



**International School of Economics**

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**Бронирование кабинетов в КазГЮУ,  
Booking of classrooms in KAZGUU,  
Казгюуда кабинеттерді броньдау системасы**

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## Plan

Table with plan of website development

Name of the stages of the work	Deadlines	Mark of completion
Collecting Data from surveys	01.03.2023-04.04.2023	+
Planning structure	01.03.2023-03.05.2023	+
Creating mockup	01.03.2023-03.05.2023	+
Sample work with database	01.03.2023-03.05.2023	+-
Web Development to search for available classrooms/open rooms	01.03.2023-03.05.2023	+-
Work with sample website	01.03.2023-03.05.2023	+-
Report preparation	01.03.2023-03.05.2023	

### **List of concepts and symbols**

API (Application Programming Interface) - a software application interface, a way for programs to interact with each other.

REST (Representational State Transfer) - transfer of the representation of a resource state.

REST API - an API that uses the principles of REST, usually data exchange is implemented using the HTTP protocol.

WEB API - an API that provides a platform for creating services such as REST and SOAP, usually data exchange is implemented using the HTTP protocol.

SOAP (Simple Object Access Protocol) - a simple protocol for accessing objects.

RESTful API - a term used for web services built with REST in mind (i.e. not violating its constraints).

HTML (HyperText Markup Language) - a standardized markup language for documents on the internet.

CSS (Cascading Style Sheets) - a language for describing the appearance of a document.

HTTP (HyperText Transfer Protocol) - a protocol for transferring hypertext.

JSON (JavaScript Object Notation) - a text format for data exchange based on JavaScript.

URL - identifier of an abstract or physical resource.

Client-side of the application (frontend) - implements the user interface, generates requests to the server, and processes responses from it.

Server-side of the application (backend) - a program or script on the server that processes user requests (more precisely, requests from the browser).

Bootstrap - an open and free HTML, CSS, and JS framework used to create responsive website designs quickly.

JS (JavaScript) - a scripting programming language used to add interactivity to a website.

Node JS - is an open-source, cross-platform JavaScript runtime environment and library for running web applications outside the client's browser.

Vue JS- Vue.js is an open-source model–view–view model front end JavaScript framework for building user interfaces and single-page applications.

SQLite3- SQLite is a database engine written in the C programming language. It is not a standalone app; rather, it is a library that software developers embed in their apps.

DB (Data Base) - an organized structure designed for storing, modifying, and processing interconnected information.

DOM (Document Object Model) - an object model of a document.

JSX (JavaScript XML) - an extension of the JavaScript language.

ER-model (Entity-Relationship model) - an entity-relationship model.

ORM (Object-Relational Mapping) - mapping data to real-world objects.

## **Thesis**

Our research in Booking System/rooms is appeared from the situation where students faced with the problems which are connected with booking open rooms, rooms/offices/cabinets. The main problem in that case it is students cannot just book offices and open rooms online, they have to waste their extra time to come physically to the university and agree with the open room's admin. With booking rooms/offices/cabinets is more harder, to make a reservation/booking students have to deal with DSA (Department of Student Affairs), the problem in that situation it is to make a booking student have to speak with them for at least two weeks before, which is inconvenient for students. As well it is huge problem for Student's Organizations, for example they have to train, practice their activities, but there is bunch of problems to book the place where they can do their businesses. According to the statistic, freshmen in KAZGUU were increased, due to the increase of students, which mean accordingly, student activity is increasing.

Through the quantitative research as surveys, some interviews from the students, as well we checked by ourselves and according to analysis, we have came up to necessity of this project for conveniences and supporting students and their activities.

The paper consists of several chapters. First there it is an introduction to the subject area, where the requirements from the terms of reference are analyzed, as well as options for using a web-site are compiled. The second chapter introduces to the basic concepts, techniques, technologies and tools used later in the development of a web-site. The third chapter is devoted to the development of a web-site, namely description of the database design and development processes, implementation of the client and server parts, as well creating web-site according to the mockup. The result of this work was a web-site - an interactive office map of University, for finding and booking free classrooms, open room.

## **Introduction**

As we know our century it is century of modern and information technology, if take specifically web development, their demand is rapidly increasing and it becomes to necessary component of modern life in business and in any activity.

Nowadays, companies often are resorting to web application development services to effectively solve a wide range of business tasks. Since universal solutions allow you to simplify and optimize some business processes. The service should provide non-static information at the request of the user, and dynamically generate pages with the necessary data. Therefore, it is web applications that oppose the creation of static sites.

For example booking system, it is a computerized system is used to store and retrieve information and conduct various rental transactions, such as cars or flights, etc. as well in our time it becomes to basic and default feature which almost uses everywhere.

