Evaluating possible classifications of websites by design type in electronic commerce

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Abstract. This article has covered e-commerce websites. The history of the websites has been examined. We looked at the types and classification of websites, such as business card sites, corporate sites, directory sites, online stores. The advantages and disadvantages of these classifications are compared. The work of the server side of websites is considered. A diagram of the architecture of a static and dynamic website has been built. The tasks of the server side were considered, such as: using databases for storing and retrieving data; control of sent data and requests; processing of the received data and their transformation; sending processed data to the client. The main stages of the backend, as well as its advantages and benefits, are examined. Two main technologies of website development are studied and analyzed, such as web frameworks and CMS (Content Management System). Based on our analysis, we compiled a comparative table of the advantages and disadvantages of these technologies. Based on this table, conclusions were drawn about which technology is the most convenient and profitable.

1. Introduction
With the advent of the Internet, people cannot imagine their lives without its participation. Work, study, communication, leisure and much more have become closely intertwined with the possibilities of the World Wide Web. Most of the technologies of our time use the Internet in one way or another. Computers, phones, smartwatches, homes, and even modern cars are able to interact directly with online services or services to meet the needs of their users [1-3].

In 1994, Jeff Bezos concluded that in addition to communication, people can also use the Internet to shop. At that time, books, music discs, audio and video cassettes became the subject of trade. As a result, he became the founder of the first online store known today as Amazon [4-6].

Amazon's success predetermined the retreat of stores to the Internet. The assortment of such stores has long gone from books to selling items of any field of human activity. People realized the convenience and practicality of online shopping, which, in turn, led to the emergence of online marketing, which further strengthened the existence of online shopping in people's lives [7-9].

Online commerce is dynamically developing, allowing companies to enter new markets using information technology, tracking user preferences and providing them with the necessary alternative.
With an online store, an entrepreneur or organization gets their hands on a universal tool for selling goods, working around the clock and seven days a week [10-12].

2. Materials and Methods
The advantages of Internet commerce and its rapid development [1] prompt the owners of companies or enterprises to resort to the development of websites. “If your business is not on the Internet, then you are not in business,” said Bill Gates. As modern practice shows, he is right in his statement.

Before developing a website, you need to know exactly what type it belongs to, what functions it performs and what should come out at the end of development. It is natural that websites can be different or similar in different ways. Therefore, a classification can be proposed that describes their features. A distinctive feature of the proposed classification is its availability not only to the developer, but also to the customer, which helps to clarify the details of the technical task at the negotiation stage.

In terms of service availability, websites can be:

- Open – website and its services are available to all visitors.
- Semi-open – registration is required to access the services of the website.
- Closed – website is accessible to a small circle of visitors.

Depending on the nature of the content, websites can be dynamic or static. In the first case, the page content is generated using scripts based on data from files, a database, or other sources, while static websites use pre-built content (stored on the server).

Websites also vary in physical location. Websites that are accessible only on the local network are referred to as local websites, while the rest belong to the group of external websites. An example of local sites are web resources of individuals on the local network of a provider.

Further classification describes the way information is presented. It depends on the business model, the segment of the target audience and the functionality of the future site. There are the following types of web resources:

- Web representations.
- Information resources.
- Web services.

A web presence is a site or page that is used for business interactions between a company and its customers (for example, to disseminate information about the company's products and services) [2]. Modern websites involve hosting them on their own domain, but this is not a prerequisite for creating a web presence.

Information resources include thematic sites and thematic portals. The thematic site provides comprehensive information on any topic, and the thematic portal also contains means of interaction with users. It also allows users to communicate within the portal. Examples of such an information resource are forums and interviews.

Web services usually solve a specific user problem, which is directly related to the Internet. These include search, mail and blog services, web forums, photo hosting, message boards, and site directories [12].

