TASKS:

CHAPTER 2 (Deadline May, 31, 2024)

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Conceptual Model of the Study

Operational Definition of Terms

CHAPTER 3 (Deadline June 11, 2024)

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Hierarchy chart for admin Module

Data Flow Diagram

Data Flow Diagram level 1

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Operation and Testing Procedure (LINGAL)

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Chapter 2

Conceptual Framework

Review of Related Literature

Web-Based-System

According to Senthil.k-Wp. (2024), A web-based system is an application that is accessed via HTTP. The term web-based is usually used to describe applications that run in a web browser. It can, though, also be used to describe applications that have a very small component of the solution loaded on the client's PC. The host server for a web-based system could be local, or it could be accessed via the internet.

The researchers proposed a web based monitoring system because it is easy to access from both factory workers and human resource' employees compared to traditional desktop apps that still need to be download

Web-Based-System Benefits

In the article by Technologies, O. (2024), Web-based systems, also known as cloud-based or online software, have become increasingly popular in recent years. Unlike traditional

software, which is installed on individual devices and can only be used on that device, web-based systems can be accessed 24/7 online using a web browser. This allows users to access the software from any location and device. In this article, it will explore some of the benefits of using web-based systems.

- 24/7 Accessibility: Web-based systems can be accessed round-the-clock as long as an internet connection is available. In the current environment, where remote accessibility is a benefit, web-based systems allow customers and employees to access the system outside regular working hours and locations.
- Cross-platform Compatibility: Web-based systems are designed to be compatible with multiple hardware and operating systems, with user interfaces that can adapt to the device in use. User data is stored on remote cloud-based servers, which can be accessed anytime. On the other hand, traditional software typically does not support multiple operating systems. It may have specific system requirements for installation, with data storage limited to individual PCs.
- Scalability: Web-based systems can easily adapt to changing business requirements. This allows organizations to quickly scale up or down as their needs change without investing in new hardware or software. Traditional software systems need to roll out the upgrades to each user. The user has to install the upgrade on all the required PCs, which may incur more costs and require more installation time.
- Additional Security Layers: Web-based software stores data on servers with multiple layers of security and is automatically updated with the latest security patches and antivirus upgrades. This provides a higher level of protection compared to traditional software.

- Minimal Disruption: Web-based systems undergo upgrades and maintenance at the server level, minimizing disruption to end users.
- Collaborative: Web-based systems allow team members to collaborate and manage system information in real time, regardless of the location. Many web-based applications also facilitate version control, allowing users to easily track changes.
- Increased Productivity: Web systems may offer automated processes that help in delivering quantifiable business benefits over traditional desktop software. Centralized data storage can also enhance productivity and efficiency by allowing users to easily access and share data.

Web-Based Monitoring System

According to Mleke & Dida (2020), Web Based Monitoring and evaluation systems are used by organizations or governments to measure, track progress, and evaluate the outcomes of projects. Organizations can improve their performance, effectiveness, and achieve results in project success by strengthening their monitoring and evaluation systems. Moreover, various studies reveal the need for information and communication technology systems in monitoring and evaluation activities.

Online Recruitment

According to A, E. T. J. (2021). E -recruitment, also known as online recruitment, is the practice of utilizing technology and in particular web-based means for tasks which involves finding, attracting, assessing, interviewing and hiring new personnel. It is intended to make the process involved more efficient and effective, as well as less costly. Online recruitment can reach

a larger pool of potential employees and facilitate the selection process. She pointed out that the Effectiveness of the Internet as a Recruitment Source, the author stipulated that the internet as a recruitment source is an effective tool to use in reaching target markets when compared to more traditional recruitment sources.

Based on the study by Fachrizal, M. R., Radliya, N. R., & Manik, A. (2019), e-recruitment is an electronic-based system that significantly enhances the effectiveness of the Human Resource Department. The increasing number of applicants in many organizations and companies complicates the management of applicant data, resulting in a prolonged recruitment process and the potential hiring of employees who do not meet the desired competencies. By designing and implementing an e-recruitment system, these issues can be mitigated. The use of a profile matching method within the system further aids in selecting applicants who best fit the company's requirements.

In addition to Sima, V., Gheorghe, I. G., Subić, J., & Nancu, D. (2020). Online recruitment platforms allow better matching between the needs of the employers and the skills of the applicants to find suitable people for certain managerial functions. IT’s influences on communication are also generating implications for marketing managers dealing with increasingly demanded consumers in today’s digital environment.

Inclusive – Talent – Management

In a Study of Kaliannan, Darmanlinggam, and Doromsamy (2024) they pointed out the growing value of Inclusive Talent Development (ITD) within Talent Management Systems (TMS) they Highlight that Inclusive Talent Development (ITD) is a Crucial for the skill, talent growth

and Organizational performance. IDT practices lead to Competitive advantage, particularly when analyzed through the Resource-Based View and VRIO model. Thus, the approach focuses on developing all employees, not just top or elite talent, thereby reducing skills mismatched and enhancing overall organizational capabilities.

Talent Management Benefits

In Study of Li Qi, Voon, and Jia Qi, (2021) on their examination in Government – Linked Companies or GLCs in Malaysia, they make point of the impact of Talent Management through employees engagement levels, highlighting various challenges such as bureaucratic interference, ineffective performance management systems(PMS), Talent retention obstacle, and talent shortages, *with proposed strategic intervention to address these issue and elevate employee engagement, fostering organizational growth and their performance.*

- To state these challenges, Li Qi, Voon and Jia Qi, Cheong Provide and Recommend Strategic Interventions for GLCs in Malaysia
- Establishing Clear Authority and Hierarchical Management: They proposed a defined management system to mitigate bureaucratic interference, following the Bureaucracy Theory of Mac's Weber.
- Fair Performance Management System: Li Qi Voon, and Jia Qi Ensure Fairness in PMS to pin out inefficiencies and promote equity in evaluation and compensation.
- Understanding Workforce Needed: they enhance Maslow hierarchy of needs to identify and meet employee needs, thereby enhancing job satisfaction and retaining qualified talents

- Retaining and Acquiring the Right Talent: They Employed the Model 4B's to minimize talent inefficiencies by acquiring suitable or capable talent and ensuring their commitment.To their roles

Strategic Talent Management System

Based on Chen, Lee, and Ahlstrom (2019), The Strategic Talent Management System is a critical situation for developing and retaining talent, which helps organizations or a company compete effectively. By focusing investment on a talented group, STMS align employees' job interpretation in terms of employee calling. This approach fosters excellence in employee behaviors such as entrepreneurship and voice, which enhances organizational performance.Study shows or provides observational evidence that worker calling acts as a key mediator in developing these beneficial work behaviors, Picturing the importance of STMS in improving or refined talent management strategies and build a competitive edge for organizations.

Human Resource Tools in Hiring Process

According to Boiko, Volianska-Savchuk, Bazaliyska, and Zelena Published in (2021) 11th International Conference on Advanced Computer Information Technologies (ACIT) They emphasize the Crucial role of modernized HR equipment or tools in enhancing the HR Hiring process. The study shows the necessity of employing recruitment services and proposes a scheme to improve recruitment practices through the system of smart recruiting methodologies. By applying advanced and modernized HR tools, the authors establish criteria for choosing the

candidate search sources and develop a comprehensive set of specific skill sets required for HR positions within organizations. Particularly, the introduction of a smart recruitment evaluation system enables the ranking of candidates based on a calculation of the ratio between alternative and ideal HR criteria, using multi criterion competent analysis. This emphasis on leveraging advanced HR tools underscores their potential in facilitating more efficient and effective recruitment practices, contributing to centralized hiring processes and improved organizational results.

Generating Instant Feedback

According to Jia, Qinjin et al. (2022), timely feedback is critical for academic success, yet traditional methods often fall short due to resource limitations. To address this, automated feedback systems have emerged, spanning various educational tasks. However, research on automated feedback for student project reports remains limited. In their study, Jia, Qinjin et al. introduce "Insta-Reviewer," a data-driven system utilizing advanced natural language processing (NLP) models to provide instant feedback on project reports. Their research demonstrates near-human performance in generating feedback, highlighting the potential of automated systems to enhance learning outcomes.

Performance management System

Based on Vainieri, M., Noto, G., Ferre, F., & Rosella, L. C. (2020) Consistently practice all elements and measure the performance management system. Through a survey approach the study evaluated how well administrators and faculty members adhere to the performance

management system. The results indicate that the institution has incorporated all components of a performance management system, such as planning, monitoring, evaluation, It is found that the institution's performance management system is effective and aligns with the belief that measuring leads to action, managing leads to improvement and rewarding leads to prompt action.

In addition Minoza Joemar .(2024).Research studies have highlighted the importance of performance management as a factor for organizational success. Within the hospitality industry performance management plays a role in motivating and empowering employees to provide services. According to Williams Principle of Performance Management measuring tasks ensures completion managing tasks leads to outcomes and rewarding tasks results in completion (Williams, n.d.).The findings indicate that the institution has successfully implemented also a components that was mentioned early on that a performance management system is capable when it comes on creating a plan, monitoring, evaluation, development and recognition of performance.

Effectiveness of performance management system

Based on Awan, S. H., Habib, N., Akhtar, C. S., & Naveed, S. (2020). A comprehensive performance management system is used by organizations to measure, track progress, and evaluate the effectiveness of employee performance; the mediating effect of work engagement was also examined. Organizations can improve their performance, effectiveness, and achieve results in employee success by strengthening their performance management systems. Moreover, various studies reveal the need for a comprehensive performance management system in order to enhance employee work engagement and task/contextual performance.

In Addition of Maseke, B. F., Unengu, V. K., & Haufiku, T. (2022) Employees strongly believe that performance counseling should be introduced in the organization. Furthermore, organization must provide training to employees on managing work balance stress. In addition, employees find it difficult to achieve their goals because no clear career path is provided. Performance feedback needs to be introduced in the organization to identify areas of weakness and strength and offer training where it is necessary.

Design and development of human resource management computer system

Based on Wang, T., Li, N., & Li, H. (2021) The design and development of this system aims to provide technical support for the service quality of enterprise human resource management business, to improve the overall efficiency, promote the pace of enterprise strategic development, and enhance the market competitiveness of enterprises. this system can be used by users without geographical restrictions and system maintenance. In this system, performance logic and business logic are separated, which makes it convenient for the development and maintenance of the system. The system mainly includes six modules: personnel management, organizational management, recruitment management, training management, salary management and system management, which integrates enterprise information and realizes the functions of easy access and easy query of information databases.

Understanding the system six module of Wang, T., Li, N., & Li, H. (2021)

- ***Personnel management*** - is used to input, query, add, modify and delete all the information of enterprise staff from entering the duty to exiting the duty.

- ***Organizational managemen****t* - is a comprehensive management of enterprise architecture and job information, including comprehensive information of various departments, existing positions and vacant positions, so that enterprises can adjust and deploy relevant departments and positions in a timely manner in the development process.

- ***Recruitment management*** - is the most basic part of HRMS, which is mainly used to track and record the recruitment process of new employees, including recruitment content promotion, resume reception, appointment interview and entry approval.

In Addition of Pathinayake, Y. (2021, August 4) in Online Recruitment Management System, This system enables advertise vacancies via the website, client companies can send vacancy details to advertise, job seekers can apply for vacancies, schedule selection tests and interviews, held online selection tests, email notifications, report generation, get backups and restore backups. Using the Recruitment Management System the company can achieve the following benefits. Benefits of the system are reducing advertising costs, minimizing documentation, improving efficiency and productivity, reducing human error and saving time.

- ***Training management*** - is an important part of HRMS, which is mainly used to track the whole process of enterprise training, including training plan, training implementation, training feedback and opinions

- ***Salary management*** - is mainly used for the accounting, recording and managing of wages and insurance of employees. It includes compensation accounting and management, wage data records, employee tax and social security cost accounting, welfare payment schedule records and open query permissions of employees

(MONTERO)

Hypertext Markup Language (HTML)

According to Schwarz, L. (2022). HTML provides the basic structure for web pages. It consists of a series of commands, known as tags, that instruct a browser on how to interpret content. For example, specific HTML tags indicate a page's headline, where a new paragraph begins, when text should be boldfaced or italicized and when to link to another document. The web requires three elements to function: a web server, a web browser and content. HTML is a simple language for writing the content. A page written in HTML is placed on a server and can then be accessed by a web browser. HTML provides the basic functionality for tagging content to display as headlines, subheadings and bulleted lists, for example, as well as for linking one document to another.

Based on S, A. (2023). HTML has a lot of use cases, namely:

- Web development. Developers use HTML code to design how a browser displays web page elements, such as text, hyperlinks, and media files.

- Internet navigation. Users can easily navigate and insert links between related pages and websites as HTML is heavily used to embed hyperlinks.
- Web documentation. HTML makes it possible to organize and format documents, similarly to Microsoft Word.

Additionally, It's also worth noting that HTML is not considered a programming language as it can't create dynamic functionality, although it is now considered an official web standard. The World Wide Web Consortium (W3C) maintains and develops HTML specifications, along with providing regular updates.

In addition to Hayes, A. (2022, November 24). HyperText Markup Language, or HTML, is a set of markup symbols or codes inserted into a file intended for display on the internet. The markup tells web browsers how words and images should be displayed on a webpage.

```
<!DOCTYPE html>
<html>
<head>
  <title>HTML Layout</title>
  <style>
header {
    background-color:#f8fbff;
    color:black;
    text-align:center;
    padding:5px;
}
nav {
    line-height:30px;
    background-color:#eeeeee;
    height:300px;
    width:100px;
    float:left;
    padding:5px;
}
section {
    width:350px;
    float:left;
    padding:10px;
}
footer {
    background-color:#f8ab33;
    color:white;
    clear:both;
    text-align:center;
    padding:5px;
}
</style>
```

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Cascading Style Sheet (CSS)

As eloquently stated by Ahmed, A. M., Mohammed, C. N., & Ahmad, A. M. (2023), Cascading Style Sheets (CSS) are essential in web development for designing and styling websites. CSS allows developers to control the layout, colors, fonts, and overall visual presentation of a site. It enables the separation of content (HTML) from design, making it easier to maintain and update. CSS enhances user experience by providing a consistent and attractive interface across different devices and browsers.

Based on Abramowski, N. (2023). CSS is one of the most powerful tools in a web designer's arsenal. With it, you can drastically alter the entire mood and user experience of a website. Some further benefits you'll find using CSS are:

- Freedom to position HTML elements anywhere on a web page, while allowing you to keep your markup (HTML) clean and organized.
- Ability to adjust for differences in the way browsers render a web page.
- Endless customization options to a web page including fonts, colors, borders, hover and transition effects, etc.
- CSS preprocessors change the game entirely for developers, allowing them to create more complex layouts more efficiently and use tools such as loops, variables, and if/else statements. You can learn more about it in our guide to CSS preprocessors.
- Ability to easily create, update and maintain styles simultaneously for a large number of web pages.
- Ability to use media queries and relative units (ems and %s) to create web pages which adapt to the user's screen size—ideal for creating mobile-responsive web pages.

In addition to Haim, I. (2024). CSS makes websites visually appealing and user-friendly. Its key advantage lies in its separation of content (HTML) from presentation (CSS). This means you can update styles across an entire website with minimal changes to the code. This efficiency saves time and makes website maintenance a breeze. In short, if HTML builds the house, CSS paints the walls, decorates the rooms, and makes it a place you want to spend time in.

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Javascript

According to Kugell, A. (2024). JavaScript is a fundamental technology in web development, playing a crucial role in creating dynamic and interactive websites. It is the principal client-side programming language used to add interactive elements to web pages, such as animations, form validations, and dynamic content updates without needing to reload the entire

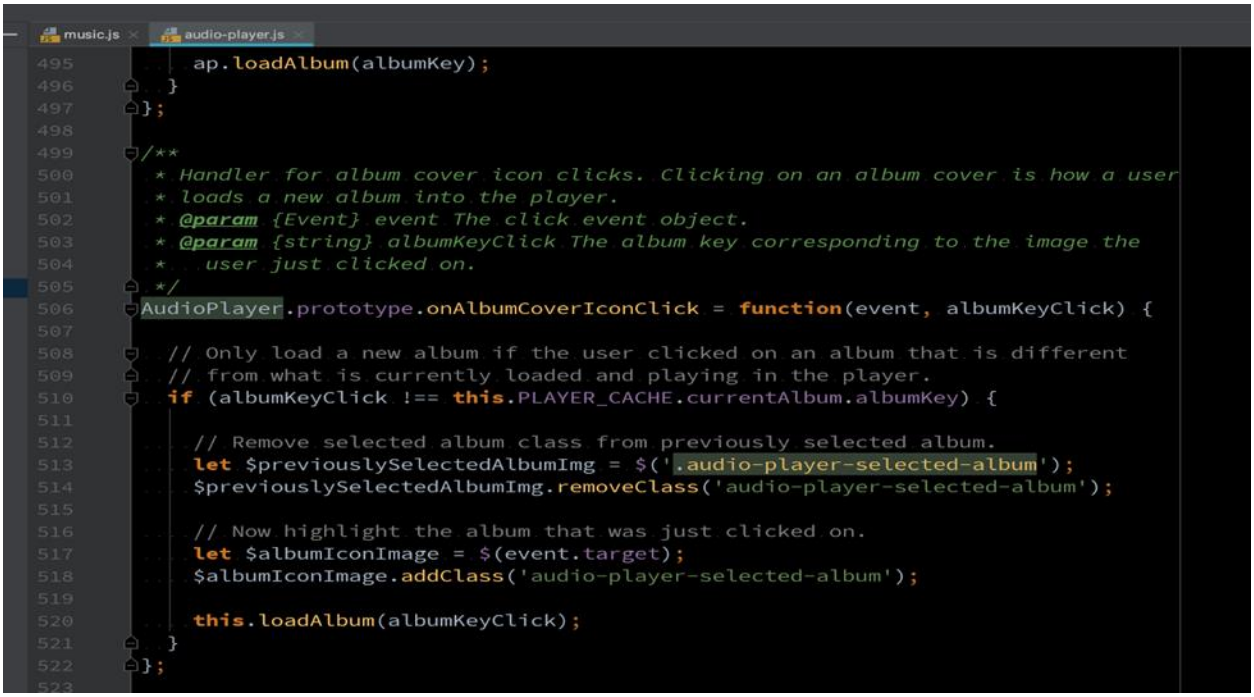
page.One of the primary reasons for JavaScript's importance is its ability to enhance user experience by making web pages more responsive and interactive. For instance, JavaScript frameworks like React, Angular, and Vue.js are widely used to build Single Page Applications (SPAs), which allow for seamless navigation and data fetching without full page reloads, thus improving performance and user experience.