The aim of the final qualifying project it is the development of a website – an interactive map of KAZGUU which designed to find the free offices for students.

To achieve this goal, there are several tasks:

- Design and development of local database;
- Preparation of test data version about classrooms;
- Implementation of the free classroom finding service;
- Implementation of booking classrooms;
- Implementation of booking open rooms;
- Creating website according mockup.

The object of the study is the booking process for students in University.

The subject of the study it is the process of developing an interactive map of the office of KAZGUU.

The purpose of the work is to develop a website – An website of the University for booking,

searching for free classrooms for KAZGUU students.

The object of research is the navigation and booking process for KAZGUU students.

Results of the work will be: a website development – an website of university for finding the workplace and free classrooms for KAZGUU students



## Body

### 1. Introduction to the subject area

#### 1.1 Research

To be more precise for this project, a survey was conducted among students from March 3rd to April 7th. The questionnaire questions were asked in three languages: Russian, Kazakh, and English. We conducted the survey using Google Forms, and to obtain as many responses as possible, we sent out emails via Outlook. More than 400 students from the first to fourth year participated in our survey. Our main target audience was students from the first to the third year, as they are the ones who are more active in the university.

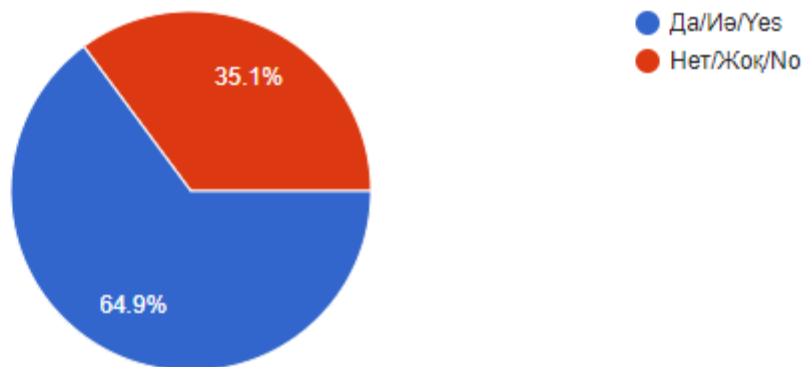
Statistics show that most audiences are in favor of being able to book classrooms. The questions in the questionnaire were designed to determine whether students need to book classrooms and for what purposes.

#### 1.2 Survey

Пользуетесь ли вы Open rooms для подготовки к учебе?\*

Сіз сабаққа дайындалу үшін Open rooms кабинеттерімен қолданасызба ?\*

Do you use Open rooms for study preparation?

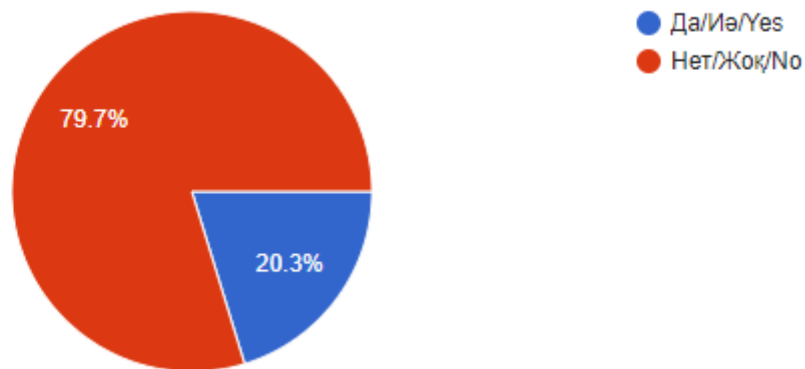


Picture 2

Всегда ли вам удавалось в нужный момент забронировать Open rooms?

Сіз әрқашан қажетті уақытта Open rooms-ты брондай алдыңыз ба ?

Have you always managed to book an Open room at the right time?

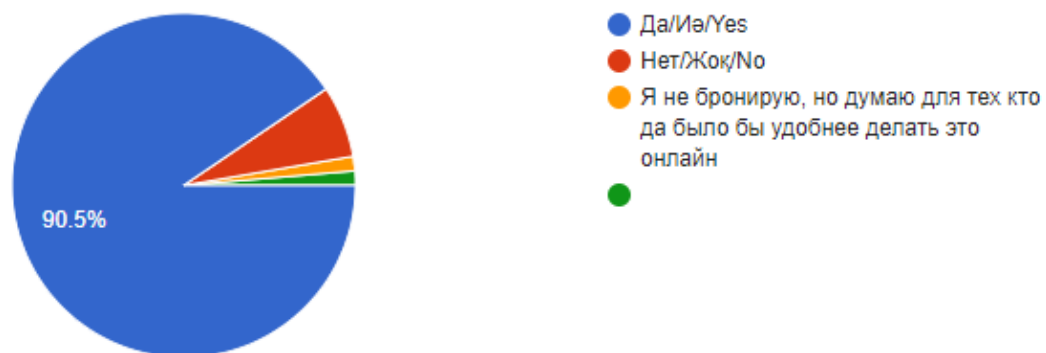


Picture 3

Хотели бы вы онлайн заранее бронировать Open Rooms?

