Czech University of Life Sciences Prague

Faculty of Economics and Management

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Bachelor Thesis

CULS Mobile App

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Declaration

      I declare that I have worked on my bachelor thesis titled "CULS Mobile App" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on date of submission 14.03.2018   _____

                                                  Noor Al-Taie

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ČZU Mobile App

Souhrn

Cílem této bakalářské práce bylo navrhnout mobilní aplikaci pro studenty ČZU, která nabízí některé ze základních rysů Moodle a IS tím, že kombinuje a přizpůsobuje tak, aby byly přístupné se smartphony - zařízeními, které nejvíce využívají studenti. Tato práce vysvětluje hlavní principy návrhu mobilních uživatelských zkušeností, obsahuje výzkum, definici problému, návrh řešení, drátové snímky, prototypy, design vizuálního uživatelského rozhraní a příklad prototypu s vysokou věrností s velmi podrobnými interakcemi a zvuky, napsané v jazyce CoffeeScript.

Klíčová slova: IS, mobilní aplikace, CULS, iOS, Android, UX, UI, Moodle, Design

CULS Mobile App

Summay

The goal of this bachelor thesis was to design a mobile application for students of CULS which offers some of the essential features of Moodle and IS by combining and adapting them in a way to be accessible with smartphones - devices students use the most. This work explains the main principles of mobile user experience design, it contains a research, a problem definition, a solution proposal, wireframes, prototypes, a visual user interface design and an example of a high-fidelity prototype with very detailed interactions and sounds, written in the CoffeeScript language.

Keywords: IS, mobile application, CULS, iOS, Android, UX, UI, Moodle, Design

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Introduction

Technology is a very useful advancement for learning purposes. It greatly helps students and teachers collaborate, affirm relationships between each other, build experiences and adapt to satisfy their educational needs.

The aim of this project is to create an application that contains both Moodle and IS systems' features, which fulfils customers' requirements and more specifically student's requirements based on the research that was made for this work.

This application was carefully and accurately designed to avoid mistakes, debugs and make sure that it's very easy and clear to use.

The reasons of choosing an app for mobile phones are firstly, the majority of students nowadays owe mobile phones, and secondly, students prefer using mobile phones due to their easy usage compared to other devices and lastly, for the reason that students carry their mobile phones almost everywhere they go.

Based on the previous reasons, it was decided to create the application for mobile phones and it will available for both operating systems iOS and Android.

This work covers the following major parts:
1. Research and analysis of both Moodle and IS websites' features.
2. Problem and solution definitions.
3. iOS and Android design principles.
4. Prototypes and wireframes.
5. Design tools definitions that were used for designing the application.
6. Final design of the application.
7. Notifications prototype.

Objectives and Methodology

Objectives

Designing a mobile application which includes both Moodle and IS systems:

- Fulfills the student's needs and requirements
- Prepare a prototype and final design of the app
- Receiving notifications, chatrooms for courses, ability to register for exams, finding study materials and viewing grades in the app.

Methodology

Study these points:

- Research about weak points of Moodle and IS
- Define existing solution
- Define user needs and expectations from the app
- Search for competitors
- Follow iOS and Android design principles
- Follow UX Design, UI and wireframes.

Literature overview

History of Moodle

Moodle was developed by Martin Dougiamas, to help educators create online courses. He started to develop Moodle for solving some WebCT (Web Course Tools) problems.

The original Moodle version was used for small classes and a case study, but later, many features were added by different developers around the world.
The first Moodle version was released in 2002. (1)

Currently, Moodle has a large and diverse user community with over 1,077,969 users on this site, speaking 86 languages in 212 countries around the world (Al-Ajlan, et al., 2008). (2)

Moodle can be used in different ways and in different establishments such as education, development, training and in business settings. (1)

History of IS

In the past, universities and large school districts, in particular, have created their own bespoke student record systems. Such as the Repository of Student Information (ROSI) system at University of Toronto. With growing complexity in the business of educational establishments, most organizations now choose to buy customizable software and the number of purchasing software as a service (SAAS) is increasing. The majority of student information systems in use today are server-based, with the application residing on a central computer server, and being accessed by client applications at various places inside and even outside the school. But student information systems have been moving to the web since the late 1990s and that trend is accelerating as institutions replace or upgrade older systems. (3)

Overview

Moodle

Moodle is a free and open-source learning management system written in PHP and distributed under the GNU (General Public License). Developed on pedagogical principles, Moodle is used for blended learning, distance education, flipped classroom and other e-learning projects in schools, universities, workplaces and other sectors.

With customizable management features, it is used to create private websites with online courses for educators and trainers to achieve learning goals. Moodle allows for extending and tailoring learning environments using community-sourced plugins. (1)

Students use Moodle mostly, to check study materials, important deadlines for assignments or tasks assigned by the professors, send messages to professors and vice-versa, upload some projects or assignments, check their grades, and some other tasks.

SIS

A student information system (SIS) is a management information system for education establishments to manage student data.

Student information systems provide capabilities of courses registration, grading and checking grades, viewing results of tests or exams, tracking students' attendance, transcripts, create and view schedules, and many other tasks.

An SIS should not be confused with a learning management system or virtual learning environment, where course materials, assignments, and assessment tests can be published electronically. (3)

Smart devices

Nowadays, all around the world, the usage of smartphones is rapidly increasing every year, people tend to use smartphones rather than other devices on a daily basis due to its size, affordability, portability and easy usage.

According to Pew Research center, from 2010 until 2015, smartphone's usage has significantly increased. (4)

This research reinforces the idea that young adults tend to use cell phones among other devices for the reasons mentioned previously.

MP3, Computer Ownership Has Dropped Among Younger Adults Since 2010

% of U.S. adults ages 18-29 who own the following devices

	2010	2011	2012	2013	2014	2015
Cellphone	96	95	93	97	98	98
Computer	88	88	89	-	-	78
MP3 player	75	71	-	62	-	51
Game console	62	-	-	71	-	56
Smartphone	-	52	65	79	85	86
Tablet computer	5	13	32	36	48	50
E-book reader	5	8	27	24	28	18

Source: Pew Research Center surveys conducted 2000-15. Dashes represent years when these questions were not asked.

PEW RESEARCH CENTER

Figure 1. Technology Device Ownership. Source:

http://www.pewinternet.org/2015/10/29/technology-device-ownership-20

Moodle website analysis

Moodle website on a mobile phone has a very poor UX design, some of the weak points include: poor content, inconsistency, difficult navigational structures, lack of social integration, lack of balance between design and content and a lack of mobile compatibility, as well as poor communication between teachers and students - that's why email is still the only way how we contact each other.

IS website analysis

The pages of IS website on a mobile phone again, have many drawbacks just like Moodle website pages and even worse, it has a very poor UX design that should be reconsidered, including: over-complication, inefficiency, offering a wide range of unnecessary features and information, lacks up-to-date design and technology, difficulty of finding useful information, unfriendly and non-intuitive site navigation and lack of balance between design and content.

Solution proposal and research

Due to the inefficiency of Moodle and the absence of IS app on mobile phones and after the research that was made, I have decided to create an application that includes useful features from both systems: the IS and Moodle systems to make it easier and more comfortable for students to meet the deadlines, check their schedules, communicate with other students and teachers, receive notifications and easily access all the necessary and important information they need.

The app will be easily accessible, as we are accustomed to different kinds of mobile apps, and students will feel more satisfied using their mobile phones. The design of the application will be thoroughly and carefully designed due to the drawbacks that exist in the Moodle and the IS apps.

Research and Problem Definition

Based on the questionnaires and surveys I have done with 30 participants, I created the charts below to help me build the application based on the participants' requirements and needs. For setting goals and being informed of customer's needs, a research was made to fulfil all the required features and information. The target audiences for my application are students from CULS university, for a better and accurate outcome. The conversations were made online as well as face-to-face.

What information should the app offer?
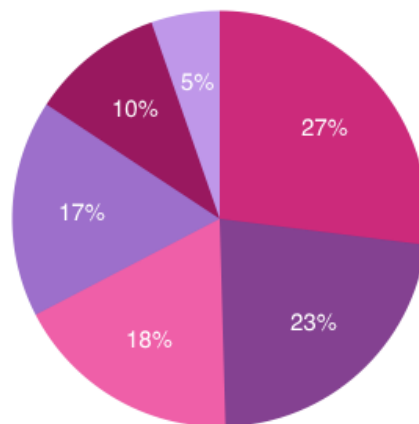
Figure 2. Functionality chart. Source: Author

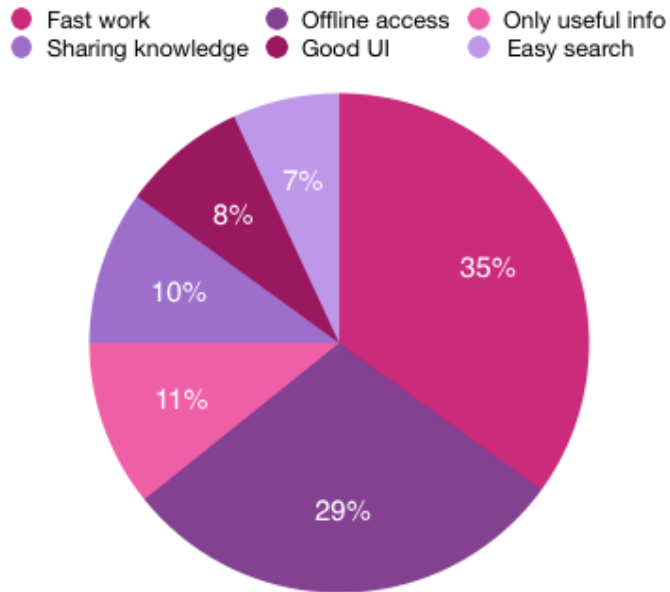What are your expectations from the app?

Figure 3. Expectations from the app chart. Source: Author

The required information for the application according to the first chart:

1. Notifications (27%)
- Notifications regarding new assignments
- Deadlines
- Important dates and news
- Grades or Results

2. Alerts (23%)
- Alerts for notifications not to miss any deadline or event

3. Agenda (18%)
- Allows students to check schedules, and view news on the home screen

4. Browse courses (17%)
- Finding courses easily and accessing the materials

5. Find contacts (10%)
- Find students and teachers contacts and their personal information

6. Upload Projects (5%)

- Uploading tasks, projects and assignments easily and with different file extensions (pdf, txt, doc….)

The app requirements from the second chart are:

1- Fast work (35%)

2- Offline access (29%)

3- Only useful information (11%)

4- Sharing knowledge and discussing in direct messages and group chats even with teachers (10%)

5- Good UI (8%)

6- Easy search (7%)

As we can notice from the previous charts, and based on the drawbacks analysis of the Moodle and IS websites, students don't have all the requirements available on different apps they use, which makes it more difficult and complicated for them to find a complete app that satisfies their educational needs. It's also difficult for others to find the useful information they need due to the bad design.

On the other hand, most of the students around the world are not even acknowledged of the Moodle app presence, for example, there are only 1 million downloads for the Moodle app, which is a very small number compared to Edmodo app, for example with 10 million users.

So, the trouble is that none of the found applications fulfil the needs and requirements of the students who I interviewed. As well as, the functionality of those applications is different than my proposal. Most of the competitive apps covered only some of the use cases but none of them has all the required and desired features that cover users' needs.

Existing solution and Competitors

To satisfy the user's needs, and to build the application correctly and accurately, a research was made about various applications related to this topic.

And after the research, different competitive apps to Moodle has been found. Some of them are Edmodo, eFront, Geenio, Canva Student, Schoology, and many more.

The weak points of the competitive apps are:
- Not user-friendly
- Some of them are paid
- Some of them are not available on iOS devices
- Other apps are not available on Microsoft phones
- No online or phone support
- Some paid apps don't offer a free trial period
- No chat rooms between students and teachers
- No communication between teachers and students

How it started

The idea of this application appeared when several friends of mine were not able to find information easily, all of them were uncertain and sometimes lost for not finding the information they need, for instance, problems with deadlines, where and how to submit a task and what are the requirements, where to find a professor's contact and many other issues.
It appeared that these friends shared the same questions repeatedly.