A business card site contains the most common information about a person or the site owner himself: history, type of activity, contact information, price list, contact information, city maps. Many professionals publish their resume on a business card website.
Table 1. Features of Web Representation Types.

| Web Representation Type     | Advantages                                                                 | Disadvantages                                                                 |
|-----------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Business card website       | Low cost of creation. Quick start. Upgradeable to more advanced types of web representations is possible. | Small functionality. Often weak design. The client does not stay on the site. Small amount of content, which makes the website almost impossible to promote. |
| Corporate website           | Centralized storage of detailed information about the company, goods and services. A large amount of reference information for the user. Interaction of employees of the organization with each other through internal services. Customer focus. It is possible to upgrade to an online store. | There is much more functionality than a business card site. Requires competent support. Promotion is necessary. |
| Site-catalog                | The client gets the opportunity to get acquainted with the services/goods of the company. Quick start. It is possible to upgrade to an online store. | Performs relatively fewer functions in comparison with an online store and, often, a corporate website. Being now an outdated business solution. |
| Online store                | Wide audience coverage; Unlimited number of products on the showcase. Round-the-clock access. The ability to compare and evaluate products; Lower costs in comparison with an offline store. | The most complex accompaniment of all the types presented. Great sensitivity to online promotion. Requires a long development time. |

A corporate site, unlike a business card site, often contains various tools for working with content (for example, site search, filtering news) and the degree of completeness of the information presented. It can be integrated into the owner’s internal information systems (sellers, suppliers, etc.).

The catalog site contains a detailed description of goods or services, certificates, technical and consumer data, expert opinions, etc. All information that cannot be included in the price list is available on such sites.

An online store is a product catalog website through which a customer can order products that are of interest to him. Unlike a catalog page, an online store has excellent functionality. Various payment systems are used: from cash on delivery or automatic invoicing by fax to payments by plastic card.

Understanding the key features of the types of web representations allows you to establish contact with the client and form a more complete technical task. Table 1 shows the features of the described types.

Figure 1 shows the basic web server architecture for a static web page. The server, if successful, returns a response that contains the 200 OK status and the document. Regardless of the reason, if the document retrieval fails, an error status is returned. This status contains a numeric code that can be clarified in the documentation to understand the cause of the problem.

Figure 2 shows a simple web server architecture that is orders of magnitude more complex than a static web server architecture. To provide such an architecture, most of the code must run on the server.
side. The creation of this code is the basis of server-side programming. This process is also called backend programming.

Dynamic data requests are sent to the back-end code, where it is interpreted by the server and the corresponding data is retrieved from the database. Depending on the expected end result, generated HTML documents or a set of processed data can be received as a response.

![Static Website Architecture](image)

**Figure 1.** Static Website Architecture.

The server-side and front-end code is significantly different because they have different goals and objectives. The code executed in the browser is the client-side code. It is intended to change the design of the page and improve the behavior of the web page, while the server side code mainly involves retrieving and processing information from databases or files, which are then sent back to the client in response [11].

![Simple architecture of a dynamic website](image)

**Figure 2.** Simple architecture of a dynamic website.

The main tasks of the server side:

- Using databases to store and retrieve data.
- Control of sent data and requests.
• Processing of the received data and their transformation.
• Sending the processed data to the client.

Let us describe the main advantages and benefits of the backend:
1. Storage, processing and delivery of information. Generating static pages for every e-commerce product is inefficient as it quickly becomes a memory overhead. Instead, all information can be dynamically stored on the server, combined with HTML templates, and returned as generated HTML pages or data in a suitable format (the most popular of which are JSON, XML, CSV, and so on) that are processed by the client side.
2. User experience of interaction. Customer information can be stored on a server and used to create a user experience. In-depth analysis of the user's habits can be used to predict their interests and adjust the corresponding responses or notifications. For example, after paying for an item, many online stores support the auto-fill data function in the checkout section.
3. Access control. Server-side programming allows a website to create groups of users and control their access to content. Thus, clients can only see what they are allowed to see.
4. Storing session information. When developing the server side, programmers can use sessions. A session is a mechanism that allows you to store individual information about a user and use it to perform some of the site's functions or change the content of dynamic content. An example of the session mechanism is the selection of a city in an online store and the withdrawal of goods that are sold in it.
5. Sending a message to the mail and notifications. Servers can notify clients when performing any action (a special case - ordering a call back) about it. For example, they send a message by mail, SMS, video communication and other means of communication [12].
6. Data analysis. The server part can implement a mechanism for processing the collected information. The analyzed data may participate in the search for any information on the website and in the formation of offers and advertisements to customers. The range of possibilities is determined only by the experience and qualifications of the backend developer.
7. The key information about why a consumer should buy a particular product or perform another targeted action. Benefits, promotions, photos, a call to action are the main components of the landing page.

