE)



FINAL PROJECT REPORT ON

**“INTERNET HEALTH NEPAL”**

Submitted for the **Prixa Excellence Award**

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# **CERTIFICATION**

## **SECOND YEAR SECOND SEMESTER PROJECT REPORT**

**On**

**Internet Health Nepal**

Certified that this project report “**Internet Health Nepal**” is the bona fide work of “**Roshan Bhandari, Yogesh Bhandari, Murari Kumar Gupta, Anish Poudel, Suraj Kumar Sah**”, who carried out the project work under my supervision.

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## **Acknowledgement**

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We would like to thank Department of Computer Science and Engineering (DoCSE) and the whole university for providing us a chance to work on the project.

**Abstract:**

People use different internet speed test websites to check the speed of internet their particular device is receiving from the ISPs. These websites find out the internet speed but do not keep record of the tests performed. Due to this, people cannot go against their ISPs due to lack of data. The solution to this is to develop a website that would keep the record of the speed tests performed by the users.

This project is about a website that aims to measure the internet health of the users on the basis of different parameters like ping, jitter, upload, download. The website keeps the record of their personal information, ISPs, IP Address, their location and the speed test details which is used to measure the overall penetration of the internet of a certain city, village and also check the quality of the internet provided by individual ISPs.

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# **Chapter 1 :Introduction**

## **1.1 Background:**

Our current world is in the age of technology where computers are replacing vast majority of things and Internet has become a prerequisite for advancing forward. Without access to Internet our day to day task will be halted, so, right now one of the primary focus of every developing country, like Nepal, is providing Internet access to all the citizens of the country. But one of the major problems of providing Internet in such rapid pace is that the ISPs in Nepal are left unchecked i.e. there is no way to keep track of the services provided by the ISPs. So, in order to keep track of the quality of the Internet which is used by the people, we are developing “Internet Health Nepal”. The “Internet Health Nepal" will allow the users to check the quality of their Internet based on latency, bandwidth as well as jitter. Furthermore, the app will store the data from the users and keep track of the quality of Internet from different ISPs as a whole.

## **1.2 Objective:**

The objectives of the “Internet Health Nepal” are as follows:

- To implement our knowledge on computer networking as a project.
- To allow users to check if they are getting the bandwidth they are paying for.
- To check the average penetration of the Internet in rural as well as urban area and also compare the overall quality of the Internet from various ISPs.

## **1.3 Motivation and Significance:**

The truth about Speedtest is that, most of the speed testing websites tend to be less informative and less accurate. For example, Fast.com is simply a website which tests our internet speed basically without saving our speed test data. So we made this fact our motivation. Improving the speedtest results and also saving the data of the result, Internet Health Nepal will be more informative and useful website to use.

## **Chapter 2: Related Works**

SpeedTest is a test of your internet speed given by your Internet Service Provider(ISP). It basically checks your download, upload speed, ping and jitter. Speedtest is a way to check your current speed rather than bandwidth.

There are different speed test web applications which helps us to find out our speed that is being provided by the particular ISP. The speed varies according to the service one owes from its ISP. Some of the most popular speed test web applications are fast.com, speedtest.net by ookla, xfinity speed test, and so on. However, these web applications only provides the download and upload speed. They do not keep the track of the users data like: their provided speed by the ISP, neither keep the record of their weekly, monthly data speed progress and jitter as well as ping. They do not have any login process for the users.

InternetHealthNepal.com is also an speed test web based application which has some additional features in compared to some of the most popular applications (as mentioned above). Internethealthnepal.com helps to login the user via facebook and gmail which then helps to keep their record for further investigations like the speed of the particular user, their internet health on weekly, monthly basis. It also helps us to give feedbacks in the feedback section.



## Chapter 3: System Design

### 3.1 Test Parameters

Our website measures the 'health' of the internet the device is using based on four specific parameters. They are ping, jitter, upload, download. They are discussed below.