These students like technologies, so using technologies can be certainly helpful for students. As mentioned before, nowadays, the number of people who possess different smart devices is very high and it's constantly increasing. And it was recognized that all my friends, mentioned above, have smartphones, and their smartphones are likely to be with them almost

everywhere they go. Based on the previous reasons, it was decided to help my friends and other students with similar problems, by creating a mobile application with useful information for guiding students and helping them achieve their goals.

Design

"Design can be art. Design can be simple. That's why it's so complicated." –Paul Rand
 Bojan Kocijan, UX/UI Designer at CONDA.

"To design is much more than simply to assemble, to order, or even to edit: it is to add value and meaning, to illuminate, to simplify, to clarify, to modify, to dignify, to dramatize, to persuade, and perhaps even to amuse. To design is to transform prose into poetry." –Paul Rand
Maryna Smit, UX Practitioner Sage. (5)

Why is design important?

Design is becoming more familiar every year, we hear the word design very often accompanied by different fields, however, people very often misunderstand this huge concept. They consider design as anything related to drawing, painting, and they owe an idea which is every designer is an artist who draws professionally.

And these ideas are applied to graphic designers but definitely not for a mobile designer. Because, a mobile designer, doesn't necessarily need to know how to draw and he doesn't have to.

A lot of good companies hire UI or UX designers to improve the design of different platforms related to their product or service, as it attracts and increases the number of customers and increases customer's satisfaction by working with or using their product.

And according to the Interaction Design Foundation: The Mobile User Experience Design refers to the design of positive experiences during the use of mobile devices and wearables, and applications or services running on such devices. The mobile market, like the contexts in which mobiles are used, places unique requirements on the design of the user experience. Mobile UX design focuses strongly on efficiency and discoverability. (6)

On the other hand, there are two types of design: good, and bad. And we experience both on an everyday basis. Design is everywhere in our lives, starting from doors, clothes, electronics to books and pencils. The design shapes our lives and human-centered design is made to make our lives as easy and comfortable as possible by employing good design.

Android Design Principles

1- Enchant Me
- Delight me in surprising ways

It refers to choosing delightful backgrounds, with a nice animation and sounds.

- Real objects are more fun than buttons and menus

To easily perform tasks to satisfy the users' emotions

- Let me make it mine

To personalize the user's preferences by choosing his own defaults

- Get to know me

Remember users' preferences and make suggestions for them to avoid overwriting the information every-time

2- Simplify my life
- Keep it brief

Sentences must be short and brief, people hate reading long sentences

- Pictures are faster than words

Pictures are always louder than words, and it attracts people's attention much faster, so pictures should be used instead of words for expressing ideas

- Decide for me but let me have the final say

We often press the wrong buttons so, the 'undo' button has to be offered

- Only show what I need when I need it

Essential options and information should be separated into small sections otherwise they must be hidden

- I should always know where I am

Relationships between screens must be shown and feedback on tasks while in progress must be provided

- Never lose my stuff

Provide easy access to users' preferences and make it easily accessible for example settings, personal defaults and creations on different smart devices.

- If it looks the same, it should act the same

Avoid similar modes that act differently for the same input

- Only interrupt me if it's important

An interruption must occur only in case of a high-priority and crucial

3- Make me amazing

- Give me tricks that work everywhere

By, for example, using visual patterns of other Android apps

- It's not my fault

Try avoiding technical mistakes and if needed, let the user know clearly what went wrong with your app.

- Sprinkle encouragement

Separating tasks and make them smaller as well as giving feedback on actions even if it's not crucial to give users trust

• Do the heavy lifting for me

Offering unexpected options is absolutely amazing like shortcuts combining multiple tasks

• Make important things fast

Basically, it means considering the important events first. like the pause button in a music player. (7)

iOS Design Principles

1- Aesthetic Integrity

represents how well the app appearance and behaviour integrate with its function and purpose. For example, using light bright colours, sounds, and animation in a game that represents fun and excitement is fine but not in a serious application that contains serious tasks.

2- Consistency

Using different user interface elements that users are familiar with. For example, icons, buttons, standard text styles.

3- Direct Manipulation

User experience direct manipulation happens when the user moves the device - like rotating or uses gestures on the screen, and through the direct manipulation, users can visibly notice the results of their actions.

4- Feedback

Is informing users of actions and results. IOS apps provide feedback in every action the users take, when an object is tapped, the element is highlighted.

5- Metaphors

It is fast how people interact with virtual objects and actions. Metaphors work when a physical interaction happens between the user and the screen. While swiping, dragging and scrolling content and flicking a book page.

6- User Control

The user should feel in control of the app, but not the opposite. By keeping a balance between enabling users and avoiding unwanted outcomes. I.e. allowing the user to cancel a delete action, undo changes and so on. (8)

UX and UI Design

User experience design is engaged in every product and service. However, it's mainly used in software applications like websites and web applications.

UX designers are free to add different features and functionality to websites and applications. But it should be aimed at users' satisfaction.

The following questions are related to every designer and they should be answered with a positive yes.

- Is the site or application useful and meaningful to the user?
- Is the site or application easy, simple to be used and navigated by the user?
- Does the site or the application make the user happy? (9)

UX Design meaning

User Experience or UX is meeting the exact customer's requirements, without making them feel bad or bothered. Also, making the customer feel very comfortable with using the product or service by adding joy, simplicity and elegance to the product. Various features are provided so the customer can choose what matches his desires. Moreover, what matters to UX practitioners is the relationship between users, computers, and computer-based products, such as websites, applications and systems.

UX essential elements

Figure 4. what is User Experience Design. Source: https://www.interaction-design.org/courses/become-a-ux-designer-from-scratch/lessons/1.1

The following elements answer the questions below:

Value

- Is there a value for the product or service offered to the user?

Usability

- How easy is it to complete tasks?

Adaptability

- Are there any potential users or customers for the product?

Desirability

- Is the product holding good emotions to the user? (10) (11)

UI Design

"User interface design (UI) or user interface engineering is the design of user interfaces for machines and software, such as computers, home appliances, mobile devices and other electronic devices, with the focus on maximizing usability and the user experience. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals (user-centered design)." (12)

User interface explains the connection between user and machines or devices. It increases the productivity and makes sure of bringing joy to users with delightful and pleasant visuals.

The goal of the user interface design is to achieve an easy-to-use and pleasurable user interface for people by following the principles of a user-centered design approach.

Jesse James Garrett defines interface design as being "all about selecting the right interface elements—like text, buttons, text fields, color-coded lists, etc—for the task the user is trying to accomplish and arranging them on the screen in a way that will be readily understood and easily used". (13)

Shortly, it's to interact with users in an extremely simple, clear and effective way.
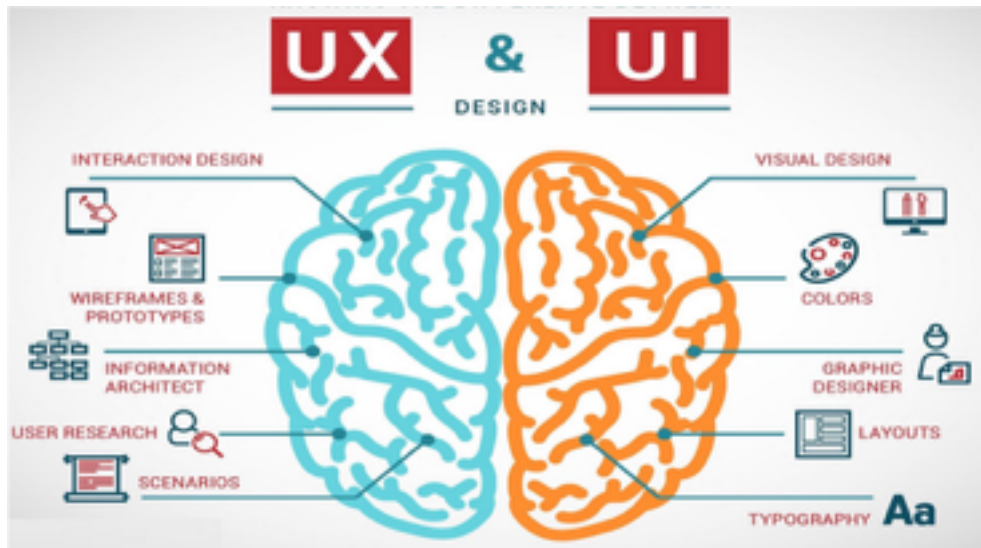
Figure 5. UX and UI Design. Source: https://www.devsaran.com/blog/difference-between-ux-and-ui-design

UX fails

The following examples are results of bad UX design products

- The Nokia N-Gage

Nokia announced the N-Gage device in 2002, it decided to combine a mobile phone with a gaming device at once. As this will be very interesting and beneficial to a lot of gamers. It was a good thing to think of but in reality, it was too bad to design in. (14)

For changing the games cartilages, users had to disjoin the phone remove the device's battery and as a result of the bad system, there was no space for speakers and microphones, so users had to carry N-Gage sideways to communicate with each other. Also, the buttons were designed for a mobile phone which wasn't suitable for gaming. And that's how this device failed to succeed.

- Macintosh TV

This TV came with a credit-card sized remote control and a black keyboard and mouse. The TV was designed badly that it couldn't be shown on a desktop window. Also, the quality of the TV was very horrendous (even back in 1993 when TVs weren't that great compared to

today's 3D High-Definition TV's) In addition to that, it wasn't powerful enough and had a poor usability. Only 10,000 TV's were made of this model.

Figure 6. Macintosh TV. Source: https://www.interaction-design.org/courses/become-a-ux-designer-from-scratch/lessons/1.7

- Eyetop's Wearable DVD Player

In 2004, this DVD player was made to make you feel that you're watching a big-screen TV while sitting in a small room. It was based on wearing a pair of glasses and watching your DVD on a tiny embedded screen on one of the lenses. This product had a terrible UX Design that it caused motion sickness because it wasn't possible to watch a DVD with one eye while crossing the road besides this, the DVD should be carried with you and being connected with a cable. And lastly, any little heavy move will cause skipping by the DVD player.

- Windows Vista

It was described as the best alternative for the Windows XP operating system and it was also designed to run on XP machines.

The new UI together with the infinity disk drive index made hardware incredibly slow. The disk was continuously in motion and it had no functionality. Thus, Vista was too slow while starting, operating and shutting down. (15)

Design tools

Sketch

Sketch is a proprietary vector graphics editor for Apple's macOS, developed by the Bohemian Coding company It won an Apple Design Award in 2012. Sketch was first released in 2010.

In 2016 Bohemian Coding announced on their blog that they were switching to a new licensing system for Sketch. Licenses would allow users to receive updates for 1 year. After that point, they could continue using the last version published prior to the license expiring, or renew their license to continue receiving updates for another year. (16)

Sketch is a very good tool for designers for the following reasons:

- It's paid, but it doesn't cost a lot
- Very easy to learn
- Offers Device mirroring, to check the designs on mobile or desktop
- Offers cloud sharing
- Saves all the changes automatically
- Contains templates that are ready to use
- Vector graphic based
- Offers perfect layouts both for web and mobile (17)

Sketch is a very lightweight tool compared to its old competitor from Adobe - Photoshop. Sketch is focused on UX and UI design, there are a lot of plugins which make the design process even better, for example, plugins for pasting icons, downloading fonts, simulating color-blindness, exporting to HTML and CSS, copying JavaScript code, and much more. Sketch has a system of shared online libraries which allows the designer to create design systems to reuse common design elements - buttons, colours, icons, fonts and more complex design elements such as forms, headers, etc.

Sketch works with a lot of other tools like Framer and Zeplin.