Based on Paul, C. (2024). JavaScript is regarded by developers as a crucial language for web design and development for a number of reasons. These are evidently the primary causes;

- Famous as the Most Popular Language Among developers, JavaScript is practically the most widely used programming language. It offers enormous potential for future development and is currently being used to develop a variety of applications. It is a highly sought-after skill that professionals ought to have, according to the industry.
- Easy to Learn JavaScript is far simpler to start using than other programming languages. You can use JavaScript on a web browser without having to install any software on your computer.
- Fun to Work Working with multiple programs in different programming languages can cause stress. With the aid of a graphical user interface, you can deal with the same important issues in JavaScript. When development projects are conducted with this language, work becomes more enjoyable.
- Very Supportive Language JavaScript programming language is still available for free. It offers a sizable network of support teams to assist you with any issue you may run into

while the project is still in development. Additionally, the community frequently hosts sporadic JavaScript meetups, which may facilitate your learning.

Moreover, JavaScript is essential for implementing client-side functionalities, such as interactive forms, modal windows, and sliders. It also enables the creation of complex web applications by managing user interactions and updating content dynamically in response to user inputs. (Jayatilleke, B. G., Ranawaka, G. R., Wijesekera, C., & Kumarasinha, M. C., 2019).



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React.js

According to Fariz, M., Lazuardy, S., & Anggraini, D. (2022). Title React or also known as React.js or ReactJS is a Java Script-based front-end library for building user interfaces or UI components. React is managed by Facebook, a community of developers and companies. In a study conducted by Venkat in 2021, it was explained that web development technology before 2015 was about scripting and rendering. At that time HTML and CSS were used for the front-end, while the back-end used PHP. Developer puts static HTML pages in some folders and renders those files using PHP. Developers use this method for decades, so there is no visible revolution on a website until there is a Java Script library like React.js. React.js has several excellent features that make front-end web development faster and more responsive.

Based on Hutsulyak, O. (2024). Being a part of the JavaScript language, using React spawns many advantages. Products built with React are simple to scale, a single language used on the server/client/mobile side of things grants outstanding productivity, there are workflow patterns for convenient teamwork, UI code is readable and maintainable, and more. World-leading companies have used React and other JS technologies in some of the top market-defining products (Instagram, Reddit, and Facebook being the most vivid examples).

In front-end development, the function that react.js plays is becoming increasingly important, providing developers with new options to create new applications. React.js is utilized by a significant percentage of all websites today (Chen, S., Thaduri, U. R., & Ballamudi, V. K. R., 2019).

```
import React, { Component } from 'react';

class App extends Component {
    render() {
        return (
            <div>
                <Component1 person={{ name: "xyz", age: 23, country: "India" }} />
            </div>
        );
    }
}
class Component1 extends Component {
    render() {
        return (
            <div>
              <h3> Person Information: </h3>
              <ul>
                <li>Name={this.props.person.name}</li>
                <li>Age={this.props.person.age}</li>
                <li>Country={this.props.person.country}</li>
              </ul>
            </div>
        );
    }
}
export default App;
```

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Angular

According to Anastasia, D. (2022). Angular is an open-source web application framework based on TypeScript. It accomplishes various web development activities and improves the app or the website with the required functionalities. Angular supports multiple platforms like mobile, web, and desktop natives.Angular comes as a standalone framework for front-end development and can be used for enterprise software development. If a project is a complicated web app with many features, then Angular is the best choice for this particular project. The reasons why developers and companies choose Angular are: clean code, fast testing, good debugging, and

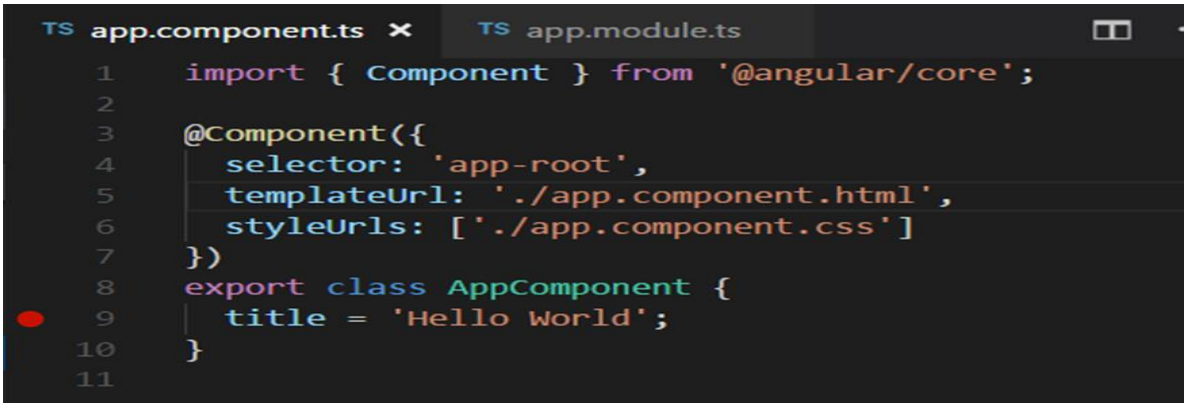
improved CSS class. It’s also worth adding that Angular has a collection of well-integrated libraries. They provide ample opportunities for creating functions, including client-server communication tools, routing, form management, etc. Angular web development is a great solution for projects that need to scale quickly and efficiently. The component base and a wide selection of developer tools provide all the possibilities for simple updating, expanding functionality, high performance, etc.

Angular is a powerful and versatile framework for web application development. With its extensive features, robust architecture, and wide range of capabilities, Angular enables developers to build scalable, maintainable, and efficient applications. While Angular has its advantages and limitations, it remains a popular choice among developers and organizations worldwide. By understanding the key aspects of Angular and its architecture, developers can leverage the framework's full potential and deliver exceptional user experiences (Kaur, N., 2023).

In addition to Deshpande, C. (2023). Many versions of Angular have been released since its inception. All these versions have added to the efficient working of the framework.

- Custom Components - Angular enables users to build their own components that can pack functionality along with rendering logic into reusable pieces. It also plays well with web components.
- Data Binding - Angular enables users to effortlessly move data from JavaScript code to the view, and react to user events without having to write any code manually.

- Dependency Injection - Angular enables users to write modular services and inject them wherever they are needed. This improves the testability and reusability of the same services.
- Testing - Tests are first-class tools, and Angular has been built from the ground up with testability in mind. You will have the ability to test every part of your application—which is highly recommended.
- Comprehensive - Angular is a full-fledged framework and provides out-of-the-box solutions for server communication, routing within your application, and more.
- Browser Compatibility - Angular is cross-platform and compatible with multiple browsers. An Angular application can typically run on all browsers (Eg: Chrome, Firefox) and OSes, such as Windows, macOS, and Linux.



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PHP

According to Singla, L. (2024). PHP is a common open-source scripting language popular for web applications. Although it originally stood for “personal home page,” PHP is now a recursive acronym for “hypertext preprocessor,”. PHP is a server-side scripting language embedded in HTML in its simplest form. PHP allows web developers to create dynamic content

and interact with databases. PHP is known for its simplicity, speed, and flexibility — features that have made it a cornerstone in the web development world. Like any other scripting language, PHP is fundamentally the tool you use to connect to your database to get information and hand that information over to your web server to be displayed in HTML. But many aspects of PHP set it apart from other languages. PHP is:

- A Scripting Language**:** Scripting languages are interpreted by another program at runtime (no need for compilation). Scripting languages can be interpreted server-side or client-side (in the browser).
- Server-Side**:** PHP is a server-side scripting language processed by a PHP interpreter on a web server; the result (the output) is sent to the web browser as plain HTML.
- Open-Source**:** PHP is freely available to download and use.
- Object-Oriented**:** Object-Oriented Programming (OOP) leverages the concept of "objects" to contain data and functions to help build more complex, reusable web applications. OOP was added to PHP5.
- Fast**:** PHP uses its memory, minimizing server workload and increasing performance. PHP can be up to 382% faster than Python and 195% faster than Ruby.
- Simple**:** The PHP syntax is easily understood and learned, whether you're building from scratch or leveraging existing frameworks or add-ons.
- Well Supported: PHP supports all leading databases (MySQL, SQLite, ODBC) and is compatible with most servers (Apache, IIS, etc.). It is portable across all platforms (Windows, Mac OS, Linux, etc., and can be further supported by PHP frameworks (Laravel, CodeIgniter, Symfony) and many well-stocked and vetted libraries.

Based on S, A. (2024). Anyone can benefit from learning about PHP, but it is even more essential for those interested in web programming. PHP is available on all major operating systems, such as Linux, Microsoft Windows, and macOS. Most web servers, including Apache and IIS, also support PHP. One of the main benefits of using PHP is advancing the customization of a WordPress site. Other features include great online support and documentation, so even beginners can learn PHP quickly.

In addition to Bydec, I. (2020). PHP is one of the core languages of web development and has been around since 1995. It has been a part of web development since the start and is one of the most commonly used languages in that field. Many modern web applications are written in PHP, and some websites that use only PHP are among the most visited in the world. As we mentioned, PHP can be used to create any kind of dynamic website, including eCommerce sites. It's also extremely easy to learn, which makes it ideal for beginners. Generally speaking, the more demanding the website, the more likely it is to be built on PHP. That's because PHP is an extremely robust language and its core functionality can be extended with a variety of frameworks and libraries. Benefits of Using PHP for Web Development are:

- Extremely Popular - Popularity is a good sign. It means that more people use it, and more companies are hiring people to work with it. The more people that use a tool, the more likely it is that it's going to be supported and updated for years to come.
- Easy to Learn - PHP is a great language for beginners. Because it is so widely used, there are plenty of resources available to help you master it and build your skill set.
- Robust - As mentioned, the core functionality of PHP can be extended with a variety of frameworks and libraries. This makes it very robust and ideal for enterprise applications.

- Open Source - This may not be an advantage for everyone, but it definitely is for certain segments of the population. If you don't have a lot of money to spend on developing your website, or you want to try something new without spending a lot of money, PHP is open source and free.

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>Test page</title>
  </head>
  <body>
    <p><?php echo rand(1, 10); ?></p>

    <p><?php echo 'rand(1, 10)'; ?></p>
  </body>
</html>
```

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Python

According to Pitaliya, S. (2024). Python is an interpreted, high-level, dynamically semantic, object-oriented programming language. It is particularly suited for Rapid Application Development and usage as a scripting or glue language to connect existing components because of its high-level built-in data structures, dynamic typing, and dynamic binding. Python, a well-liked open-source programming language, provides improved process management capabilities. Python software development helps develop complex multi-protocol network applications while maintaining simple syntax. Not to overlook that popular platform like Google, Instagram, and

Spotify use Python. Therefore, being a versatile programming language, Python offers a wide range of benefits and advantages in software development. There are reasons to choose Python:

- It is a Versatile Language
- It Has a Simple and Short Code Structure
- It Offers Cloud Computing Support
- It Has Dynamic Language Features
- It Offers Interfaces with Other Languages
- It is an Extensible and Portable Language

Based on Kumar, P. (2023). In Python web development, developers use Python to write the server-side logic that powers web applications. This includes handling HTTP requests and responses, managing data storage and retrieval, implementing business logic, and rendering dynamic content.

In addition to Gadhavi, M. (2024). Web development in Python is a widely adopted approach for creating dynamic websites and applications. With its rich ecosystem of frameworks, libraries, and tools, Python simplifies development and supports scalable solutions. In this comprehensive guide, we will talk about Python web development, explore frameworks, and provide an example of building a web application/system.

```python
class Integer:
    """ Simple class to represent an integer """
    def __init__(self, n):
        if not isinstance(n, int):
            raise TypeError('Invalid initializer')
        self.number = n

    def is_palindrome(self):
        """ Returns True if the integer is a palindrome """
        reversed_num = 0
        n = self.number
        while n > 0:
            ones_digit = n % 10
            reversed_num = 10 * reversed_num + ones_digit
            n = n // 10
        return reversed_num == self.number