Сіз Open rooms-ты алдын-ала Онлайн брондағыңыз келеді ме ?

Would you like to book an Open Rooms online in advance?



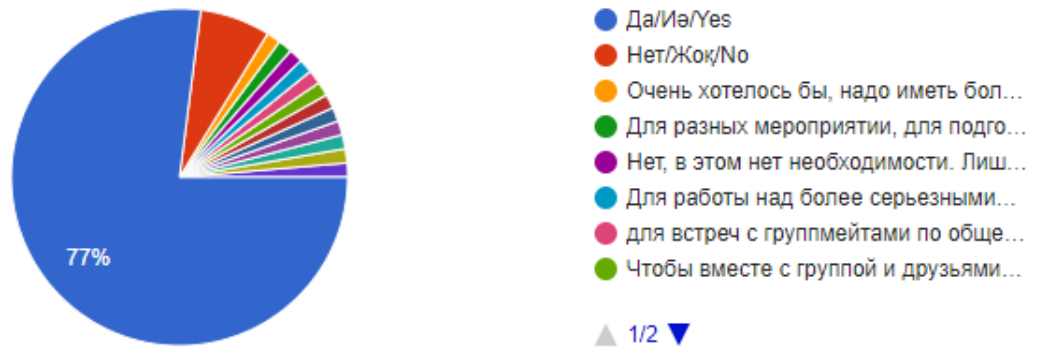
Picture 4

Хотели бы вы бронировать “аудитории/кабинеты”?

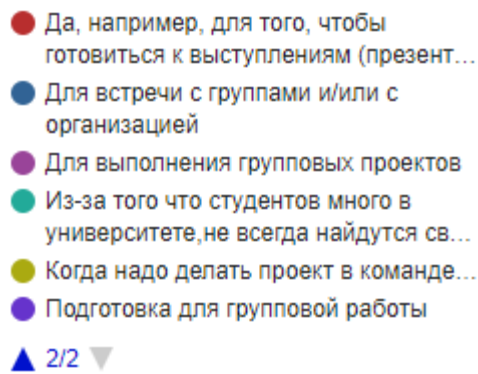
Если да, то для чего?Сіз аудитория/кабинетті брондағыңыз келедіме ?

Иә болса, не себепті?

Would you like to book “auditoriums/cabinets”? If yes, then why?



Picture 5

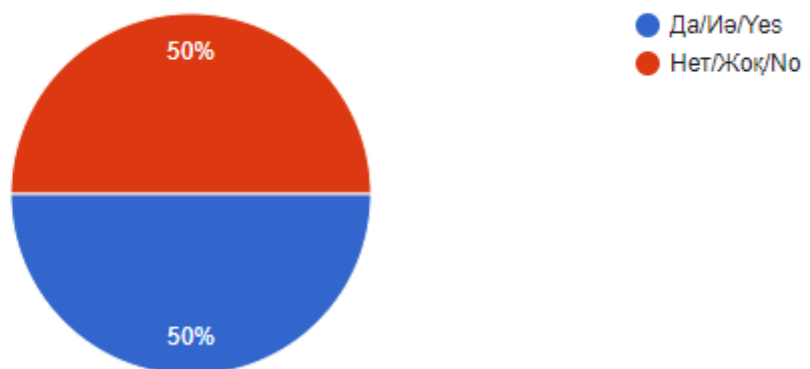


Picture 6

Сталкивались ли вы отказами бронирования “кабинетов/аудитории ” в срочном порядке?

Сізге жедел уақытта қажет кезінде, “кабинетті/аудиторияны” брондауға рұқсат берілмеген

сәттер болды ма ?Have you experienced rush booking rejections of cabinets/auditorium ?



Picture 7

### 1.3 Requirements analysis

We divided Body part on two main parts it is coding part and design part, as well decided to

start from coding part with simple design, because the main thing in that project it is a functional of website then a design.

According to the results of surveys we understood Classroom booking Website is necessary for our students. An analysis of the requirements was based out on the results of surveys and demonstrated in Pictures 1-7.

