Chapter-3

Methodology

Chapter 3 provides the detailed explanation of tools and technologies used for the development of this project.

**HTML:**

Computer programmes use Hypertext Markup Language (HTML) to tell browsers how to build the structure of web pages. The ability of billions of people to read and understand web pages depends on this programming language. Displaying text, establishing picture styles, providing search engines with information about the website's content, and identifying specific page components are all aspects within HTML's purview. Contents such as text, photos, and videos can be structured for online display using HTML, a textual markup language.

Web pages can not exist without HTML, which also makes them discoverable online via text, graphics, and search engines. Many people use the phrase "most basic building block" to explain it. It is a component of the websites that we encounter when we navigate, in addition to JavaScript and CSS.

HTML, particularly its most recent iteration, is a potent programming language that can be employed for a variety of purposes related to data and web browsing. HTML is employed to generate web pages, web documents, and internet navigation. HTML5 enhances these capabilities by incorporating more sophisticated APIs, enabling client-side storage through local Storage and Index DB, supporting data input, simplifying offline application usage through caching, and even enabling the development of games. HTML code commands are composed in simple text files that terminate with the extension ".html." The text components that constitute an HTML document can be read and loaded by a web browser. Elements, which are organised in a downward tree structure and characterise the functionality of HTML markup, are responsible for its functionality (builtin, 2022).

**Advantages** (Geeksforgeeks, 2022)**:**

* HTML, a markup language, is employed by numerous individuals to assist in the development of a website's framework.
* It is straightforward to comprehend.
* The HTML language is compatible with all types of computers.
* HTML is compact and renders rapidly.
* The programme cache feature enables the storage of massive files.
* The software is included with every computer, eliminating the need to purchase any additional software.

**CSS:** CSS, or "Cascading Style Sheets Language," is a method for styling items that are composed in a markup language such as HTML. It maintains a clear distinction between the site's information and its visual appearance. HTML and CSS are inextricably linked, as HTML is responsible for the functionality of a website, while CSS is responsible for its aesthetic appeal. The World Wide Web Consortium (W3C) developed CSS in 1996 for a straightforward purpose. HTML elements were not intended to contain identifiers that would assist in formatting the page. The sole responsibility was to compose the code for the website.

At that time, HTML version 3.2 introduced elements such as , which caused significant confusion for web writers. The process of rewriting the code was time-consuming, agonizing, and expensive due to the numerous styles, fonts, and backgrounds that are distinct colours on web pages. Therefore, CSS was implemented by the W3C to resolve the matter.   
Despite the fact that CSS is not mandatory, it is unlikely that you would wish to view a website that is solely composed of HTML components, as it would appear overly simplistic (hostinger, 2023).

**Advantages of CSS** (Ellow, 2024)**:**

1. Global Style and Consistency

2. Updates are more rapid and simpler to monitor.

3. Accelerating processing periods and saving time

4. Additional design options and responsive design

5. Friendly to SEO

6. Pages that are straightforward to navigate and print

7. Compatibility with a variety of devices and platform independence

**JavaScript’s:**

JavaScript (js), a straightforward object-oriented programming language, is employed by numerous websites to incorporate scripts into their pages. It is a comprehensive programming language that is interpreted and can be employed to create dynamically interactive websites by incorporating it into an HTML page. It was initially published in 1995 to enable Netscape Navigator users to incorporate programmes into web pages. Since that time, it has been implemented by all graphical computer browsers. Users have the ability to develop contemporary web applications that enable them to communicate directly with one another without the need to refresh the page. In numerous applications, traditional websites employ JavaScript to simplify and enhance their interactivity. The computer language Java and JavaScript are incompatible. Java was gaining popularity in the market at the time the name was suggested and given. Online browsers, MySQL and CouchDB are two databases that employ JavaScript as their query and scripting language. (Javatpoint, 2023).

