Live Website to track covid-19 cases in Nepal

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Background

Introduction

The coronavirus has been creating a global panic for the last few months. Coronaviruses are a large family of viruses that may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections. The most recently discovered coronavirus causes coronavirus disease COVID-19. Believed to have originated from Wuhan, China, it has gone on to affect major parts of Europe, the United States, Asia and other parts of the world, hence creating a global pandemic. The disease can spread from person to person if they breathe in the small droplets containing the virus when that person with COVID-19 coughs or exhales. These droplets land on objects and surfaces around the person. Other people then catch COVID-19 by touching these objects or surfaces, then touching their eyes, nose or mouth. Hence, maintaining physical distance and practicing good hygiene has proven to be effective preventive measures to contain the virus.

Covid-19 situation in Nepal

The virus has created a worldwide crisis with lockdowns being enforced in many countries as a preventive measure. Death tolls have surged to over 10,000 people due to the COVID-19 with more than 250,000 cases worldwide. Nepal, itself has been highly affected by the outbreak of coronavirus with confirmed cases increasing day by day. In Nepal, the first case of COVID 19 was tested positive by real-time RT-PCR test on 23 January 2020. The case is reported to be a 31-year-old male who studies in Wuhan and traveled to Kathmandu from Wuhan. The Nepalese Government evacuated 175 Nepalese citizens from various parts of the Hubei Province on 16 February, 2020 and quarantined at Kharipati, Bhaktapur and on day 16 of quarantine after the test results were negative, they were sent back home. The second case was tested positive on 22 March 2020 (MOHP). The Government of Nepal issued a national lockdown on 23 March, 2020(News). On 4 April 2020, 3 new cases were tested positive making total count 9. It was on 4 April 2020 when the first local transmission was reported and following this Nepal entered the second stage of COVID 19 outbreak (MOHP). On 6 April 2020 the Government of Nepal extended the national lockdown to contain the spread of the COVID 19.

Problem Statement

People's adherence to control measures are essential, which is largely affected by their knowledge, attitudes, and practices towards COVID-19. Residents of the country are the most important stakeholders to control the spread of such viruses. Nepal is a land locked country situated between India and China and is one of the vulnerable areas

among SAARC nations. In spite of being such a vulnerable nation there was a lack of previous studies detecting the degree of awareness among Nepalese residents towards COVID 19. At such a time, it is normal for people to panic but what has been fueling this panic to a greater extent is the spread of misinformation regarding the virus.

Problem Solution

Thus, in order to help the public, get authentic information and updates about COVID-19, I have come up with a dynamic informative website which provides an interactive overview of the latest situation, including the total number of confirmed cases, as well as deaths and recoveries globally. Furthermore, one can explore these numbers by country, and in the case of Nepal — by districts and interactive map. This website aims on delivering important updates on coronavirus with data being collected from authentic sources, hence avoiding misinformation and helps in creating awareness among people to stay alert and apply preventive measures. A website alone cannot stop the onset of this pandemic; however, it can help prevent the spread, educate, warn, and empower those on the ground to be aware of the situation, and noticeably lessen the impact.

Data Source

Data is the most crucial asset of our project, while data collection and storage being the most important part to achieve the objective of our website. Working with live data from different data sources during an evolving virus outbreak meant that we have to adapt and be flexible regarding data collection and processing. The data is being fetched from various authentic sources and websites such as WHO, Ministry of Health and population, Nepal etc. which are automatically updated every 24 hours.

Data collection and Processing

In this project, the data is directly collected through the pomber's covid19 API i.e. https://github.com/pomber/covid19. This API transforms the data from CSSEGISandData/COVID-19 into a JSON file and is updated three times a day using GitHub Actions. The JSON contains the number of Coronavirus confirmed cases, deaths, and recovered cases for every country and every day since 2020-1-22. It is then used to fetch the list of the countries and the stats associated with them through the use of countries endpoint from https://pomber.github.io/covid19/timeseries.json.

Furthermore, in order to provide detailed information in context of Nepal, this website incorporates interactive map of Nepal highlighting each districts , with stats of