assert Integer(123).is_palindrome() is False
assert Integer(12321).is_palindrome() is True
```

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Node.js

According to Sufiyan, T. (2023). Node.js is an open-source, cross-platform JavaScript runtime environment and library for running web applications outside the client's browser. Developers use Node.js to create server-side web applications, and it is perfect for data-intensive applications since it uses an asynchronous, event-driven model.

Based on Bakhur, N. (2024). Node.js is a system that executes JavaScript separately from your browser. We can say that this is a standalone environment for executing JavaScript.Node.js

can be installed on a server (just like Python) and your code can be executed on it, giving the result of execution to users. On it, you can make separate applications using additional frameworks. Before the advent of Node.js, applications that were written in the JavaScript programming language could only be run in a browser. Using Node.js allows you to write in JavaScript not only in the browser but also on the server. *These are the benefits of Node.js:*

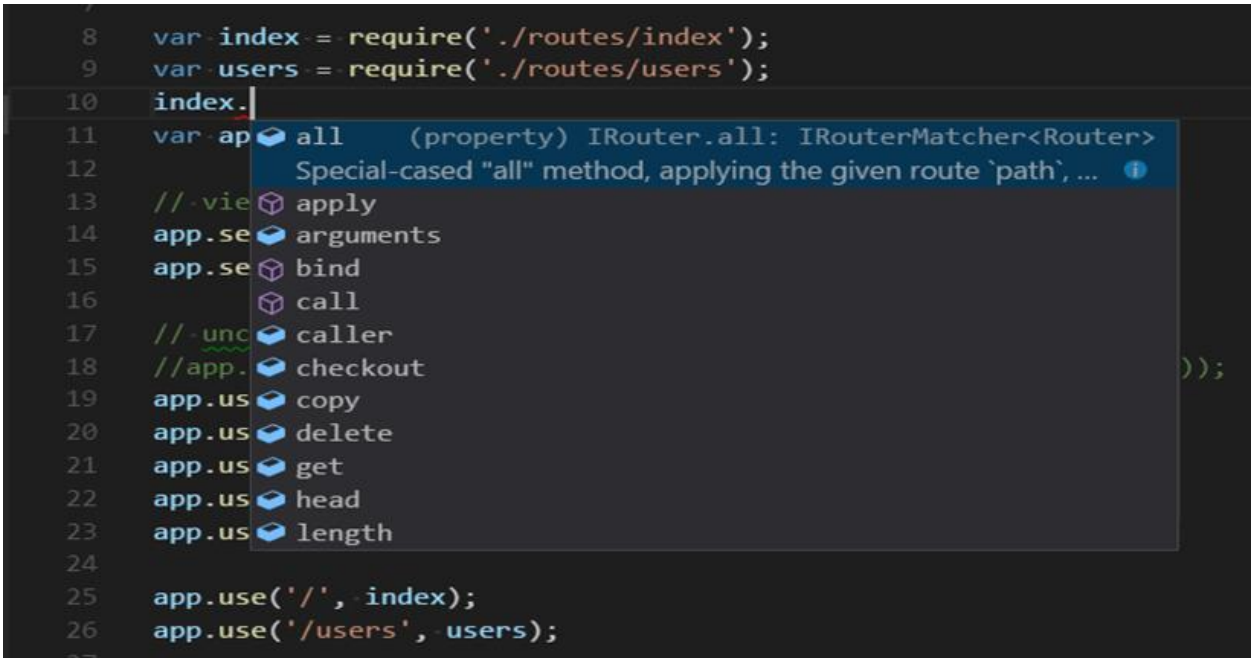
- High speed. JavaScript code that runs in Node.js can be several times faster than code written in languages like Ruby or Python. Node.js uses the asynchronous programming model. The model allows you to continue processing other tasks without waiting for the completion of the data transfer. When an I/O operation needs to be performed, such as accessing a file system or a database, Node.js does not block the main thread waiting for the results. The platform initiates its execution and continues to perform other tasks until the results of the previous operation are received.
- Versatility and flexibility. Node.js runs code that is written in JavaScript. This means that front-end developers who already use JavaScript in the browser can write both client-side and server-side code in a familiar programming language without having to learn the tool from scratch. In Node.js, you can quickly migrate to new ECMAScript standards as they are implemented. New language features become available as soon as you install a version of Node.js that supports them.
- A large number of modules and libraries. Another advantage of Node.js is that its ecosystem is growing rapidly thanks to the NPM package manager. It contains over 500,000 open-source modules and libraries that are freely available. There are also new ones all the time.

- Working on the Chrome V8 engine. Node.js runs on Google's V8 JavaScript engine. V8 is an open-source JavaScript engine with a BSD license. It is used in Chromium-based browsers. This means that Node.js uses the work of thousands of engineers. The engine is written in C++ and has open-source code and advanced libraries.

In addition to Khare, M. (2023, November 7). Node.js is used for a wide variety of applications. Let's explore some popular use cases where Node.js is a good choice:

- Real-time chats - Due to its single-threaded asynchronous nature, Node.js is well-suited to processing real-time communication. It can easily scale and is often used in building chatbots. Node.js also makes it simple to build additional chat features like multi-person chat and push notifications.
- Internet of Things - IoT applications usually comprise multiple sensors, as they frequently send small chunks of data that can pile into a large number of requests. Node.js is a good choice since it's able to handle these concurrent requests quickly.
- Data streaming - Companies like Netflix use Node.js for streaming purposes. This is mainly due to Node.js being lightweight and fast, besides which Node.js provides a native streaming API. These streams allow users to pipe requests to each other, resulting in data being streamed directly to its final destination.
- Complex single-page applications (SPAs) - In SPAs, the whole application is loaded in a single page. This usually means there are a couple of requests made in the background for specific components. Node.js's event loop comes to the rescue here, as it processes requests in a non-blocking fashion.
- REST API-based applications - JavaScript is used both in the frontend and backend of sites. Thus, a server can easily communicate with the frontend via REST APIs using

Node.js. Node.js also provides packages like Express.js and Koa that make it even easier to build web applications



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MySQL

According to Giaquinto, R. (2022). MySQL is an open-source SQL relational database management system from Oracle. As a relational database, the data is stored in smaller storage areas called tables. This makes it easier to locate the data you need, but more importantly, it helps organize data.For example, let's say you store what your customer recently bought and also their contact information. It's pretty basic stuff that you would be expected to store. In MySQL, each of these pieces would be stored in a separate table.Thus, you could examine the table you want to get the information you need. If it wasn't a relational database, then both pieces of data would be

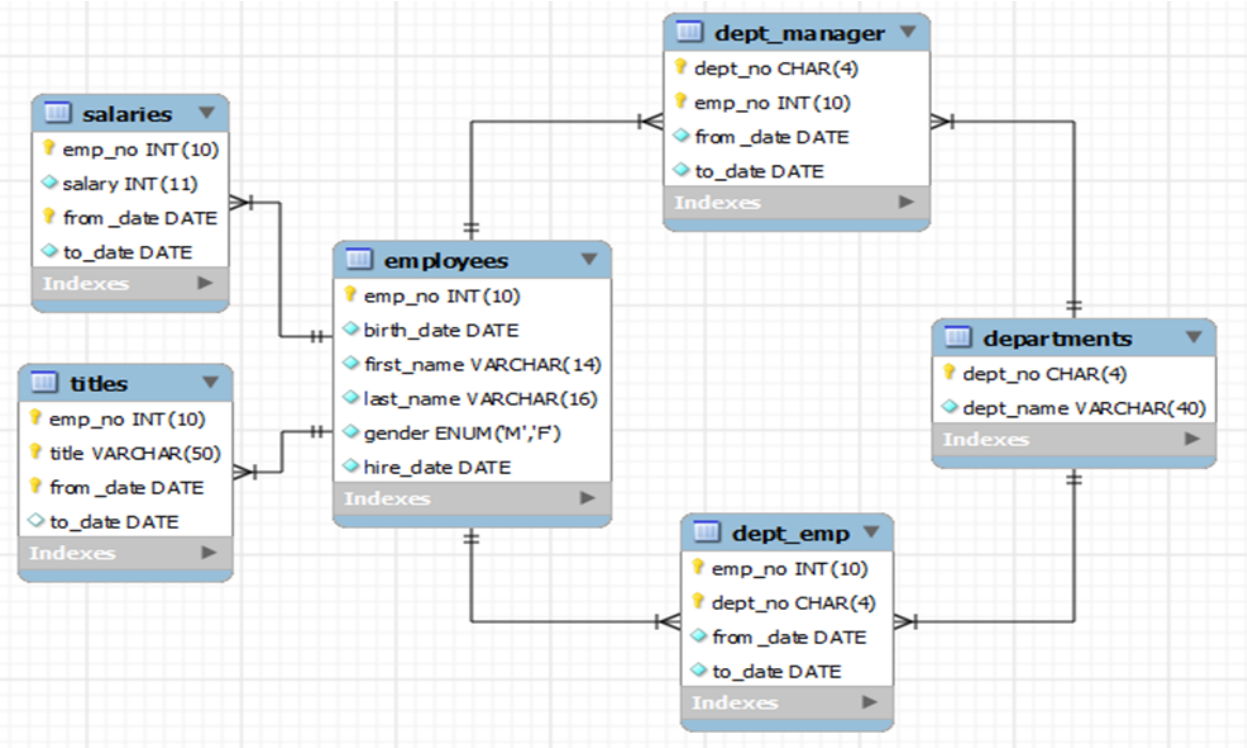
stored in the same location.First, this makes it very hard to find the data you are looking for.And secondly, there would be a lot of duplicate information taking up space. This makes relational databases like MySQL very efficient overall.You can also view multiple pieces of data by using a key. This allows you to take data related to that key from multiple tables. The key is the unique ID assigned to that piece of data.So for example, let's say you want to view John Doe's contact info and shopping history. You would take his unique ID number, and you would pull up all data related to it in another table.

Based on Dobrovolska, V. (2024). Imagine a website as a bustling city. The visual elements – the buildings, streets, and parks – are like the HTML and CSS that create the website's structure and design. But just like a city needs a complex network of pipes and power lines to function, websites require robust back-end technologies to manage data, user interactions, and dynamic content. This is where PHP and MySQL come in.

In addition to G, D. (2024). MySQL is indeed not the only RDBMS on the market, but it is one of the most popular ones. The fact that many major tech giants rely on it further solidifies the well-deserved position. Here are some of the reasons.

- Flexible and Easy To Use - As open-source software, you can modify the source code to suit your need and don't need to pay anything. It includes the option for upgrading to the advanced commercial version. The installation process is relatively simple, and shouldn't take longer than 30 minutes.

- High Performance - A wide array of cluster servers backs MySQL. Whether you are storing massive amounts of big eCommerce data or doing heavy business intelligence activities, MySQL can assist you smoothly with optimum speed.
- An Industry Standard - Industries have been using MySQL for years, which means that there are abundant resources for skilled developers. MySQL users can expect rapid development of the software and freelance experts willing to work for a smaller wage if they ever need them.
- Secure - Your data should be your primary concern when choosing the right RDBMS software. With its Access Privilege System and User Account Management, MySQL sets the security bar high. Host-based verification and password encryption are both available.



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Laravel

According to Jalli, A. (2022). Laravel is an easy-to-use web framework that will help you create extensible PHP-based websites and web applications at scale. Before creating a web app or website, you need to make a foundational decision as to what technology you are going to use. This is one of the trickiest parts of the web development process. Laravel is a good choice as an easy-to-use open-source framework for building modern web applications at scale. *Here are a few notable Laravel features that make it such a popular PHP framework among web developers.*

1. MVC Architecture - Laravel framework promotes the MVC architectural pattern for creating web apps. This pattern specifies a set of rules that specify how to build scalable and maintainable web apps. The Laravel MVC pattern helps developers bring order and consistency to unstructured code. The MVC approach also makes it easy to develop both small and large-scale web applications.
2. Artisan CLI - Laravel uses Artisan as a CLI that helps web developers to:

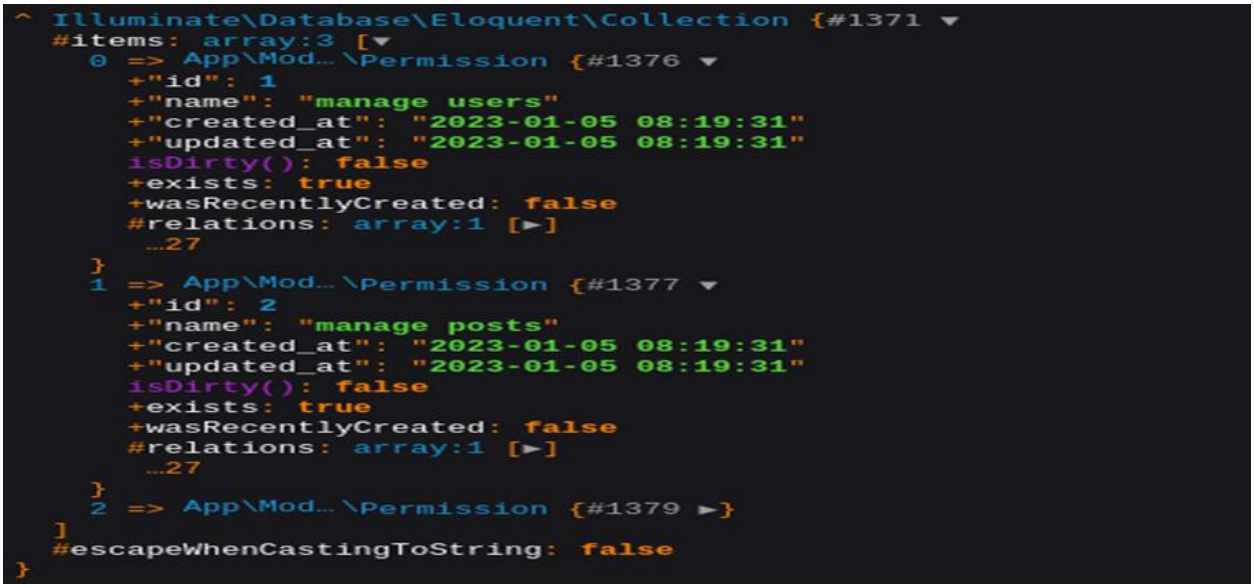
- Migrate data
- Manage databases
- Generate boilerplate code, controllers, models and more

The Artisan CLI makes web development easier thanks to code generation and database management features that are only a few commands away. Instead of writing boilerplate code or setting up a database, a developer can focus on building the app's logic.

3. Built-In Authentication - Laravel comes with out-of-the-box solutions for authentication and authorization. With a couple of Artisan commands, you can set up reliable and robust authentication and authorization for your web app.

Laravel (a top PHP framework) is behind some amazing web applications/system with a superior personalized experience for users. PHP and Laravel allow impeccable syntax to enable coding with a minimal chance of errors. By hiring expert Laravel developers businesses can make error-free web-based solutions that deliver the best experience to users.This framework is powering various types of web-driven projects and products. Laravel enables the development of websites that help in facilitating specific requirements. Especially, it perfectly suits coding server-side of customer-facing applications like eCommerce portals. Arguably, one of the most popular web application/system frameworks, Laravel provides ease in common website programming tasks. For instance, authentication, routing, sessions, and caching. It uses PHP as a back-end programming language for coding applications (Techliance, 2024).

In addition to Stickman, N. (2021). With Laravel, you can easily spin up a new website while also having the features and scalability to handle advanced and large-scale applications.



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Django

According to Nihar-Raval. (2023). Django is an open-source web app development framework based on Python programming language. It is used to develop backend web applications. Its key objectives are integrating reliability, scalability, adaptability, and simplicity into the web development process. The Django Python web framework, being open-source, regularly introduces new Django MVT architecture and updates to improve its features and address the needs of its users. Some of its essential features include:

- Object-Relational Mapping (ORM) - Django's ORM maps database tables to Python classes. Thus, it is incredibly easy to work on databases without having to write SQL queries.

- Authentication and Authorization - With a robust authentication and authorization system in place, Django allows you to seamlessly manage user authentication and permissions.
- Admin Interface - The admin interface provides an out-of-the-box dashboard for managing data in the database. It is highly customizable and you can extend it to include personalized functionalities.
- Internationalization - It supports internationalization and localization, making it easy to create multilingual websites or web apps based on demographics.
- URL Routing - The URL routing system enables developers to define URLs to view functions or methods. and create clean, readable, and scalable URLs.
- Templating Engine - Django has a built-in templating engine to create dynamic web pages by allowing developers to mix HTML with Python code.

Based on Smith, O. (2022). It provides a lot of features to the developers "out of the box," so development can be rapid. However, websites built from it are secured, scalable, and maintainable at the same time. Some features of Django include a lightweight and modular design, a powerful ORM (Object-Relational Mapper) that simplifies database interactions, and built-in support for common web development tasks such as user authentication and management, form handling, and content administration.

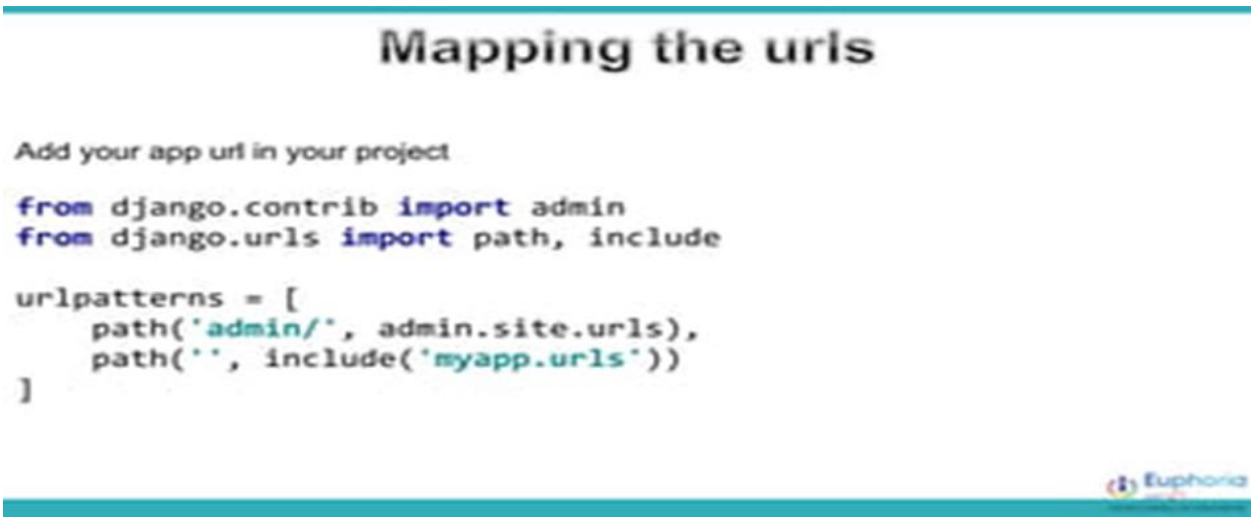
In addition to Mahalias, I. (2024). *Here are the advantages of the Python Django framework:*

- Security - Keeping everything aside, data security is the primary concern for every business in every industry. Django is a trustworthy platform with built-in protection for request

forgery, clickjacking, cross-site scripting, and SQL injection. Being a high-end full-featured framework, Django contains an impressive built-in toolbox that is thoroughly tested and has a predictable release cycle. Thus, everything stays secure and in the control of the developer.

- Performance - As it's a Python-based framework, Django offers incredible performance. It comes with Django's exceptional documentation that gathers relevant links and aids performance during the development processes. Also, you have access to lots of tools that boost productivity when you need them. For example, the Django Caching framework aids performance with several levels of cache granularity. It prevents the calculation of dynamic content for each request and enhances your site performance. However, it only works if your code is running perfectly as expected.
- Simplicity - The reason is that it's Python-based and pluggable modules for the developer's convenience. Django features included batteries such as Object Relational Mappers (ORMs), Forms, Testing, Templates, and Authentication Mechanism. Django is easy-to-use and productive enough for web development because you don't need to create these modules from scratch.
- Support & Community - Being an open-source framework, Django is reliable and offers you complete access to your website. But there's one more thing that describes the trustworthiness of Django over other web frameworks. It's Django's massive community of over thousands of contributors. The Python developers in the community keep introducing new libraries to solve most coding issues. In simple words, even if you're searching for a common issue, you will surely find out the issue has already been solved by the community.

- Built-in Admin Panel - Many web frameworks oblige you to invest your time building your own admin panel. Fortunately, that doesn't happen with the Django framework, as it features an in-build web interface. You get access to a customizable and versatile admin panel with required permissions and authentication modules. Moreover, Django's built-in admin panel also supports the addition of third-party applications and wrappers.
- Scalability - Django is highly used because of its scalability and helps you minimize the cost when it comes to project growth. It's a pluggable framework that allows you to add or remove decoupled components during the scalability. Whether site traffic or mobile app API, Django can help you scale your website to support over 400 million users. Besides this, Django features loosely coupled architecture that supports the addition of hardware at any point. Unlike other frameworks, any hardware addition does not affect the working of already used components.
- Libraries - This framework is definitely a great option for web development, thanks to the large collection of built-in libraries. You get access to productive libraries such as Django REST Framework, Celery (distributed task queue), Sentry(app monitoring), and other packages that simplify and speed up the development. Whether you want to develop an API or mobile apps backend, Django libraries meet all your development needs. That's why we consider libraries as among the top advantages of Django for web development.



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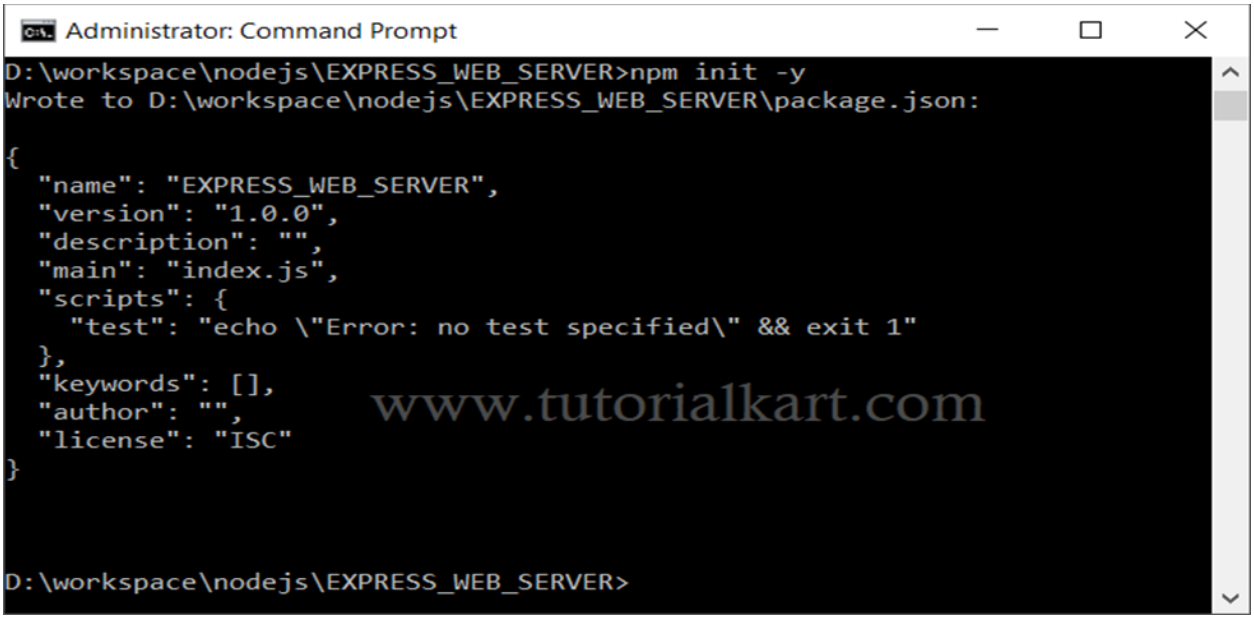
Express.js

According to Eseme, S. (2023). Express.js, sometimes also referred to as “Express,” is a minimalist, fast, and Sinatra-like Node.js backend framework that provides robust features and tools for developing scalable backend applications. It gives you the routing system and simplified features to extend the framework by developing more powerful components and parts depending on your application use cases.

Based on Ghosh, D. (2023). Express.js is a powerful web application/system framework for Node.js that offers a wide range of features, such as a robust routing system, middleware support, and template engine integration. It’s an easy-to-learn and versatile framework that can be used to build a variety of web applications/system. With an active community of developers and third-party plugins, Express.js is continuously evolving, making it a top choice for web

development. So, whether you're a newbie tech enthusiast or an experienced developer, learning Express.js can take your web development skills to an advanced level.

In addition to Katariya, L. (2023). Express.js is a flexible framework that lets developers do their thing. You can mix and match middleware, pick your favorite templating engines, and even choose databases that fit your project. It's like having a toolbox of tools at your disposal. For example, if you need to build a real-time app, you can use Express.js with middleware like Socket.io to add real-time functionality to your app. Or, if you need to build a single-page app, you can use Express.js with a templating engine like Pug to render your HTML views. It is also lightweight and easy to use. It gives developers a lot of control over the architecture of their applications, which can be helpful for building customized and complex applications.



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Bootstrap

According to Alexandrea, J. (2023). Bootstrap helps web developers build websites faster as they don't need to worry about basic commands and functions. It consists of HTML, CSS, and JS-based scripts for various web design-related functions and components. *Here are the reasons why you should use Bootstrap:*

- Ease of Use - Bootstrap is easy to learn. Due to its popularity, plenty of tutorials and online forums are available to help you get started. One of the reasons why Bootstrap is so popular among web developers and web designers is that it has a simple file structure. Its files are compiled for easy access, and it only requires basic knowledge of HTML, CSS, and JS to modify them. You can also use themes for popular content management systems as learning tools. For example, most WordPress themes were developed using Bootstrap, which any beginner web developer can access.To increase the site's page load time, Bootstrap minifies the CSS and JavaScript files. Additionally, Bootstrap maintains consistency across the syntax between websites and developers, which is ideal for team-based projects.

- Responsive Grid - Bootstrap comes with a predefined grid system, saving you from creating one from scratch. The grid system consists of rows and columns, letting you make a grid inside the existing one instead of entering media queries within the CSS file.Additionally, Bootstrap's grid system makes the data entry process more

straightforward. It contains lots of media queries, allowing you to define each column's custom breakpoints based on your web project needs.

- Browser Compatibility - Making your website accessible via different browsers helps reduce the bounce rate and rank higher in search results. Bootstrap fulfills that requirement by being compatible with the latest versions of popular browsers.

Based on Ouellette, A. (2023). Bootstrap saves you from writing lots of CSS code, giving you more time to spend on designing webpages. Bootstrap is a powerful tool that allows a developer to get up and running quickly and painlessly. It makes it easy to integrate many great features that enrich a user's interaction with the web without having to code them from scratch.

In addition to Singh, U. (2024). Bootstrap is one of the most popular frameworks for building websites and web apps. It is a great tool for web developers and designers because it:

- Speeds up development
- Makes responsive design easier and more consistent
- Allows you to customize your site without coding

He concluded that the most significant aspect of Bootstrap is its responsive grid system, which allows creation of websites that are easily adaptable for multiple devices.