Framer

Framer is an advanced prototyping tool. It is the only prototyping software which uses programming to design interactions. In Framer, designers need to use CoffeeScript to build elements or interaction. Prototyping in Framer is much more difficult and time-consuming than in other tools, that's why Framer is mostly used for final production-ready high-fidelity prototypes with carefully designed interactions and animations. Because everything is written in code, it makes it a perfect tool for developers to understand the designs, since every animation or interaction come with coded properties, events (onClick, onDoubleTap, etc.) and rules.

From Google Nexus to Pixel, you can prototype for any mobile Android device in Framer. Create adaptive layouts, … add flows, gestures, and animations.

Framer allows you to draw, animate, and share high-fidelity work. It is the best tool for screen design and interactive prototyping. (18)

Users don't need built-in controls which offer limitless freedom to the designer

It's available on all types of devices such as smartphones, desktops, tablets and smart-TVs

It allows users to share their work using project-independent libraries

The prototypes' code is very easy to copy which makes it easier for developers to reproduce patterns. (19)

Zeplin

Zeplin is a great collaboration tool for UI designers and front-end developers. It goes beyond the design workflow and helps teams with the design hand-off. It allows designers to upload their wireframes or visual designs straight from Sketch and add them to project folders in Zeplin. Annotations will automatically be added to the designs (sizes, colours, margins and even CSS suggestions for certain elements) which will leave you with an online repository that the whole team can contribute to.

Users can upload their visual designs or wireframes directly from Sketch and add them to Zeplin's project folder. It's very easy to export designs from Sketch on Zeplin, just with one click, the design is uploaded and this is because Zeplin works with Sketch as a plugin.

Other advantages for Zeplin:

- Developers can quickly access the individual assets if exportable designs are created by designers
- With only a few clicks, designers can create, upload and update as many projects as they want (20)

Zeplin Extensions allow developers to add certain add-ons to Zeplin projects to adjust the export settings to their needs. For example, developers can install extensions for generating code in Swift, Objective-C, Java, HTML, CSS, React and much more.
Most of the extensions are created by Zeplin community which makes the extension base larger and covers needs of all kinds of teams.

React Native

React Native is a JavaScript framework highly supported by Facebook, who invests in React Native and its community. React Native allows developers to create native applications for iOS and Android reusing one code written in JavaScript, which means there is no more need to have two developer teams or to learn two programming languages and IDEs (Integration Development Environment).

Native app creation simply means writing apps for a specific operating system.

React Native enables building apps for iOS and Android operating systems by reusing the code across each operating system so engineers won't have to build two separate apps for each.

React Native allows building mobile apps using JavaScript language only and it uses the same design as React by combining fundamental UI building blocks from iOS and Android apps.

It also offers fast apps building, instead of recompiling, the app can be reloaded immediately. And with Hot Reloading, it's possible to run a new code while retaining the application's state. (21)

Which makes the process of development much faster and smoother, especially when it comes to learning or testing new ideas.

Expo.io is the best tool to get started with React Native development, it runs in a browser, has mobile apps for iOS and Android that run the code from the browser on smartphones and everything work wirelessly and free of charge.

React Native became very popular and it is sometimes called a rising star of mobile development. A lot of products are created using React Native, for example, big companies like Facebook, AirBnB, Instagram, Bloomberg use React, as well as smaller companies and agencies including Czech products.

Practical Part

Personas

According to the interview that was held with students, the following personas are determined:

Name: Lisa Smith

Age: 22

Gender: Female

Skills: Programming, Computer Networks

Typical day: Lisa wakes up at 8:30, has breakfast, then stays at home or goes to university depending on her schedule. At noon, she has lunch and works online from home. In the afternoon, studies and checks for important dates related to her study.

Background: Lisa is a very active and smart student, she always gets high grades and never misses a deadline. She studies in the CULS and it's always difficult for her to find the important information on Moodle and IS because she's a programmer and programmers are usually not able to find information on complicated websites.

Phone and usage: iPhone 6, moderate

Job / Activities: Bachelor's student, developer

Name: Adam Pavlik

Age: 28

Gender: Male

Skills: Analyzing Business Problems, technical knowledge

Typical day: Adam listens to music after waking up, checks his schedule, drinks a cup of coffee and goes to work. At noon, he has lunch with his friend and in the afternoon studies.

Background: Adam is not a very active man, very often he misses the assignments deadlines. Because he can't attend lectures due to his full-time job so he studies at home. Also, faces some difficulties with studying because he misses the lectures and he doesn't have time to study and his university website doesn't offer videos of the lectures.

Phone and usage: Samsung S8, Low

Job / Activities: Master's student, manager

Name: Marketa Karlova

Age: 24

Gender: Female

Skills: Design, Programming, drawing

Typical day: Marketa wakes up early in the morning, has a healthy breakfast and goes to the university. At noon, she has lunch and studies. In the afternoon, she has dinner and works online. As a designer, she knows the negative points of apps and websites. And she gets frustrated very often when she can't use a website or an app which has a bad design. And her university's website has a poor design so she always asks her friends for help regarding the important dates, assignments and tasks she has to fulfill.

Job / Activities: Bachelor's student, designer

Phone and usage: iPhone 8 plus, Moderate

Mind Map

To understand and visualize the structure of the app with all the necessary or possible sections I have created a mind map.
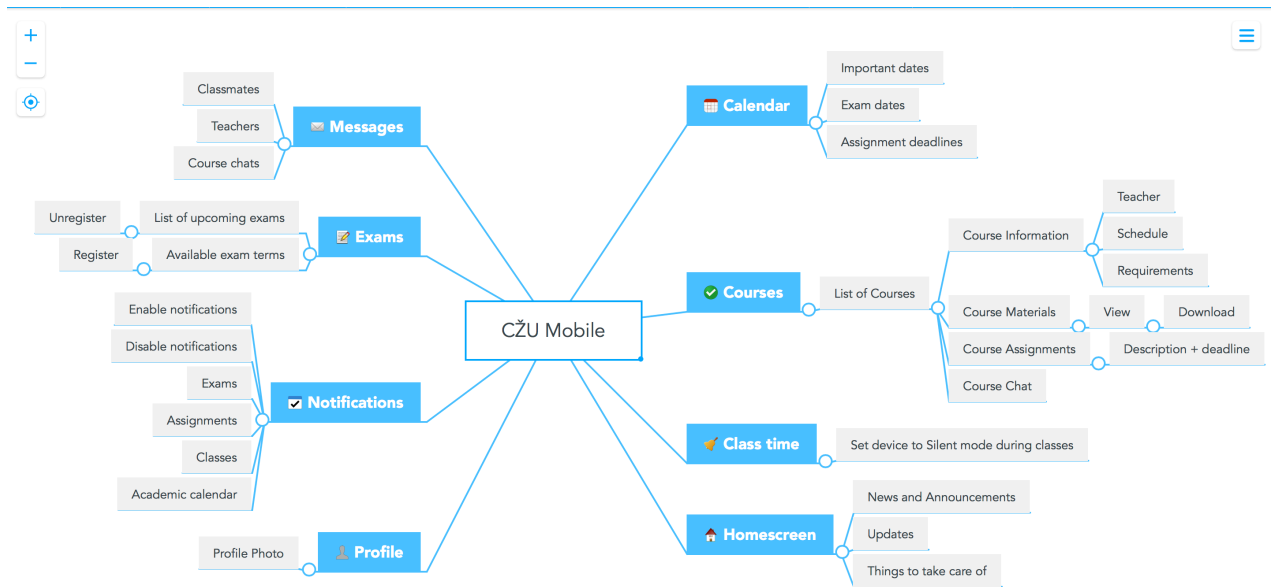
Figure 7. Mind Map. Source: Author

This mind map represents the essential parts of the app and certain details about the functionality.
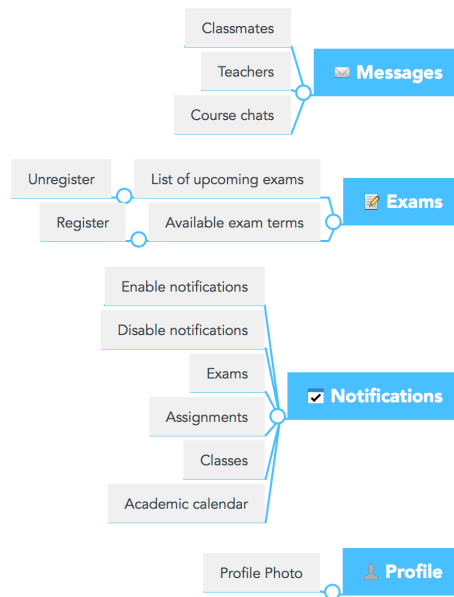
Figure 8. Mind Map Sections. Source: Author

There are 8 sections in the application - Messages, Exams, Notifications, Profile, Calendar, Courses, Class time, Home screen.

Messages would allow students and teacher to communicate with each other in a way people like to do it nowadays - by instant messages or chats. Also, in addition to that, every course should have a group chat where any discussion related to the course takes place, would it be a question about a homework or a teacher's update on grades or an assignment.

Exams. Students should be able to see a list of current exams they are registered to as well as a list of all available exam terms. They can register or unregister right in the app.

Notifications. the app sends to students are about upcoming exams, assignment deadline, upcoming classes, other events in the academic calendar of CULS. All notifications can be turn on and off separately depending on user's preferences.

Profile section displays users profile and allows him to choose or take a profile photo.
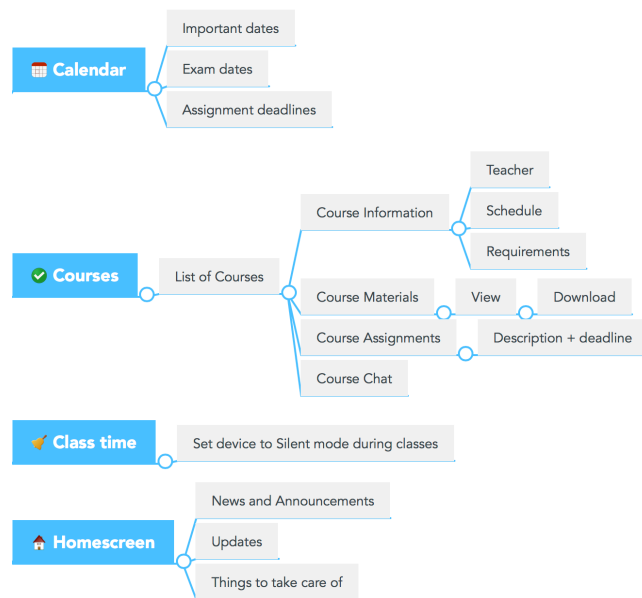
Figure 9. Mind Map Sections 2. Source: Author

Calendar shows student's agenda in a daily, weekly or monthly views. It shows important dates from the academic calendar, exam dates, classes and assignment deadlines.

One of the main functionality of Moodle is courses. Students can browse their courses, view course materials from lectures and seminars, check homework tasks, assignments, read

information about the course and contact teachers leading this course directly or through the group chat.

Class time is a special feature designed for mobile phones. When turned on, Class time will set user's device to silent mode during classes and switch back to normal mode when the class is done.

Home screen of the application can contain some news and announcements (e.g. information about states exams, team-building trips, events), updates from teachers about courses and important things to take care of, such as a credit test which will be closed soon.