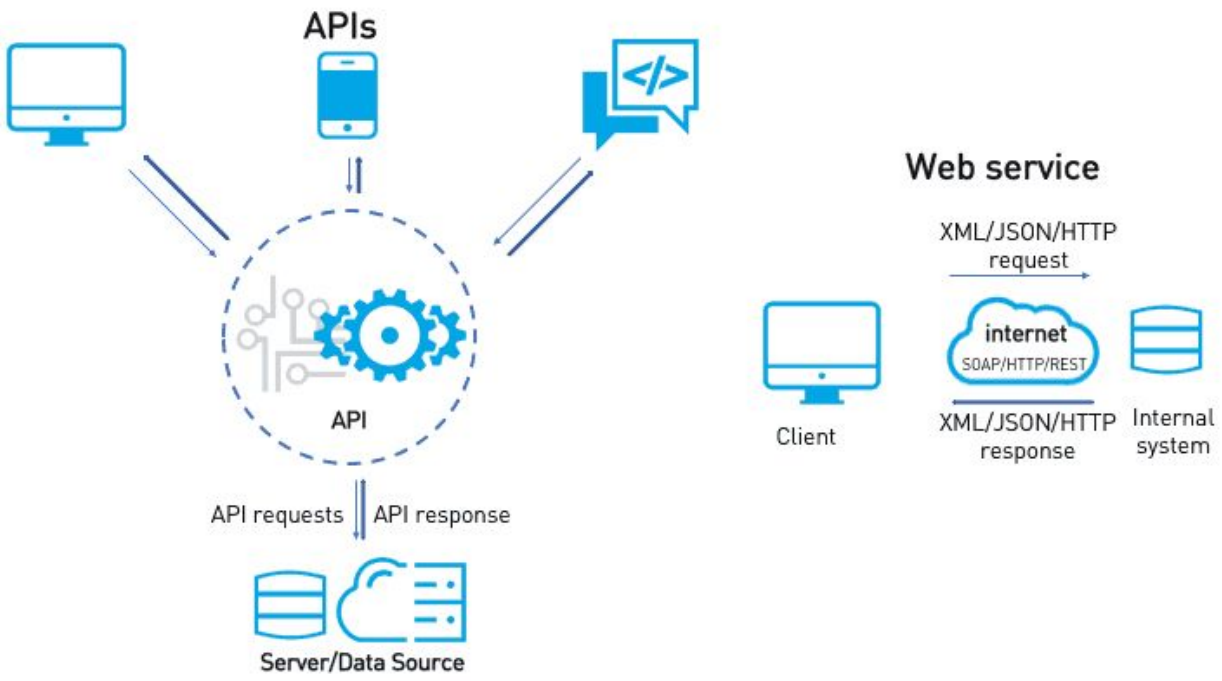
confirmed, recovered, active and death cases with the use of open data API from https://data.nepalcorona.info/api/v1/mapinfo.

In this project, the list of districts of Nepal is being stored in JSON format and is fetched from the API https://data.nepalcorona.info/api/v1/districts. While, all the stats related to each district i.e. confirmed, recovered, active and death cases are fetched from the API https://data.nepalcorona.info/api/v1/covid/summary in JSON format.

What is API?

An application programming interface (API) is a computing interface which defines interactions between multiple software intermediaries. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc. It can also provide extension mechanisms so that users can extend existing functionality in various ways and to varying degrees. An API can be entirely custom, specific to a component, or it can be designed based on an industry standard to ensure interoperability.
To simplify, an API delivers a user response to a system and sends the system's response back to a user. API lets a developer make a specific "call" or "request" in order to send or receive information. This communication is done using a programming language called "JSON." It can also be used to make a defined action such as updating or deleting data.
There are four basic request methods that can be made with API:

GET – Gathers information (Eg: Pulling all Coupon Codes)
PUT – Updates pieces of data (Eg: Updating Product pricing)
POST – Creates (Eg: Creating a new Product Category)
DELETE – Delete (Eg: Deleting a blog post)



APIs used in this project

Global Data API:

https://pomber.github.io/covid19/timeseries.json

Nepal Districts API:

https://data.nepalcorona.info/api/v1/districts

Nepal District Data API:

https://data.nepalcorona.info/api/v1/covid/summary

Nepal Interactive Map

https://pomber.github.io/covid19/timeseries.json.

What is JSON?

JSON is a lightweight text-based open standard data-interchange format. It is human readable. JSON is derived from a subset of JavaScript programming language (Standard ECMA-262 3rd Edition—December 1999). It is entirely language independent and can be used with most of the modern programming languages.

JSON is often used to serialize and transfer data over a network connection, for example between the web server and a web application. In computer science, serialization is a process to transform data structures and objects in a format suitable to be stored in a

file or memory buffer or transmitted over a network connection. Later on, this data can be retrieved. Because of the very nature of the JSON, it is useful for storing or representing semi structured data.

JSON strings are commonly stored in .json files and transmitted over the network with an application/json MIME type.

Data types

JSON supports some basic data types:

- Number: any number that's not wrapped in quotes
- String: any set of characters wrapped in quotes
- Boolean: true or false
- Array: a list of values, wrapped in square brackets
- Object: a set of key-value pairs, wrapped in curly brackets
- null: the null word, which represents an empty value

Any other data type must be serialized to a string (and then de-serialized) in order to be stored in JSON.

How is data being stored and fetched?