```
<!DOCTYPE html>
<html>
<head>
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet" href="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.5/css/bootstrap.min.css">
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/1.11.3/jquery.min.js"></script>
  <script src="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.5/js/bootstrap.min.js"></script>
</head>
<body>

<nav class="navbar navbar-inverse" style="background-color: navy;">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="myBootstrapHome.cfm">Beginner Boostrap Website</a>
    </div>
    <div>
      <ul class="nav navbar-nav">
        <li><a href="myBootstrapTable.cfm">Table Page</a></li>
        <li><a href="myBootstrapTabs.cfm">Tab Page</a></li>
        <li><a href="myBootstrapGrid.cfm">Grid Page</a></li>
        <li><a href="myBootstrapForm.cfm">Form Page</a></li>
      </ul>
    </div>
  </div>
</nav>
```

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GitHub

According to Gaba, I. (2023). GitHub is a Git repository hosting service that provides a web-based graphical interface. It is the world's largest coding community. Putting a code or a project into GitHub brings it increased, widespread exposure. Programmers can find source codes in many different languages and use the command-line interface, Git, to make and keep track of any changes.GitHub helps every team member work together on a project from any location while facilitating collaboration. You can also review previous versions created at an earlier point in time.

Based on Lutkevich, B., & Courtemanche, M. (2023). GitHub facilitates social coding by providing a hosting service and web interface for the Git code repository, as well as management tools for collaboration. The developer platform can be thought of as a social networking site for

software developers. Members can follow each other, rate each other's work, receive updates for specific open source projects, and communicate publicly or privately.

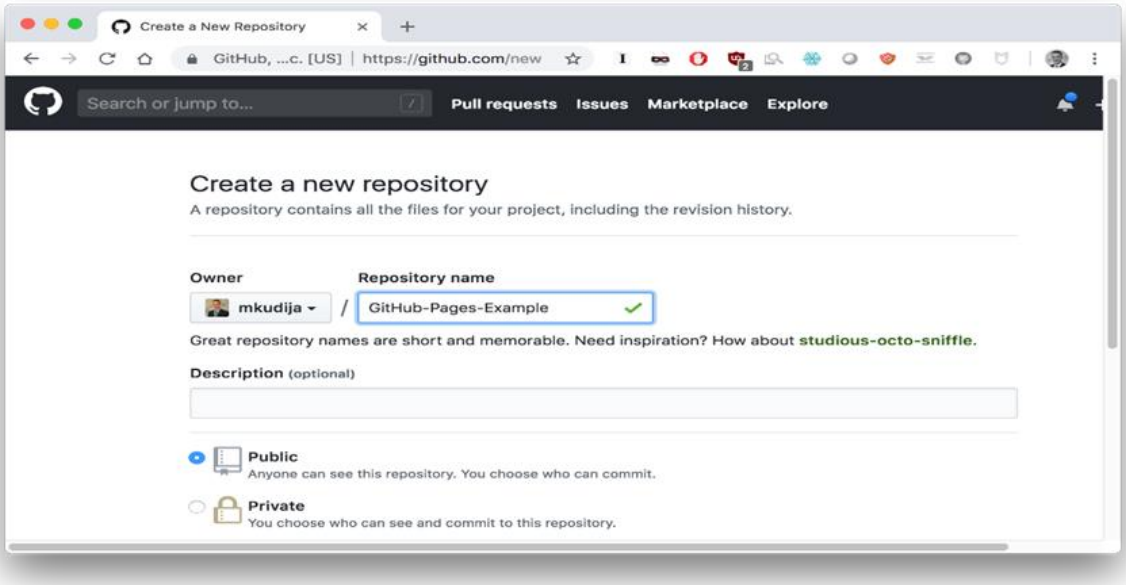
The following are some important terms GitHub developers use:

- **Fork.** A fork, also known as a branch, is a repository that has been copied from one member's account to another member's account. Forks and branches let a developer make modifications without affecting the original code.
- **Pull request.** If a developer would like to share their modifications, they can send a pull request to the owner of the original repository.
- **Merge.** If, after reviewing the modifications, the original owner would like to pull the modifications into the repository, they can accept the modifications and merge them with the original repository.
- **Push.** This is the reverse of a pull -- a programmer sends code from a local copy to the online repository.
- **Commit.** A commit, or code revision, is an individual change to a file or set of files. By default, commits are retained and interleaved onto the main project, or they can be combined into a simpler merge via commit squashing. A unique ID is created when each commit is saved that lets collaborators keep a record of their work. A commit can be thought of as a snapshot of a repository.
- **Clone.** A clone is a local copy of a repository.

In addition to Juviler, J. (2024). The single biggest selling point of GitHub is its set of project collaboration features, including version control and access control.To illustrate what’s

possible with GitHub, imagine this scenario. You want to code an online game, and you enlist your friend to help you.You create a repository on GitHub that stores all the files, including current and past versions, then give your friend collaborator access to this repo as well.

A robust online portfolio shows employers your programming skills and experience using common tools like GitHub. Through your public profile on GitHub, potential employers can gain insights into your organization, coding, and developing skills. In addition to including previous work in your portfolio, highlight your familiarity with GitHub and Git in job or internship descriptions on your resume. Including specific details about projects you've done, even if they're not featured in your GitHub portfolio, can be beneficial. One great aspect of GitHub is you can use it to gain experience even if you don't have any prior professional jobs or internships in coding or programming. Using open-source projects or building your own can help you develop a portfolio of work that speaks for itself outside of your resume or cover letter (Girardin, M. (2024).



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Canva

According to Gareth (2023). Canva is an online graphic design tool pre-loaded with thousands of templates to spark your creativity. Whether it be for internal use or for a client, the many benefits of using Canva make it easier than ever to knock up stunning visuals in no time. From magazines to website design to logos, Canva helps you design everything simply and efficiently without needing extensive graphic design experience or complicated Adobe programs.

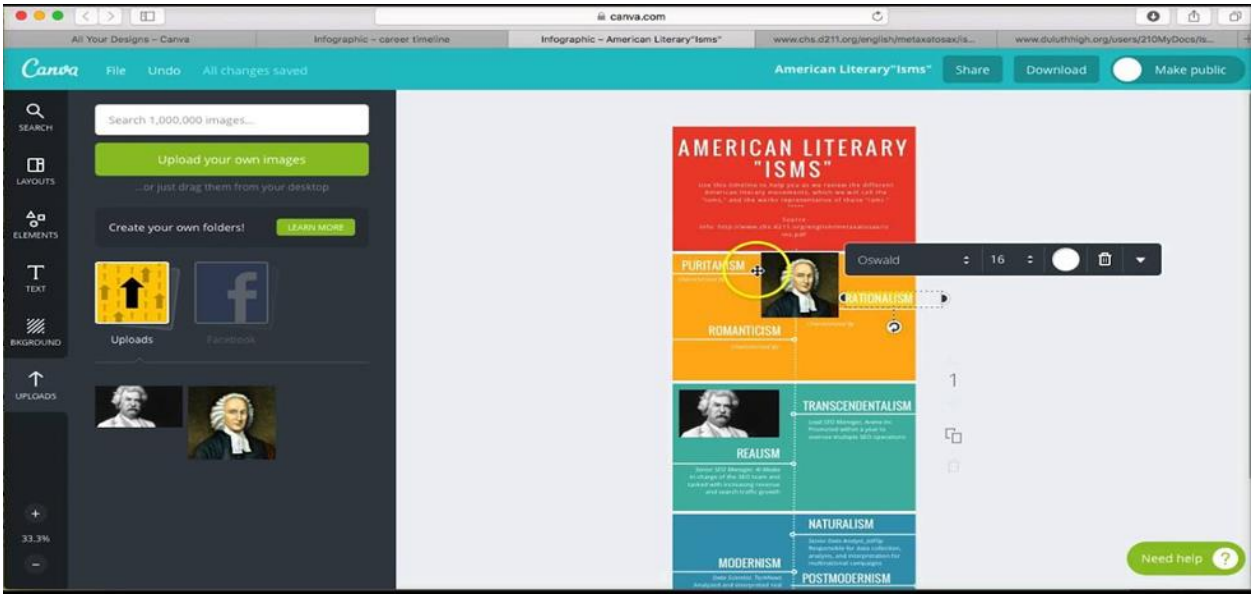
Here are the benefits of using canva

- Create wireframes with ease.
- Pre-made size templates make creating size-specific content simple.
- The ability to use the transparency tool on all elements.
- Hundreds of elements, icons and graphics to choose from.
- The ability to add frames and vignette to imagery.
- The user-friendly interface is easy to use for all levels.
- The free design templates make designing content super quick.
- Access to free, safe stock imagery.
- Comment and collaborate with team access.
- There are endless possibilities for creation.

In addition to Clark, H. (2024). Canva enables you to create visually appealing websites in minutes. It is the perfect platform for beginners with little to no experience. Canva features an

easy-to-use drag-and-drop website editor and a vast database of design templates, royalty-free images, and graphics. As a result, your web design process becomes quick, simple, and extremely cost-effective.You may use Canva online or by downloading the app for your Mac, PC, Chromebook, iOS, or Android device. Canva offers thousands of free templates and over 250,000 free photos, icons, illustrations, graphics, social media elements, videos, animations, and more that you can easily drag and drop into your website. The platform has other features, such as Styles, to help you find the perfect color and font combinations for image editing. Additionally, Canva features Magic Write, an AI writer & text generator powered by OpenAI and canva ships a color palette generator to create custom color palettes. Canva also allows you to add brand elements to your sites. Subsequently, Canva stores your logo, brand colors, and fonts in its Brand Kit.

Stunning graphics can play a huge role when it comes to marketing your business and attracting customers. Canva offers a simple, free solution to help you create amazing professional designs with little effort. The biggest decision you'll have to make is which types of graphics to focus on for your business (Hughes, J. (2023)



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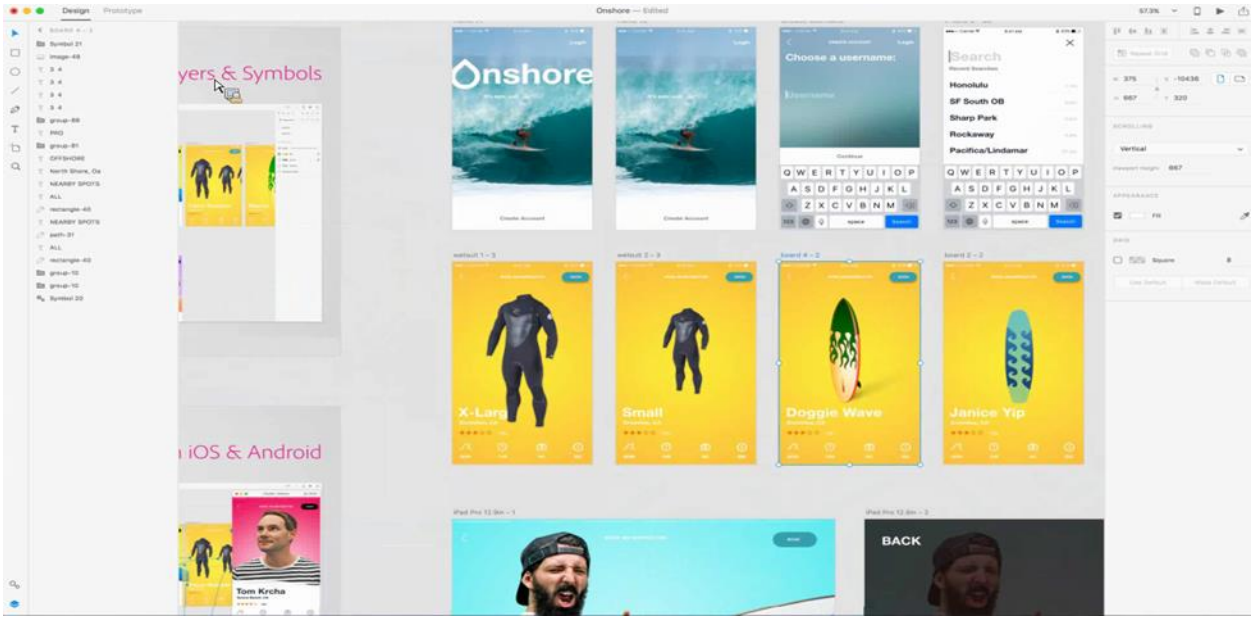
Adobe XD

According to Ap, B. (2021).You won't develop a website or app indeed, through the Adobe Xd (I mean a complete application with code, etc), instead you will design/prototype your system screens there. Therefore is a useful tool for UI and UX professionals to validate a system usability concept, before starting code. You must think that you're "spending time", in a concept validation initial step, to be more assertive in the future, when you start to code your website/app. This is an important User experience concept. You have to test, test, and test again before going around coding. Adobe Xd is also a useful tool to create wireframes (that low fidelity prototypes), that are helpful when you want to quickly validate system usability without spending much time and before thinking about the layout.

Based on Lynch, L. (2022). Adobe XD relieves that burden by allowing us to design interactive elements, including dropdown navigation, pop-ups, and mobile touch-based behaviors. It's also possible to incorporate links within the document, making it easier to demonstrate a specific kind of user flow. We can even share a link to the design document with our clients so that they can view the designs in their web browsers, as if it were a real website. All this makes it easier for them to envision what the final product will be like, and to provide feedback based on that prototype without worrying about whether they've understood our designs correctly.

In addition to Mishra, D. P., Rout, K. K., & Salkuti, S. R. (2021). For any Web application, its interface and design play an important role in business, because it directly reflects a customer's usage. More the customers are satisfied, it helps in growing your business, you get many more customers. Keeping this in mind, it's hard to straight away start designing the UI without having a feel of how our application would look like to our customers. This is where a need for UX arises. The most popular tool for UX/UI designing in Adobe XD. It's user-friendly with many features and is available for both macOS and Windows. The part that any web designer would like about this software is that it gives a feel of the application we intend to make, a functional application, and design. So a developer could make a rough sketch of their entire application along with the design and its functionaries like a pop-up window (a modal in CSS), the link between pages in the web application, animation effects, fill color property, and many more. One more major advantage to a UI designer is that the names of the features used in Adobe Xd are the same in coding CSS properties.



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Figma

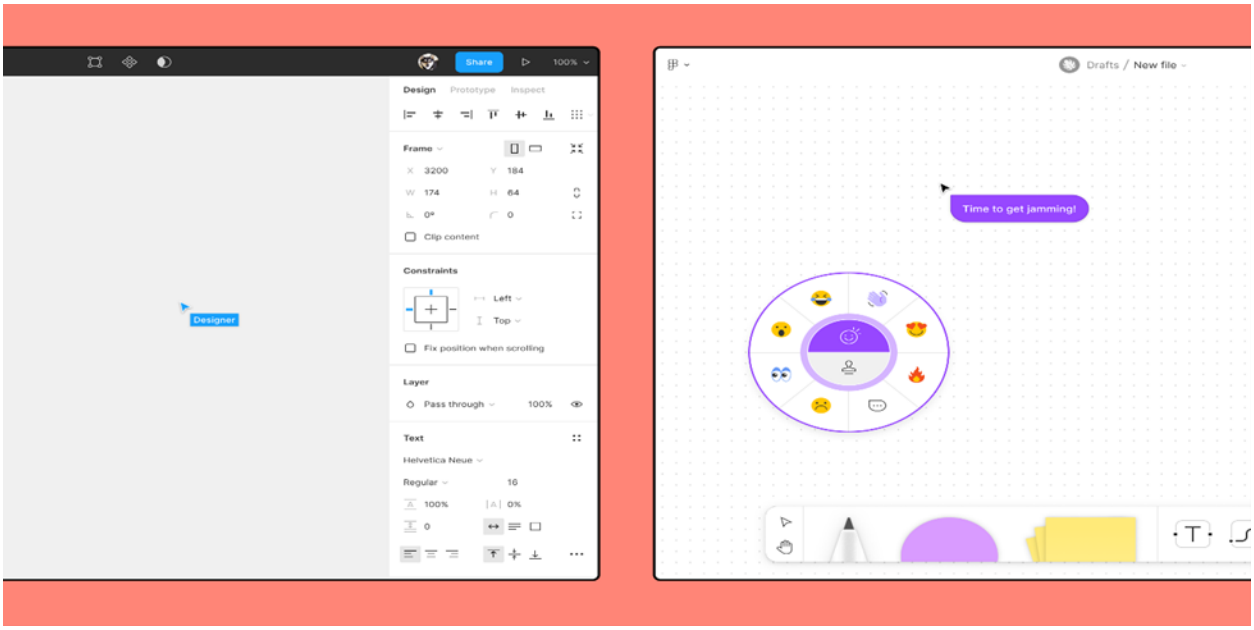
According to Writes, B. (2023). Figma is primarily a browser-based design tool. Whether you're using Chrome or Safari, Figma's browser compatibility ensures a smooth, feature-rich experience without heavy software installations. You can use it on any device with an internet connection. However, you can also install Figma's desktop app. It's supported on MacOS, Windows, and Linux. Irrespective of your operating system, Figma remains consistent in its offering, ensuring a familiar and intuitive interface. And if you're on the go and want to make some quick changes to your design when the inspiration kicks in, you can install the Figma mobile app on iOS and Android. Perhaps even more importantly, the browser version and app have almost the same features so you won't miss out on anything, no matter your choice. As a fully remote agency owner, the author finds this cross-device compatibility invaluable. It means that my team, regardless of their location, device preference, or operating system, can collaborate effectively and efficiently.