- **Ping :** Ping is the response time of the connection i.e. how long it takes for you to get a response from the server after you send the request. In simply terms, ping is the time duration the packets from your device take to reach the server. The website measures ping based on an empty XHR request from client to the server instead of the generally used ICMP protocol. Also, it is to be noted that ping is taken as the median of the values obtained.
- **Jitter :** Jitter is the variation in the ping. The website simply takes the difference in the packet arrival time to calculate the ping. In contrast to ping which is a median value, the jitter is taken as the maximum value in the variation of ping hence it can be greater than ping.
- **Download Speed :** Download speed is the actual rate at which the device is receiving the data. The download speed is measured on the basis of how much of an incompressible file can be downloaded to the device in certain time.
- **Upload Speed :** Upload speed is the rate at which the device sends the data to the server. It is measured on the basis of how much of the file can the client send to the server in certain time.

### 3.2 Algorithms and flowcharts

#### 3.2.1 Algorithm and Flowchart for overall system:

- Step 1: Start
- Step 2: If users clicks start then go to next step else keep waiting.
- Step 3: Start the ping and jitter test.
- Step 4: If the ping and jitter test are complete, go to next step.
- Step 5: Start the download speed test.
- Step 6: If the download test is complete go to next step.
- Step 7: Start the upload test.
- Step 8: If the upload test is complete go to next step.
- Step 9: Log the data of the speed test into the database.
- Step 10: Stop.

