Information System of Photostock Web Galleries Based on Machine Learning Technology

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Abstract. The purpose of this work is to create a software product to facilitate the dissemination of photos among users of the network and beyond, as well as sell their works and store all relevant information, which is extremely relevant in our time. The object is the methods and tools for automated photography, which will provide a process of sharing photos between users using modern technologies that are accessible to any user working with a computer. This system is designed to solve the problems of transferring an unlimited number of photos between any cities on our planet. The subject of this system are the processes of activity of this web resource. This automated system for uploading, sharing and storing photos is made following all international standards and meets all requirements.

Keywords. Information System, Photostock, Web Gallery, Machine Learning

1 Introduction

In the modern world with the development of technology and smartphones, the number of photos taken by people around the world in a second is many times more than the number of photos taken in the first 50 years after the opening of the camera [1-4]. More and more people are beginning to bring certain moments of their life to the memory of their smartphone: from meeting with friends to traveling and celebrating family and national holidays [5-8]. Accordingly, there is a need to exchange and disseminate such memories [9-12]. Ten years ago, this problem was solved using Bluetooth technology or external storage [13-18]. However, the world is out of place and this technology can no longer compete with the time and number of photos transmitted between users every second across the globe [19-24]. It is the process of sharing photos between people, ways of finding the most profitable and less resource-

intensive ways and is the subject of the system under study [25-29]. However, there are also difficulties in working with photobanks: first, just being a good photographer is not enough to become a participant of a photobank: you need to be really professional, have a great experience, have not only creative thinking, but also be a good businessman for orientation in the trends of the modern market of photography and illustration [30-36]. Secondly, the development of photographic banks often does not allow high competition, because many world-famous photographers have long marked their position and entrenched themselves in the market of photographic banks, which complicates the work of newcomers [37-41].

2 Advantages and Disadvantages of Photo Gallery Computerization

Not too long ago, everyone remembers the time people stored photos in ordinary photo albums, and the only opportunity to spread them was when the whole family gathered at a holiday table and looked at old photos. Nevertheless, over time, the colors of the photos printed on the special photo - paper fade, and classic paper albums may be open to damage caused by external factors. And as a rule, photos in photo albums are stored in a single copy without being recoverable. There is also the other side of the coin. It is often the case that the people we want to share with or just show photos are at a distance. Thanks to state-of-the-art technology and email, we can send photos to any corner of the world where there is an Internet network, but this is usually not very convenient because the services we use to send letters are often not adapted to send large numbers of large-sized photos. So despite all the downsides, it is still worth pursuing an alternative to classic photo albums - a photo stack. Let's take a closer look at this question. The major drawbacks are the cost of serious resources in terms of implementation, implementation, and support of this type of product. Also analysis of profitability in the market and popularity among users is the main advantages and disadvantages of starting with the disadvantages:

- The cost of buying / renting equipment, including server parts for product maintenance.
- Cost of implementation of the software product.
- The cost of marketing and third-party advertising
- Product support in case of server outages. Also online help and support for resource users.
- Great competition with products that have been on the market for a long time.

Advantages of computing :

- The ability to access photos from anywhere in the world
- Use of Machine Learning technology for photo validation, which will compete with existing products in the market.
- Profitability thanks to profile popularity and photo quality.
- Simplify the process of working with photos.

3 Analysis of Existing Solutions

To date, there are several dozen photo banks in the world that take jobs from private photographers and sell them online. The following systems were selected from the existing systems for analysis:

- Shutterstock.
- Dreamstime.
- Depositphotos.
- Bigstockphoto.

Shutterstock is the best photobank to date, is the undisputed leader in microstock photography agencies, both in the number of clients worldwide and in payments to photographers. In this photobank, photographers, illustrators, and videographers can make the greatest profit, compared to other agencies, through the model of work and the huge popularity of the photobank. Shutterstock helps inspire designers, creative directors, video editors, directors, web developers, and other creative professionals, providing a wide variety of content for businesses, marketing agencies, the media, and media organizations around the world. Content creators submit their work to Shutterstock, where end users can buy and use it in a variety of creative personal and business projects. It is a two-way market that opens new opportunities for all authors. Also, the advantages of this photo stock can be distinguished by its simple and clear user interface, as well as the popularity in the market and the volume of databases of users who actively use it. It is also a simple sign-up process and a short guide for new users, helping to increase the client base of the site.
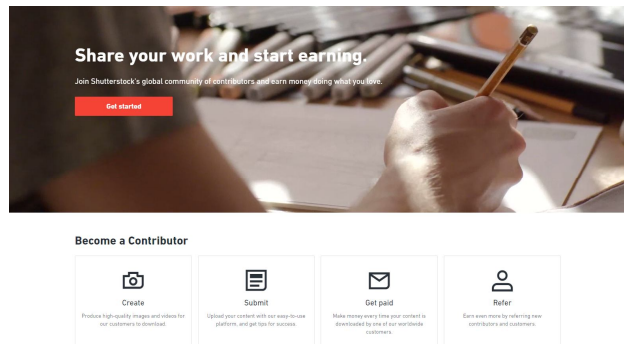

Fig. 1. The homepage of the Shutterstock photo stack

Dreamstime is Europe's largest photobank, one of the largest (over 50 million images), created in 2004. The site offers various images, videos, and audio. Loyal to image quality. It pays about 50% of the cost of the image. Accepts RAW and vector formats. For their purchase, the photographer receives twice the value of the largest size in JPG format. Registered users have the opportunity to use the free photos section.
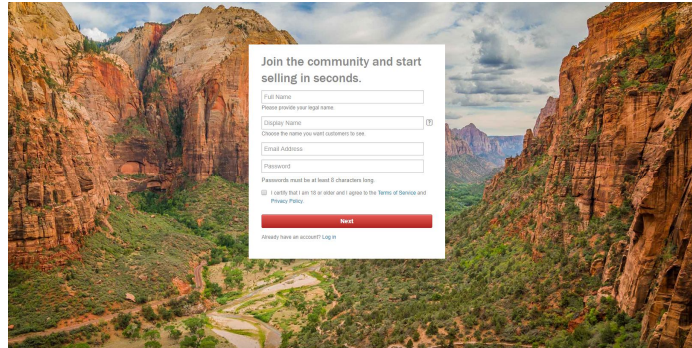
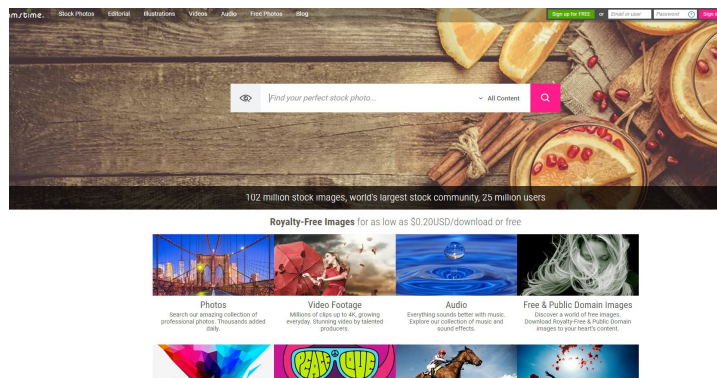**Fig. 2.** The sign-up process for new Shutterstock users