The data is stored in JSON in the format like this with the use of object and array:

```
{
  "Thailand": [
    {
      "date": "2020-1-22",
      "confirmed": 2,
      "deaths": 0,
      "recovered": 0
    },
    {
      "date": "2020-1-23",
      "confirmed": 3,
      "deaths": 0,
      "recovered": 0
    },
    ...
  ],
  ...
}
```

The data then can be fetched through this way:

```
fetch("https://pomber.github.io/covid19/timeseries.json")
  .then(response => response.json())
  .then(data => {
```

```
  data["Argentina"].forEach(({ date, confirmed, recovered, deaths }) =>
    console.log(`${date} active cases: ${confirmed - recovered - deaths}`)
  );
});
```

Use of JSON over Relational Database

Though JSON is used to host/represent data, it is somehow different from the traditional Relational Database model used in RDBMS systems like MySQL, SQL Server etc. Below are a few reasons why we decided to choose JSON over RDBMS.

- **Structure** : In the relational database, these are tables, which are responsible for storing data in the form of rows and columns. JSON uses objects and arrays - objects are label-value pairs and arrays are the list of values. They can be nested recursively.

- **Metadata** : In a relational database, it is a schema, which is used for storing data about the structure and type of the data to be stored and schemas are predefined, i.e. they are created at the time of creation of database and tables before you can store data. JSON also may use schema, to have a definition of the structure and type of data to represent, but it is not predefined. Most of the time it is self-describing, even if it uses a schema, it comes with much more flexibility than a schema used in relational databases. But it would be judgmental to say that it is an advantage of JSON over Relational Database. Having a predefined schema may have several benefits depending upon the data to be dealt with.

- **Retrieving data** : Relational databases use Structured Query Language, an expressive and very powerful language, based on relational algebra to fetch data from the database. JSON does not have any widely used or accepted language to query the data stored. JAQL and JSONiq are many of the query languages which mostly are work in progress to query data from JSON.

- **Sorting** : SQL does the job in case of Relational Database. In the case of JSON, since arrays are often used, in programs, arrays can be sorted.

- **Application** : There are many open-source as well as commercial Relational Database systems are available - like MySQL, POstgreSQL, SQL Server, Oracle, DB2 etc. JSON is mostly applied to programming languages. But there are also NoSQL systems. NoSQL systems use JSON format to store data. Some of the NoSQL systems that use JSON format are - MongoDB, CouchDB etc.

Implementations

Covid-19 Tracker is a dynamic website which aims on providing authentic and updated information about the coronavirus. It acts as a bridge between public and data sources including government and other concerned authorities to avoid misinformation and help educate, warn and aware people of the situation and act as a helping tool for the government to help lessen the spread.

Target Audience

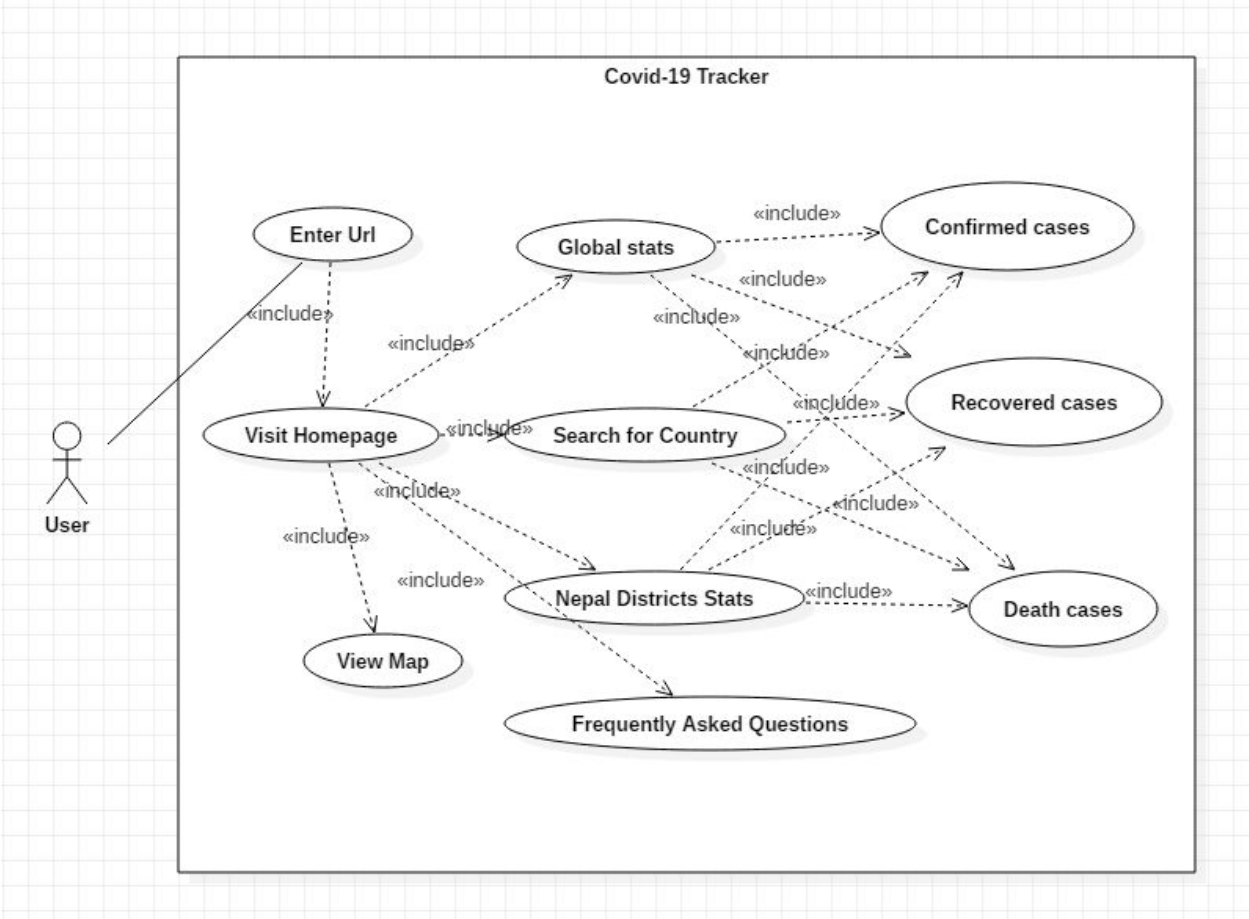
This website is mainly targeted for Nepalese individuals. This website fetches data from authorized sources of WHO, Ministry of Health and population, Nepal and makes use of APIs to provide global and local data. Since, Nepal has implemented lockdown as a measure to maintain physical distancing, it has become more than necessary to aware people and provide them with right information.