Based on Fernandes, J. (2023). A wireframe allows the designer to work with a client or developer and walk through the structure of the website without getting sidetracked by other elements such as colors, images or illustrations. When working with large sites, wireframing helps the designer determine which elements should be included on the page and which functionality needs to be set for each section. While there are no hard and fast rules to where you can create wireframes, be it a low fidelity wireframe on paper or a high fidelity one on software, on Figma, you can create wireframes by making use of pre-existing tools that you would use to make your final website. You can use the frame tool, which has presets of desktop and mobile sizes, or create your own dimensions. You can add grids (columns and rows) to your wireframe and create rectangles to denote where the elements on the page would be placed. This is essentially your blueprint for your website.

In addition to Martinez, P. (2023). Since Figma is a web-based tool, you can access it on any browser or computer of your choice. Also, you can find a wide range of designing tools in Figma to create wireframes of low and high fidelity. Besides that, there are several other designing and interactive options that you can explore in Figma. To use Figma for wireframing, *These are the recommended following steps:*

- Step 1: Get the Figma Wireframe Kit - Firstly, you can just go to the official website of Figma and access its online tool. Though, if you want to save your time, then you can get a readily available Figma wireframe kit from its website and include it in your account. There are all kinds of templates and designs in the kit to help you do wireframing in Figma easily.
- Step 2: Include the basic design elements - On the web interface of Figma, you can see all kinds of design elements on the side. All you need to do is just drag and drop the element and include it on your canvas. You can further adjust its CSS by changing its color, size, alignment, and so on. By following the same approach, you can work on multiple frames. For instance, if you want to create a wireframe of an app on Figma, then you can have different screens for it. You can just copy a design element and reuse it multiple times to provide a uniform appeal to your wireframe.
- Step 3: Finalize your Figma wireframe design - Using the same design elements, you can also create different versions of the Figma wireframe as well. In the end, you can use its inbuilt tool to link various screens and components of your wireframe with each other. This will provide high fidelity in the wireframe for Figma project of yours. When you are done, you can go to the Observation Mode of Figma to get a

real-time preview of how your wireframe design would look like. Later, you can also share this design with others and save it to the cloud.



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Visual Studio Code

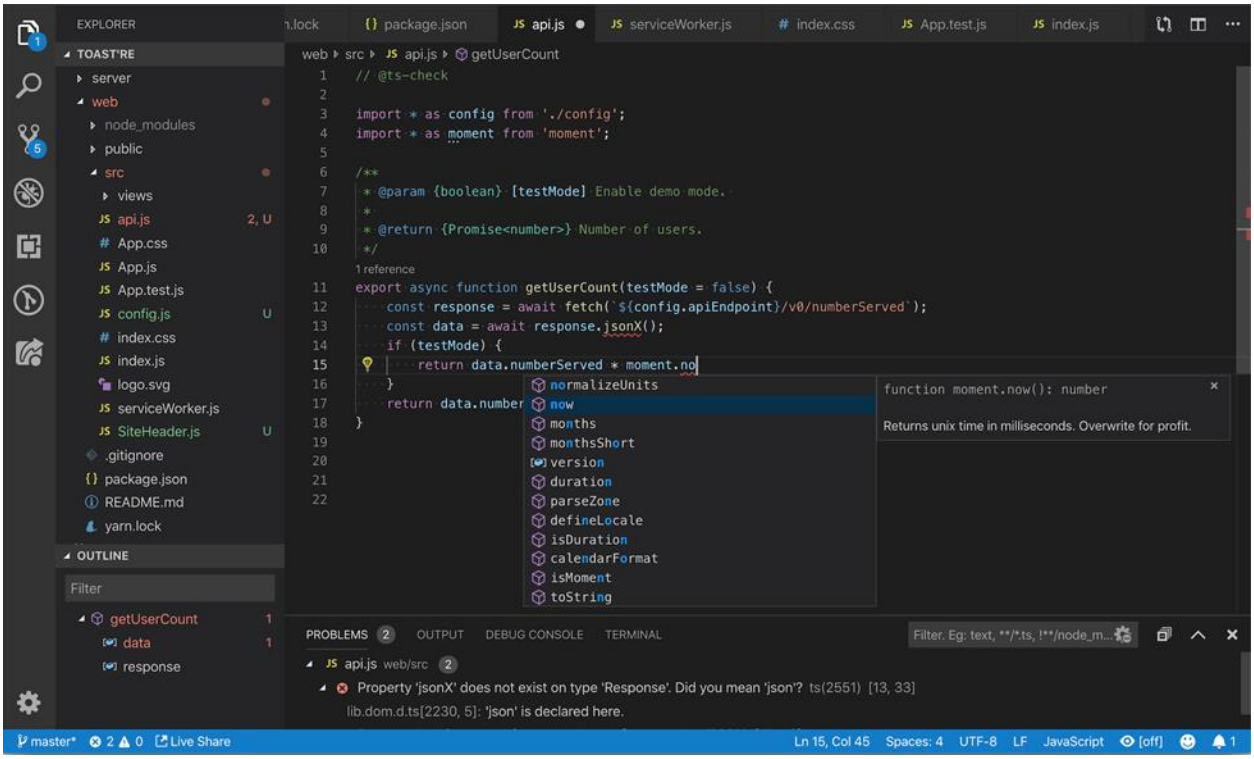
According to Murali, M. (2023). When developers collaborate on coding projects and debugging, they typically do so through an integrated development environment (IDE). Microsoft's Visual Studio is one of the most popular IDEs and has been around for 25 years. Visual Studio IDE allows programmers to create and edit their code collaboratively. It has extensions and includes tools to assist in building code. This lets you see in real-time what your teammates are working on so you can reduce redundancies. It has code completion with syntax highlighting, an AI coding model to assist with programming, and an analysis tool to help you with debugging.

Based on Quoy, L. (2024), there are pros to using Visual Studio Code (VSC):

- Comprehensive Development Environment: Visual Studio Code comes with a wide range of development tools pre-installed, eliminating the need for separate installations.
- IDE Capabilities: It functions as a robust Integrated Development Environment (IDE), supporting project building, interactive debugging, and code profiling.
- IntelliSense: Provides intelligent code suggestions, which are especially useful for languages like C++, enhancing coding efficiency.
- Advanced Code Profiling: Allows for in-depth code analysis and fine-tuning to achieve optimal performance.
- Team Collaboration: Includes built-in features that facilitate collaborative development, making it suitable for larger projects.
- Customized Language Support: Adapts to the specific programming language being used, offering tailored features and support.

In addition to Mir, M. A. (2023), there are several advantages to using Visual Studio Code (VSC). Visual Studio Code provides robust support for a wide range of programming languages, including Java, Python, C++, JavaScript, and more. It features syntax highlighting, code completion, and language-specific tools, making it an excellent choice for developers working with multiple languages. Additionally, Visual Studio Code is a powerful code editor with many features, such as Git integration, debugging tools, and extensions that allow for workflow customization. The high customizability of Visual Studio Code enables developers to configure the interface and keyboard shortcuts to their preferences, making it suitable for those who want to tailor their coding environment to their specific needs. Furthermore, Visual Studio Code boasts a large community of developers who create and maintain extensions and plugins, adding new

functionality to the editor. This extensive range of extensions can enhance the coding workflow. Lastly, Visual Studio Code is known for being fast and efficient, with a small footprint, making it an ideal choice for developers seeking a code editor that does not slow down their computer.



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ISO25010

According to Britton, J. (2021). ISO 25010, titled “Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models”, is a software quality standard. It describes the models, consisting of characteristics and sub-characteristics, for both software product quality, and software quality in use together with practical guidance on the use of the quality models.

ISO25010 describes two quality models: The first is the quality in use model composed of five characteristics (some of which are further sub-divided into sub-characteristics) that relate to the outcome of interaction when a product is used in a particular context of use. Second is a product quality model composed of eight characteristics (which are further sub-divided into sub-characteristics) that relate to static properties of software and dynamic properties of the computer system. Based on Britton, J. (2021). The characteristics and sub-characteristics provide consistent terminology for specifying, measuring and evaluating system and software product quality. They also provide a set of quality characteristics against which stated quality requirements can be compared for completeness. In addition to Britton, J. (2021). ISO 25010 is made up of eight product quality characteristics and 31 sub-characteristics:

Functional Suitability

Functional Suitability refers to how well a product or system is able to provide functions that meet the stated and implied needs.

- Functional Completeness: Refers to the set of functions that covers all of the specified tasks and user objectives.
- Functional Correctness: Refers to how well a product or system provides the correct results with the needed degree of precision.

- Functional Appropriateness: Refers to how well functions are able to accomplish specified tasks and objectives.

Reliability

Reliability refers to how well a system, product, or component performs specified functions under specified conditions.

- Maturity: Refers to how well a system, product, or component is able to meet your needs for reliability.
- Availability: Refers to whether a system, product, or component is operational and accessible.
- Fault Tolerance: Refers to how well a system, product, or component operates despite hardware and/or software faults.
- Recoverability: Refers to how well a product or system can recover data in the event of an interruption or failure.

Performance Efficiency

Performance Efficiency refers to the performance related to the amount of resources used.

- Time Behavior: Refers to the response and processing times, and throughput rates of a product or system while it’s performing its functions.
- Resource Utilization: Refers to the amounts and types of resources used by a product or system while performing its functions.
- Capacity: Refers to the maximum limits of a product or system parameter.

Usability

Usability refers to how well a product or system can be used to achieve specified goals effectively, efficiently, and satisfactorily.

- Appropriateness Recognizability: Refers to how well you can recognize whether a product or system is appropriate for your needs.
- Learnability: Refers to how easy it is to learn how to use a product or system.
- Operability: Refers to whether a product or system has attributes that make it easy to operate and control.
- User Error Protection: Refers to how well a system protects users against making errors.
- User Interface Aesthetics: Refers to whether a user interface is pleasing.
- Accessibility: Refers to how well a product or system can be used with the widest range of characteristics and capabilities.

Security

Security refers to how well a product or system protects information and data from security vulnerabilities.

- Confidentiality: Refers to how well a product or system is able to ensure that data is only accessible to those who have authorized access.
- Integrity: Refers to how well a system, product, or component is able to prevent unauthorized access and modification to computer programs and/or data.
- Non-repudiation: Refers to how well actions or events can be proven to have taken place.
- Accountability: Refers to the actions of an unauthorized user can be traced back to them.
- Authenticity: Refers to how well the identity of a subject or resource can be proved.

Compatibility

Compatibility refers to how well a product, system, or component can exchange information as well as perform its required functions while sharing the same hardware or software environment.