Fig. 3. Dreamstime photo stack home page

Registration is standard. According to a study by PDN, this resource pays the highest deductions in the entire photo sales industry. The average profit on Dreamstime is $ 0.68 to $ 3, but "bonuses" (such as acquiring unique author status) allow you to earn up to $ 40 per post. It is necessary to realize that such sums earn units, only the best.
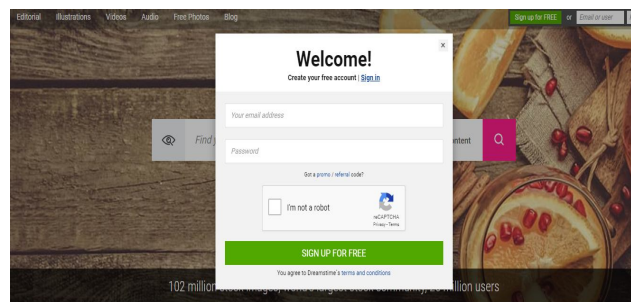

Fig. 4. The registration process for new Dreamstime users

Uploading an image is not accepted immediately. She is being tested. As a result, either the item will appear on your account or a message will be sent to the post stating the reason for the opt-out and tips for fixing the defects. If you can correct these shortcomings, it is possible to download the files again. If the pictures for sale are accepted and the files appear on the site, they are awarded the first level. Depending on the quality of the image, its size, composition, and subject, this file will sell better or worse than similar images. Once a photo has a certain amount of sales, its level automatically rises, allowing you to sell it at a higher price.

Depositphotos is young photo bank, which now forms the basis of photographs and therefore offers many events for photographers. The Photobank website supports the Russian language. Very easy system for attribution of images with AutoFill option. The first photobank to start paying by phone via SMS.
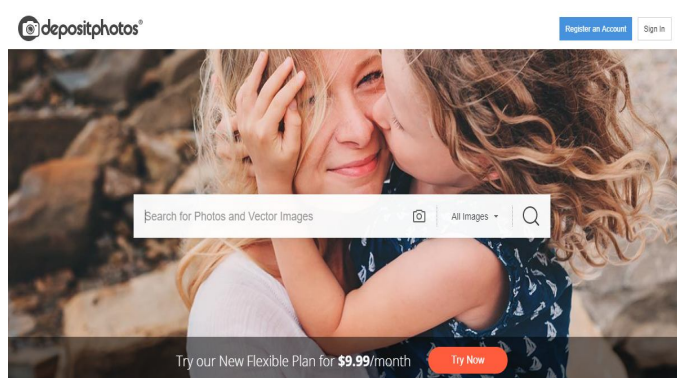

Fig. 5. PhotoStack Home Page Depositphotos

Among the main advantages is convenient search on the site even for unregistered users. Images are convenient to search, the keywords can be entered in both Russian and English. Another advantage of DepositPhoto is that it can be used as a photo bank of free high-resolution photos. The weekly stream sends registered users an invitation to download free images and videos. They are few, but it is quite possible to pick something for yourself. Photo Bank is developing dynamically, although it is quite recent in the market. Has an author-friendly rating and rating system. The higher the level of the author, the more sales commission he receives. They behave calmly and correctly towards all clients.

Bigstockphoto is a small photo bank, the main advantage of which is a convenient photo search system and simple image quality requirements. Even photographers with digital soaps can work with this photo bank. There is a high percentage of image acquisition, but good sales only start with a solid portfolio.

The system has the possibility of one week of free use. To access it, you need to subscribe by entering your bank card number and selecting a rate. Within a week, you will be able to receive five pictures a day, with any permission.

You can also sign up for a week of free video, you can upload one video a day.
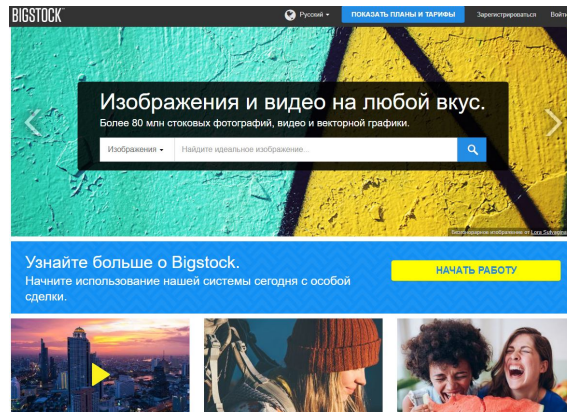
Fig. 6. The homepage of the Bigstockphoto photo stack

Finding a photo is no different from searching for other stock - enter keywords in English, refine your query. Not the most convenient search service, but not the worst. Stock is interesting for those who constantly need images. Such users have attractive wholesale rates - from $ 0.16 per image. You can also take advantage of the week of free download and get 35 high-quality photos, which is not bad. Having analyzed several alternatives we can draw the following table of comparisons:

Table 1. Analyzed several alternatives

Photobank	Shut-terstock	Dreamstime	Depositpho-tos	Bigstockphoto
Minimal size of picture (in Mpx)	4	3	3,8	2
File types	JPG, EPS	JPG, EPS, RAW, AI, CDR	JPG, EPS, AI	JPG, EPS, AI, PSD, PNG, PDF
Minimal payment for photos	$75	$100	$50	$30
Comfortable search on website	no	yes	yes	T yes

So, looking at alternative products and solutions, we can see that the more content is filled and the more popular a site is, the more difficult it is to make user-friendly file searches. To solve this problem, the product being developed within this project will be added "Advanced Search", which will help the user to search the image not only by name but also by various parameters, which the author specifies when uploading it to the site. Also, the bigger and more popular this resource becomes, the more difficult it will be to support and add new functionality. Therefore, this aspect is very important to consider when choosing an architectural solution and code deployment systems on the server. Summarizing all of the above, we can conclude that none of the analyzed photostack systems has integrated validation with Machine Learning, which will make our product unique and fresh on the market. Moreover, it will save users from third-party content, and servers from the unnecessary load of invalid data. That is why

analyzing existing products in the market, their weaknesses and strengths will make this product competitive.

4   Description of the Goals and Objectives of the Company

The goal of each company is to maximize profits. The activity of this company is related to the development and maintenance of a web resource such as "photostack". The main functionality includes [42-49]:

- Uploading files to a resource.
- Normal file search.
- Advanced file search.
- Creating albums.
- Attaching photos to an album.
- Opportunity to buy and sell.
- Web resource and content security.