Objective

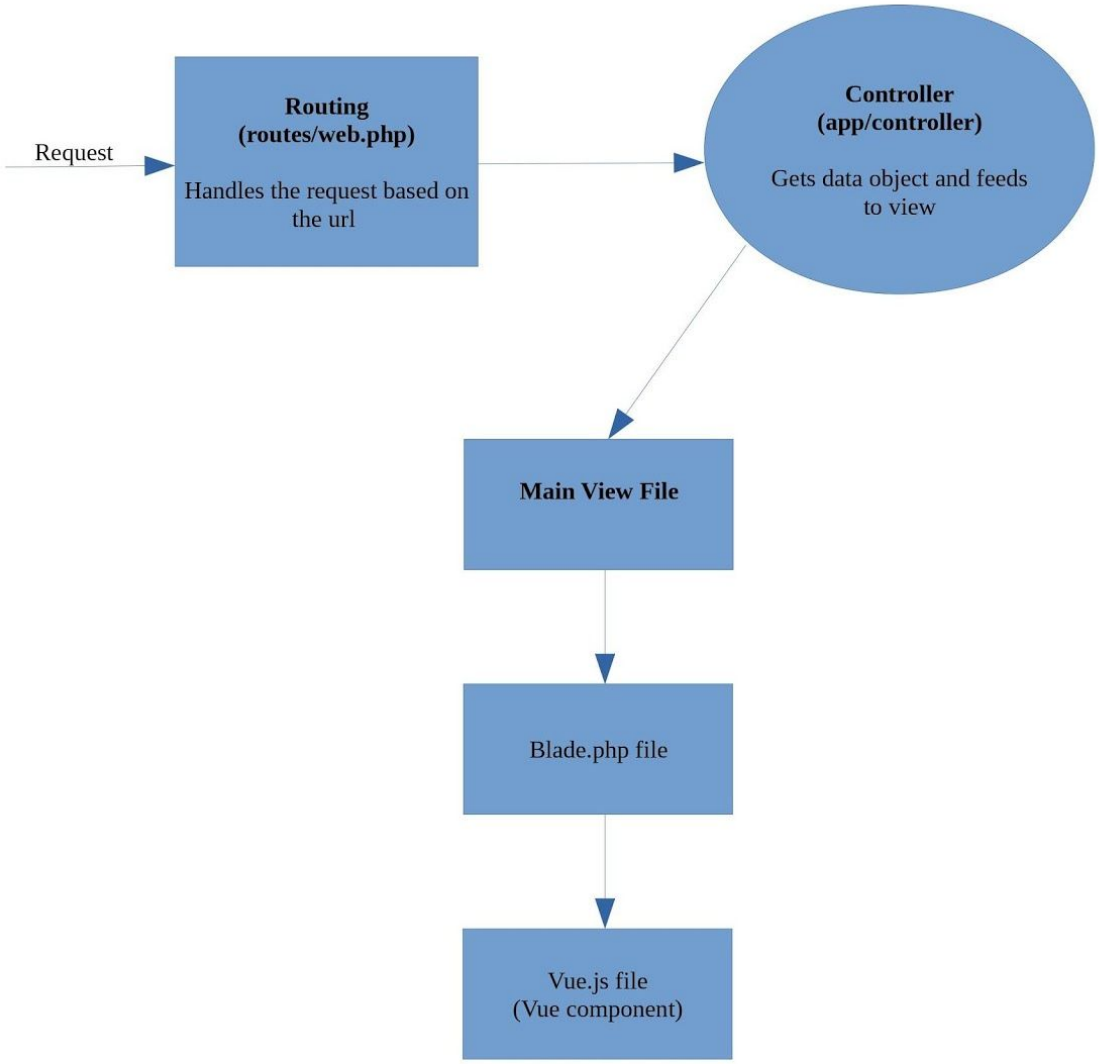
This website is designed to be user friendly with the use of interactive maps of Nepal showcasing the actual stats of confirmed, active, recovered, and death cases in each district at a glance. Further, with the updated information of each district, Nepalese citizens can stay alert about the situation around their locality and apply preventive measures accordingly. Not only that, various myths and hoaxes have been spreading online regarding cases of COVID-19, its symptoms, prevention, cure, circulation and more which has created growing fear among the public. So, in order to avoid such misinformation, the FAQs section in the website explains the details about the coronavirus, its symptoms, transmission, preventive measures and all other related information fetched directly from the authentic sources such as WHO, CDC, Ministry of Health and Population, Nepal.