- Co-existence: Refers to how well a product can perform its required functions efficiently while sharing a common environment and resources with products, without negatively impacting any other product.
- Interoperability: Refers to how well two or more systems, products, or components are able to exchange information and use that information.

Maintainability

Maintainability refers to how well a product or system can be modified to improve, correct, or adapt to changes in the environment as well as requirements.

- Modularity: Refers to whether the components of a system or program can be changed with minimal impact on the other components.
- Reusability: Refers to how well an asset can be used in more than one system.
- Analysability: Refers to the effectiveness of an impact assessment on intended changes. In addition, it also refers to the diagnosis of deficiencies or causes of failures, or to identify parts to be modified.
- Modifiability: Refers to how well a product or system can be modified without introducing defects or degrading existing product quality.
- Testability: Refers to how effective the test criteria is for a system, product, or component. In addition, it also refers to the tests that can be performed to determine whether the test criteria has been met.

Portability

Portability refers to how well a system, product, or component can be transferred from one environment to another.

- Adaptability: Refers to how well a product or system can be adapted for different or evolving hardware, software, or other usage environments.
- Installability: Refers to how successfully a product or system can be installed and/or uninstalled.
- Replaceability: Refers to how well a product can replace another comparable product.

Britton, J. (2021) stated that software quality reflects how well software conforms to the design but also how it meets non-functional requirements such as security or maintainability as described by the characteristics in ISO 25010. Software quality measurement quantifies to what extent the software rates with regard to each of the characteristics.

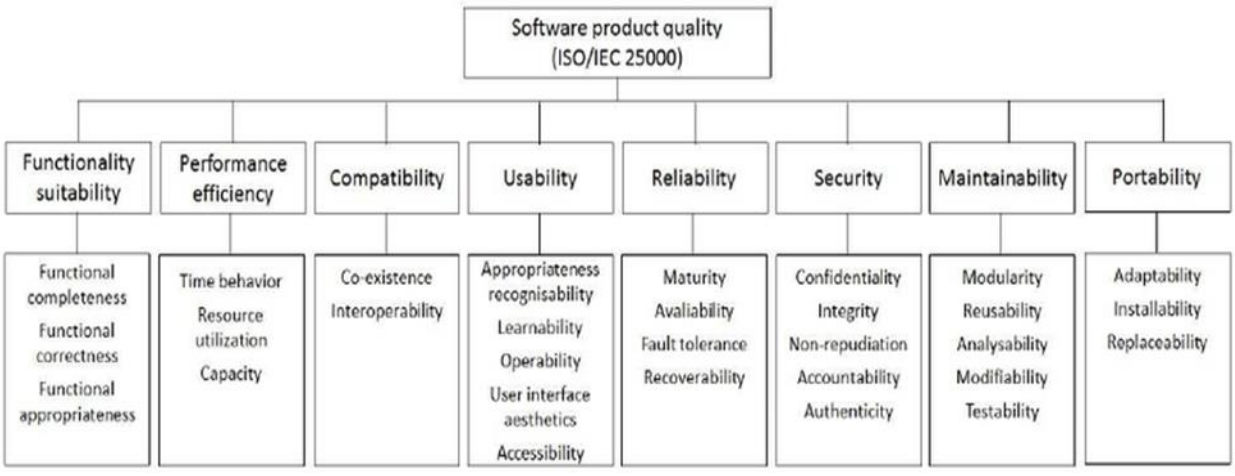
Within the characteristics, the software can be assessed as to:

- Can be tested.
- Is easy to understand and follow.
- Is easy to edit and upgrade without introducing new errors.

According to Rebes, P. (2024), in "Is ISO 25010 Standard Good For Everyone?", each project is different, so the list cannot be treated as a ready-made plan of action. It is essential to first consider what is important for the client and the user, from the very beginning of work with the client. Rebes emphasizes that every organization benefits from "best practices" and

predictability. Process standardization and automation of testing save considerable time and money, and help protect against common bugs. However, predicting obstacles and errors cannot be added to the product after it is already built.

Rebes further suggests that it is beneficial to include a QA team member in workshops with the client to ensure the client understands the role QA plays in the development process. A QA specialist can identify potential challenges early on and propose solutions. Even during the software creation process, it is useful to keep the ISO standard in mind, regardless of one's specific role, such as a frontend QA. ISO 25010 serves as a great framework for defining important software metrics for a particular project. It is not a comprehensive, detailed map, but rather a guide that can be used according to the circumstances. Every development project has different priorities and metrics, and this standard allows enough flexibility to accommodate all of them.



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Related Studies

Digital Human Resource Management Platform based on ChatGPT

According to Jinbo Zhou, & Weiren Cen (2023). Digital human resource management platform based on ChatGPT demonstrates significant advantages in personalized employee experiences, decision-making efficiency, and work productivity, holding greater potential and value compared to conventional human resource management platforms. Nevertheless, successful application of the platform necessitates further exploration and refinement to address data privacy and security concerns, provide appropriate training and support, and continuously improve and innovate platform functionalities and performance.

Research on performance management of ground service staff in Xiamen Airlines

According to Ye, S. (2024).An effective performance appraisal mechanism is crucial to motivate employees and improve service levels.Within the framework of human resource management, performance management plays a central role.which helps airlines maintain their advantages in the fierce market competition. In order to achieve this purpose, airlines must analyze the current performance evaluation system in depth and implement corresponding improvement

measures. Such a reform can not only promote the improvement of individual employee performance, but also enhance the service quality and market competitiveness of the whole airline.

DIGITAL HUMAN RESOURCE PRACTICES AND EMPLOYEE DEVELOPMENT IN NIGERIAN BANKING SECTOR

According to Okoro, G. O. (2024, May 2) as dimensions of digital human resource practice while measures of employee development were performance management and competence development. Study revealed that digital human resource practice is imperative and essential to employee development in the Nigerian banking sector. Digital human resource practice and employee development have become integral components of the Nigerian banking sector. By adopting digital HR practices, banks can enhance recruitment processes, improve employee training and development, streamline performance management, foster employee engagement, and retain top talent.

Digitalised talent management and automated talent decisions: the implications for HR professionals

Based on Wiblen, S., & Marler, J. H. (2021).By employing a qualitative case study with multiple embedded units of analysis, they show how the same digital talent management technology produced different ways of identifying talent even within the one organisation. Role of digitalisation plays in how various stakeholder groups (HR and line managers) identify talents and whether digitalisation transforms the role of HR professionals in identifying talent. In one social context, the material properties of the technology dominated, while in another the existing social context and relationships prevailed over the material properties of the technology. The findings

They've discovered have implications for understanding digital transformations by acknowledging what factors influence the role that digitalisation and automation have on the perceived legitimacy of HR professionals.

Recruiting digital talent: The strategic role of recruitment in organisations' digital transformation

according to Gilch, P. M., & Sieweke, J. (2020). Found that the recruitment of digital talent as a new target group triggers change within the company, and does so in three ways: First, recruiters have realised the necessity to adapt their measures and processes to the new target group. Second, recruiters have developed a new self-understanding. Third, recruiters have recognised the need to support the organisation's digital transformation by taking on a bridging function. Recruitment plays a central role during digital transformation because companies in many industries need to hire employees who possess IT-related knowledge, skills and abilities to digitalise their products, services and processes. The study they make has two contributions: First, they identified two new roles for recruitment during digital transformation: It acts as a 'sensory organ' that enhances the organisation's absorptive capacity; and it takes on the role of a 'mediator' between external and internal groups. Second, Study builds on the human resources (HR) literature by analysing the strategic implications that digital transformation imposes on recruitment, highlighting recruitment's part in renewing an organisation's human resource base, which is crucial for its digital transformation.

Digital human resource development: where are we? Where should we go and how do we go there?

According to Thite, M. (2020). The evolution of HR-Technology interface is leading up to the incorporation purposely to trace the digital world in Human Resource Development's design thinking, strategizing and execution. The purpose of the study is to trace the evolution of HR-Technology interface leading up to the incorporation of the digital world in Human Resource Development's design thinking, strategizing and execution. The paper presents a comprehensive framework that encompasses external demands, internal capabilities and key recommendations for a fit-for-purpose, future-focused Digital HR Strategy. it critically analyzes Digital HR in terms of where it is now (degree of alignment between external demands and internal capabilities), where it should be (future-focused HR technology strategy), and how it can reach there (implementation road map). In the process, the Study adopts a holistic perspective of virtual HRD (VHRD) and draws implications for technology-led developments in the HRD field.

The Influence of Social Networks on the Digital Recruitment of Human Resources: An Empirical Study in the Tourism Sector

Based on Oncioiu, I., Anton, E., Ifrim, A. M., & Mândricel, D. A. (2022).It is crucial to develop a digital recruitment strategy and communicate a good employer brand, supported by targeted digital advertising. The global employment landscape will continue to change due to new technologies, in particular automation, online collaboration tools, and artificial intelligence. The study identifies the impact of social networks on the effectiveness of digital human resources recruitment strategies in tourism. The integration of the digital transformation of human resources management in the field of tourism in consolidating the business model requires the adoption of sound employee selection strategies to identify that value-added information is not only relevant

to the company's activities but at the same time significantly impacts the decisions of stakeholders/users, thus reducing the overload of risk information. Therefore, the situation in the labor market in the field of tourism has changed, and employees have become a rare commodity.

Exploring Human Resource Management Digital Transformation in the Digital Age