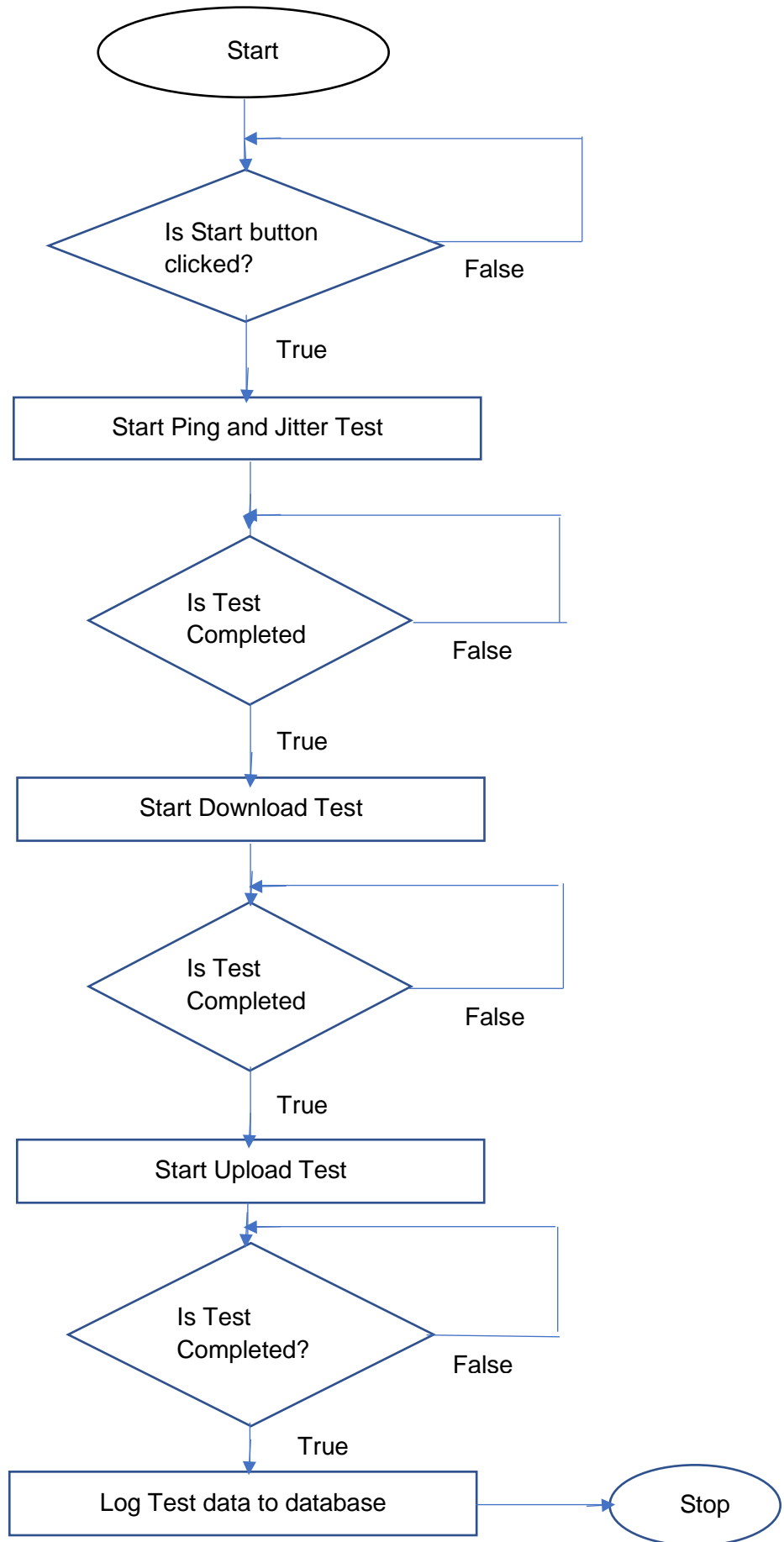


Fig 3.2.1: System Flowchart

### 3.2.2 Algorithm and Flowchart for Ping Calculation

- Step 1: Start
- Step 2: If status is 'ping' then continue else wait till status is 'ping'
- Step 3: Start ping test.
- Step 4: Get the performance API.
- Step 5: Select the browser for optimal test.
- Step 6: Calculate ping = responseStart - requestStart
- Step 7: Calculate Jitter = oPing - nPing
- Step 8: Update Ping and Jitter
- Step 9: Is count > 30, if yes go to next step else go to Step 6.
- Step 10: Status = 'dl'
- Step 10: Stop