Modelling

Use Case Diagram

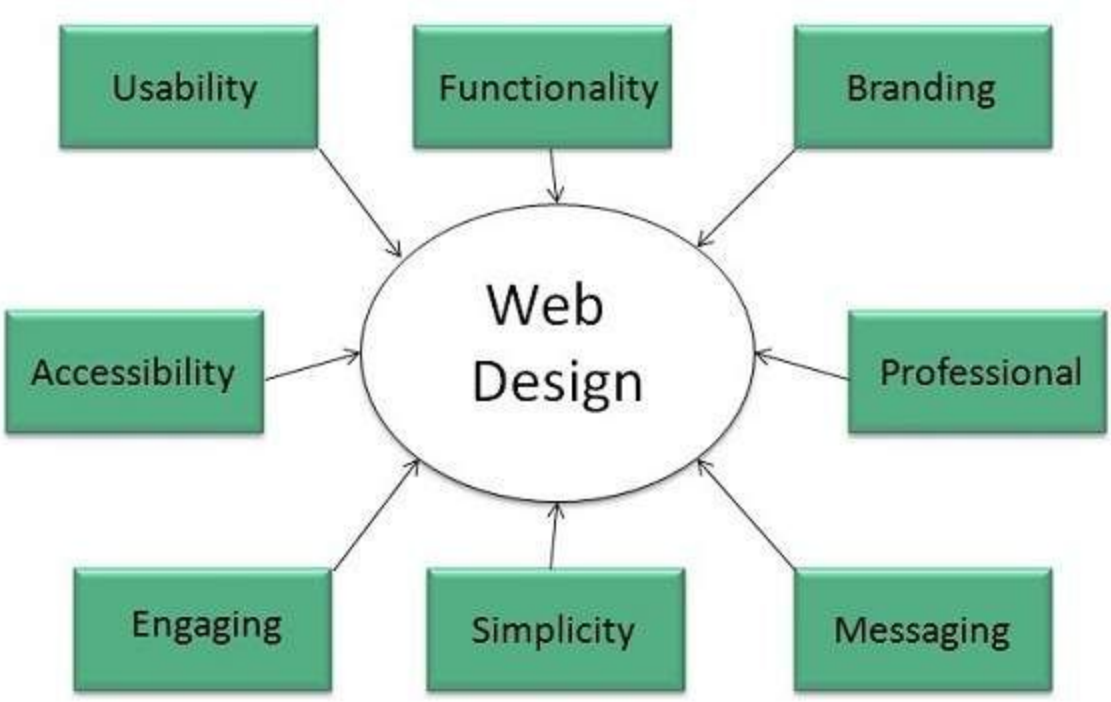


Architectural Diagram



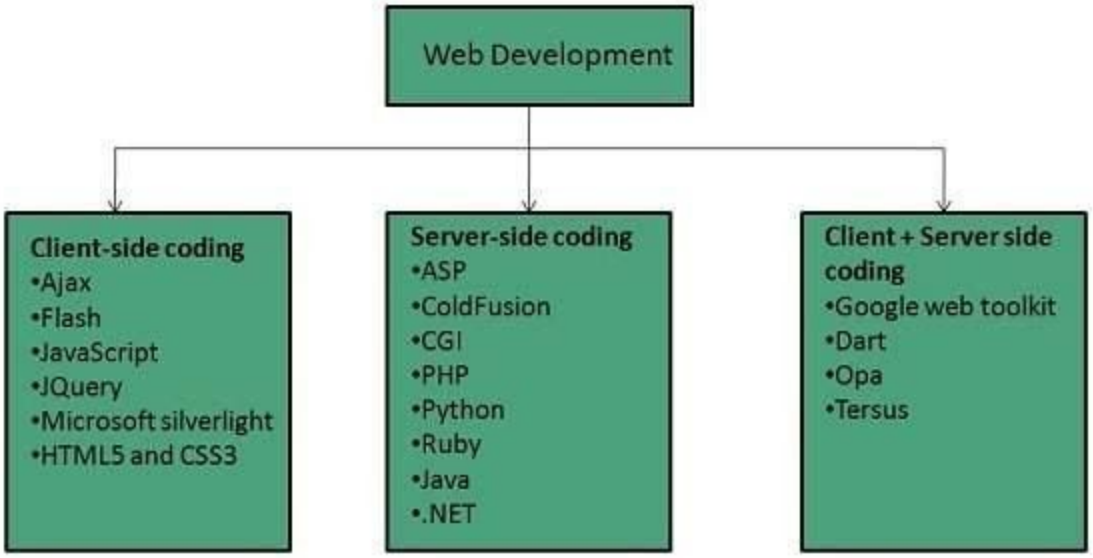
Web designing

Web designing has direct link to the visual aspect of a web site. Effective web design is necessary to communicate ideas effectively. Web designing is a subset of web development. However, these terms are used interchangeably.

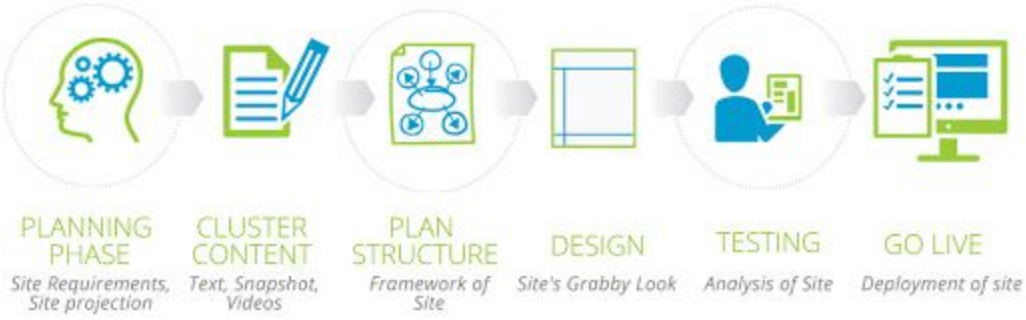


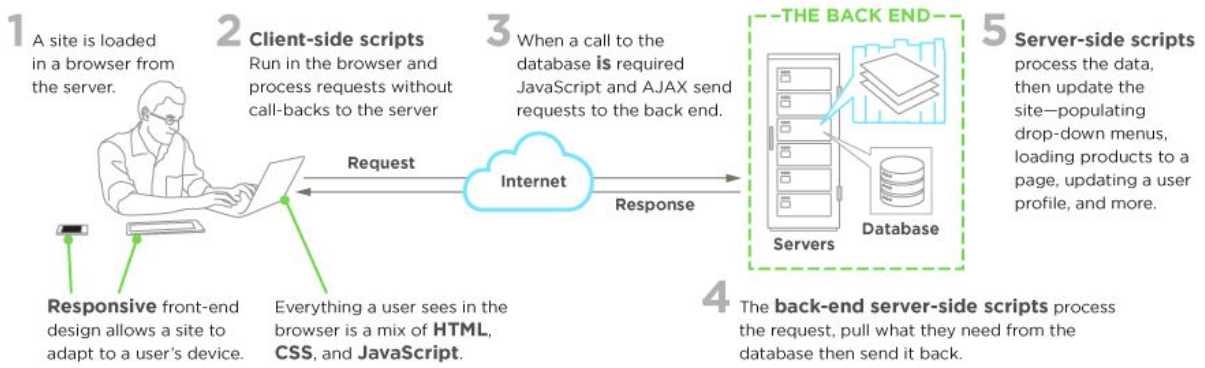
Web development

Web development broadly refers to the tasks associated with developing websites for hosting via intranet or internet. The web development process includes web design, web content development, client-side/server-side scripting and network security configuration etc.



Web Development Cycle:





Tools and Technologies used in our website:

Front End Development:

The part of a website that the user interacts with directly is termed as front end. It is also referred to as the 'client side' of the application. It includes everything that users experience directly: text colors and styles, images, graphs and tables, buttons, colors, and navigation menu. HTML, CSS, and Javascript are the languages used for Front End development. The structure, design, behavior, and content of everything seen on browser screens when websites, web applications, or mobile apps are opened up, is implemented by front End developers.