Wireframes

All wireframes for this application have been created in Sketch 49 using its new features of rapid prototyping. Functional elements are connected and have a logic behind them, they are interactive and represent actions available in the application. Once all elements are connected a live prototype can be generated and shared via Sketch Cloud.
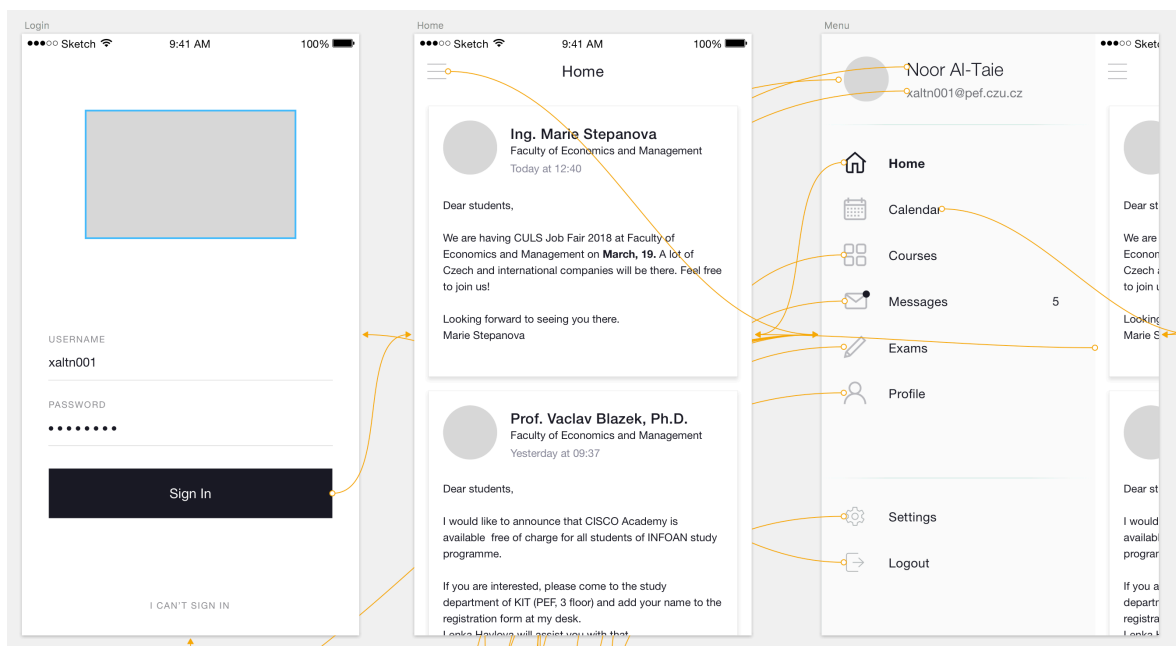
Figure 10. Sign-In and Home screens wireframe. Source: Author

For this project I have tested several prototypes with the help of other students who volunteered to participate in the usability studies. After each stage issues were fixed and a new cycle started.

At the end of the last cycle all usability issues have been eliminated and the final version of wireframes has been established.

The wireframe contains the following designs:

Sign-In screen is a regular sign in process with CULS logo, password recovery and a "Sign-In" button which takes you to Home.

Home has aforementioned data organized in a feed and presented by cards. A feed is a well recognized UI pattern, especially for younger generations. It shares the same logic as Facebook or Instagram feeds. Each card contains a message, a person posting the message, date and time. In special cases it could also have an action button which would take the user to an expanded view of the post.

The navigation inside the app is made by exploiting a so called "sidebar", "side menu", "hamburger menu" or "menu drawer" UI pattern. This pattern has been chosen because of the number of elements exceeding 5 items which would not fit a tab bar (bottom or top bar navigation).

Using this side bar, users not only navigate in the application but also see indicators in case of any updates for each section (e.g. New messages or course updates)
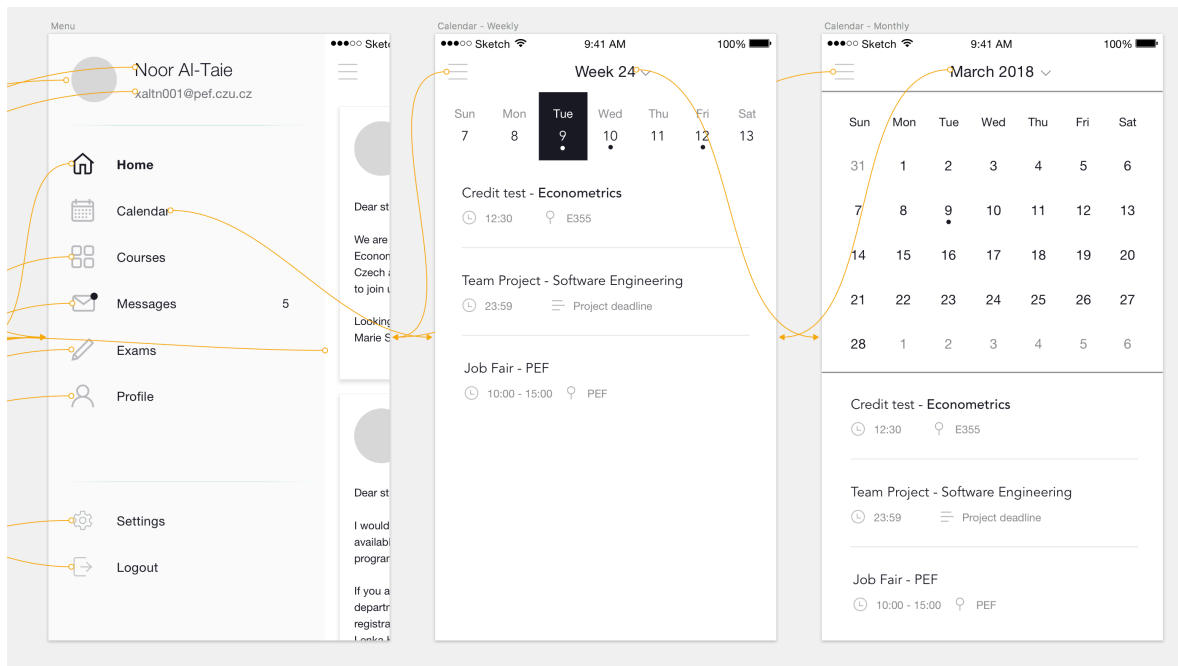
Figure 11. Calendar wireframe. Source: Author

Calendar offers different ways to view the agenda. But all the events have a similar structure:

- A descriptive title
- Date and time
- Location or, in case of online events - type of an event (e.g. Project deadline)

Users cannot add events to the calendar because it is highly focused on the academic events and cannot contain any other events to keep the study process in the center of user's attention.

All events are added to the calendar automatically, such as home-works, classes, deadlines, etc.
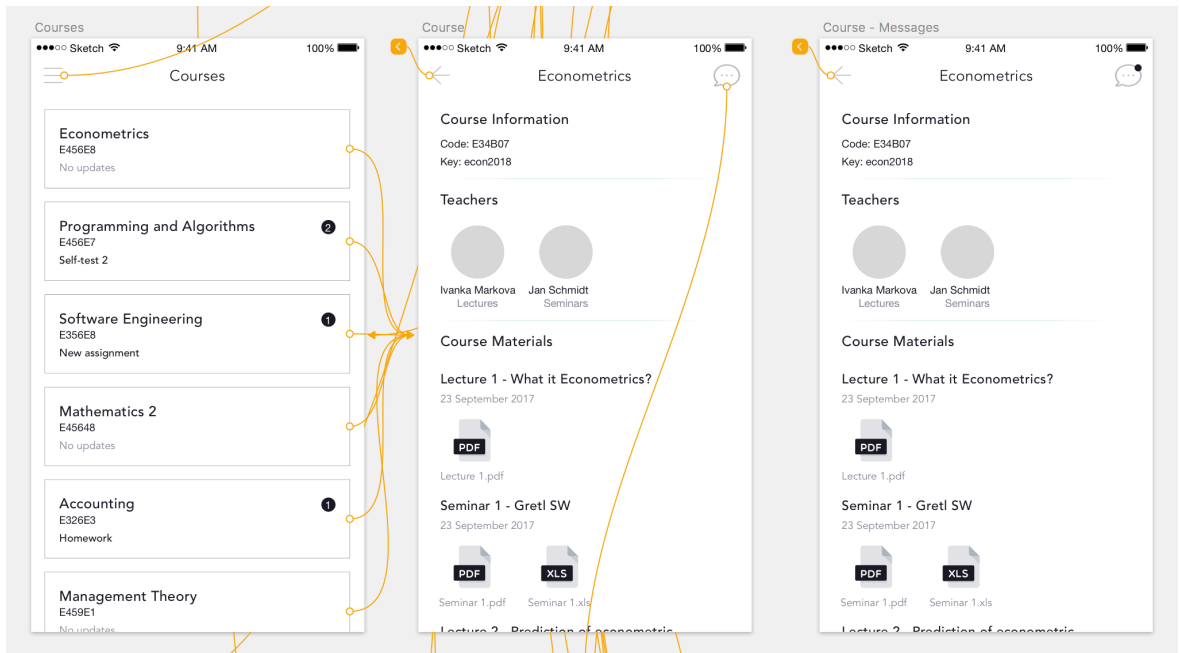
Figure 12. Courses wireframe. Source: Author

Courses screen present a list of the enrolled courses. In case of any updates, they are presented under the course title and have an indication badge with a number of updates for the course.

User can view a course by tapping on it. The course page offers overall information about the course, teachers, study materials, etc., and has a button opening a group chat for this specific course. This button also has its own notification badge informing users of new messages in the discussion. Students can also view and download all study materials.
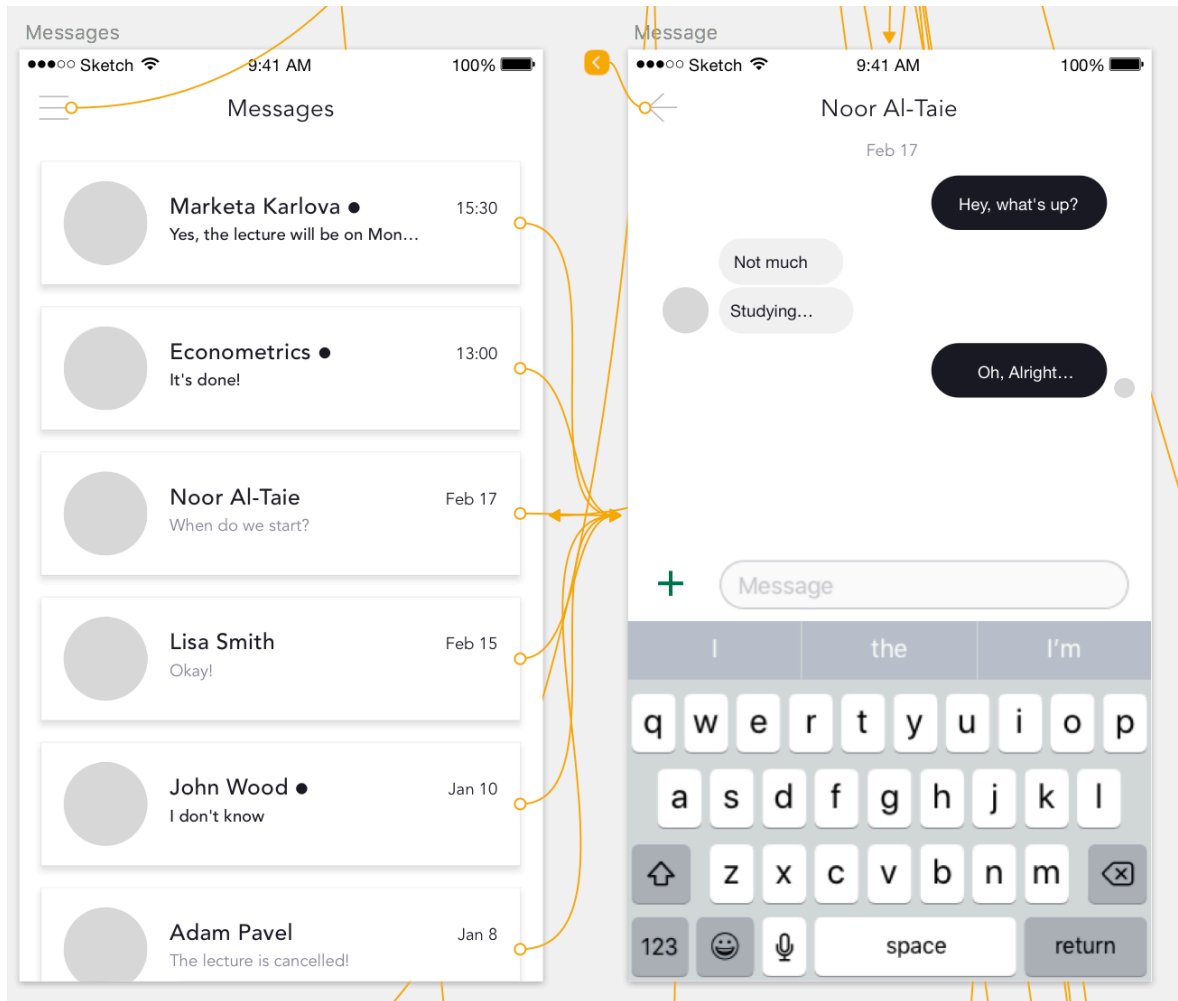
Figure 13. Messages wireframe. Source: Author

Messages screen repeats a common pattern of other mobile messaging applications like Facebook Messenger or WhatsApp. It is a proven experience to adopt famous and often used patterns since they are recognizable by many users and eliminate any need of onboarding or tutorials. On this screen, users see a list of their chats. Each chat has a title - Name of a person or Name of a course in case of group chats, last message - read or unread, time or date in case of older messages. New messages are highlighted with a bold font and an indicator.

