In earlier days portfolio websites were supposed to be only for an acclaimed artist or for big names in the industry. But over the period of time, the availability of the internet is not an issue as it used to be. Every day you see a lot of new technologies are being unveiled for example – Recently we get to hear about the 5G network is being tested successfully and many more. One is considered to be behind the time if he is not an active user of the internet.

And in this era of the Internet, there is no bigger platform than websites to showcase your work, your achievements, and your goals, etc.

There are several benefits of having a portfolio website:

Portfolios are the best and unique way to showcase your work and put you ahead in the race. You may mention your past project which you are proud of. You may also include information about your case studies. You may also put your past experiences, upcoming project and what you are planning for your future. You can also add the testimonials from your previous clients and you can show how satisfied they are from your work. By doing this the clients will get a better insight into you and they will come to know about the type and quality of the work that you do.

Also, if you have an online presence then it becomes very easy for your nearby clients to approach you, so it will increase your client base and you will get more work.

Overall, it helps to make your own identity and it also helps to build your own brand.

## Individuals who can consider to have a portfolio website are:

* Graphic Designers
* Website Designers
* Website Developers
* Application Developers
* Interior Designers
* Photographers

Now that we have understood the importance of creating a portfolio website let’s have a look at the technologies and tools which will be used in this particular project for making it more reliable, efficient and easy to understand as well as develop.

This project makes use of virtualization technology using Docker

From the name Virtualization, it is very clear that it has something to do with virtuality. In the context of this project, virtualization is basically deploying/creating a number of virtual machines/applications on a single operating system.

It utilizes the host systems hardware in the most efficient way by creating multiple virtual instances on a single machine.

|  |  |
| --- | --- |
| BEFORE VIRTUALIZATION | AFTER VIRTUALIZATION |
| **1**. Only one operating system was able to run on the entire hardware  **2**. Wastage of resources  **3**. Very difficult and time-consuming to transfer the same configuration on a newer machine | **1**. Multiple instances of an Operating system can run on a single hardware  **2**. Minimal wastage of resources  **3**. Very easy and less time consuming to transfer it to another machine |

There are so many virtual technologies available in the market but in this project, we have made the use of Docker for virtualization. This section explains why docker is chosen over other technologies. We will compare it with other widely used technology which is Virtual Machine.

## DOCKER Vs. VIRTUAL MACHINE (Preeth *et al.*, 2016)

**Why Docker?**

Docker was introduced to make the developer’s life easier. Once in a while, every developer may encounter a situation in which the code application works absolutely fine and his machine or in the development environment but it fails to work in the production environment or in somebody else’s machine, and this was a huge problem.

The reason for this problem is, there are various dependencies to be considered like Operating systems, Libraries, tools, memory, space, etc. While developing a software developer will include all the required dependencies on his machine and application will work fine, but there is no guaranty that it will work the way it should be in some other environment because that environment might not be configured for that particular application. So here comes the docker into the picture and solves the problem.

**What is Docker?**

Docker is an open-source platform that allows you to develop, run, transfer and deploy packages called containers on various virtual machines with ease. Docker doesn’t create a new operating system on a host OS like Virtual Machine does instead it creates packages called containers and they can be transferred and deploy further to any other OS. While developing an application, the developer will create one container and inputs all the dependencies, libraries, etc into it which can be used on any environment independently. Containers in docker are unknown to each other i.e they are isolated from each other so they are well secured. Therefore multiple containers can be run simultaneously but independently from each other sharing the same kernel. In this way, the docker avoids having a separate operating system for each application like Virtual Machine.

|  |  |
| --- | --- |
| **CONTAINER-BASED VM - DOCKER** | **HYPERVISOR-BASED VM** |
| Performance of the container-based virtualization is enhanced because it shares the kernel between multiple instances | Performance is not very optimum because it uses the same hardware as the host hardware uses |
| Easy to distribute or transfer to another machine | Inconvenient and needs lots of resources for transformation |
| Provides isolation between the containers as a security feature | Hard to obtain isolation |
| It is more resource efficient | It is less resource efficient |