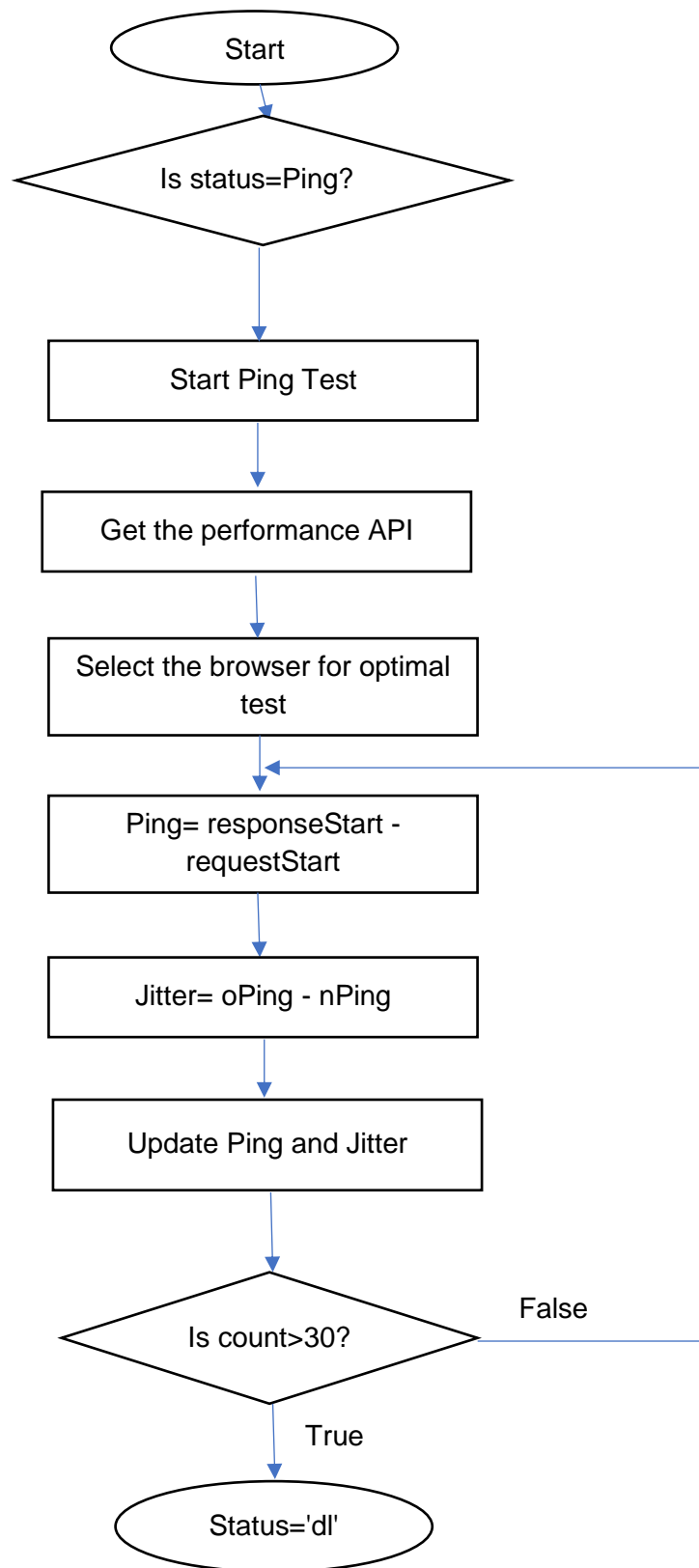


Fig 3.2.2: Ping-Jitter flowchart

### 3.2.3 Algorithm and Flowchart for Download Speed

- Step 1: Start
- Step 2: If status = 'dl' continue else wait till status = 'dl' .
- Step 3: Start xhr stream.
- Step 4: Wait for grace time.
- Step 5: Calculate dlspeed = (No. of chunks)/time
- Step 6: Update download speed.
- Step 7: Is count > 20 if yes continue else go to step
- Step 8: Status = 'ul'
- Step 9: Stop

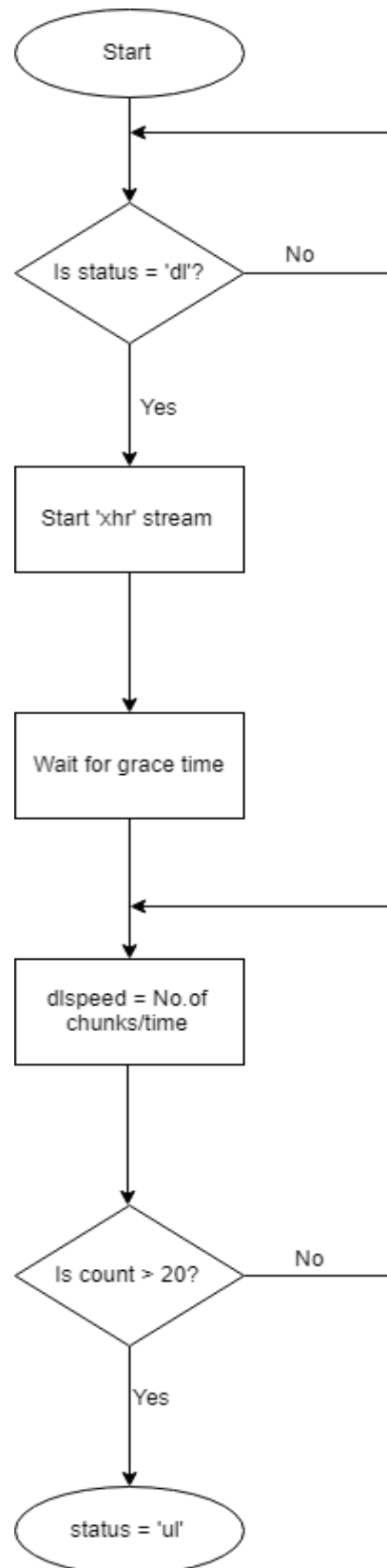


Fig 3.2.3: Download-Speed flowchart

### 3.2.4 Algorithm and Flowchart for Upload Speed

Step 1: Start

Step 2: If status = 'ul' continue else wait till status = 'ul' .