- **HTML:** HTML stands for Hyper Text Markup Language. It is used to design the front end portion of web pages using markup language. HTML is the combination of Hypertext and Markup language. Hypertext defines the link between the web pages. The markup language is used to define the text documentation within the tag which defines the structure of web pages.
- **CSS:** Cascading Style Sheets fondly referred to as CSS is a simply designed language intended to simplify the process of making web pages presentable. CSS allows you to apply styles to web pages. More importantly, CSS enables you to do this independent of the HTML that makes up each web page.
- **JavaScript:** JavaScript is a famous scripting language used to create the magic on the sites to make the site interactive for the user. It is used to enhance the functionality of a website to run cool games and web-based software.

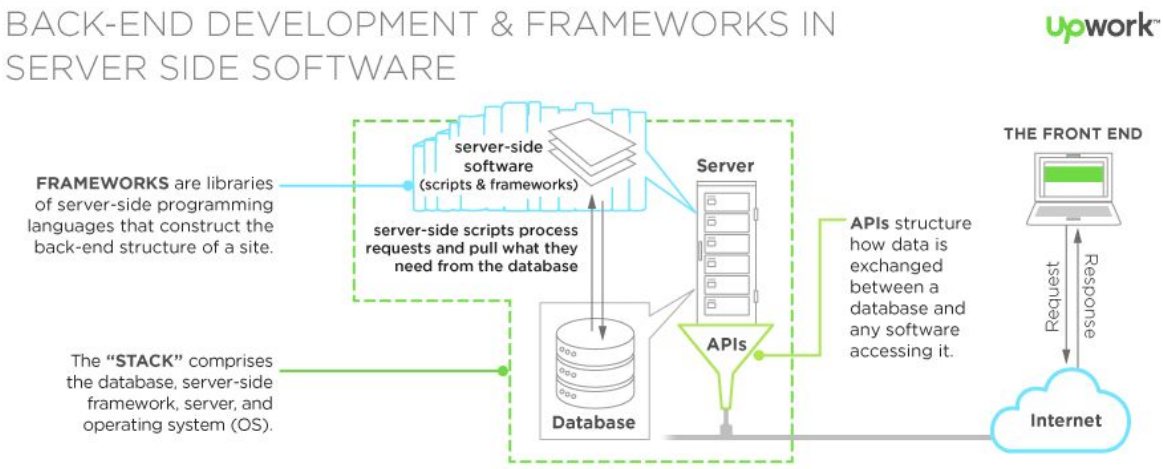
Backend Development:

Backend is the server side of the website. It stores and arranges data, and also makes sure everything on the client-side of the website works fine. It is the part of the website that you cannot see and interact with. It is the portion of software that does not come in direct contact with the users. The parts and characteristics developed by backend designers are indirectly accessed by users through a front-end application. Activities, like writing APIs, creating libraries, and working with system components without user interfaces or even systems of scientific programming, are also included in the backend.

- **PHP:** PHP is a server-side scripting language designed specifically for web development. PHP is cross-platform compatible and is known for its portability as it can run on any operating System and Windows environments. The most common are XAMPP (Windows, Apache Server, MySQL, Perl, and PHP) and LAMP (Linux, Apache, MySQL, PHP). As PHP is platform-independent, it's very easy to integrate with various databases and other technologies without re-implementation. It effectively saves a lot of energy, time and money.
  PHP is known for its flexibility and embedded nature as it can be well integrated with HTML, XML, Javascript and many more. It supports fast and efficient performance for websites.

Frameworks used in our website:

- **SASS:**
  It is the most reliable, mature and robust CSS extension language. It is used to extend the functionality of an existing CSS of a site including everything from variables, inheritance, and nesting with ease.
- **Vue.js:**
  Vue.js is a JavaScript library for building web interfaces using the MVVM (Model-View-ViewModel) architecture pattern.
- **Laravel:**
  Laravel is a prominent member of a new generation of web frameworks. It is a free, open-source PHP web framework and intended for the development of web applications following the MVC model.