According to Zhang, J., & Chen, Z. (2023).human resource management can be digitally transformed in the context of the digital economy. The drivers, directions, and impacts of human resource management digital transformation constitute the major study content. The study proposes that five factors—internal customer digital needs, industry digital innovation, competitor challenges, digital innovation governance, and digital era needs—drive human resource management digital transformation. The study points out that digital human resource management processes refer to the implementation of selection, training and development, and assessment functions leveraging state-of-the-art digital technologies.

Conceptual Model of the Study

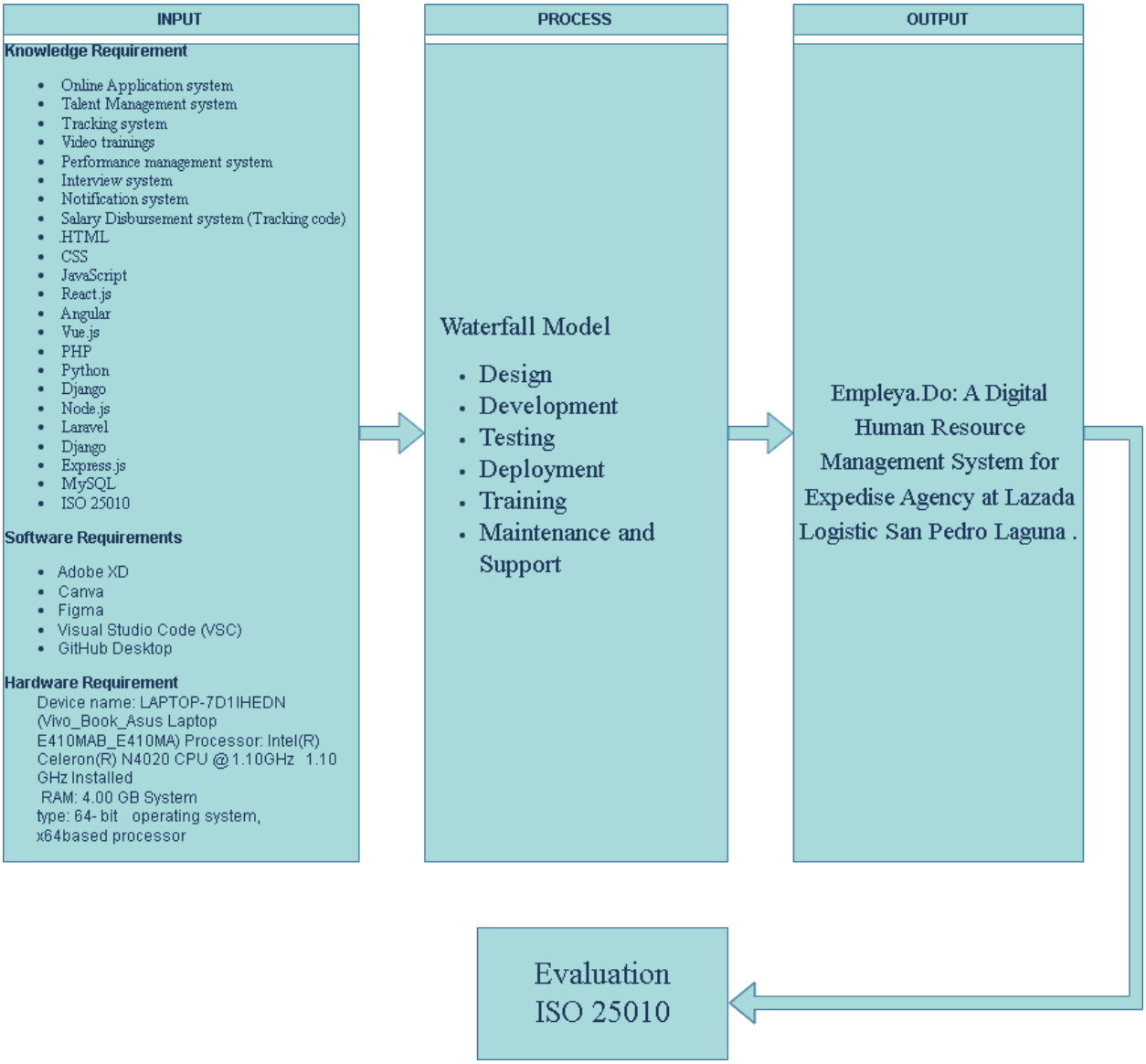

FIgure ???. Conceptual Model of The Study

Input:

The input section lists the knowledge and software requirements for the project. These include various web technologies, programming languages, design tools, and the hardware specifications of the device to be used for development.

Knowledge Requirement: Online Application system Talent Management system Tracking system Video trainings Performance management system Notification system Interview system Salary Disbursement system (Tracking code) HTML, CSS, JavaScript, React.js

Software Requirements: Angular, Vue.js, PHP, Python, Django, Node.js, Laravel, Express.js, MySQL Adobe XD, Waterfall Model

Hardware Requirement: Device name: LAPTOP-7D1IHEDN (Vivo_Book_Asus Laptop E410MAB_E410MA) Processor: Intel(R) Celeron(R) N4020 CPU @1.10GHZ 1.10 GHz Installed RAM: 4.00 GB System type: 64-bit operating system, x64based processor

Process:

The process section explains the development methodology, which is the Waterfall Model. The Waterfall Model is a linear sequential approach, where each phase of the development cycle is completed before moving to the next. This includes phases like:

Design: Conceptualizing the system architecture and functionalities. Development: Coding and building the system. Testing: Ensuring the system functions as intended and identifying and fixing any bugs. Deployment: Making the system available to users. Training: Providing instructions and guidance to users on how to use the system. Maintenance and Support: Ongoing upkeep and troubleshooting of the system.

Output:

The output section describes the final product of the development process. It's a digital human resource management system designed specifically for Expedise Agency, a logistics company in San Pedro Laguna. The system includes features such as:

Employee management Time and attendance tracking Performance evaluation Salary and benefits management Training and development Recruitment and onboarding

Evaluation:

The final step involves evaluation using ISO 25010. This standard provides guidelines for software quality evaluation, ensuring that the system meets the required standards and user expectations. The evaluation process includes assessing the system's functionality, performance, compatibility, usability, maintainability, and portability.

Operational Definition of Terms

The following terms or Phrases are defined to better understand the study:

Collaboration refers to the technique of facilitating collaboration amongst researchers, consisting of features consisting of task control equipment, model management, and real-time commenting, through an internet-primarily based device.

Communication refers to the method of facilitating communique amongst researchers, contributors, and stakeholders via an internet-based gadget.

Compliance with Regulations refers to the ability of web-based systems to meet regulatory requirements related to research data management, such as GDPR or HIPAA.

Data Collection refers back to the technique of gathering records from members, which includes surveys, questionnaires, or behavioral facts, through an internet-based system.

Empleya.Do refers to a digital Human Resource Management System that will be implemented in Expedise Agency, a logistics company in San Pedro Laguna.

Enhanced Collaboration refers to the potential of web-primarily based systems to facilitate collaboration amongst researchers, improving verbal exchange and lowering the threat of misunderstandings.

Human Resource Management Computer System refers to a system that aims to offer technical assistance for the carrier first-rate of organization human useful resource management commercial enterprise.

Inclusive Talent Development refers back to the technique that makes a speciality of developing all personnel, no longer simply top or elite expertise, thereby lowering skills mismatched and improving ordinary organizational skills.

Online Recruitment refers back to the practice of using era and particularly internet-based total methods for duties which contain locating, attracting, assessing, interviewing, and hiring new personnel.

Participant engagement refers to the manner of enticing members inside the studies manner, which includes supplying feedback on the have a look at, asking questions, or presenting extra facts, through an internet-based totally system.

Performance Management System: refers to a system that measures, tracks development, and evaluates the effectiveness of worker performance.

Scalability refers to the ability of web-based systems to handle large amounts of data and increase in capacity as needed

Strategic Talent Management System: refers to an important situation for developing and keeping talent, which allows organizations or a corporation to compete successfully.

Support and Maintenance refer to the level of technical support and maintenance provided by the web-based system's developers or vendors

Web-Based System refers to a utility that is accessed through HTTP.

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Chapter 3

METHODOLOGY

This chapter includes the project design, project development, procedure for operation and testing, and the procedure for evaluation of the study.

Project Design

The project design for the Digital Human Resource Management System at Expedise Agency explained below using theUML diagrams or Unified Modeling Language diagrams, wire frame, System Flowchart and UI design.

Use Case Diagram.

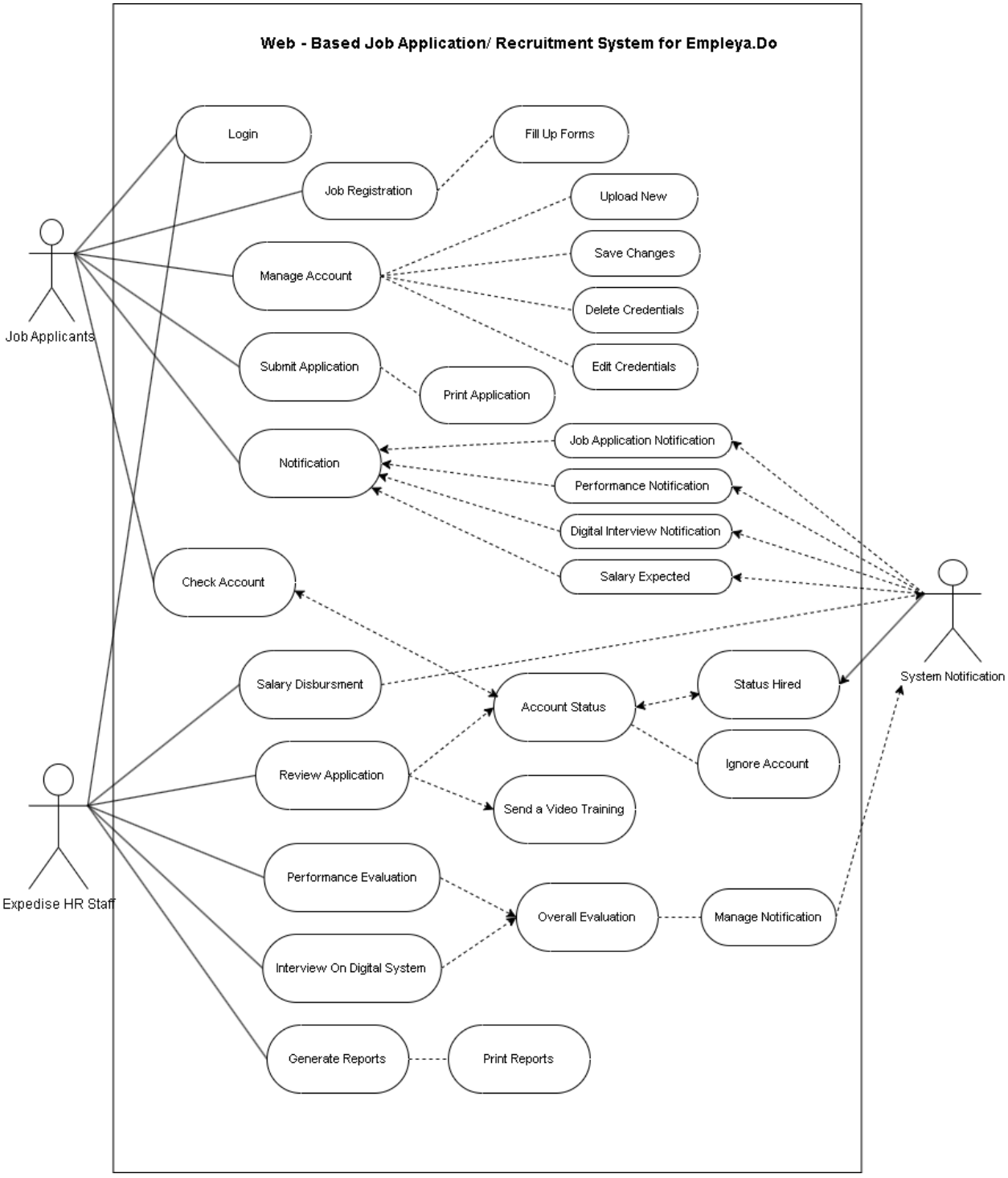

Figure:## **Use Case Diagram**

Job applicants engage in several functionalities, including login, job registration, fill up forms, performance notification, delete credentials, save changes, upload new, digital interview

notification, salary expected, job registration, job applicants, submit application, print application, edt credentials, job application notification, salary disbursement, system notification, status hired, account status, ignore account, send a video training, review application, overall evaluation, manage notification, interview on digital system, print reports, generate reports, and manage account.

The "job registration" module offers options such as filling out profile information and submitting applications. In the "fill up forms" section, additional options like uploading new credentials and editing existing ones are available. Similarly, the "submit application" section extends functionalities like tracking application status and receiving notifications.

The Expedise HR staff, on the other hand, has relationships with various functionalities, including login for accessing the HR account, manage notification, interview on digital system, print reports, generate reports, manage account, notification, check account, performance evaluation, and expedise HR staff. In the "manage account" module, there is a "check account" feature that allows HR staff to view candidate profiles. Additionally, the "performance evaluation" module includes the ability to review candidate applications and provide feedback.

By accurately representing these relationships and functionalities, the use case diagram effectively communicates the system's interactions, allowing for a comprehensive understanding of the Web-Based Job Application and Recruitment System for Empleya.Do and its operations.

Model Hierarchy Chart

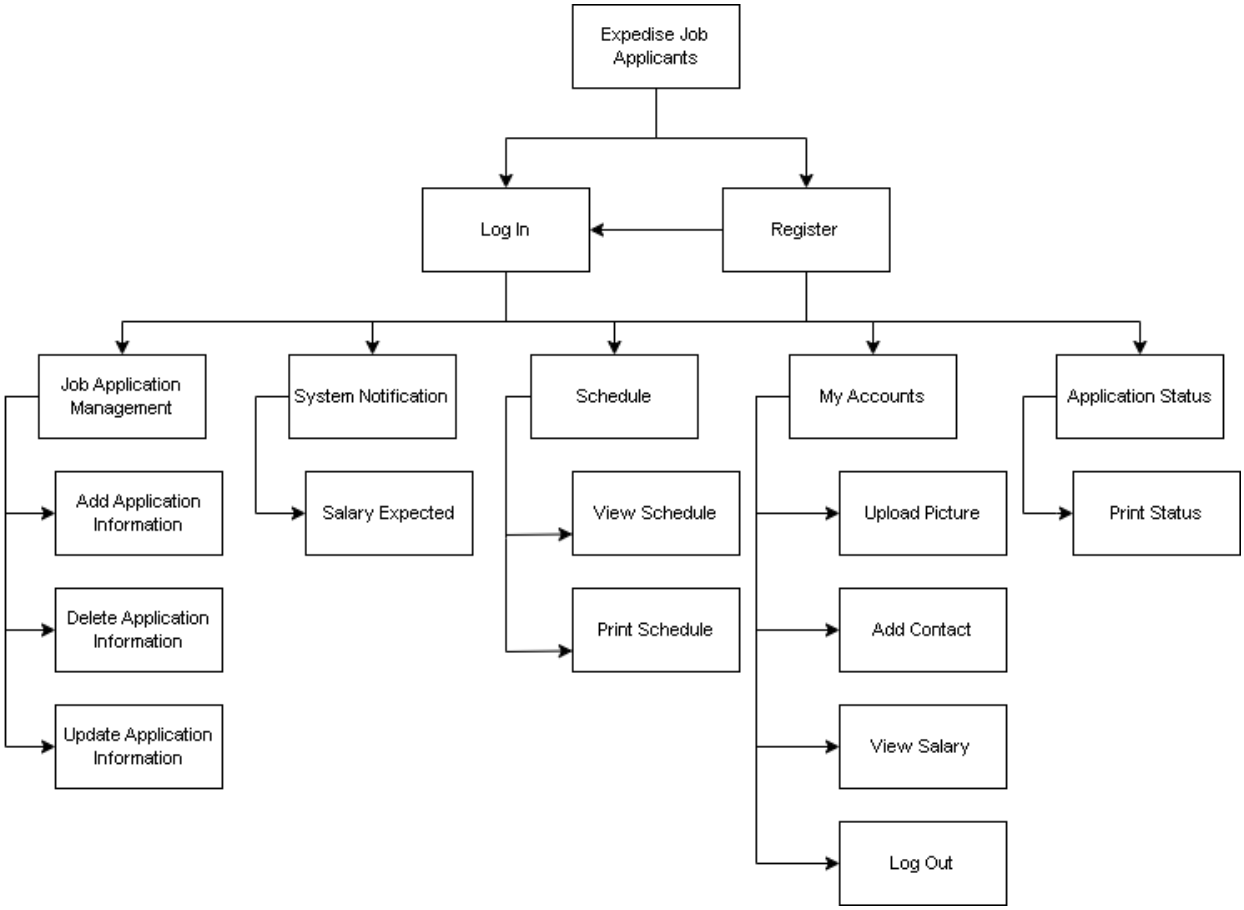

***Figure*: Hierarchy Chart for Job Applicants Module**

The hierarchy chart for the Web-Based Job Application/Recruitment System for Empleya.Do presents the flow of functionalities within the "Expedise Job Applicants" system. The chart is divided into two main sections: one for registered users who log in and another for unregistered users who register.

For registered users, the system offers several modules to manage their job application process.

The "Job Application Management" module allows users to add, delete, and update their job application information. The "System Notification" module keeps users informed about any updates or changes related to their job application. The "Schedule" module enables users to view and print schedules related to job interviews or other events. The "My Accounts" module allows

users to manage their account information and preferences. The "Application Status" module provides users with information about the current status of their job application.

For unregistered users, the "Application Status" module is the only available option, allowing them to check the status of their job application.

After logging in or registering, users can perform common actions such as adding application information, specifying their desired salary range, uploading a profile picture, printing their application status or schedule, adding contact information, viewing the offered salary for a particular job, and logging out of the system.

Overall, the hierarchy chart provides a clear and concise overview of the functionalities available to users within the "Expedise Job Applicants" system, making it easy for them to navigate and manage their job application process.

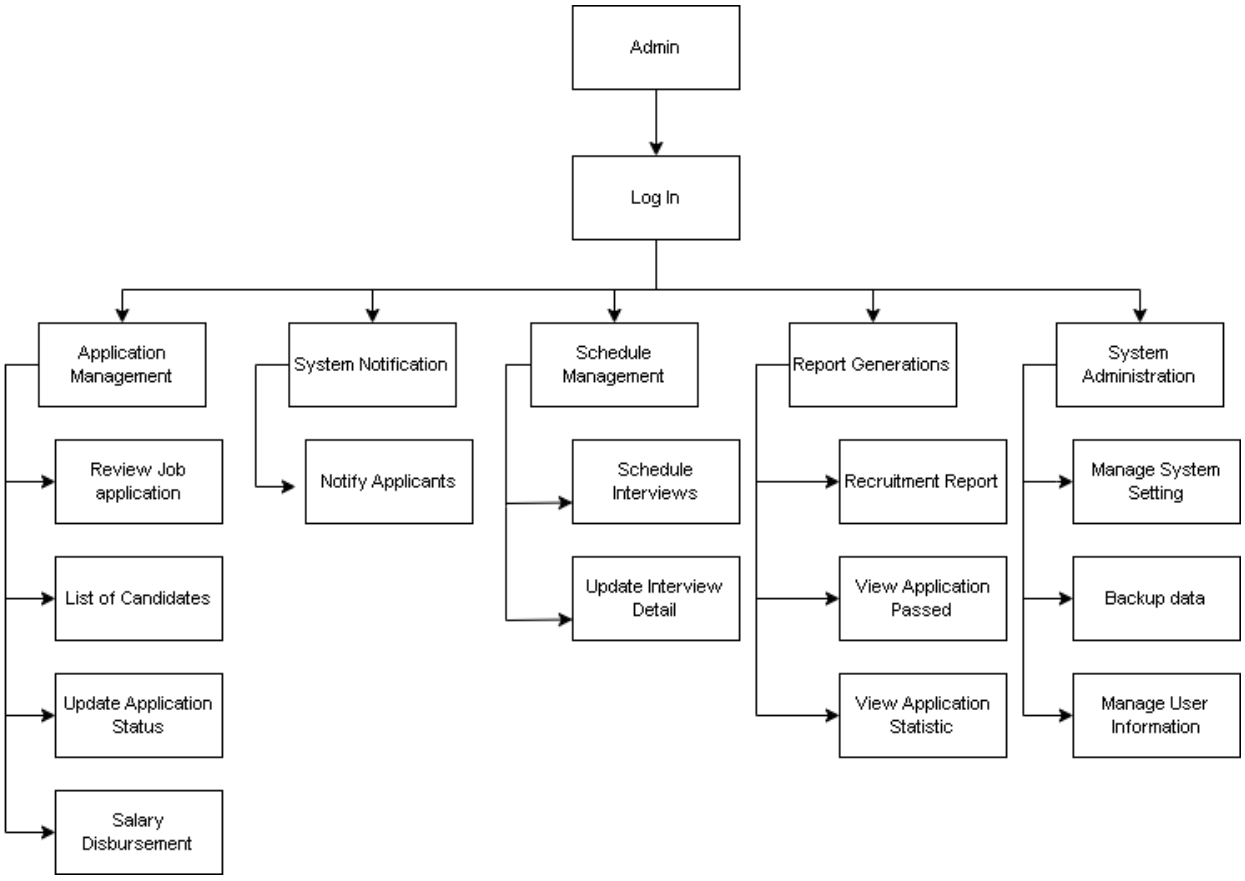

***Figure*: Hierarchy Chart for HR Module**

In figure## presents the hierarchy chart for the HR module in a visually appealing and accurate manner. Each module is represented by a box containing its name. The chart showcases the breakdown of the recruitment module into smaller modules for specific activities, with each sub-module connected underneath its parent module.

The recruitment module starts with the Admin who has to log in to access the functionalities. The admin has access to four main options: Application Management, System Notification, Schedule Management and System Administration.

The Application Management module is responsible for reviewing the job application, maintaining a list of candidates, updating application status and processing salary disbursements.