## **2. Methods, techniques, tools**

### **2.1 API**

API- API stands for "Application Programming Interface." In simple words, an API is a set of rules and protocols that enable different software applications to communicate with each other [5]. In simple terms, it is like cashier, which takes orders from people, he is responsible for the communication between client and with the kitchen, and as a result, it will deliver the order to the customer. The cashier or any worker, which works in serving, knows the rules and how he must take orders, what the dishes can cook or kitchen have, and main part it is they know how to deliver the order to the customer. In that case, API is similarly, because an API knows the rules of how to request it is like take order and receive data (like deliver order), as well API can perform some actions if it necessary between the different software applications. APIs are commonly used in software development to help different programs or systems work together, share information, and automate tasks. For example, social media platforms use APIs to allow third-party apps to post content or access user data, while e-commerce sites use APIs to integrate with payment gateways and shipping providers.

In other words, if to interact with a computer or system to obtain information or perform a function, the API will help to convey what is required to this system so that it can understand and execute the request (picture 9).



**Picture 9**

One advantage of APIs is that there is no need to know the specifics of caching - how a resource is retrieved or where it comes from. As the name suggests, a WEB API is used in web development and is an API accessed through the Internet using the HTTP protocol. It also provides a platform for creating services such as REST and SOAP. This is a concept, not a technology.

REST APIs provide at least the following operations:

GET - retrieves resources,

POST - sends new data to the server,

PUT - updates existing data,

DELETE - removes data.

These operations allow clients to perform actions through **RESTful APIs**.

A RESTful API (Representational State Transfer) it is a type of web service that follows a set of principles for building scalable and efficient web applications. RESTful APIs are designed to be stateless, meaning that each request contains all the information necessary for the server to understand and process the request [10].

The main principles of how works a RESTful API is include main points:

1. Architecture of Client and Server: there is pure separation between CLIENT and SERVER where they have own tasks and responsibilities.
2. Stateless communication: Each request from the client contains all the necessary information to complete the request and in that, moment server is not maintaining any state between requests.
3. Cacheability: Responses should be cacheable to improve performance and reduce the number of requests to the server, reduce latency, reduce loads on servers etc.

RESTful APIs as other basically uses HTTP methods such as GET, POST, PUT and DELETE to perform CRUD (Create, Read, Update, Delete) operations on resources. In general resources are always identified by unique URLs, and responses are returning in the JSON or XML formats. RESTful APIs are more actively using in the web-development and the most popular choice for building the web-applications, which are, can be flexible, scalable and the main is efficient.

## **2.2 HTML**

HTML (HyperText Markup Language) is a markup language for web pages. It allows the user to create and structure sections, paragraphs, headers, links, and quotes for web pages and applications [7].

HTML is not a programming language, which means it cannot create dynamic functions. Instead, it allows for organizing and formatting documents similarly to Microsoft Word. When working with HTML, simple code structures (tags and attributes) are used to markup the website page. For example, a paragraph can be created by enclosing the text within the starting `<p>` and closing `</p>` tags.

Although HTML is a powerful language, it is not enough to create a professional and fully responsive website. It can only be used to add textual elements and create content structure.

## **2.3 CSS**

CSS (Cascading Style Sheets) is a language used for styling elements written in a markup language such as HTML. It separates content from the visual presentation of the website [8]. The relationship between HTML and CSS is tightly linked. Since HTML is a markup language (the backbone of the website), and CSS emphasizes style (the entire aesthetics of the website), they go hand in hand.

There are various styles of CSS. They can be inline, external, or internal. Inline style involves styling CSS with certain elements having the `<style>` tag. Each component must be styled, so this may not be the best or fastest way to process CSS. However, it can be useful. For example, if you need to change one element, quickly preview changes, or possibly don't have access to CSS files.

External style may be the most convenient. Everything is done externally in a .css file. This means that all styles can be made in a separate file and apply CSS to any page. External style can also improve load time.

Internal style is done by loading CSS styles each time a website is updated, which can increase load time. Also, the same CSS style cannot be used on multiple pages because it is contained on one page. However, it also has its advantages. Placing everything on one page simplifies sharing templates for previewing.

## **2.4 JavaScript (JS)**

JavaScript is a scripting language that allows creating dynamically updating content, managing multimedia, animating images, and much more [9].

JavaScript does not require a compiler because web browsers interpret it with HTML;  
Errors are easier to detect and therefore correct;

It can be assigned to specific elements of a web page or specific events, such as clicks or mouse hovering;

JS works on many browsers, platforms, etc.;

JavaScript can be used to check input data and reduce the need for manual data checking;

It makes websites more interactive and attracts visitors' attention;

It is faster and lighter than other programming languages;

The core client-side language JavaScript consists of some common programming functions that allow doing things like:

- Storing useful values inside variables,
- Operating on fragments of text,
- Running code in response to specific events occurring on a web page, and so on [20].