## DOMAIN NAME SYSTEM (DNS)

DNS is basically used for resolving the URL (Uniform Resource Locator) to IP Addresses. It acts as a phonebook for the content available on the internet. The way humans have a phonebook application in their smartphones for storing the contacts of their beloved ones, DNS also behaves in the same way. Computer doesn't work like human do i.e. computers doesn’t understand the names and words it only understands numbers. There are millions of sites available on the internet and millions of IP addresses are associated with that of uniformity. IP addresses are consisting of numbers and dot patterns. So, it is highly impossible for humans to remember the IP addresses for each and every website. Therefore, the DNS system is there. It behaves as the bridge between humans and computers to serve human needs and reduces human efforts.

When we type some URL (https://isaurabh.me) in the browser, to serve the requesting computer has to convert it to a computer-readable format IP address (35.228.90.221), this is the job of DNS. …. What is DNS (Domain name system - Wikipedia, Cloudflare)

**WORKING OF DNS**

There are 4 entities involved in resolving the single domain.

* **DNS Recursive Resolver**
* **DNS Root Nameserver**
* **DNS TLD Nameserver**
* **Authoritative Nameserver**

We won’t get into the much details of each entity, but we will briefly see what steps are involved in resolving the domain.

1. When the user enters the address (www.isaurabh.me) he wants to visit the browser. It first received at the DNS recursive resolver server
2. Then resolver forwards this query to the DNS root nameserver.
3. If DNS root nameserver doesn’t have the information it will respond back with the address of Top-Level Domain (TLD) DNS server which has information about the requested URL. Int this case it will reply with the address of .me TLD
4. Then resolver makes request to the TLD which is received by the ROOT name server and asks for the IP address
5. If TLD Don’t have the information about the IP address which resolver is asking about it will reply back with address of Authoritative name server which contains all the information about the IP addresses and is the final authoritative name server
6. Then the request is forwarded to the Authorative name server by the resolver and resolver responds back with the IP addresses of the requested domain name in this case isaurabh.me
7. Further, on receiving the IP address at resolver, it tells the computer the IP address of requested URL and then computer can retrieve the webpage from the requested site
8. Also, resolver stores the IP address of requested URL in its cache for avoiding the all steps discussed above for the same domain

## HTTP, HTTPS, SSL

Hypertext Transfer Protocol is probably the most widely used protocol in the world today. HTTP is the protocol that is used for viewing web pages on the internet so when you type in a web address like isaurabh.me HTTP is automatically added at the beginning of the web address and this indicates that you were now using HTTP. Now, the exchange of data between the server and client in HTTP protocol takes place in clear plain text and this is highly insecure. Because the transferring of data is takes place over the public internet and anyone (Hacker) who is aware of the data transmission, can get access to your data and he can still your information like Your name, address, contact details, etc. So due to lack of security, the HTTPS was introduced. HTTPS stands for Secure Hypertext Transfer Protocol and this is HTTP with a security feature. In this protocol, all the data transmission takes place in a secure environment i.e. all the data being transferred is encrypted by a Public key. So when data is transmitted it is encrypted and unreadable to the hacker so even if he gets access to the data it is of no use to the hacker. This is highly recommended for websites where you are supposed to enter your private details example: Shopping websites, Banking website, etc

**How SSL Works?**

SSL or secure sockets layer is a protocol that used to ensure security on the internet. It uses public-key encryption to secure data. When a computer connects to a website that uses SSL the computer's web browser will ask the website to identify itself, then the webserver will send the computer a copy of its SSL certificate.SSL certificate is a small digital certificate that is used to authenticate the identity of a website. Basically it's used to let your computer know that the website you're visiting is trustworthy so then the computer's browser will check to make sure that it trusts the certificate and if it does, it will send message to the webserver, then after the webserver will respond back with an acknowledgment so SSL session can proceed. Then after all these steps are complete, encrypted data can now be exchanged between your computer and the webserver.