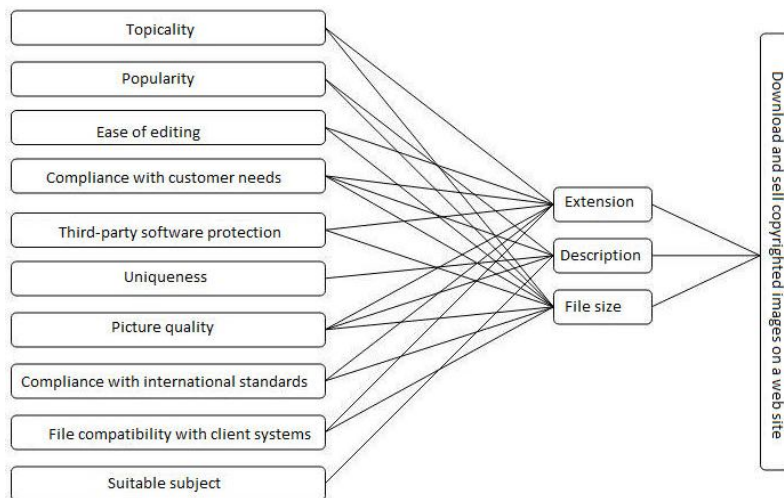For a comprehensive picture of the essence of the system under study, we depict a tree of goals.

Fig. 7. Goal tree

To detail the system and its specific implementations, I decided to use a simple and accessible Structured Analysis and Design Technique (SADT) method. This chart will contain two external entities [50-51]:

- External User entity that can interact with other user entities or custom entities. It all depends on the specific account and the purpose of registering on the web property.

- The external essence of the "Client". Typically, it interacts with examples of "User" entities whose input is the file parameters specified by the Client entity.
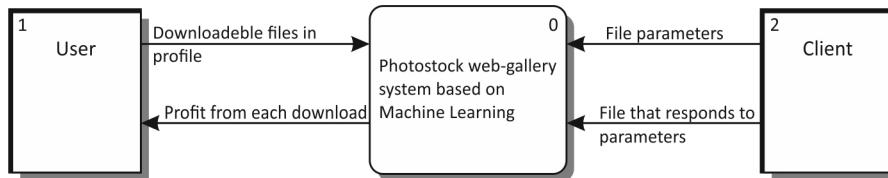

Fig. 8. Contextual diagram of data flows in the Heine-Sarsano notation

In the construction of systems distinguish the basic and auxiliary processes. The main processes are those that define the quality and cover the main goals of the web service. The ability to upload, share and sell photos. Ancillary processes determine the additional capabilities of the system that determine demand and place in the market. A very important point is when the auxiliary processes are complementary to the basic processes and they work smoothly in the system and do not interfere with each other's functions.
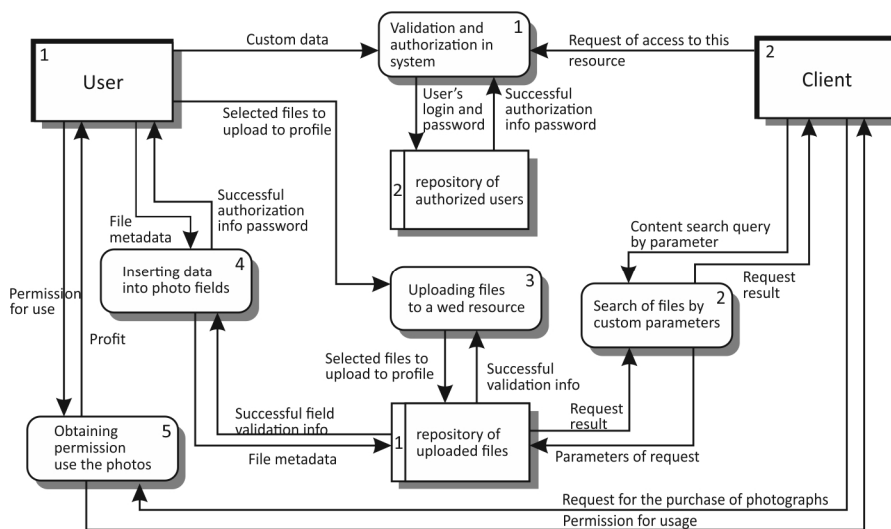

Fig. 9. The flow chart in Heine-Sarsano notation 1

Each system consists of processes that are performed in the middle of it, so to understand how the system worked, you need to familiarize yourself with its simplest unit - the processes, and more precisely detail it. Since this system includes a variety of functionalities, it would be advisable to split it into parts, which during implementation will allow parallel work between developers, which will also simplify the understanding of the system and will make it more secure and flexible in future support. Because the smaller the dependencies between the parts of the system and the easier it

is to divide it into subsystems, the easier it will be to realize it. So, using the AllFusion Process Modeler software, we create a hierarchy of tasks for this system.
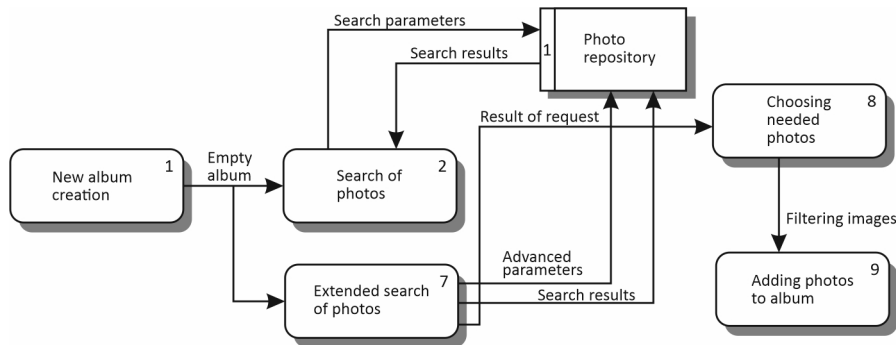

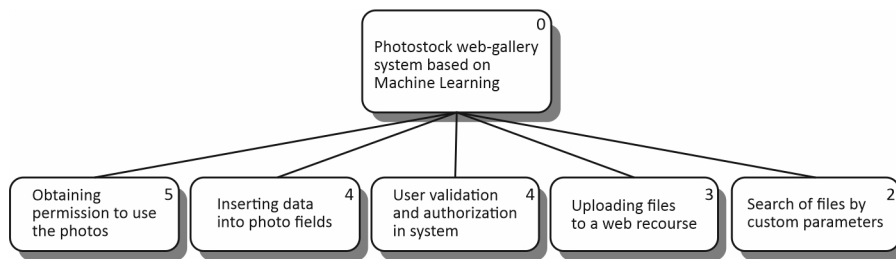**Fig. 10.** Detailing the process of "Adding a Photo to an Album"

Fig. 11. The hierarchy of tasks of this system

A very important feature is that it can be represented as a graphical diagram. This greatly facilitates domain analysis. There are several options for denoting the elements of the entity-relationship diagram, each of which has its positive features and provides a powerful enough tool for data modeling during the analysis and design stages. Diagrams also help you understand and understand the logical structure of subject data, complex data objects, and existing relationships between them.