## **2.5 Vue JS**

Vue.js it is not separate programming language, it is a very progressive JavaScript framework which used for building UI (user interfaces), that framework gained huge popularity among the web developers because that framework is flexible, easy to use and simple.

Vue.js allows us to build complex and dynamic web-applications by providing a set of tools and libraries that make it easy to handle data binding, components, directives, and transitions. It is designed to be easy to learn and can be used for small to large-scale projects.

One of the most important key features of Vue.js it has system which called “reactive data binding system”, which allows the UI to update in real-time as the data changes. This means that developers can focus on writing code that handles the logic of the application, while Vue.js takes care of updating the user interface.

Vue.js as well provides a really powerful set of directives, which are using to manipulate the Document Object Model (DOM) and create the dynamic web applications. Overall developers have directives permission to add functionality such as event handling, conditional rendering, and animation to their applications.

Overall, Vue.js is a popular choice for web-developers who want to build dynamic and scalable UI using a simple and flexible framework. Its popularity is reflected in the large and growing community of developers who contribute to the ecosystem by creating plugins, tools, and components that extend the capabilities of the framework.

## **2.6 Node JS**

As well Node.js it is not a separate programming language, it is a cross-platform, open-source, JavaScript runtime environment which allows to the developers to run JavaScript on the server-side (Back-end). As well as Vue Js get huge popularity, because of his performance and easy to use.

Node.js uses specific model which allows to us build applications, websites in real time, it means we can change something and not to restarting server to load new code or properties. For example, we changed button, it will change immediately, it calls non-blocking I/O model.

One of the most important thing in Node.js it is he can capable of handling asynchronous programming, that's mean it can process multiple requests at the same time without stopping and disturbing to coding. This makes it a great choice for developers to build applications, which requires working in real time, such as chat applications, real-time collaboration tools, and Internet of Things



(IoT) applications.

### **3. Web application architecture**

#### **3.1.1 User Interface UI**

UI stands for User Interface.

The website is designed in clean tones, it is simple and pleasant to look at. It is easy to use, and most importantly, the services are at the center, and the design complements the website and leads users to access these services.

##### Consistency

To prevent users from getting confused while using the website, a unified color scheme was created for the website. Not too bright, not too dark colors and identical fonts were chosen for the "Book", "Reserve" buttons, as the actions are the same.

The Online Booking page is aesthetically designed. No additional pictures, buttons, or colors are used to avoid distracting the user from filling out the information. The text fonts are in black to emphasize the proper reading and filling out of the information.

##### Visual clarity

On the homepage, the service images are displayed with large icons to emphasize them, and to help the user understand what site they are on and what this site can offer.

There is not much text on the site, as our service only focuses on booking rooms. Explanations or any additional data are not necessary and will only distract the user. Our main goal is to make it easy for the customer to browse the site and find everything they need.