Step 3: Start xhr stream.

Step 4: Wait for grace time.

Step 5: Calculate ulspeed = (No. of chunks)/time

Step 6: Update upload speed.

Step 7: Is count > 20 if yes continue else go to step

Step 8: Status = 'complete'

Step 9: Stop

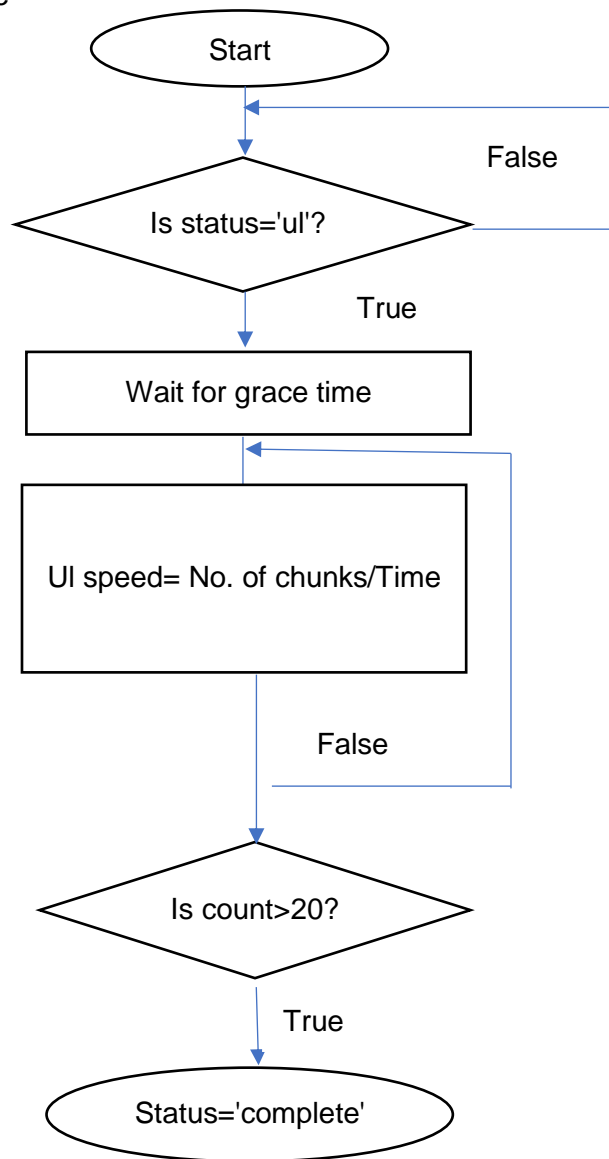


Fig 3.2.4: Upload-Speed flowchart

## Chapter 4: Implementation

### 4.1. System Requirement Specification

#### 4.1.1 Software Specification

##### 4.1.1.1 Front End Tools:

###### ► HTML:

“HTML” stands for **H**yper**T**ext **M**arkup **L**anguage. A markup language is a computer language which defines the structure and presentation of raw text. Markup languages work by surrounding raw text with information the computer can interpret, “marking it up” to be processed.

###### ► CSS:

CSS stands as **C**ascading **S**tyle **S**heet which describes how HTML elements are to be displayed on screen, paper, or in other media. It customizes HTML by controlling the layout of multiple web pages all at once. There are three types of CSS:

- external style sheet: defined outside the tag and functions
- internal style sheet: defined inside then functions
- inline style sheet: defined in specified line

###### ► JavaScript:

JavaScript often abbreviated as JS, is a high-level, interpreted programming language. It is a language which is also characterized as dynamic, weakly typed, prototype-based any multi-paradigm. Alongside HTML and CSS, JavaScript is one of the the core technologies of the World Wide Web. JavaScript enables interactive web pages and thus is an essential part of web applications.