5 Formulation of the Site Design Process

The whole design process is divided into the following steps:

- Analysis of the subject area.
- Website design development.
- Creating a layout.
- Creating a Database that the site will access.
- Creating the server-side of the site.
- Integration of site layout with base and server part.
- \Testing the site.

To create a successful project, first of all, you need a successful start with clearly defined tasks that our project must solve. So, there were 3 main tasks:

- An analysis of the functionality that a software product should perform
- Highlight the main functional characteristics of the project
- Conduct research on usability

In this product, the basic unit will be a photo. That is why the basic logic of the site should directly relate to this unit:

- Each user has their profile.
- Each profile can add and delete photos and albums for it.
- Other users can rate, comment, or add a photo to their album.
- The uninitiated user also can view photos.

After analyzing the functionality that the product should perform, we conclude that the main functionality of the product should be:

- Add, delete, and edit photos.
- Create and delete albums.
- The ability to add and delete photos from an album.
- Ability to link both photos and albums to the user's profile.
- The functionality of comments and likes.
- The ability to view user photos even if the user is unlocked.
- Ability to search and advanced photo search.

Having conducted basic research into the functionality that should cover our project, we can conclude that the database scheme that interacts with the current product will look like this as Fig. 6. In the broadest sense, the term usability refers to the degree of usability of a particular item. In some ways, it is in line with the concept of "ergonomics" - a scientific discipline that studies the effectiveness of human work in creating certain conditions. For sites, and more specifically for user interfaces, usability means:

- logic and simplicity of arrangement of various graphic elements;
- ease and convenience of navigation;
- thoughtful arrangement of controls;
- overall ease of perception of the design of the Internet resource.

In the aggregate, everything is listed and determines the usability of the site.

Numerous researches of psychologists and Internet marketers show that modern users are becoming more impatient and superficial every year. According to the latest data from research firm Nielsen Norman Group, the average length of time a user is on one page of the site is only 27 seconds. At the very end, only some visitors scroll through the page. This means that the main goal of the creators of the site is to be able to interest the user. And it takes seconds to reach this goal. In less than half a minute, the casual visitor needs to explain where he/she is, how this resource differs from the

others, and what benefits can be obtained here. If a person does not have time to get this information in the same 27 seconds, he just goes to another site. Questions about how to attract and retain a visitor site, and deals with usability.
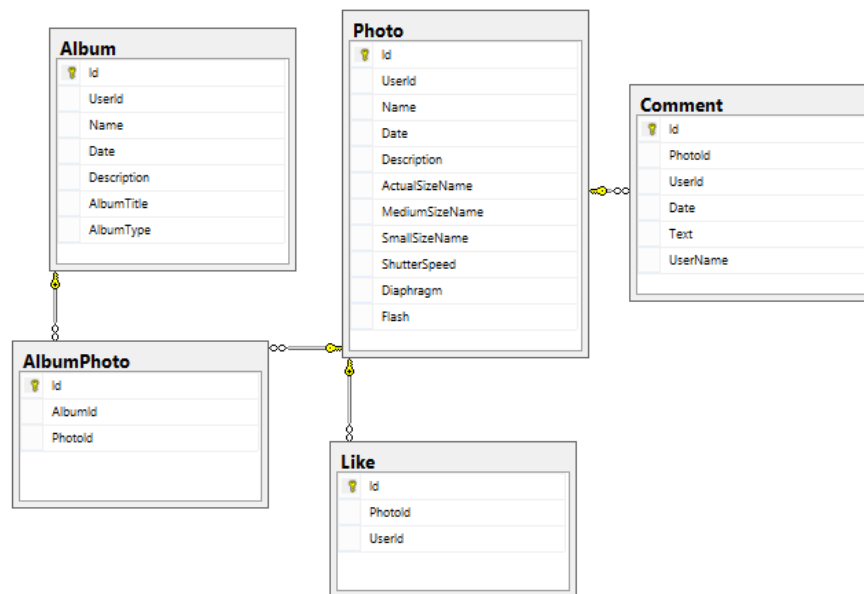

Fig. 12. Scheme of the interaction of photo functionality in the database

So, we begin to analyze this software product from its thorough and comprehensive audit, in other words, analysis. The usability audit reveals the most relevant issues of the site in terms of its usability and user-friendliness. It deals with many different aspects: navigation, internal search, design, content filling, etc. Let's take a closer look at the most important ones. After conducting the research, we highlight the basic usability rules for the following elements of the site: Navigation, Internal search and Home page.

Navigation. To make it easier to use the product and improve its place in the popularity rating of users, we make navigation the same everywhere. This improves its perception and makes it easier for the user to find the information they need. Also, in the context of improving site navigation, we recommend:

- place a web site logo or title on all pages with a link to the homepage. As a rule, the logo is in the upper left corner of the page;
- place detailed contact information not only in the "basement" (at the bottom of the page) but also in the site header;
- make the first level menu on all pages;
- specify the name of the site section on web pages;
- provide for "bread crumbs".

Also, on all pages, the user should immediately understand what is and what is not a link. At the same time, the links throughout the site should be underlined, the same color and font. Developing user-friendly and intuitive navigation is one of the cornerstones of site creation.

Internal search. The usability audit necessarily involves analyzing the effectiveness of an internal search. To them, contrary to the popular opinion of the site owners themselves, visitors are used very often.

So, to make your site search easy, you must:

- place it in the upper right corner on all pages;
- limit the length of the query input field to 27-30 characters (optimal value);
- make the search purely internal, only by photos. It is not necessary to offer visitors also external search, on third-party sites on the Internet - it will distract them from ours;
- use the query spell check feature. If the user enters a query with an error, a line should appear with the message "Did you mean [query with correct spelling]?". The search must be able to recognize errors in the queries, otherwise, the customer will not be able to find the product you are looking for.

Also, usability experts advise you to design a page with search results in the manner and appearance of known search engines. It must contain a field for entering the query, links to finding pages with their description. It is also recommended to specify the section of the site to which the pages found are related.

But does the site always need an internal search? Well-known usability expert Jacob Nielsen believes that effective search should only be done on large resources with more than 1,000 pages. If the site contains between 100 and 1,000 pages, it is quite possible to do a simpler search engine. And on smaller sites with less than a hundred pages, the search function must navigate.