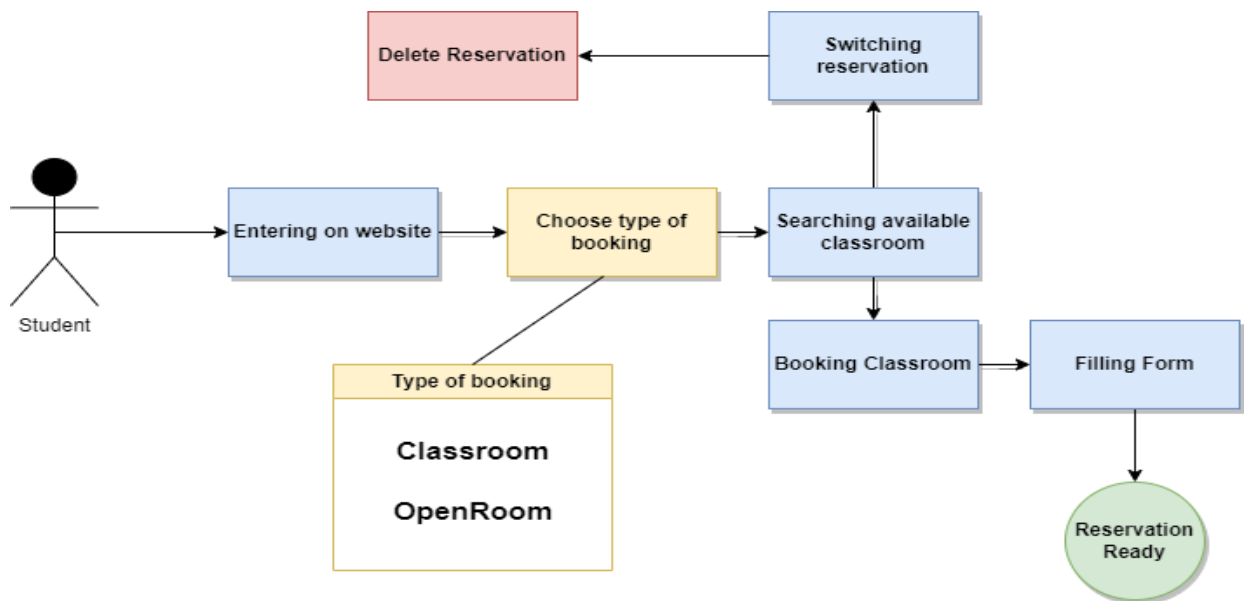
##### Mobile UI

Graphics - something that develops day by day. Every second developer is trying to distinguish himself and make a complex, beautiful and graphic design. But you need to take into account the fact that people's eyes get tired of this contrast, graphics and complex color combinations. Therefore, our decision was to make the site concise, convenient and simple. So that the user can relax when visit our site.

The interface of our site is bright, so the buttons and pictures were made in dark colors to stand out from the background.

**Table 1 – User and functional requirements**

User requirements	Functional requirements
Users can book classrooms and see their status	The system must have the functionality of booking classrooms, displaying the status of the classrooms
Users can change the reservation	The system must have the functionality of occupying a classroom, switching his reservation



**Picture 8 – Diagram of usage**

### 3.1.2 User Experience UX

The site has been designed to be as user-friendly as possible. Since the user enters the site with the thought “Book”, the functionality of the site is the same, it only leads to booking rooms. No distracting ads, or data that needs to be closed or removed.

Given that in the 21st century, basically everyone now uses a mobile phone, and so that the user does not bother to get a laptop or turn on a computer, but can easily and conveniently immediately get a phone and make a reservation, the site has been adapted for mobile screens.

To improve usability, we also took into account the minimum data entry.

Minimal data entry helps the client not to waste time, and it has long been recognized that the more required from the user, the more annoyed he is. On our site, we limited ourselves to the fact that you

only need to fill in your full name and contact information. Also, it is convenient not only for users, but also beneficial for site owners. After all, the easier it is to fill in the data, the more users respond and fill in their data. In order to understand errors in the creation of data fields, validation was studied - this is the process of identifying errors when filling in data fields. And as it turned out, requesting a lot of unnecessary data is a big mistake, because it is complicated and strange, repels users to fill in. This leads to the fact that it is easier for the user to switch to competitors.

**“Rules of three clicks”** - this statement was taken as a basis. Our idea was to get our users what they wanted with three clicks. In our case, this is an office reservation, just three clicks - three pages and the user gets what he wanted. These three clicks: on the Main page - sign up, on the second page Selecting rooms and dates - continue, the last page filling in the data - the button book.

The mobile interface is significantly different from the computer one. Here a huge role is played by the size of the buttons, scrolling. On our website for mobile use, scrolling can be done from either side, it's faster and more convenient to use. Since, users are accustomed to this type of scrolling rather than scrolling only on the right side as on computers.

The buttons are made larger, since now all mobile phones have a touch screen, and the size of people's fingers is different, and so that when the button is clicked and worked, it was decided to make it larger. Download speed. There are no advertisements, unnecessary information, pictures, etc. on our site. due to which the Internet may take longer to load, since the user with the mobile application can be anywhere where the Internet works well or vice versa. It is important for us that the user gets what he expected from our site.

## **3.2 Web-Development**

### **3.2.1 Front-end**

The website was developed using HTML and CSS languages, and the Vue JS. The following requirements were considered: cross-browser compatibility (the page should display identically in different browsers), layout flexibility (ability to easily add/remove information from the web application), and processing speed (the web document should be quickly processed by the browser), and validity (the web document should comply with standards).

One of two approaches to web development was chosen, namely, block-based layout. This layout is based on the use of the universal <div> tag, which can perform many functions. This tag is the brick of block-based layout, and various styles are applied to it, allowing it to be used for anything. The advantages of block-based layout over table-based layout are flexibility in setting and changing styles for individual objects, quick loading of blocks, and ease of implementing responsive design. The disadvantages include block jumping during browser scaling, cross-browser compatibility issues, and higher complexity in learning.