###### ► Bootstrap:

Bootstrap is a free and open-source front-end framework(library) for designing websites and web applications. It contains HTML and CSS based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. Unlike many web frameworks, it concerns itself with front-end development only.



#### **4.1.1.2 Back End Tools:**

##### **► Node.js**

Node.js is an open-source, cross platform JavaScript runtime environment that executes JavaScript code outside the browser. Node.js developers use JavaScript to write Command Line tools and for server-side scripting, running scripts server-side to produce dynamic web page content before the page is sent to the user's web browser.

##### **► MySQL**

MySQL is the world's most popular open source relational database. It's easily accessible and is often known to be part of the LAMP web development stack, standing for the 'M' in the acronym of popular tools, along with Linux, Apache, and PHP/Perl/Python/Node. The fact that MySQL is free, easy to setup, and scales fast are some of the main reasons why it's the best match for many backend developers

##### **► Express.js**

Express.js, or simply Express, is a web application framework for Node.js, released as free and open-source software under the MIT License. It is designed for building web applications and APIs. It has been called the de facto standard server framework for Node.js.

#### **4.1.2 Hardware Requirement**

Operating System : Any

Browser : Any

Processor : Any

## **Chapter 5: Conclusion and Recommendation**

With the help of node.js, mysql database, HTML, CSS, JavaScript and general knowledge of Photoshop we are able to present, what we believe. We the whole team can assure that users will be able to measure their internet speed and they will be able to keep the record of their test statistics. This website will help the government and related authorities in keeping records of the internet speed provided by the ISPs at particular time.

### **5.1 Limitations:**

Internet Health Npeal has the following limitations:

- The website measures internet speed with accuracy only in presence of good Wi-Fi or LAN connection.
- In the presence of multiple devices in the network, the website can only measure the internet speed of single device.

### **5.2 Future Enhancements:**

In the near future we plan to further enhance UI of the website and increase the user base of our website so we can gather sufficient data. We also to plan to develop a mobile app so users can conveniently measure the internet health on the go. Furthermore, we are seeking to increase the number of servers so that the data can be collected from different servers.

**References:**

- [1] *HTML & CSS - W3C*. url: [https:// www. w3 . org/ standards/ webdesign/htmlcss](https://www.w3.org/standards/webdesign/htmlcss). Html (visited on 02/07/2018).
- [2] *JavaScript Tutorial*. url: <http://www.tutorialspoint.com/javascript/> (visited on 17/07/2017).
- [3] *Bootstrap* .url: <http://getbootstrap.com/docs/4.1/getting-started/introduction/> (visited on 24/07/2018).
- [4] *Node.js Tutorial*. Url: <http://www.udemy.com> (visited on 26/07/2018)
- [5] *Mysql Database Tutorial*. Url: <http://www.mysqltutorial.org/> (visited on 30/07/2018)