Opening a message takes user to a corresponding chat where the conversation takes place.
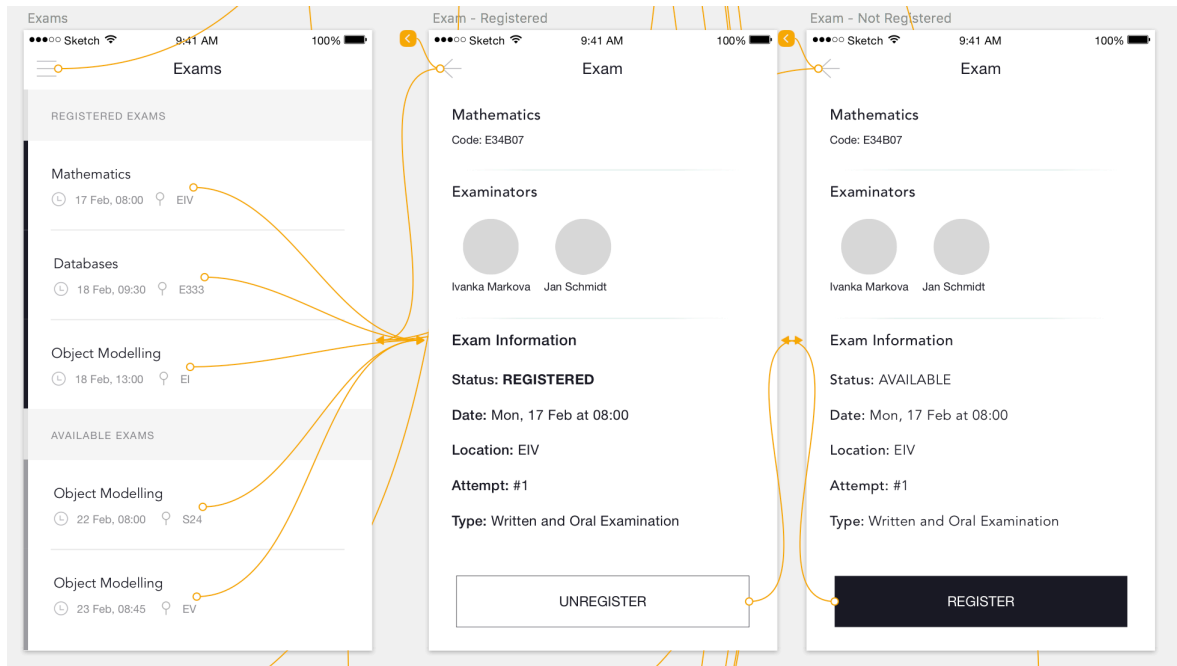
Figure 14. Exams wireframe. Source: Author

Exams section offers a list of exams grouped into two categories - registered and available exams. Each exam instance has a course name, time and date of the exam and location.

When expanded or opened, each exam has more information about itself, including examinations, status, number of user's attempt and type of examination - Oral and/or Written exam.

From the Exam screen user can register or unregister from the term.
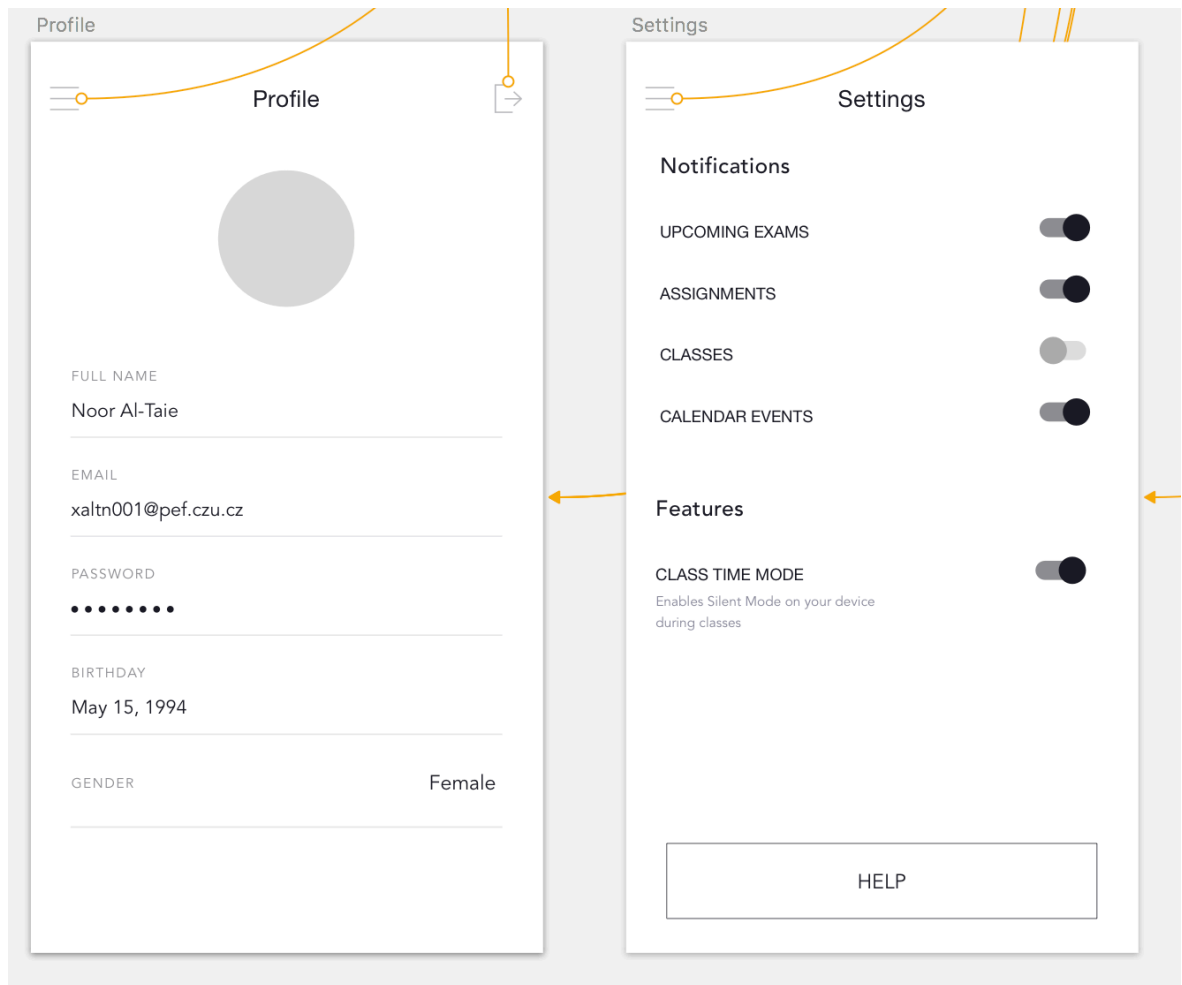
Figure 15. Profile and Settings wireframe. Source: Author

Profile page shows user's profile information available in Moodle. User can change his profile photo by taking a photo or choosing one from phone's gallery.

Settings screen offers user to set up the application in a way suitable for him. All types of notifications have their own independent switches which allows a very flexible and individual set up of preferences. In addition to that, user can set up the features available in the application such as Class mode - automatically enabling silent more on user's device during classes.

The whole structure is represented by the following scheme.
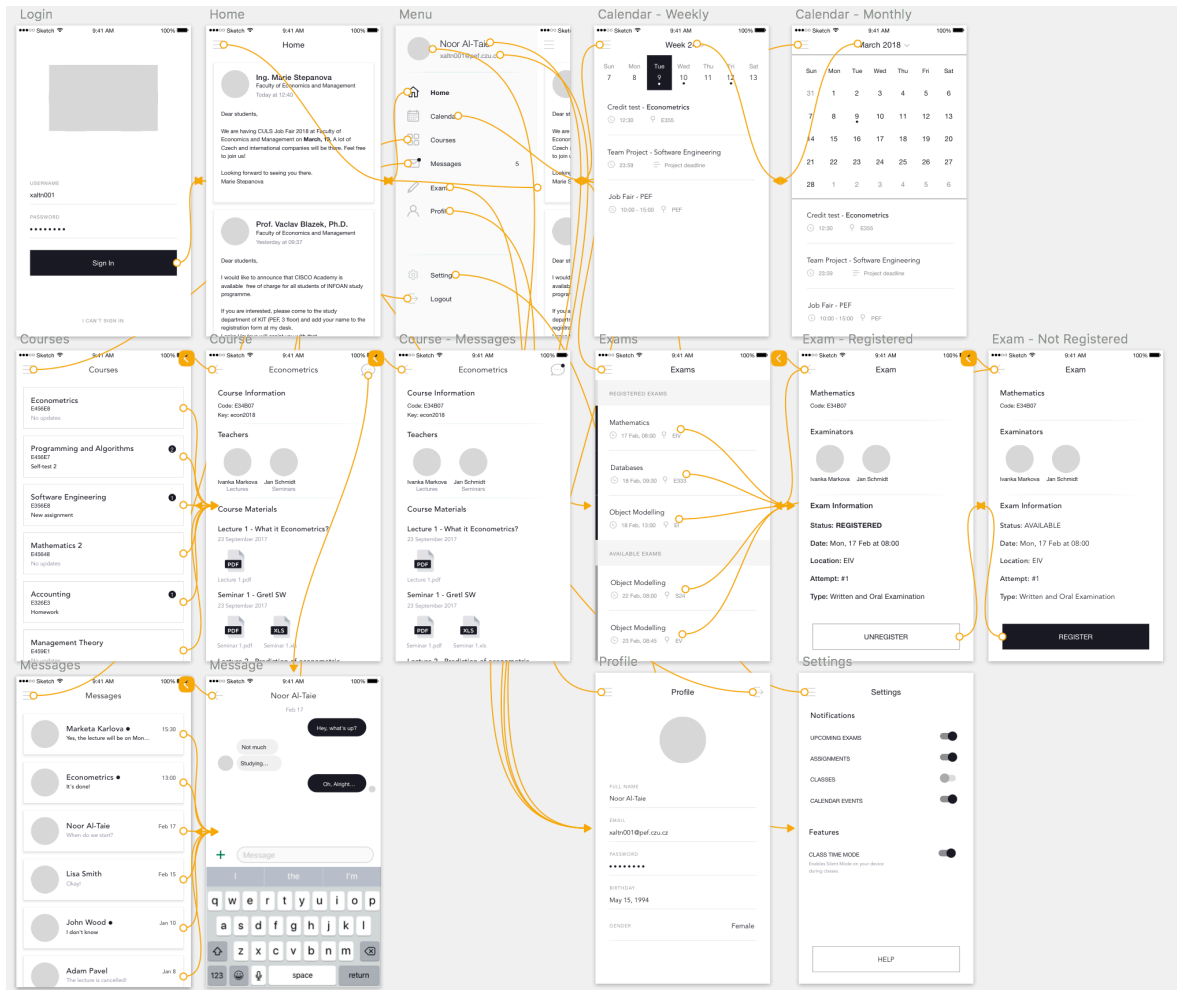
Figure 16. Wireframes structure. Source: Author

Visual design

After testing the prototype in wireframes and confirming the solution, I have proceeded with the UI design or visual design.