Home page. The homepage is one of the most important elements of any site, so when doing its audit analysis you should pay attention to the following points:

- At a glance at the homepage, it should be clear to the visitor what site it is on and why it was created. To facilitate the process of "recognition" of the resource, on the home page will not hurt to put the company slogan and text of a small greeting.
- All information about current promotions, discounts, and great deals should be posted on the homepage. There should also be space in the main for the news column and the user authorization panel. It is important that the homepage is updated periodically and up-to-date - a positive signal for both search engine robots and users.
- Some usability experts suggest posting a "Where do I start?" The card on the homepage, which can be made in the form of a link. This advice seems quite rational since such a prompt prompts the user to immediately go to the product catalog or other important section, and not to run around the site in search of the information he needs.

Machine Learning. To keep up with the times, it is necessary to use state-of-the-art technologies that already occupy a "lion's share" in the business solutions market. One of these is Machine Learning. Software products that use this technology are extremely popular and productive on the market, which is why we integrate machine learning technology into this product. We'll do this with Microsoft's ML.NET - .Net framework. With this feature, you can make automatic forecasts using data available for your application, free use or research. The following diagram represents the program code structure as well as the iterative process of model development (Fig. 13).
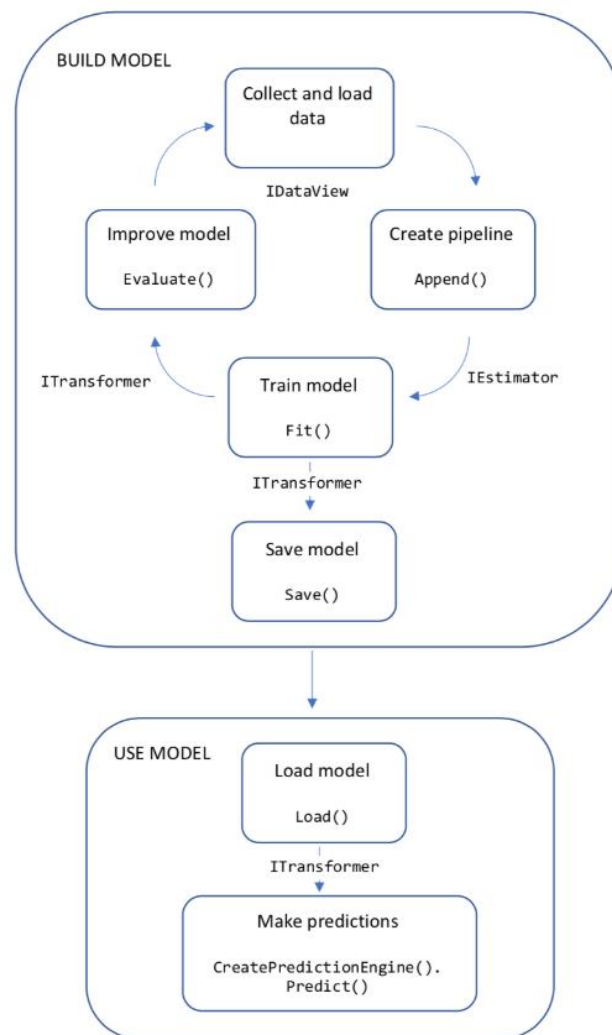

Fig. 13. Scheme of ML .NET

Database. The server is in many cases used to handle data, so you need to select at least one database technology. The best software solution for this product would be a relational database using SQL (Structured Query Language) developed by IBM in the early 1970s. In 1986, SQL was first standardized by ANSI organizations.

SQL is a powerful and at the same time not difficult language for database management. It is supported by almost all modern databases. SQL will be divided into two sets of commands: DDL (Data Definition Language) and DML (Data Manipulation Language). DDL commands are used to create new databases, tables, and columns, and DML commands are used to read, write, sort, filter, and delete data.

After choosing the main way to interact with the database, we can continue working on the design of its schemes, namely user placement schemes, access rights and roles in the database. After analyzing, we conclude that the scheme of placing users in the database will look as follows.
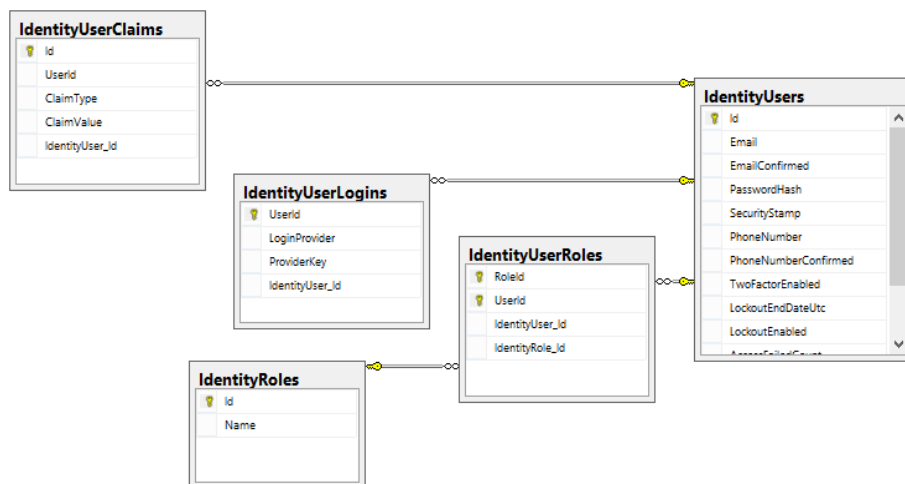

Fig. 14. Scheme of placement of users and related entities

6 Description of the Created Software Solution

The successful development of a software product requires several tasks, namely:

- Develop user interface and site design.
- Prioritize the core functionality tasks and begin designing them using appropriate design templates for an easy and convenient code support process in the future.
- Create a data repository and connect it to the executable code

To create a site design, you need to analyze the functions that will perform this web - resource and adapt them to the needs of the user.

So after the analysis, the registered user was able to edit, add and delete their photos. Also, a registered user has the opportunity to comment and put "likes" as their

own and others' photos, which can not be done by an unauthorized user. In this way, the unregistered user can only view the photos and albums of the users, which allowed any user to share, without the possibility of physically modifying the photos, which can "cause" irreversible changes on the server-side. This stage helps to improve the security of the service and distribute roles among users

6.1   Design of Web Service

To please our users from the early days, we need to implement a simple, easy and reliable interface that can be understood by anyone in a few minutes, even when interacting with these types of resources for the first time. The most important point here is the hybrid interface, that is, an adaptive interface that will equally play on devices of any size, with different screen extensions. Here comes the help of a framework, which gained its fame precisely because of the perfect execution of this item - Bootstrap. Simple, easy and easy to use, it fits perfectly into the technology stack of this site. Also, one must take into account another indispensable item - cross-browser. That is, even if the screen extension is the same, our functionality must be adapted to the major browsers that occupy the "lion's share" of the market for providing software for Internet access. These browsers include Safari, Mozilla Firefox, Google Chrome, Opera. Versioning is also required. Different versions of the browser may perceive the same design differently. This problem can arise with Internet Explorer, which is why we should take this into account. So, highlighting the major issues that developers may face while performing this task, should be taken into account so that the appropriate solution is the best and one is likely to encounter one of these problems in the future.