**Features of JavaScript:**

JavaScript is capable of performing the following tasks:

1. JavaScript is compatible with all main web browsers due to their integrated processing environments.
2. The syntax and structure of JavaScript are identical to those of the computer language C.
3. JavaScript is a weakly typed language, which implies that specific types are automatically cast in accordance with the action.
4. JavaScript and other object-oriented programming languages enable the transfer of code from one class to another through the use of prototypes, rather than classes.
5. It is a language that is easily comprehensible.
6. The language is concerned with case.
7. JavaScript is compatible with a variety of operating systems, including macOS and Windows.
8. It offers consumers a high degree of control over their web browsers.

**JavaScript Advantages** (softjourn, 2023)**:**

1. Security on the client side

2. Not as much overhead

3. By Nature Fast

4. It's easy to learn and use JavaScript.

5. How popular something is

6. Led to less server load

**Python**: Python is a computer language that is employed to develop software and websites, execute programmes automatically, and analyse data. There is no specific problem that Python is intended to address; it is an all-purpose language. It is employed to produce a variety of programmers. It is a widely used computer language that is simple to learn and can be applied to a variety of applications. Python is frequently employed to develop software and websites, automate tasks, analyse data, and present data visually. Python has been employed by numerous individuals who are not programmers, such as accountants and scientists, for routine tasks such as organising finances, due to its ease of learning.

In his book Python for Everyonebody, Charles R. Severance asserts that "programming is an extremely creative and rewarding endeavour." Severance instructs students at the University of Michigan and on Coursera. "You might write programmes for many reasons, from making your living to solving a challenging data analysis problem to having fun to helping someone else solve a problem." (Cousera, 2021).

**Advantages/Benefits of Python** (Invensis, 2022)**:**

**1. Presence of Third Party Modules:**

The Python Package Index (PyPI) is a comprehensive collection of third-party modules that enables Python to communicate with the majority of other programming languages and tools.

**2. Extensive Support Libraries:**

Python boasts an extensive standard library that includes interfaces for string processes, web services tools, operating systems, and internet protocols. The standard library already includes scripting for a significant number of common programming tasks. This significantly simplifies the process of coding.

**3. Open Source and Community Development:**

Python has been granted an open source licence by the Open Source Initiative (OSI) for the purpose of its development. After that, everyone can use and distribute it, even for business reasons.

The community is also in the position of improving the code because they work on it together at meetings, on email lists, and by providing many modules.

**4. Learning Ease and Support Available:**

Python is an excellent language for learning how to write code because it is simple and easy to understand. Code style standards (PEP 8) are a set of rules that help you handle your code better. A group of working developers and a large number of users have built up a huge library of resources on the internet that have helped the language continue to be used and grow.

**5. User-friendly Data Structures:**

Python has structures for data like sets and lists that can be used to make data structures as rapidly as possible while the programmed is running. In addition to this, Python helps you use "changeable high-level data typing," which means you do not need to write as much support code.

**Django:** Django is a Python web platform that is both open-source and free. Django employs the MVC-MVT architecture pattern to enable users to create websites that are secure, hygienic, and effortless to maintain. It is distinguished from other frameworks by its rapidity, abundance of packages, safety, extensibility, and adaptability.

This framework provides a robust, production-ready automatic management interface that can be utilized to administer the content of your website. It generates a rapid, model-centered interface by extracting metadata from the models, eliminating the necessity of manually adding data.   
Additionally, Django provides support for multiple languages, which can be employed to translate text between them. It also identifies dates, times, numerals, and time zones that are formatted in a specific manner. (Netguru, 2024).

**Advantages of Django:**

**1. Better API**

The Python Django REST Framework tool is designed to facilitate the addition and modification of modules, making it suitable for both basic and complex APIs (Pythongeeks, 2024). It is versatile and includes a built-in browser for testing Application Programming Interface Endpoints.

**2. For Search Engine Optimization**

Companies invest a significant amount of money to enhance their SEO ranking on search engines. Numerous variables contribute to the enhancement of a website's ranking. Keywords are the most critical factor in search engine optimisation, following page launch time. Python is an SEO-friendly framework due to the fact that the majority of its source code is readable by humans. It is simpler for developers to benefit from SEO despite their lack of knowledge about it, as Django includes sitemaps.