The visual design part was focused on adding colors and fonts, imagery and styles aligned with the brand of Czech University of Life Sciences.
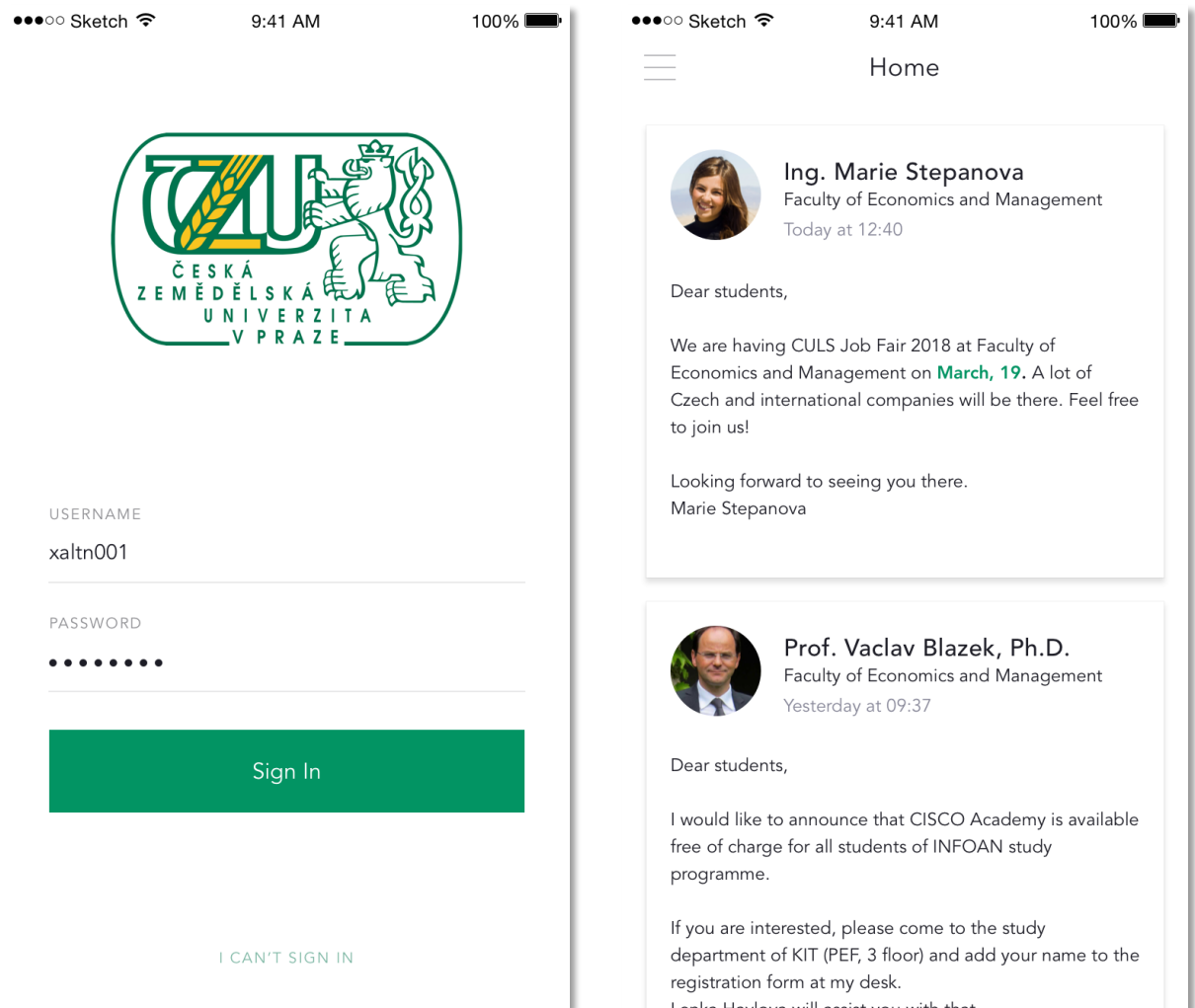
Figure 17. Sign in and Home final design. Source: Author

Every screen has been prepared for development in a proper way. Every graphical element is exportable and prepared for different screen sizes and OS standards in different resolutions and file formats. The whole project has been exported to Zeplin.

Zeplin shows all the properties of all elements such as colors, fonts, spacings, styles, dimensions, etc. This project is prepared for development in React Native to make it cross platform and to run it on Android and iOS, therefore a React Native extension has been added to the Zeplin project to generate production-ready code snippets for all the object objects as well as for the overall style guide. An example of a code snippet for a notification switch can be found below.