6.2   Design of the Client Part of the Site

The main part of the client-side of the site will consist of 2 main components: a navigation menu and open albums for users to view. The navigation menu is pinned to the top of the site and will remain unchanged when navigating between pages of the site. The main menu will consist of the following functionality:

- Service name (with the hyperlinked homepage)
- An album menu containing all the functionality associated with creating and editing user albums.
- Photo menu that contains all the functionality associated with creating and editing user photos
- A search bar that performs basic photo search on a site
- Display the login under which the user is logged in to the site
- Ability to log out of your account.

If a user is not logged in to the site under their profile, then the navigation bar will look different for them, namely:

- Service name (with the hyperlinked homepage)

- A search bar that performs basic photo search on a site.
- Login Button (for Registered Users)
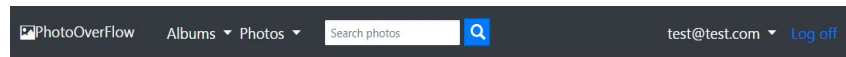- Registration button (for unregistered users)

Fig. 15. The appearance of the navigation panel for the authorized user.

Fig. 16. Navigation bar layout for an unauthorized user.

So, now let's disassemble all the basic functionality of the user in the process of its implementation and try to reproduce its main "flow". As soon as the user accesses the site for the first time, he sees the following interface:
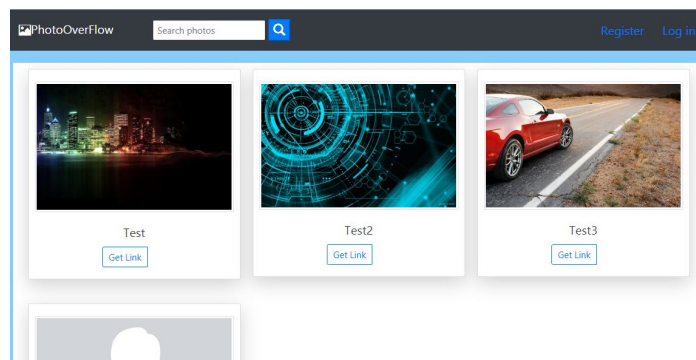

Fig. 17. Home page layout for an unauthorized user

After opening this resource in the browser, the user sees open albums of users that allowed them access to them. Also, the unauthorized user can view the content inside the album, that is, the photos themselves without the ability to leave comments or "swearing".
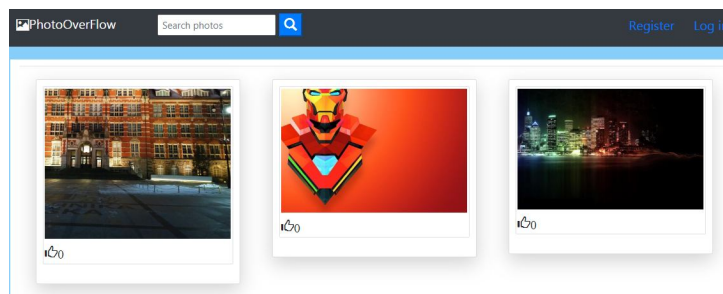

Fig. 18. Album layout for an unauthorized user

As a user of this site for the first time, they need to sign up. The registration form is as follows:
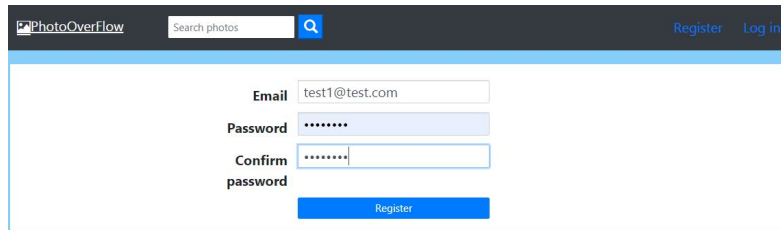

Fig. 19. User registration form

It should be noted that the password for this resource must be insoluble, containing more than 6 characters, both letters, and numbers. Also, the password should not be simple or easy to guess, which will allow all kinds of gross-ford attacks to quickly "break" the user's profile. To do this, the system has a "hardwired" special technology for authorization and validation of user input for registration - Microsoft Identity, a system of synchronization of user credentials, the system allows you to manage users, credentials, policies, and access in the organization. Also, MIM 2016 features hybrid environments and privileged access management capabilities, as well as support for new platforms. After registration, the user will see the following window:
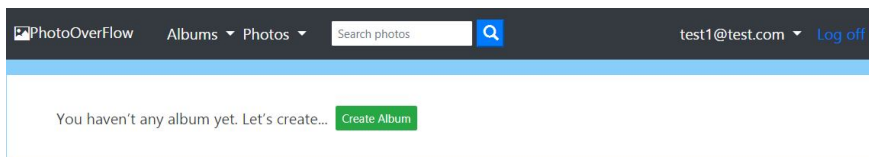
Fig. 20. User registration was successful

Now, as a registered user, he has access to advanced functionality, for example, he can create his album and upload images to it. To do this, we need to left-click once on the " Albums " tab by selecting " Create Album ":

Fig. 21. Selection of an option in the navigation menu

Then you will see a form for creating the album. It consists of the following fields:

- Album name
- Date of creation
- Description for the album

After filling in the fields, press the " Create " button, sending the form together with the entered data for processing on the server. It should be noted that the form is required fields, such as " Name " and " Date of creation. "
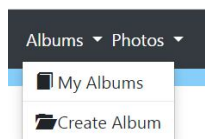

Fig. 22. Completed album creation form.

After that, the service redirects us to the main page with the album already created. By default, all new albums use the default album image, which can be modified in the future by uploading photos.
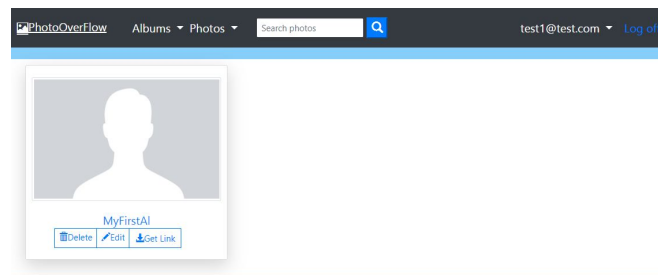
Fig. 23. Successful creation of a new album.