3. Result
When developing the server side, server programming languages are used. There are many programming languages used to develop web servers: PHP, Ruby, Java, C, Python, Perl, and others. There are no restrictions on the choice of language during the creation of the server side. In other words, any site functionality can be implemented in any of the programming languages. The difference is only from an economic point of view - the number of hours spent on development, the complexity of development and many other aspects that affect the speed and quality of development.

In most cases, it is inefficient to develop the server side yourself in a pure language. This flaw can be corrected using web frameworks [4].

A web framework is software that facilitates the development of components of a large software project and their subsequent integration. Its main goal is to make development easier and faster. Unlike a library, this is not a set of ready-made functions that can be added to a project and used pointwise on separate pages. The framework assumes that the entire project will follow its given structure. That is, it sets the restrictions that must be adhered in order to more accurately follow the standards, lower the threshold for developers to enter the project, etc.

Server-side web frameworks do not provide the ability to create rich web applications. They are limited in their functionality and is dictated by their architecture and given rules. Despite the fact that web server frameworks are different from each other, they often have similar architecture and features. The most popular server-side web frameworks today are the Express JavaScript framework, the
Django Python framework, the Rails Ruby framework, the Laravel PHP framework, and the Spring Java framework.

CMS (ContentManagementSystem) is a system or program used to support and organize the overall process of creating, editing and managing content [5]. In the past, most sites were static and required manual content editing. However, the dynamics of projects has changed a lot [6]. Today, it is often required to react quickly to changes and implement them with maximum efficiency. However, not all users want or have the ability to contact the developers, especially if the task is to edit the content of the page.

CMS, in turn, allows users who do not have programming and site development skills to work independently of each other to create and modify site content.

| Aspect                                  | CMS                               | Framework                                      |
|------------------------------------------|-----------------------------------|-----------------------------------------------|
| The speed of developing a template solution | Very fast due to the availability of ready-made templates | Slow, significantly inferior to CMS |
| The performance of the website being developed | It is always inferior in performance to a well-written site on a framework, since in most cases the finished product contains unnecessary components that negatively affect the speed of the site | High productivity due to the absence of unnecessary components of the final product |
| The presence of an administrative part | All popular CMS have a clear and convenient administrative part | You need to write the site editing section yourself |
| Functional | Limited. Improvement is possible, but there is no guarantee that with the next product update it will work | Allows you to implement any functionality without conflicts with the engine |
| Complexity of website development | Doesn't require a lot of development experience and deep programming knowledge | Requires experience and good programming knowledge |

The essence of the CMS is the scheme of dividing the page content and its design. The user must choose a template - a template that defines the appearance of the page. It remains only to fill it with information (content). Typically, CMS is used for such websites [13-15]:

- Blog, forum.
- Online store.
- Social networks.
- Personal pages.
- Corporate sites.
- Portals.

At the same time, however, CMS is not suitable for solving atypical tasks. Popular CMS (WordPress, Bitrix) are vulnerable to intruders [7], and many developers have repeatedly faced the problem of add-on compatibility when developers update a product.

Let us summarize these two technologies in the form of a comparative table (Table 2).

4. Conclusion
When preparing to work on creating an online store, the developer is faced with the question: what to choose for development? Framework or CMS?
Using a CMS, we are tied to the structure created by the developers, but we save time in template solutions; and in non-traditional solutions, we often have to make compromises or spend a lot of time introducing new functions [8].

The framework gives you complete freedom of action. We take the foundation previously written by the developers of the framework and on top of it, we can build up functionality of any complexity [9]. But for quality development, you must have a sufficient level of knowledge and experience.

Based on the fact that an online store, in most cases, is a template solution, developers often turn to CMS when developing them. But any atypical solution that must adapt to trends and actively develop will be difficult to implement using a CMS [11].

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