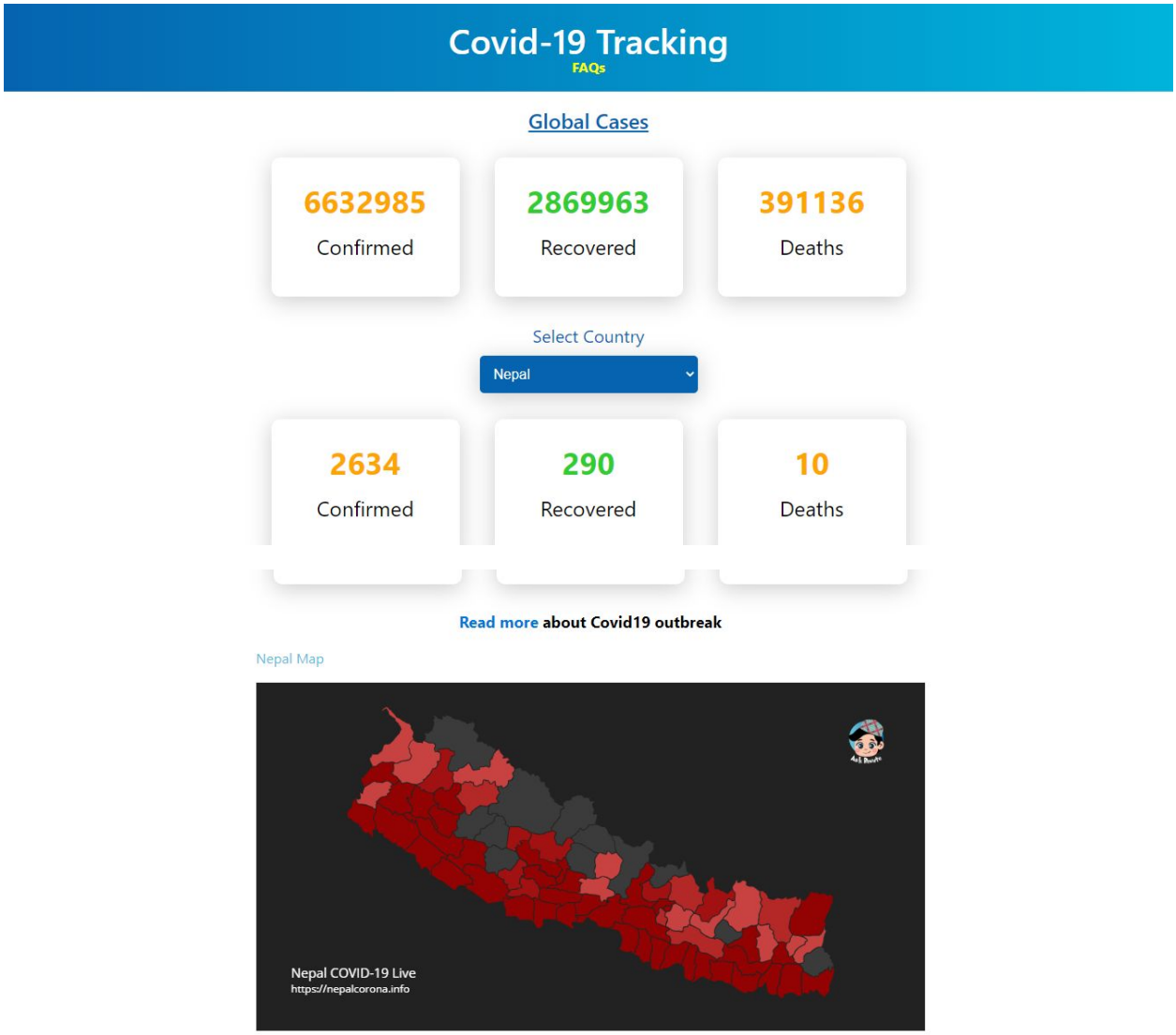


Web Hosting

Since, this website is based on Laravel Framework, it is a cross-platform compatible website which means that this website can easily be hosted on Linux based Servers, as well as Microsoft Windows based servers. Our website doesn't require any database. Therefore, our website will be easy to deploy without the hassle of configuring the database on the server.

Our website, however, uses Vue.Js framework which requires Vue supported and JavaScript enabled browsers to render. Therefore, this is the only limitation of our website. Though, modern browsers like, Google Chrome, Firefox, Opera and Microsoft Edge browsers have native support for Vue.Js. Therefore, for most of the users, viewing this website won't be a problem and won't require any special software.

Interface


Covid-19 Tracking
FAQs
Global Cases
6632985
Confirmed
2869963
Recovered
391136
Deaths
Select Country
Nepal
2634
Confirmed
290
Recovered
10
Deaths
Read more about Covid19 outbreak
Nepal Map
Nepal COVID-19 Live
https://nepalcorona.info

Nepal District Cases

Division	Confirmed	Recovered	Death
Panchthar	1	1	0
Ilam	0	0	0
Jhapa	120	101	0
Morang	11	11	0
Sunsari	11	10	0
Terhathum	1	1	0
Bhojpur	1	0	0
Sankhuwasabha	2	2	0

Conclusion

Since, Covid-19 Tracker is a dynamic website which aims on providing authentic and updated information about the coronavirus. It acts as a bridge between public and data sources including government and other concerned authorities to avoid misinformation and help educate, warn and aware people of the situation and act as a helping tool for the government to help lessen the spread. We can further include various other features in our website such as self-assessment form, list of hospitals, and also contact tracking to make the website more helpful for the general public. We can also turn this website into mobile-app for better user experience.

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