Now let's look at the process of uploading a photo to a profile. To do this, select " Upload Photo " in the Photos tab of the navigation menu
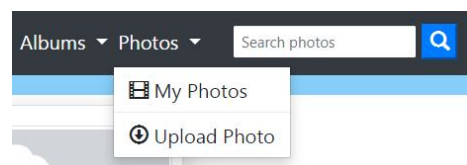
Fig. 24. Selection of an option in the navigation menu

Then you will see a form for uploading a photo to the site. The system has a set of validation rules, some of which use special libraries with artificial intelligence. For example, we can't upload images larger than 1 MB (in the trial version), there are also restrictions on the format of uploaded photos - it should only be '. jpeg '. Also, the system itself checks whether the downloaded image is an image. That is, for example, if we create a simple text document with the extension '. jpeg 'and write there a virus

which is less than 1 megabyte the system recognizes such replacement and will not create an entry in the database, giving a warning message that this file is not an image, although it is suitable for size and extension. This is because uploading an image to the site takes two different types of validation: on the site (validation front, which is easy to deceive, but it can detect the most simple violations of the rules of uploading photos to the server, which unloads it and increases the reliability of the service), and the server-side where the validation system is built more precariously and you simply won't be fooled. To prove this, we create a text file with a possible virus in it that does not exceed 1 megabyte in size and change its extension to '. jpeg ' :
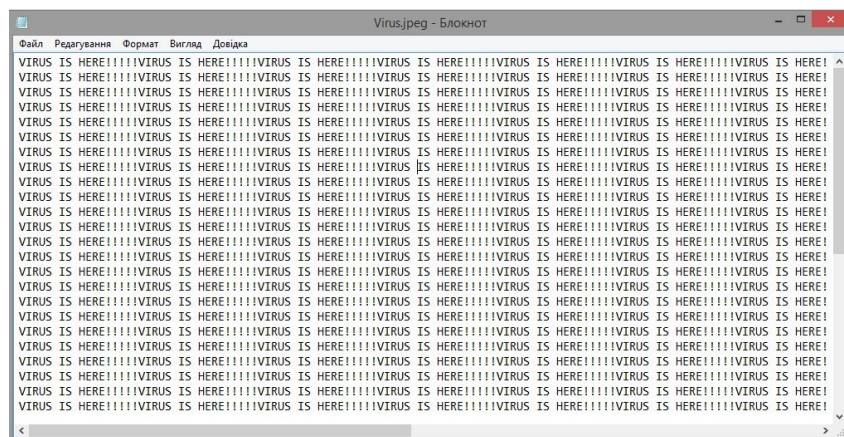
Fig. 25. Creation of file for system validation testing

After creation we will try to download our "virus" file to the server:
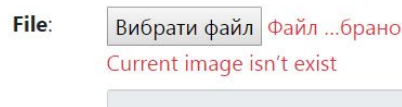
Fig. 26. The server response to a virus file

After uploading the file to the server, we get an answer identical to Figure 4.12. This is because when receiving and processing an image on the server-side, it is first to cut into bytes, tested using streams and special libraries using artificial intelligence, and then special services try to draw it again. If the drawing is successful, the service advances it to the next level, named DAL (Data Access Layer). This layer already performs basic data operations, namely, associates them with a database, creates records in it, edits them, and deletes them. That is why validation is an extremely important part of this web resource.

If validation passes successfully for potentially dangerous content, it threatens the operation of the site, namely the entry of malicious software and destruction of the resource from the middle.

If there is still something we will download content that meets all the validation requirements, then we will get the following page:
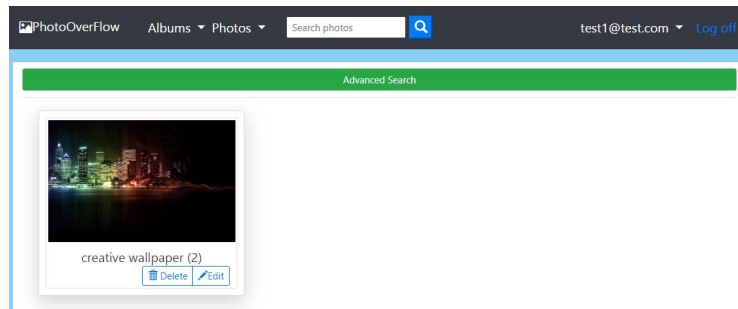
Fig. 27. The image has passed all stages of verification - successful

After creating an album and uploading an image to it, the user can attach the photos to the middle of the album. To do this, the user has to go to his albums, then select the album in which he wants to upload the photos, open it and click the " Add photos " button.
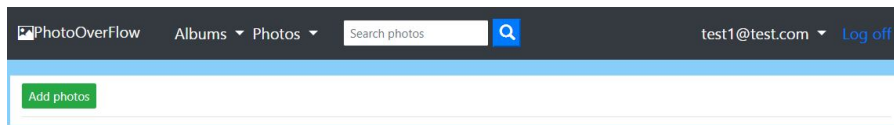
Fig. 28. The appearance of the button " Add photos ".

This will open a page with all the user's photos. The user can select an unlimited number of photos from his collection and upload them all to the selected album. It looks like this:
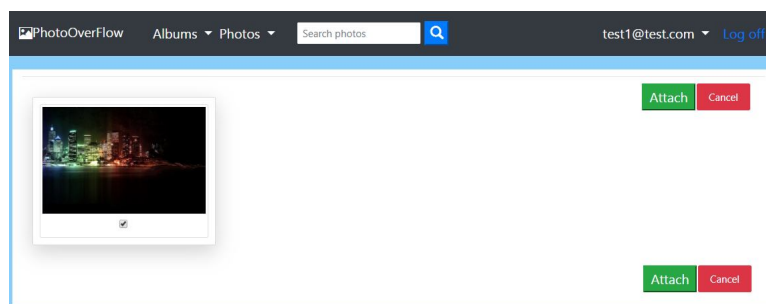
Fig. 29. The process of attaching photos.

The photos will then appear in the user's album. You can also unlink them from the album or make them the main image of the album by using the ' Detach ' and ' Set as album title ' buttons.

Fig. 30. The attached photo can be unpinned or the main photo of the album

As you can see from the picture below, you can like and leave comments.

2019.05.06 02:32**test1@test.com**

Nice picture

Fig. 31. Leave a comment under the photo.

Also, for convenience, users have an integrated search and advanced search:

creative wallpape

creative wallpaper (2)
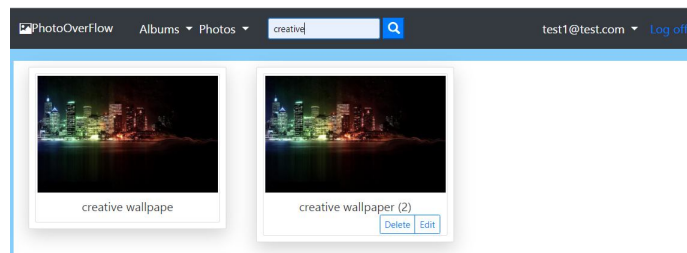
Fig. 32. Search by image name.