The System Notification module sends notifications to applicants. The Schedule Management module is responsible for scheduling interviews and updating interview details. The System Administration module handles Recruitment Reports, managing system settings, backing up data and managing user information. The Recruitment Report module enables viewing application details of candidates who have passed and viewing the application statistics.

The Manage System Setting module allows managing the overall settings of the system. The Backup data module backs up the system data. The Manage User Information module allows managing the user information.

Context Level Diagram lvl 0

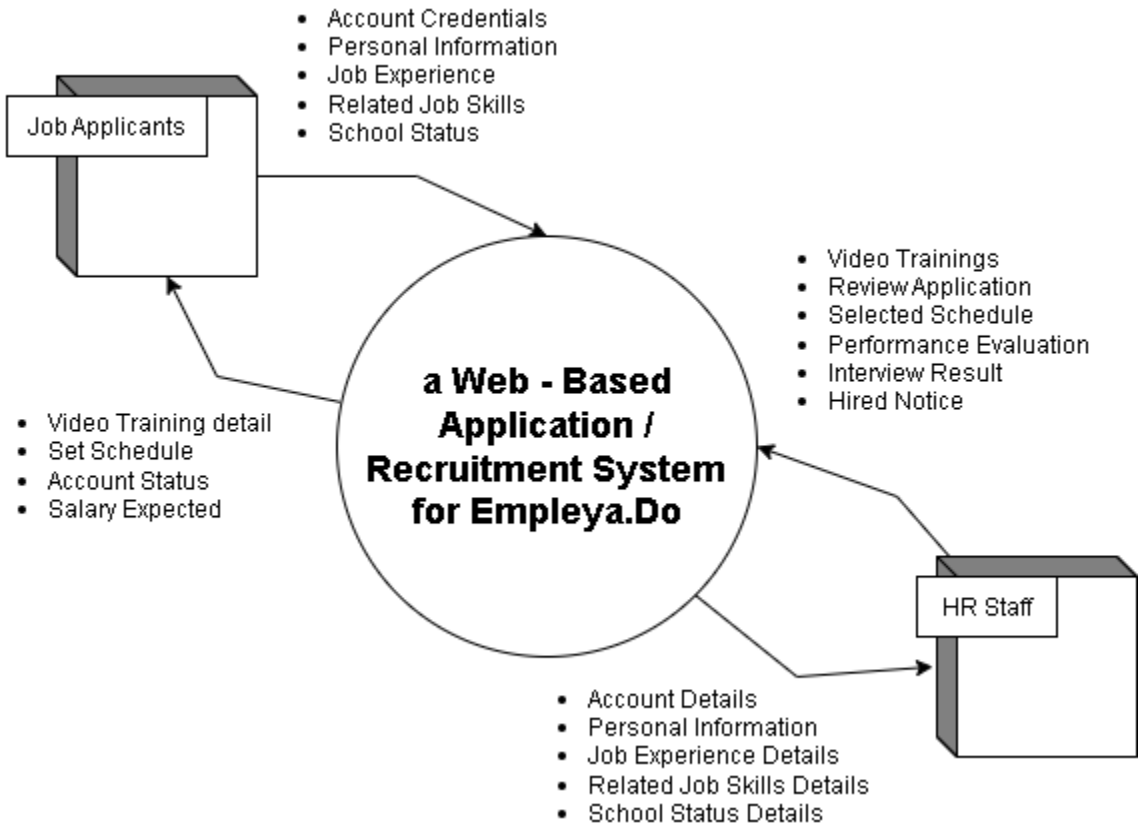

Figure . Context Level Diagram Level 0

Figure ## shows the Context Level Diagram of the online recruitment system for Empleya.Do. This diagram shows the flow of data between the external entities and the whole system.

The system has three external entities interacting with it: job applicants, HR staff and a web based application.

Job applicants give their account credentials, personal information, job experience, related job skills, and school status to the system. Then, they receive video training details, set schedule, account status, and salary expectations.

HR staff gives account details, personal information, job experience details, related job skills details, and school status details to the system. Then, they receive video trainings, review application, selected schedule, performance evaluation, interview results, and hired notice.

The web based application serves as the platform where the recruitment process takes place. It receives data from both job applicants and HR staff and facilitates the communication and interaction between them.

Context Level Diagram lvl 1

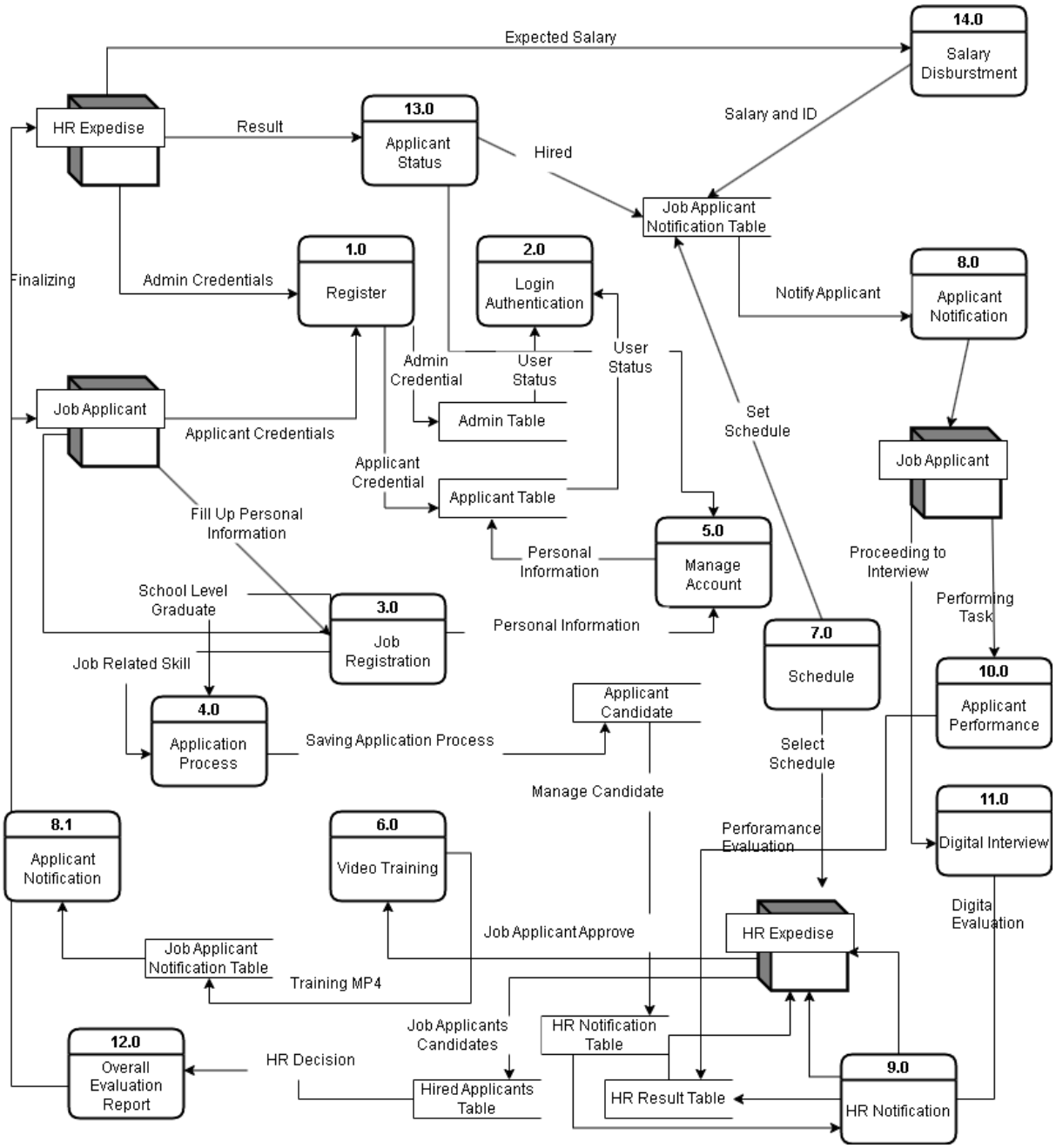

Figure . Data Flow Diagram Level 1

Figure shows the Data Flow Diagram.This level shows deeper details about the flow of data in the system, including the system's subsystems and module processes.

The system has several external entities, including HR Expedise, Job Applicants, Applicant Candidates, and PayPal. The HR Expedise entity is responsible for managing the overall hiring process. Job Applicants represent the applicants applying for a job, while Applicant Candidates represent the candidates who have been selected for an interview. PayPal is responsible for processing the payment for the candidate's background check.

When a Job Applicant registers, they provide admin credentials, which are stored in the Applicant Table and the Admin Table. They also need to provide admin credentials when they log in, which are checked in the Applicant Table and the Admin Table. The system then sends a status update to almost all the program's processes.

After logging in, Job Applicants can input their personal information in the Fill Up Personal Information module, which is stored in the Applicant Table. They can also apply for a job in the Job Registration module, which is stored in the Applicant Table. The system allows HR to manage the applicant's application, update the status of the application, and schedule interviews.

The system also allows for video training, digital interviews, and performance evaluations. The applicant's performance is tracked during the interview process, and an overall evaluation report is generated for each applicant. The system updates the applicant's status as they proceed through the application process.

On the HR side, after logging in, they can manage the applicant's application, verify their information, and update their status. They can also access order or purchase details, manage orders, and send shipping details. HR can also manage products, update product details, and access report details and business insights.

The system stores data in several tables, including the Applicant Table, Applicant Candidate Table, Notification Table, Job Applicant Notification Table, User Status Table, Admin Table, Hired Applicants Table, and HR Result Table. The system also allows for data flows between these tables, including applicant credentials, admin credentials, personal information, job-related skills, set schedules, performance evaluations, digital evaluations, expected salaries, and salary and ID information.

Overall, this system is designed to manage the applicant tracking process, from the initial application to the final hiring decision. It allows applicants to apply for jobs, HR to manage applications, and tracks the progress of the application process.

Entity Relationship diagram

Figure 1 shows the Entity Relationship Diagram for the proposed project, illustrating the database design and the relationships between entities. The main entities include Job Applicant, Job Application, Interview, Account, Notification, HR Staff, and Report.

The Job Applicant entity stores information about job applicants. Each Job Applicant can submit many Job Applications, receive many Notifications, and has one Account. The Job Application entity stores information about job applications and is linked to the Job Applicant entity, where one Job Application can result in one Interview. The Interview entity, which stores details about interviews, can trigger many Notifications.

The Account entity stores information about user accounts, with each Job Applicant having one Account. The Notification entity stores details about notifications sent to users, where one Job Applicant can receive many Notifications.

The HR Staff entity stores information about HR staff. Each HR Staff member can review many Job Applications, manage many Notifications, and generate many Reports. The Report entity stores information about reports, each of which is generated by an HR Staff member.

This design effectively supports managing the recruitment process, tracking applications, interviews, and communications with applicants and staff.

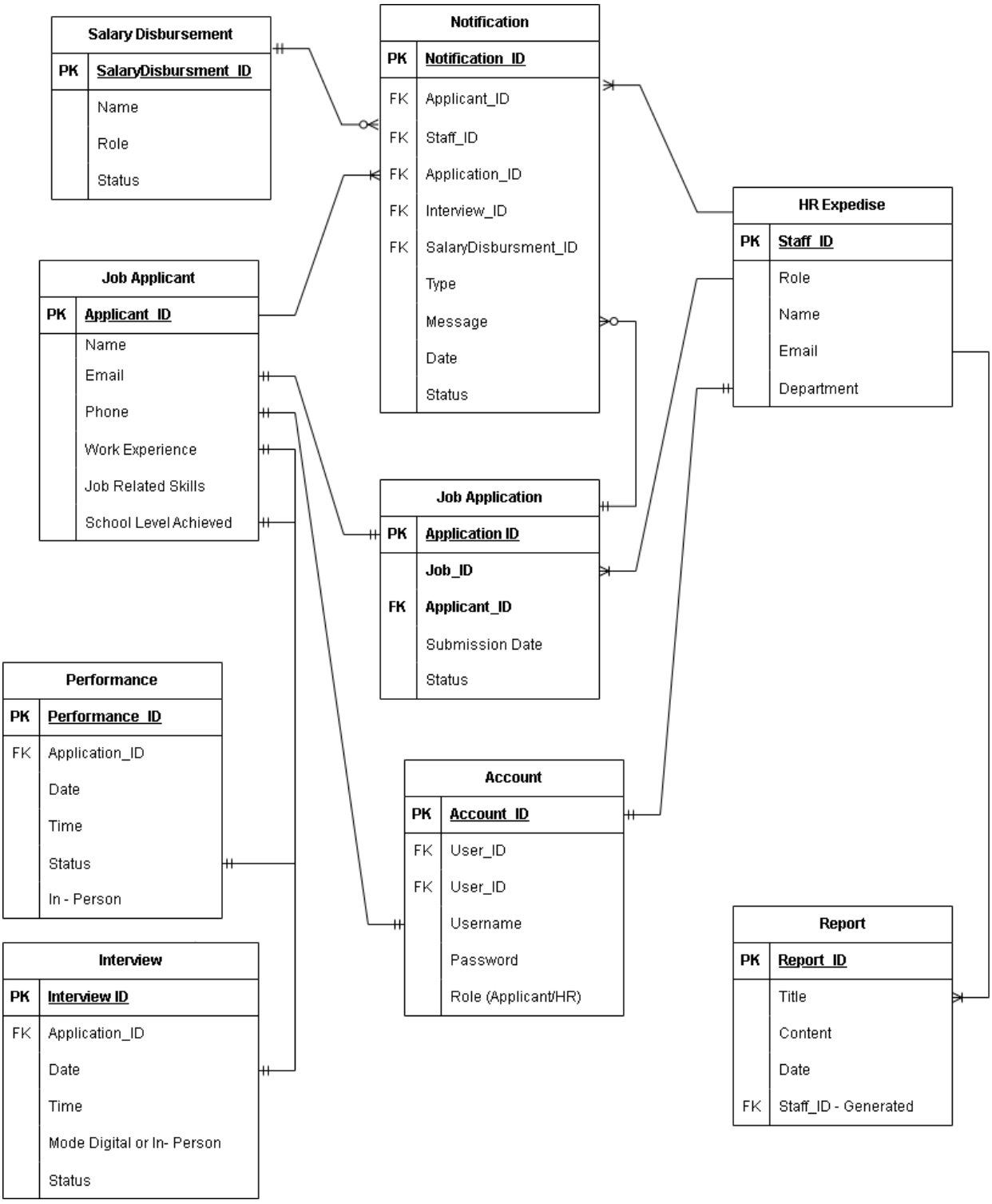

Figure . Entity Relationship Diagram**.**

System Flow Chart

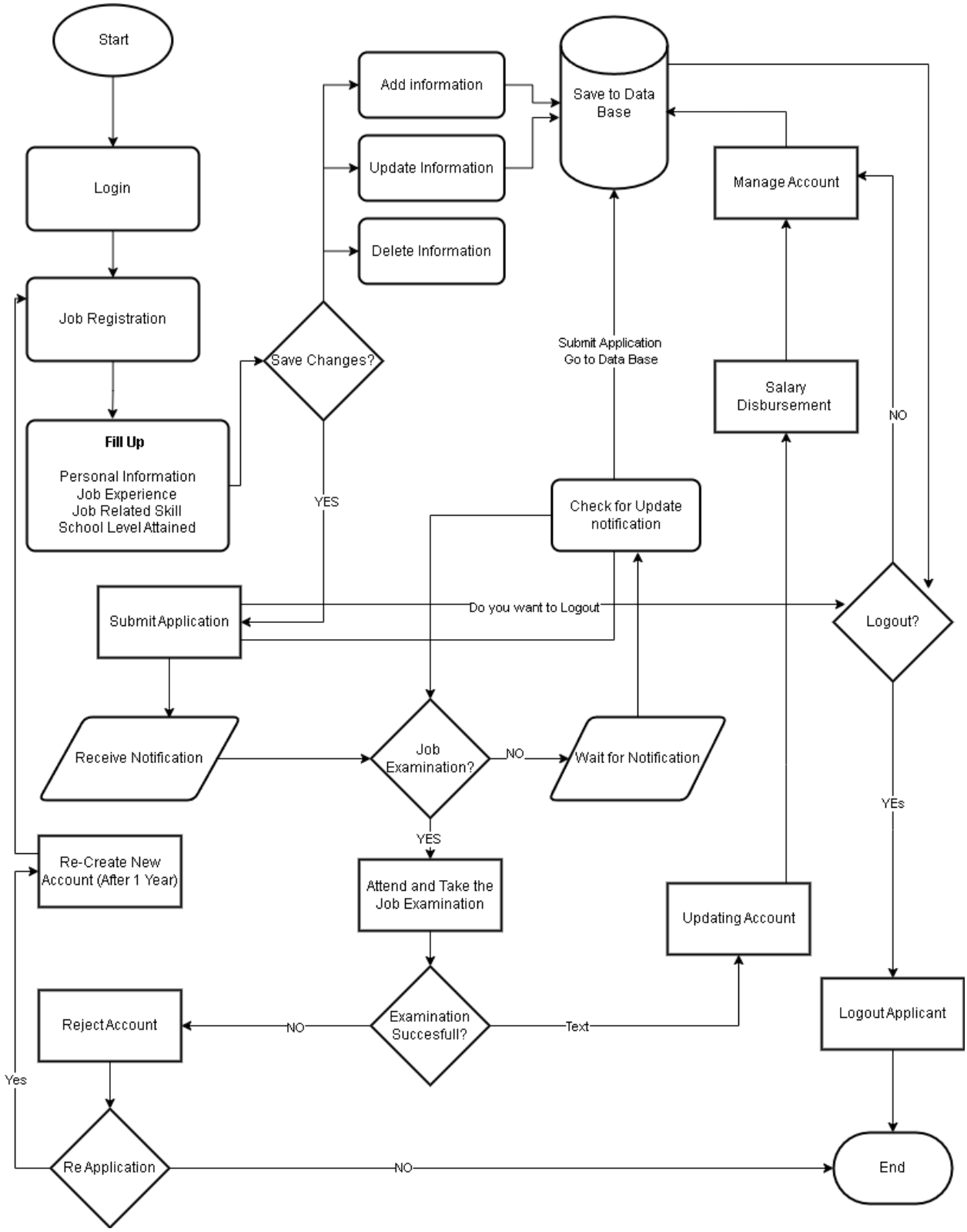

Figure . System Flow Chart

Wire Frame

Project Development

The Digital Human Resource Management System was developed using the waterfall model methodology that helped the researchers to determine specific modules and features that are accomplished during each distinct phase of the development process.With the given methodology, the researchers easily identified the problems that are encountered by the digital human resource management system and provided solutions regarding these problems. This allowed the researchers to progress efficiently and effectively during the project development.

The waterfall model or methodology is so described because the stages of a project tend to be sequential rather than iterative, i.e. each phase needs to be completed before the next phase starts. With its structured and sequential nature, the waterfall process brings a level of clarity to project management, offering a multitude of benefits for all stakeholders.It can make your projects flow smoothly, avoid bottlenecks, help you hit deadlines, ensure deliverables are met before the next phase begins, and allow the team overall to shine with perfection (Outcome, B. 2023).

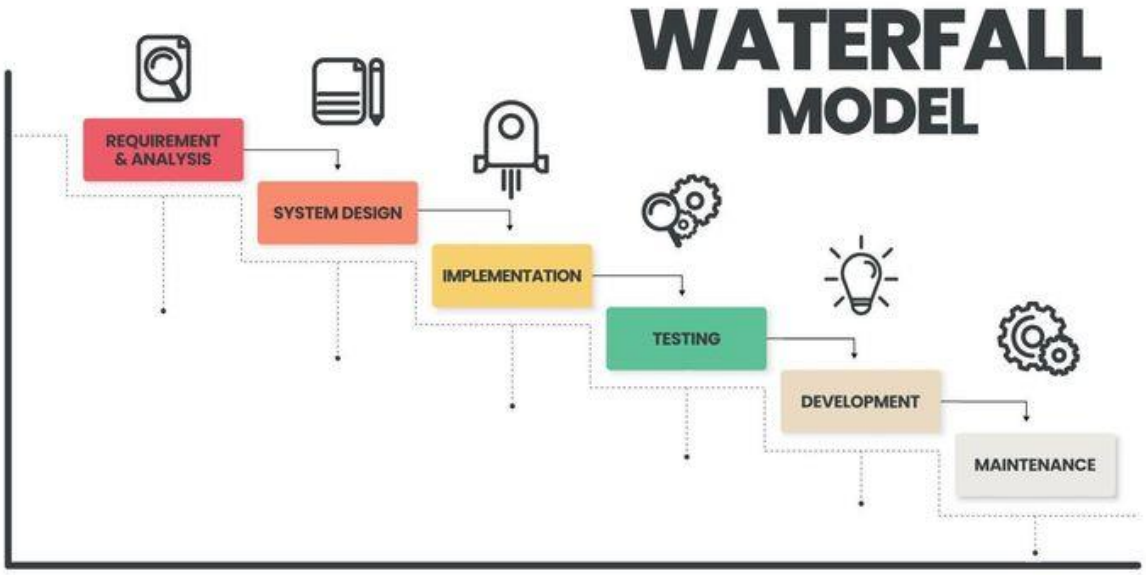

Figure ##: Waterfall Model Framework

Phases:

Requirements Gathering: In this initial phase, the researchers gathered and documented the requirements for the Digital Human Resource Management System (DHRMS). This involved understanding the needs of the collaborators and translating them into specific features and functionalities.

System Design: Once the requirements were established, the system architecture and design were planned out in detail. This phase focused on creating a blueprint for the DHRMS, including database design, user interface design, and system architecture.

Implementation: With the system design in place, the actual coding and development work began. This phase involved writing the code, integrating different components, and building the DHRMS according to the specifications outlined in the design phase.

Testing: After the implementation phase, rigorous testing was conducted to ensure that the DHRMS met the specified requirements and functioned correctly. This phase involved various types of testing, including unit testing, integration testing, system testing, and user acceptance testing.

Deployment: Once the DHRMS passed all the testing phases and was deemed ready for production, it was deployed to the live environment. This involved installing the software, configuring it for use, and training end-users on how to use the system effectively.

Maintenance: After deployment, the DHRMS entered the maintenance phase, where ongoing support and updates were provided as needed. This phase ensured that the system remained functional, secure, and aligned with the evolving needs of the organization.

Roles:

Project Manager: Oversees the entire development process, ensuring that the project stays on track and meets its objectives within the specified timeframe and budget.

Software Developer: Responsible for writing code and implementing the DHRMS according to the design specifications.

System Analyst: Analyzes the requirements gathered from stakeholders and translates them into detailed system specifications.

Quality Assurance Tester: Conducts thorough testing of the DHRMS to identify and resolve any issues or bugs before deployment.

Technical Support: Provides ongoing support and assistance to end-users, addressing any issues or concerns that arise post-deployment.

Tools:

Requirement Gathering Tools: Software tools such as Microsoft Excel, Google Sheets, or specialized requirements gathering software to document and organize stakeholder requirements.

Design Tools: Software tools like Adobe XD, Figma, or Microsoft Visio for designing the system architecture, database schema, and user interface.

Development Tools: Integrated Development Environments (IDEs) like Visual Studio for writing and debugging code.

Testing Tools: Automated testing tools like Selenium, JUnit, or Postman for conducting various types of testing, including unit testing, integration testing, and system testing.

Deployment Tools: Configuration management tools like Ansible and Puppet for automating the deployment process and ensuring consistency across different environments.

Maintenance Tools: Issue tracking and project management tools like Jira, Trello, or Asana for managing ongoing maintenance tasks and tracking software updates and bug fixes.

Operation and Testing Procedure (LINGAL)
Evaluation Procedure (DEM & LINGAL)

REFERENCES SA CHAP 3

Outcome, B. (2023, June 29). Advantage Of The Waterfall Methodology [2023] » BestOutcome. *BestOutcome*. https://bestoutcome.com/knowledge-centre/waterfall-methodology-advantage/#