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INFORMATION TECHNOLOGIES IN THE DEVELOPMENT OF WEB RESOURCES

The article focuses on an overview, analysis and examples of the use of information technology in the development of web resources. Information technology is a field of knowledge and practical applications related to the collection, processing, storage, transmission and use of information using computer systems. Information technology is used in various industries, such as business, medicine, education, science, entertainment, and many others.

Information technology covers a wide range of technologies, including software, hardware, networks, and other tools that help in managing information. They are used at every stage of web resource development, from design to deployment and support. The article describes the key aspects of IT: programming languages and frameworks; databases that can be used to store information on a web server, as well as to provide access to data through web applications using programming languages and frameworks; web servers and hosting; version control systems that help developers effectively manage code and work together on projects of any complexity; security (ensuring the security of web resources includes the use of encryption methods, data validation, protection against Testing and debugging are iterative processes that are repeated throughout the development cycle to ensure the quality and reliability of a web application). They can be used to automate business processes, increase productivity, ensure data security, simplify communication, and provide access to information.

Keywords: information technology, programming, testing, web application, software, application.

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ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ ПРИ РОЗРОБЦІ ВЕБ-РЕСУРСІВ

Стаття зосереджується на огляді, аналізі та прикладах застосування інформаційних технологій при розробці веб-ресурсів. Інформаційні технології - це область знань та практичних застосувань, пов'язаних із збиранням, обробкою, зберіганням, передачею та використанням інформації за допомогою комп'ютерних систем. Інформаційні технології використовуються в різних галузях, таких як бізнес, медицина, освіта, наука, розваги та багато інших.

Інформаційні технології охоплюють широкий спектр технологій, включаючи програмне забезпечення, апаратне забезпечення, мережі та інші інструменти, що допомагають в управлінні інформацією. Вони використовуються на кожному етапі розробки веб-ресурсів, починаючи від проєктування і закінчуючи розгортанням та підтримкою. В статті наведені ключові аспекти застосовуються IT: мови програмування та фреймворки; бази даних, які можуть використовуватися для зберігання інформації на веб-сервері, а також для забезпечення доступу до даних через веб-додатки за допомогою мов програмування та фреймворків; веб-сервери та хостинг; системи контролю версій, які допомагають розробникам ефективно керувати кодом та спільно працювати над проектами будь-якої складності; безпека (забезпечення безпеки веб-ресурсів включає в себе застосування методів шифрування, валідацію даних, захист від атак типу SQL ін'єкцій, а також застосування правильних практик автентифікації та авторизації користувачів); тестування та відладка (після виявлення помилок під час тестування виконується процес відладки, який включає усунення та виправлення виявлених проблем у програмному коді. Тестування та відладка є ітеративними процесами, що повторюються протягом усього циклу розробки для забезпечення якості та надійності веб-додатка). Вони можуть бути використані для автоматизації бізнес-процесів, збільшення продуктивності, забезпечення безпеки даних, спрощення комунікації та забезпечення доступу до інформації.

Ключові слова: інформаційні технології, програмування, тестування, веб-додаток, програмне забезпечення, застосування.

Statement of the problem

Information technology (IT) is a broad term that covers any technology related to the processing, transmission and storage of information. This includes hardware (computers, servers, network equipment), software (operating systems, programs, applications), and procedures, algorithms, methods, and strategies used to process information.

IT is used in various fields such as business, medicine, education, science, entertainment and many others. They can be used to automate business processes, increase productivity, ensure data security, simplify communication and ensure access to information.

In recent years, the development of IT has played an important role in societal and technological progress, opening up new opportunities for innovation, changing the ways in which people work, learn, communicate and have fun.

The purpose of the research is a review, analysis and examples of the use of information technologies in the development of web resources.

Presentation of main material

Information technology (IT) is the field of knowledge and practical applications related to the collection, processing, storage, transmission and use of information using computer systems. They encompass a wide range of technologies, including software, hardware, networks, and other tools that assist in information management [1].

Information technologies are used at every stage of development of web resources, starting from design and ending with deployment and support. Here are some key aspects where they apply.

Programming languages and frameworks

Various programming languages are used to develop web resources, such as HTML (HyperText Markup Language) used to create the structure and content of web pages; JavaScript is a programming language used to create interactive elements on web pages, including animation, event handling, DOM manipulation, etc., Python is a general-purpose programming language that can also be used to create web applications, especially with frameworks such as Django or Flask., CSS (Cascading Style Sheets) used for styling web pages, setting appearance and layout, as well as Ruby, PHP, etc. [2-4].

To facilitate development, frameworks are used that provide ready-made components and tools for building web applications:

1) Django: a framework for rapid development of Python-based web applications. It provides a set of tools and design patterns for convenient development of web applications;
2) Flask: a lightweight framework for creating web applications in Python. It has a simple architecture and allows you to quickly create web applications with minimal costs;
3) Ruby on Rails: a framework for web development in the Ruby programming language. It offers out-of-the-box solutions for various aspects of development such as routing, databases, and templates;
4) Angular: a framework for creating client web applications in JavaScript and TypeScript. It is developed and supported by Google;
5) React: JavaScript library for creating user interfaces. Although it is not a full-fledged framework, it is widely used for developing web interfaces and is often combined with other libraries and frameworks.

Databases. Various database management systems (DBMS) are used to store the data used on the website. Here are some of the most popular databases used in web development.

MySQL: An open relational database widely used by web developers to store and manage data on the server.

PostgreSQL: Another open source relational database that has a lot of functionality and power, including geographic feature support and extensibility.

MongoDB: A document-oriented NoSQL database that stores data as JSON-like documents. It is often used to store unstructured data and schemas that may change over time.

SQLite: A lightweight embedded database commonly used for prototyping web applications or small projects where a powerful server-side database is not required.