Advanced search for ' Flash ':
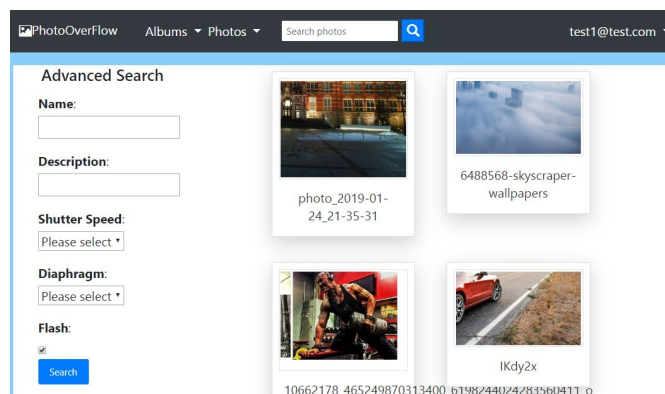
Fig. 33. Advanced search for parameter ' Flash '

So, having gone through the entire workflow, we can conclude that the user interface is quite clear and easy to use, also make sure that all the functions work flawlessly.

7   User Manual

The user does not need to install any additional software that may take up disk space or create additional boot to the user processor. All you need to do is open the browser, open the search engine it uses and enter the search bar: " PhotoOverFlow " - the name of the product that we successfully deploy on the server, and then it will be accessible to the user from anywhere in the world.

Unauthorized user, the prospect can view open albums and photos of other users, the number of likes and comments, but cannot add their likes or comments. To access the full functionality, the user must be logged in, thereby creating his profile on the system. After registration, the user has the opportunity to create their albums, upload photos, add "likes" and comments on other users' photos. You can also buy photos from other users and sell your ones. An administrator with access must review the information of the profile just created, check the accuracy of the information and the uniqueness of the photos that were uploaded by the user for resale.

8   Analysis of the control example

The site testing phase took 20 days. Test - Plans and Stages. Testing was performed after the process of " code freeze " - the point in time at which the changes to the source code are stopped. Each module of the system has been tested separately after development or reconstruction. The purpose of the testing was to identify hidden defects, malfunctioning of the system and check the ability of the site modules to perform the tasks. After finding the malfunction of the system to the obtained results, it was corrected and retested. As a result of the work, the errors in the work of the resource were discovered and eliminated and the design was changed for the convenience of the user.

Modern information technologies provide tremendous benefits for comfortable and reliable software development. But you should pay attention directly to the design of this web resource in the development process, which should be an intuitive user with any level of computer ownership. After developing and launching the site, it must comply with all the basic rules, namely to be functional and to include only the necessary and necessary modules. Software quality is an extremely important factor in terms of quality and reliability. An excellent software product should be simple and fast, anticipate all non-trivial situations caused by the user and find the best solution to solve them.

9   Economic characteristics of the design solution

The proposed PhotoStack Photo Exchange system using Machine Learning is designed to simplify the process of sharing, selling and buying user photos from anywhere on the earth at any time. At present, there are alternative solutions in the world to fulfill the tasks of such a business model. However, from section 1 we can conclude that each of them has several disadvantages. Taking into account all the drawbacks and concluding, we can design and build a system with a high enough profitability, the revenue of which will cover all costs in less than a year. Also, the system will introduce the latest achievements of the Information Technology market, which will increase the security and relevance of the system, simplify the process of maintaining it in the future, and the simplicity and ease of design will quickly give it popular among users of any age categories, which in the future will provide it with one of the flagship positions on the market. The system will be hosted on a global Internet network, enabling anyone who needs this system to use it. Since this photo-sharing system is a source of information accumulation, the system can be used to develop similar or related systems of similar activity, to use its resources for adjacent businesses under pre-agreed bilateral conditions, so the developed system will have a wide range of applications. The software solution today has a high level of technical and market value. However, we are running the risk of implementing this system because it is difficult to evaluate the profitability of the system in the first place. Despite a large number of successful projects of recent years that are relevant to this area, we can optimistically evaluate the future implementation of this system of management of the public system.

We have become quite popular in starting our own business. No matter what industry, market or country you want to start a business, it needs a name and logo. Later, if the company succeeds, this logo will grow into a brand that will be known to the whole world, which is why it is necessary to approach his choice wisely. It is now a very popular decision to use as a logo a specific image of animals, nature or anything else that surrounds us. This image can be found, purchased or simply downloaded from our web site. After all, the main point of our service is different from the others is safe and proven graphic information. Also, resources of our site can be used in different spheres of life: from sharing albums of photos from some significant event between relatives and their families to selling sketches of paintings, custom portraits, or simply well-done photographs, plans of architectural projects, submitted images.

Professional photographers try to show the world the way they see it at a certain point in time, and they need to be able to share their work with the world without losing quality in one click. The availability of such a resource will solve their tasks as suppliers and those of companies looking for brand images. The resource will also be able to be used as a storage device for family photos and shared with relatives around the world. The choice of such a software solution in this work is due to their popularity, publication of the list of completed IT projects, the stated list of functionalities and the regularity of updates.

Implementing such a system will solve a certain range of tasks and will simplify the work of many people. But for the system to function normally, it is necessary to

carry out economic analysis and determine the profitability of the product. Because of the rapid and high-quality implementation of the product, there is a need for encouragement for developers and a platform for its implementation. To finally decide whether this solution was cost-effective, it was necessary to evaluate the project to identify the best paths and opportunities. Accordingly, an estimate of the cost of product development was calculated and its cost was calculated, taking into account tax and administrative and sales costs.

10 Conclusions

Therefore, having carried out a detailed analysis we can conclude that every stage and part of the process of realization of our product is irreplaceable and must be implemented in a certain period. However, in the process of each development, sooner or later, you have to deviate from the plan and make unplanned changes. Such changes may be caused by UAT (User acceptance testing) - otherwise known as beta, application, or end-user testing - often considered the last stage of the web development process, the one before the final installation of the software on the client's site, or its final distribution. Use the software by the target audience and record and correct any defects detected. This gives users the ability to interact with the software and find out if everything works as it should if features were missed, misunderstood, not reported, and so on. The purpose of user acceptance testing is to evaluate whether the system can support daily business scenarios and user scenarios and to ensure that the system is operational and correct. That is why when designing this product, attention should be paid to solutions for easy maintenance and development of the product in the future. You should also pay attention to the user interface. There are many sites with interesting content and the necessary functionality, and despite the wrong design, the user often leaves the resource by viewing only the main page of the site. Therefore, the content and appearance of the home page of this product should not only encourage the user to go from the home page to the main functionality, but also to continue to use the site for their own and business purposes, and recommend this resource later, to their colleagues and loved ones.

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