## Appendix

### Grant Chart

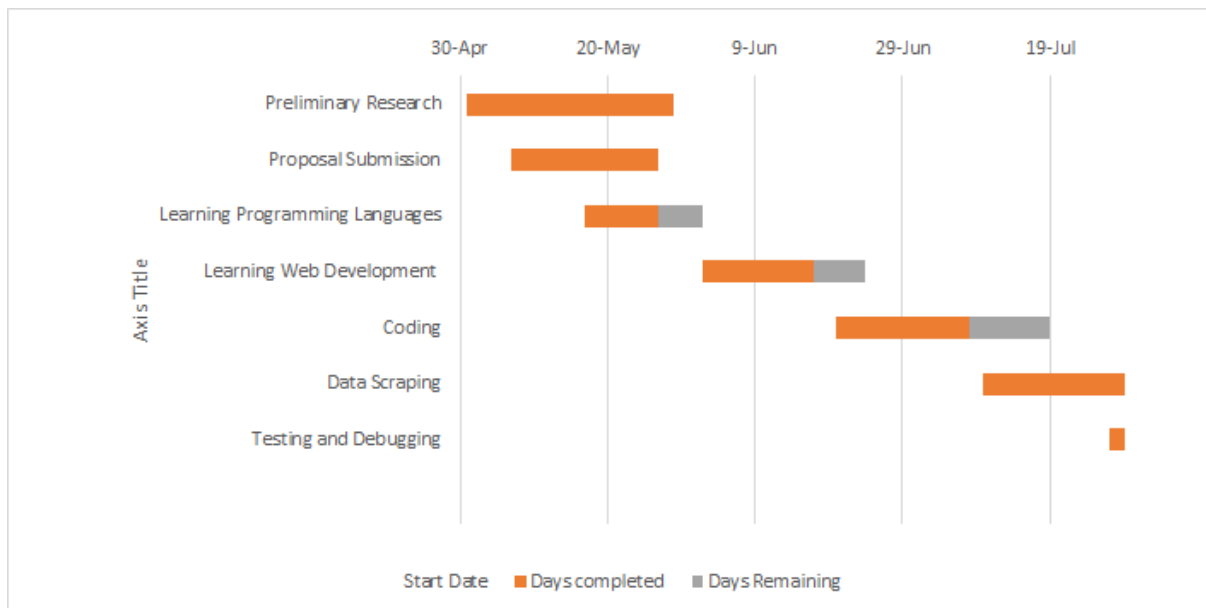


Fig: Gantt chart

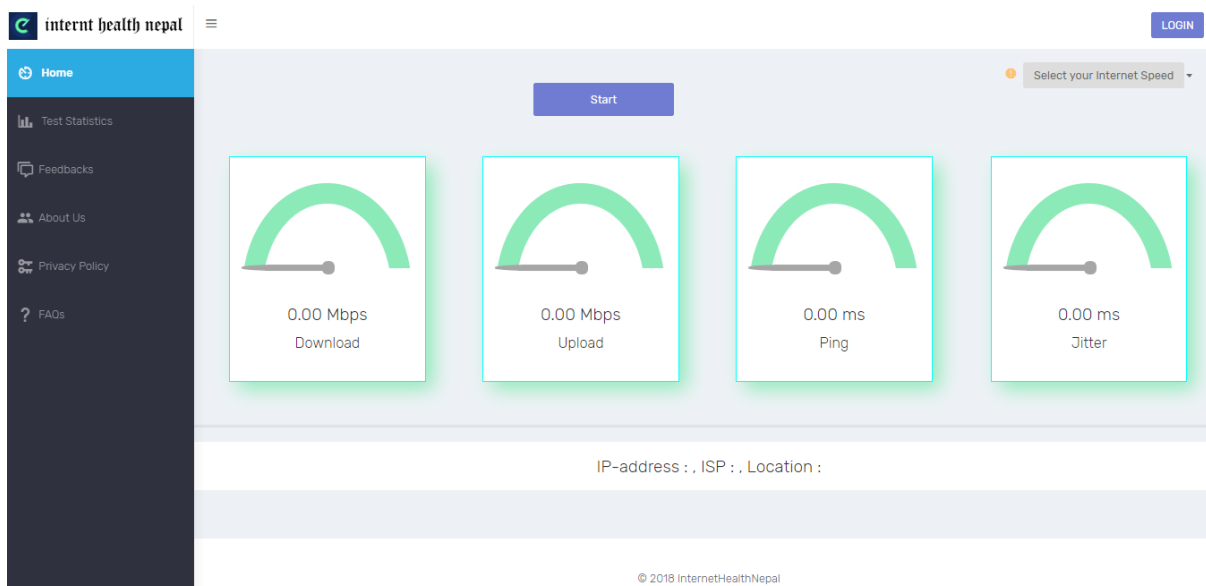


Fig: Website Homepage