Microsoft SQL Server: A commercial relational database developed by Microsoft that has extensive capabilities and integration with other Microsoft products.

These databases can be used to store information on a web server and to provide access to data through web applications using programming languages and frameworks.

Web servers and hosting. To deploy web resources, web servers such as Apache, Nginx, and hosting services are used to provide access to the website via the Internet. Let's give their main definitions and analyze the difference between them.

A web server is software that processes requests from client computers (such as web browsers) and sends them responses in the form of web pages, images, files, etc. Web servers can be implemented by various programs, such as Apache, Nginx, Microsoft IIS (Internet Information Services), and others.

Hosting is a service that makes it possible to host websites and web applications on servers that are connected to the Internet. Hosting companies provide physical servers or virtual servers (virtual private servers or cloud servers) that can be used to host websites. Hosting providers may also provide various services such as domain name registration, support, security, backup, etc.

The difference between the two is that a web server is software that processes and responds to requests, while hosting is a service that provides a physical or virtual place to host websites and applications on the Internet. Often, hosting providers also provide web server software along with other services for the convenience of their customers.

Version control systems. Version control systems (VCS) are software tools that allow you to keep track of changes in files and sets of files, collaborate on projects, track changes, and manage different versions of code, documentation, multimedia files, and other project elements. The main functions of version control systems include: saving the history of changes (VCS stores information about all changes made to files, including the description of changes, authors and time of making changes); version tracking (users can restore previous versions of files or sets of files, which allows you to roll back to the previous state of the project if necessary); management of branches (VCS allows you to create separate branches of development, which allows you to develop different functionality or variants of the project in parallel); collaborative work (multi-level access to files allows several users to work on the same project at the same time); branching and merging (VCS allows you to merge changes from one branch to another, as well as resolve conflicts that may arise during the merging of changes); backup (SKV can serve as a tool for backing up code and other project files).

The most popular version control systems include: Git, Subversion (SVN), Mercurial, CVS (Concurrent Versions System). Let's describe them.

Git. A distributed version control system that is very popular in web development and other areas of programming.

Subversion (SVN). A centralized version control system that is also widely used in programming.

Mercurial. Another distributed version control system that is an alternative to Git and is often used in operating systems such as Windows.

CVS (Concurrent Versions System). A centralized version control system that used to be popular but is now usually replaced by more modern tools like Git or SVN.

These systems help developers efficiently manage code and collaborate on projects of any complexity.

Security. Ensuring the security of web resources includes the use of encryption methods, data validation, protection against attacks such as SQL injections, as well as the use of correct user authentication and authorization practices.

Thus, ensuring the security of web resources is a critical task, especially in the context of the growing volume of online crime and threats. Let's list some key aspects of web resource security.

First, data encryption. Use of encryption protocols such as SSL/TLS to protect the transmission of confidential information between the client and the server. This ensures the confidentiality and integrity of data during transmission over the network.

Second, data validation. Input validation and filtering to prevent Cross-Site Scripting (XSS) attacks and other forms of vulnerabilities that could lead to the execution of unwanted client- or server-side code.

Third, protection against SQL injections. Using parameterized queries or Object-Relational Mapping (ORM) to prevent malicious SQL queries from being executed that could dump data or damage the database.

Fourth, user authentication and authorization. Establishing mechanisms to verify the identity of users to access protected resources, and to grant or restrict their access rights according to their roles and privileges.

Fifth, protection against session attacks. Implementation of mechanisms for generating and managing session IDs, as well as protection against attacks such as session hijacking or "cross-session injection" spoofed attacks.

Sixth, event monitoring and logging. Monitoring and logging systems that allow you to identify and respond to potential security threats, as well as analyze events to further improve security measures.

These measures and practices are only part of the full range of security measures that can be used to protect web resources from various threats. It is important to constantly update and improve security measures to effectively protect against new and improved attacks.

Testing and Debugging. To ensure the quality of web applications, various testing methods are used, such as unit testing, functional testing, etc.

Thus, testing and debugging are an integral part of the web application development process and play a key role in ensuring product quality. Here are some of the main testing methods used to ensure the quality of web applications [4-7].

Modular testing. It consists in testing individual components or software modules independently of other parts of the program. This allows errors to be detected and fixed at an early stage of development and ensures greater code stability.

Functional testing. This is a type of testing designed to verify the compliance of the functionality of the web application with the requirements and expectations of the user. These tests verify the performance of the web application from the end user's point of view [8-9].

Integration testing. It is performed to test the interaction between different modules or components of a web application. This is important because problems related to incompatibilities or incorrect interactions may occur during integration.

Load testing. This type of testing evaluates the web application's response to different load levels and data volumes. It allows determining the limits of performance and efficiency of the application.

Security testing. This testing evaluates the security of a web application against various types of attacks, such as SQL injection, Cross-Site Scripting (XSS), session hijacking, and others.

Automated testing. The use of automation tools to automate the execution of tests, which allows you to speed up the testing process and reduce its costs.

After errors are detected during testing, a debugging process is performed, which involves eliminating and correcting the identified problems in the software code. Testing and debugging are iterative processes repeated throughout the development cycle to ensure the quality and reliability of a web application [10-15].

Conclusions

Therefore, information technologies are used at every stage of development of web resources, starting from design and ending with deployment and support. The article provides an overview, analysis and several key aspects of the use of information technologies in the development of web resources. They can be used to automate business processes, increase productivity, ensure data security, simplify communication and ensure access to information.

Thus, the development of IT has played an important role in societal and technological progress, opening up new opportunities for innovation, changing the ways in which people work, learn, communicate and have fun. Key aspects apply IT: programming languages and frameworks, databases, web servers and hosting, version control systems, security, testing and debugging.

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