It takes properties of the knob and puts in a React Native code, colors from the style guide are stored as variables. For examples, colors.emerald refers to CULS green color defined in the code for the style guide.
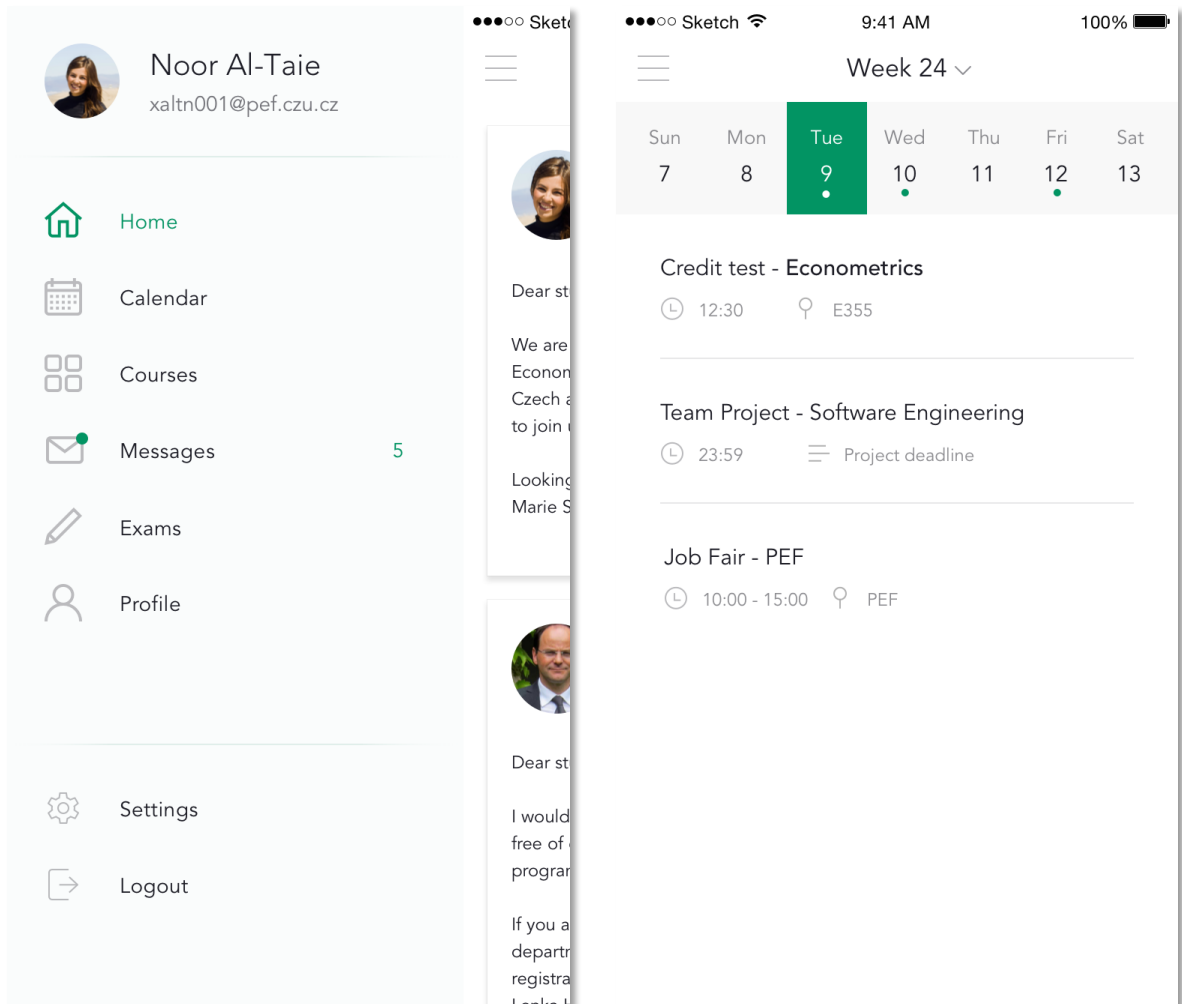
Figure 18. Sidebar and Calendar final design. Source: Author
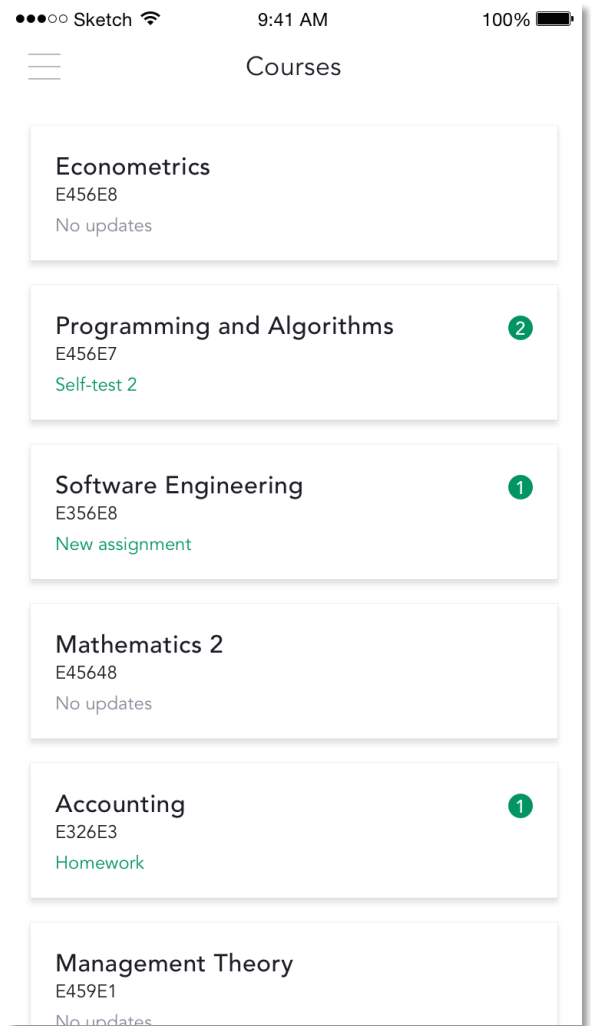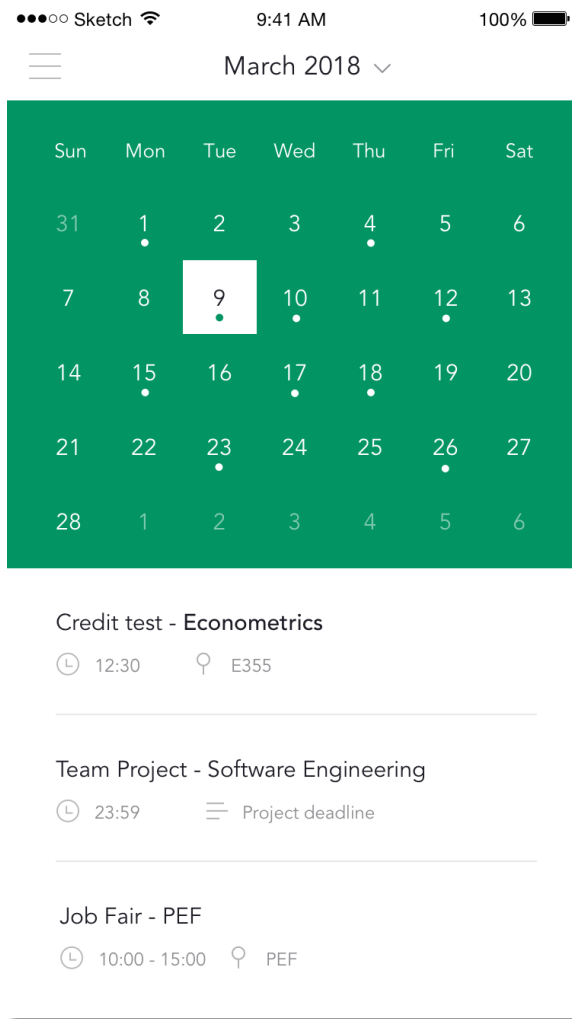
Figure 19. Courses and monthly Calendar final design. Source: Author
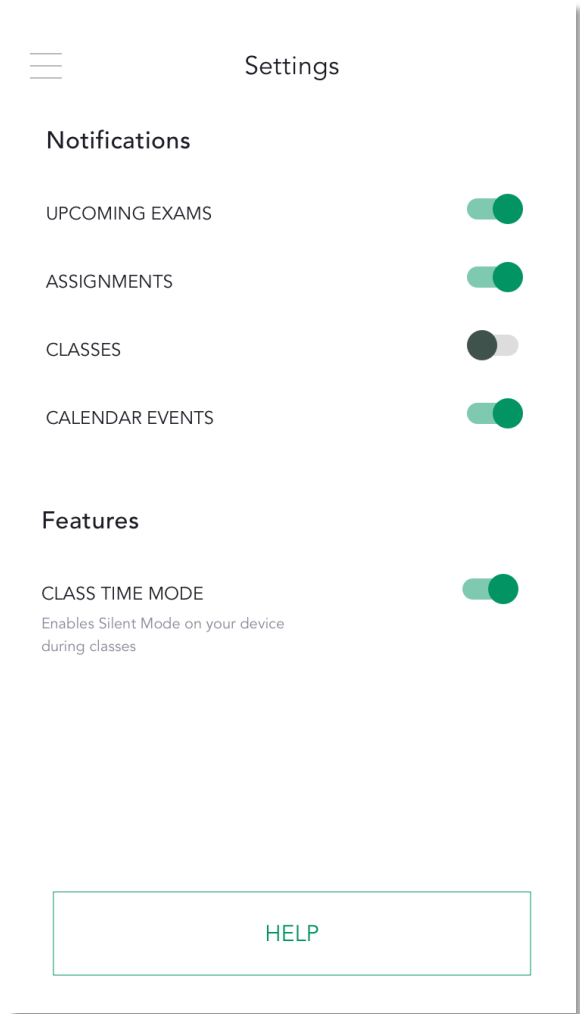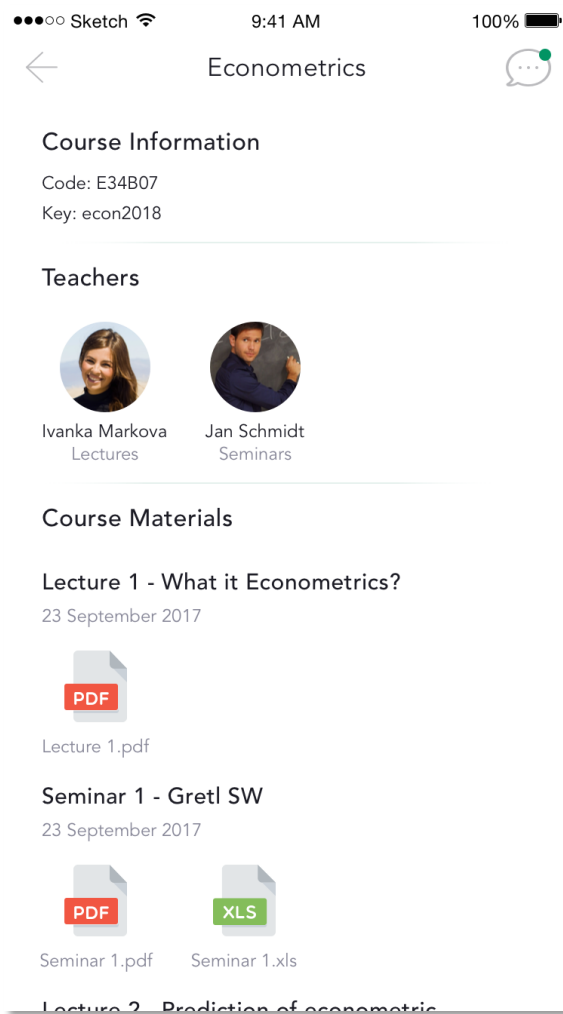
Figure 20. Courses and Settings final design. Source: Author
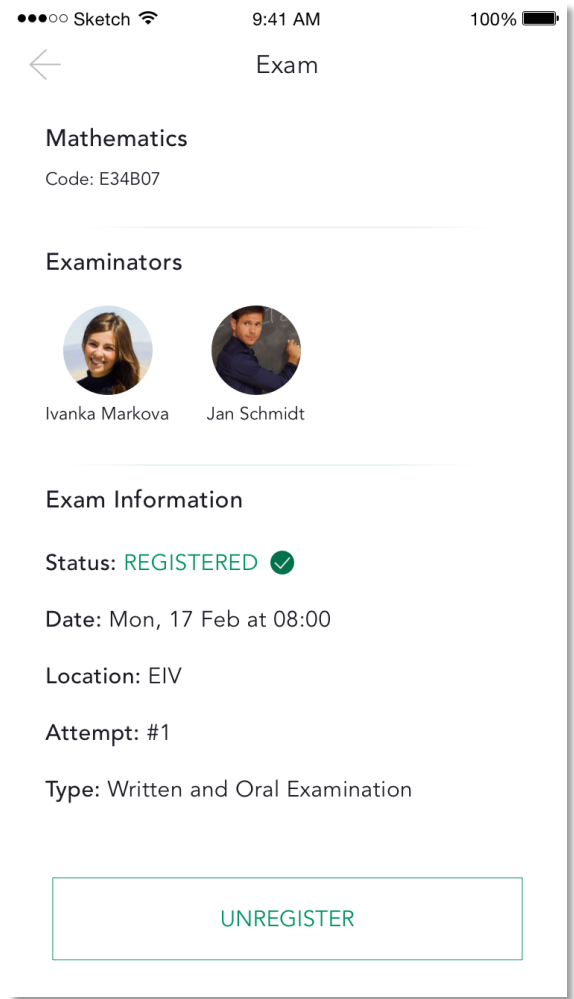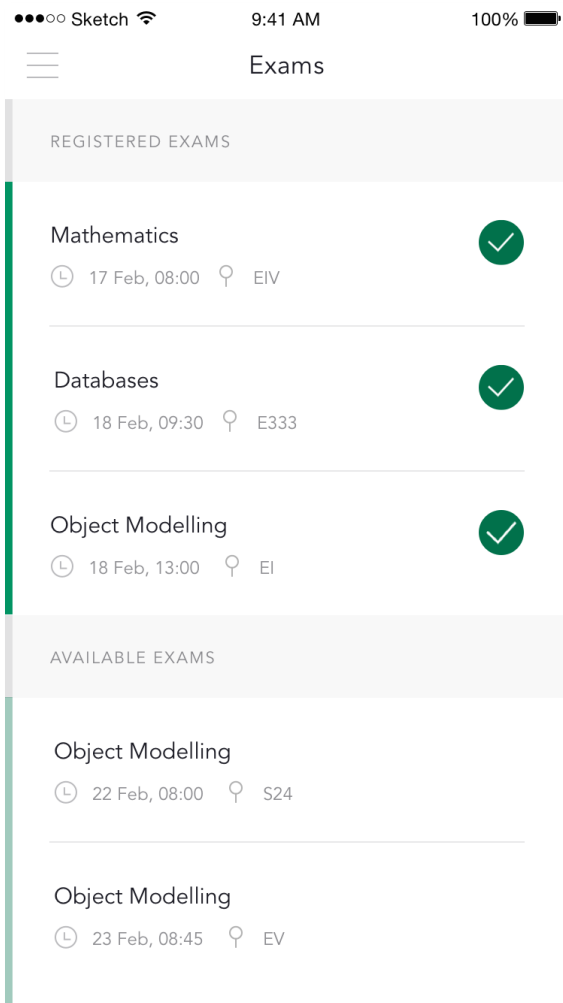
Figure 21. Exam registration final design. Source Author
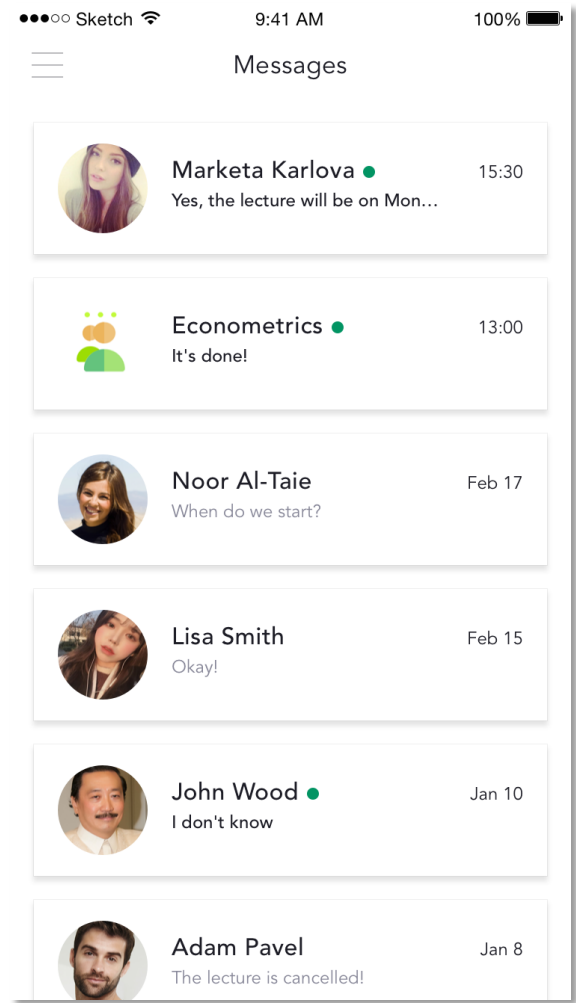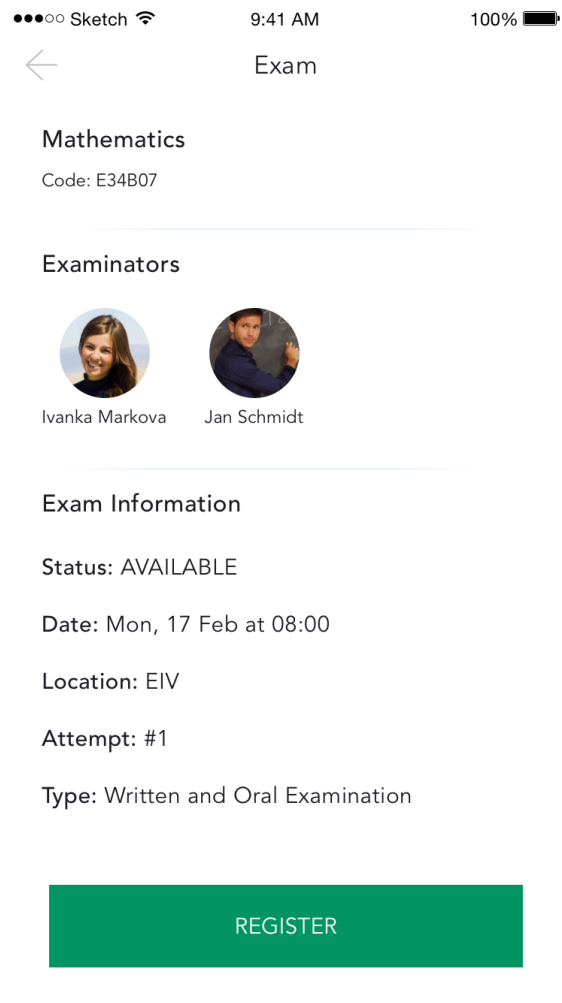
Figure 22. Messages and exams final design. Source: Author
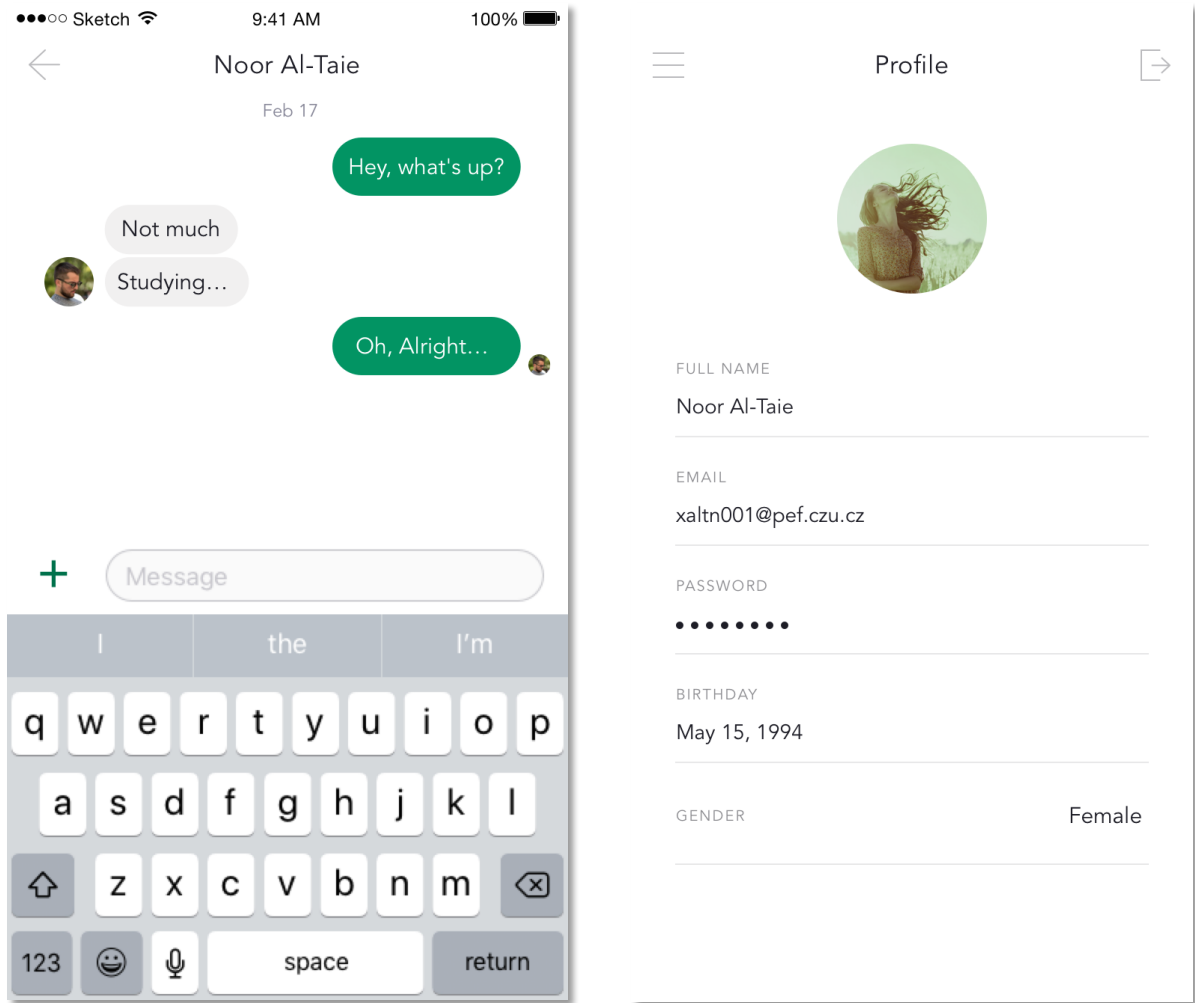
Figure 23. Messages and profile final design. Source: Author