As for the design of the web application template, a liquid design was used, where the template width usually takes up the entire browser window space and is set in percentages. For greater convenience, the CSS Flexible Box Layout Module (Flexbox) specification was used, which allows control over the size, order, and alignment of elements along multiple axes, the distribution of free space between elements, and much more. This specification solves the block-based layout problem with block jumping during browser scaling.

The cross-browser compatibility issue was resolved by adding specific rules for different browsers in the CSS.

As well as provided cross website usage, website is adaptive for mobile phones and for computers:

# Booking Rooms

[Главная](#) [Онлайн-запись](#)

## Наши услуги



Бронирование Open Rooms

[Записаться](#)



Бронирование Кабинетов/аудиторий

[Записаться](#)

## Subscribe Form

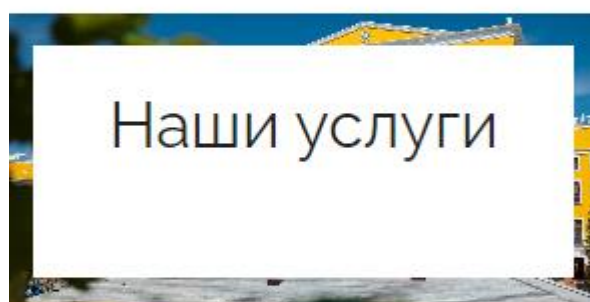
[Join](#)

Booking rooms

**Picture 9 - That version is for Computer**

# Booking Rooms

Главная    Онлайн-запись



Subscribe Form

Booking rooms

**Picture 10 – Version for Mobile Phones**

### **3.3 Implementation of the client-side**

The client-side implements the user interface, generates requests to the server, and processes responses from it. It was created using the Vue.js framework and JavaScript language. The routing between pages was set up as a top priority. There are a total of 4 pages: Home, Online Booking, Open Room, and Cabinets. On the Home and Online Booking pages, the following requests are sent:

HTTP request to select the type of reservation, floors, classrooms, and time. After filling out the forms, an object is formed for booking (Full Name and Phone Number). Then the form data is sent to the server and a response is received. If the room and booking time are already in the database, booking at that time will not be possible. The "Book" button will be displayed in red, and if the

booking time is available, "Successfully booked" will be displayed.

On the Booking page, the following requests are sent:

HTTP request to check the availability of bookings in the database (when selecting the same time that has already been selected) - we receive a visual notification that the booking for that time already exists. Then the form data is sent to the server and a response is received.

POST request to register the booking (when the "Book" button is clicked) - we get the data from the form and form an object to send (Full Name and Phone Number). Then the form data is sent to the server and a response is received. The input parameters are the type of classroom, room number, time, Full Name, and Phone Number, and the output parameters are the booking information.

The next request is

GET request for all classrooms/rooms, including free and occupied ones. The floor id is sent to the server, which is specified as the data-floor attribute and is active. The full information about the classrooms/rooms is returned in response. The input data is the floor id, and the output data is the information about the classrooms/rooms.

PUT request when a student changes the room. The floor id and the id of the room they booked are sent to the server. The input data is the room id and floor id.

### **3.1 Mockup of Website**

There is some mockups as example of future web application, which consist from 4 parts where student can click on buttons as choose floor, classrooms and the date, after that they have to fill the form about them and how to contact, for that they have 3 filling forms as Name, surname, mail and mobile phone (Appendix A).

## Conclusion

Nowadays it is not enough just to have a good institution, nowadays the hallmark of an institution is their website, application, marketing, etc. it is always very important to have social networks, sites, as people study them. People nowadays are very busy, so everything is done online. This is convenient for both users and their employees, and everyone is already used to it. It does not have an equivalent site that does not have the desire to interest customers, does not have the desire to improve its company. However, the work does not end with just creating a website. The site should always be engaging and has active information. And it is very important to create sites in the right frameworks. It is impossible to create a voluminous site on frameworks designed for one-page sites. Even if it is possible, there is a huge chance that the site simply will not be able to work correctly.

In the course of writing the Diploma for the project “Booking rooms in KazGUU”, a website based on Vue.js was developed. So, it supports easy integration with JavaScript libraries. Also, VueJs has an extensive function, for example, our site must work on a database, Vuejs just has a data binding function. The main thing on our site is booking, Vuejs has an event handling function. Vuejs is also easily scalable, in the future you can make a large project from a one-page site. This framework is easy to use and provides a lot of possibilities. It is thanks to these functionals that our choice fell on this framework.

During the implementation of the graduation project, the following tasks were completed:

- Developed Terms of Reference for the site
- Website structure developed
- Website mockup developed
- Research work was carried out (forms were developed in which about 400 students participated)

According to a survey on booking rooms in KazGUU, the creation of the site was for the majority of students. This project is necessary for students to: hold an event, both educational and entertaining; to prepare for study; for online items, etc.