**3. CDN**

Many developers who work on large websites that receive a significant number of visitors employ Content Delivery Networks. However, Django is most renowned for its Content Delivery Network Connectivity.

**4. Long-Lasting  Framework**

It was accessible to all. Despite the fact that Django is still in the process of being developed, companies that have implemented it have never transitioned to another framework in search of a superior one.

**5. Ideal for ML Projects**

Python is frequently the primary programming language employed by machine learning scientists. Django's Python framework simplifies the implementation of machine learning applications and models. With the Gunicorn Web Server and Django REST Framework, it is simpler to establish a RESTful API for Machine Learning applications and solutions that are compatible with Python.

**Agile Methodology** (Techtarget, 2023)**:**

Agile is a method of developing software that anticipates the necessity for flexibility and practicality in the delivery of the final product to the consumer. In order to implement agile software development, which emphasises the provision of clean versions of individual software components rather than the entire application, numerous organisations must modify their operational procedures.

Agile offers the advantage of enabling teams to operate in environments that are perpetually evolving while simultaneously emphasising the rapid delivery of business value. Agile fosters collaboration among teams and guarantees that each member comprehends their role in the process. This enhances the organization's overall efficiency. Finally, organisations that implement Agile software development can guarantee that their products are of high quality due to the continuous testing that is conducted. This enables you to notify teams of any potential issues and make modifications as necessary.

Agile is now the primary development method employed by the majority of organisations, as opposed to waterfall. Nevertheless, DevOps is gaining traction and has the potential to supplant or even replace agile.

**The benefits of Agile** (Wrike, 2024)**:**

**1. Satisfied customers**

Agile teams demonstrate their commitment to their customers' perspectives and maintain open communication by allowing them to participate in the development process. Stakeholders desire to be involved in each phase of a project in order to provide feedback and ensure that the final product fulfils their requirements. It is conceivable that these customized deliverables will enhance the overall user experience and encourage consumers to return.

**2. Improved quality**

Agile methodologies employ iterative project management, which involves the improvement of processes with each iteration of an interval. Agile's fundamental principle is that it is imperative to consistently evaluate and enhance the quality of one's work. This facilitates the production of superior products.

**3. Adaptability**

Agile's fundamental principle is adaptability. Agile teams can effortlessly adjust to change, which can occur at any moment. It is effortless for teams to revisit their plans and adjust their priorities to align with new objectives, as project deliverables are not inflexible. Flexibility enables teams to effectively address the evolving requirements of their clients.

**4. Predictability**

Agile teams operate in brief periods of time, which are occasionally referred to as "sprints." Project managers can easily monitor the team's progress and ensure that they have the necessary resources by observing these predetermined intervals, such as two weeks. It is also simpler to estimate the cost of a task over a shorter period of time than over a longer period.

**5. Reduced risk**

Progress is routinely monitored by developers during iterations. This provides them with a more comprehensive understanding of the undertaking and enables them to promptly identify potential issues. It is possible to address these minor issues prior to their escalation. This will set up an effective way to lower risks and increase the project's chances of success.

**6. Better communication**

Agile teams prioritise constant engagement and face-to-face communication. Every day, they typically conduct discussions to ensure that all team members are aligned and working towards the same objectives. Regular communication is maintained to prevent any misunderstandings that could impede their progress towards their objectives.

**Justification:**

The main reasons I selected Python and Django for web programming were their reliability, speed, and simplicity of use. Python is an outstanding choice for writers of all skill levels due to its user-friendly syntax and language. In this way, maintenance and development are more readily skillful. Django, a high-level Python web platform, is equipped with a variety of practical features, including an admin interface, authentication, and object relationship management, in accordance with the "batteries-included" concept. This expedites and facilitates the process of development. Django is founded on three important principles: security, scalability, and the DRY concept. This ensures that applications are scalable, user-friendly, and secure. Python and Django are the most effective languages for developing high-quality, stable web applications due to their intuitive and potent interfaces.

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