Appendix A

# KAZGUU

## Welcome on My website

Book a classrom

KAZGUU

Book a Classroom

08.04.2023

Select a Time ▾

Any Location ▾

Select a floor ▾

Please select a date and time for your reservation.

# BOOKING ROOMS

[Главная](#) [Онлайн-запись](#)

[← Назад](#)

Укажите сведения о себе

Чтобы изменить эту форму или создать для каждой услуги свою, перейдите в «Настройки записи» в панели управления.

Уже есть аккаунт? [Войдите в него](#), чтобы сэкономить время при записи.

Имя \*

Эл. почта \*

Телефон

Добавьте сообщение:

## BOOKING ROOMS

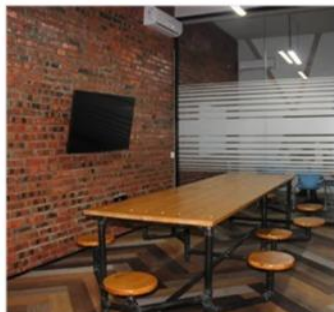


[Главная](#) [Онлайн-запись](#)

[+ Добавить секцию](#)

Секция: Заказ услуг

### Наши услуги



Бронирование Open Rooms



Бронирование Кабинетов/аудиторий

## Название услуги

Посмотрите календарь и запишитесь на удобные дату и время

Выберите дату и время

Март 2023						
пн	вт	ср	чт	пт	сб	вс
27	28	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

Восточный Казахстан (GMT+6)

четверг, 9 марта

00:00	01:00
02:00	03:00
04:00	05:00
06:00	07:00
08:00	09:00

[Показать все сессии](#)

Подробности

Доступно онлайн

Название услуги

Адрес

Сотрудник

Длительность

Цена

Дальше

## Booking rooms

info@kazguu.kz

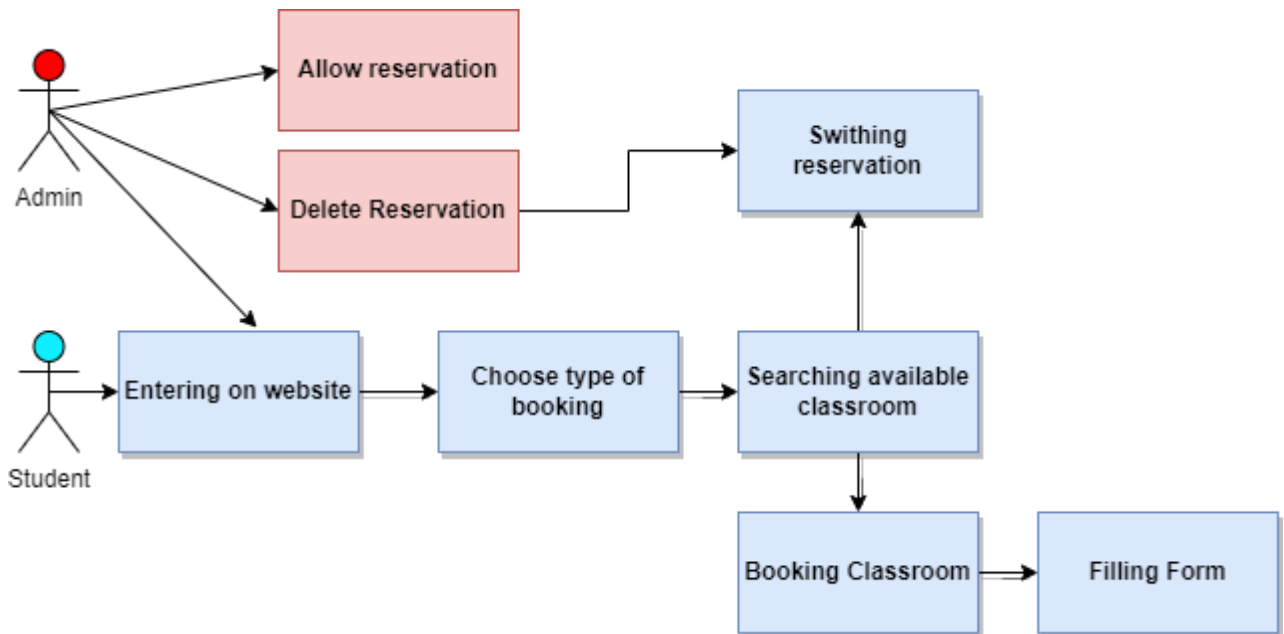


Diagram of usage with Admin

## References

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