High-fidelity prototype

To prototype micro-interactions, I have used Framer. Framer allows to code detailed animations in CoffeeScript, it supports direct import from Sketch which allows to work with the designs right.
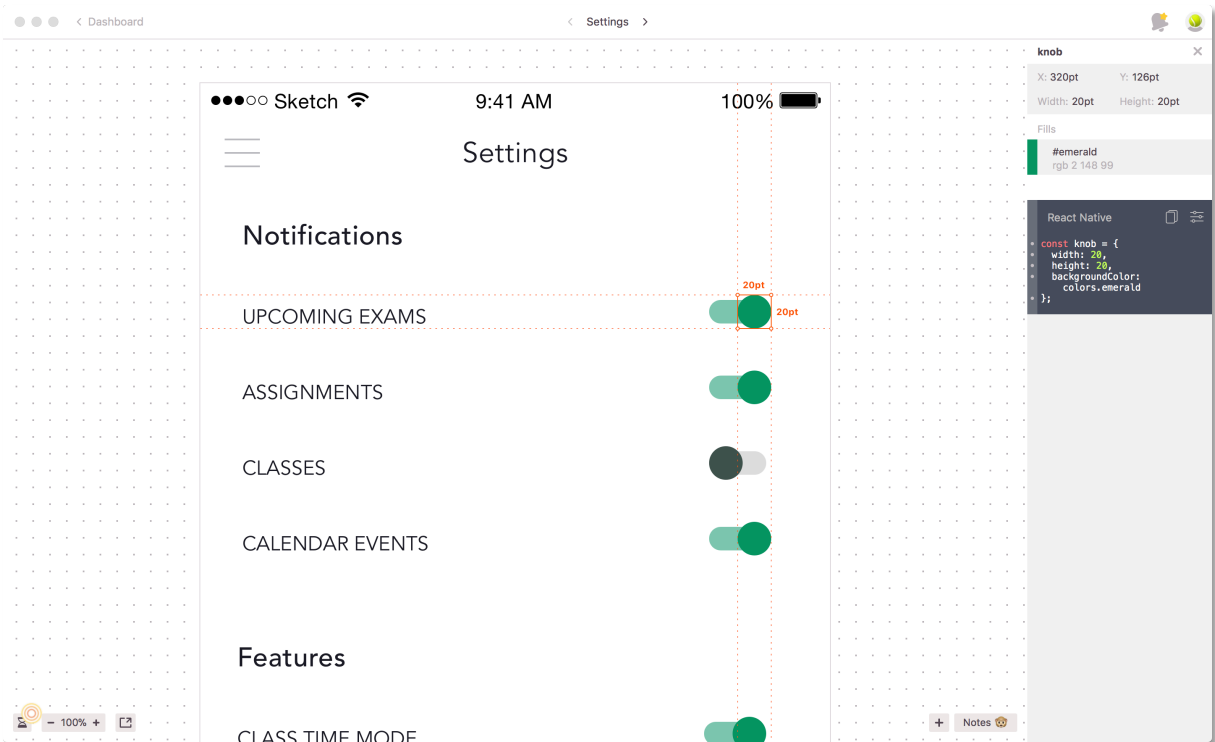
Figure 24. Settings design in Zeplin. Source: Author

CoffeeScript, supports direct import from Sketch which allows to work with the designs right away.

One important part of the application which has been prototyped in Framer is notifications. Notifications - a big feature of CULS Mobile, come with sound. Because there are different types of notifications it is important to distinguish between them without looking at your device. For example, if it is a notification about a class starting in 15 minutes, then the sound should be longer and more noticeable, since the event is happening very soon,

Figure 25. React Native code snippet. Source: Author

another type of notification, a less important one, then the sound can be shorter and softer. Sound is a very important aspect of any UI, however designers and developers rarely include any sounds to the interactions. Sounds is a great way of showing feedback to users, for example, humans have a great ability to distinguish between sounds meaning success and sounds meaning failure of an event or an action, we are used to it, because of desktop operating systems and software, but this pattern is rarely brought to mobile.

Framer supports playing sounds, sounds are presented as instances of Audio class

upcomingClass = new Audio("sounds/upcoming_class.m4a")

And played at any stage in any part of the code by writing
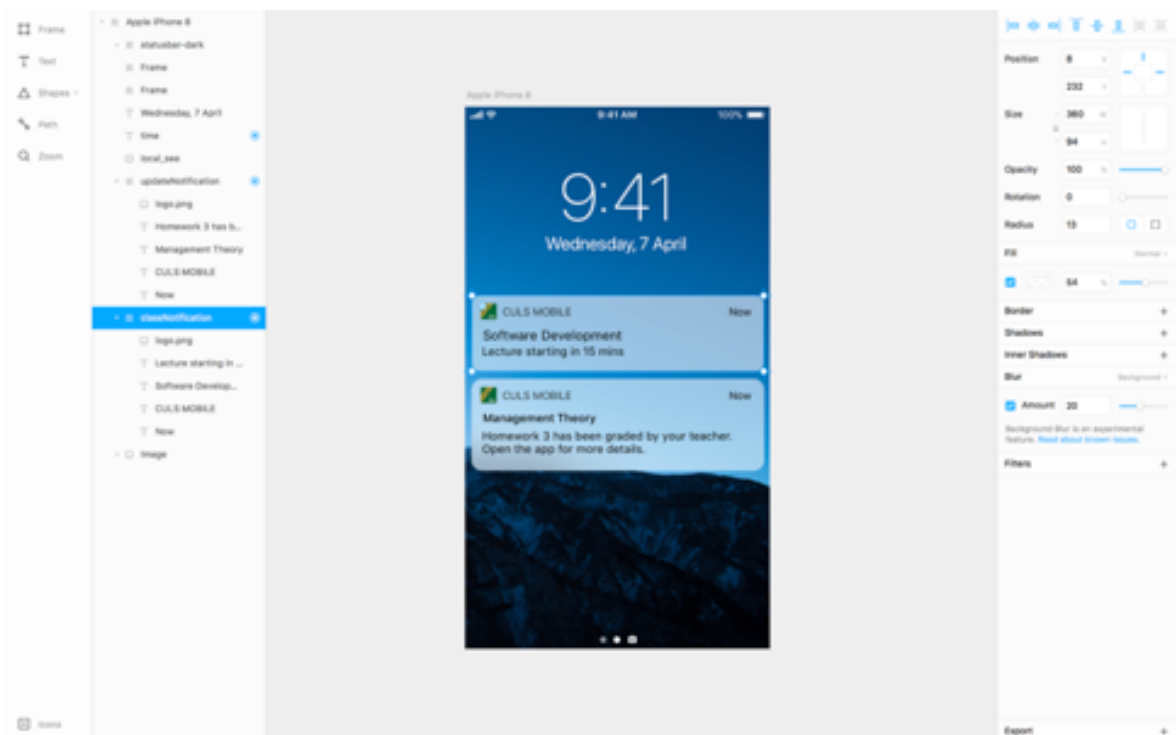
Figure 26. Notifications Design for the Application. Source: Author

upcomingClass.play( )

This prototype includes two sounds for two different types of notifications, these sounds were taken from Facebook Sound UI Kit and represents an event alert and a successful event.

The animations of notifications were created in an identical or almost identical to native iOS animations.

classNotification.animate

      y: 220

      opacity: 1

      options:

            time: 1.20

            curve: Spring(damping: 0.7)

            delay: 1

classNotification.onAnimationStart ->

      upcomingClass.play( )

Figure 27. Notifications simulation in Framer. Source: Author

This code describes how Upcoming Class Notification appears on the screen - movement according to Y axis, becoming 100% opaque or visible, the animation lasts 1.20 seconds, the animation curve is Spring with a damping parameter of 0.7 and a delay of 1, which means the notification will appear 1 second after loading the prototype.
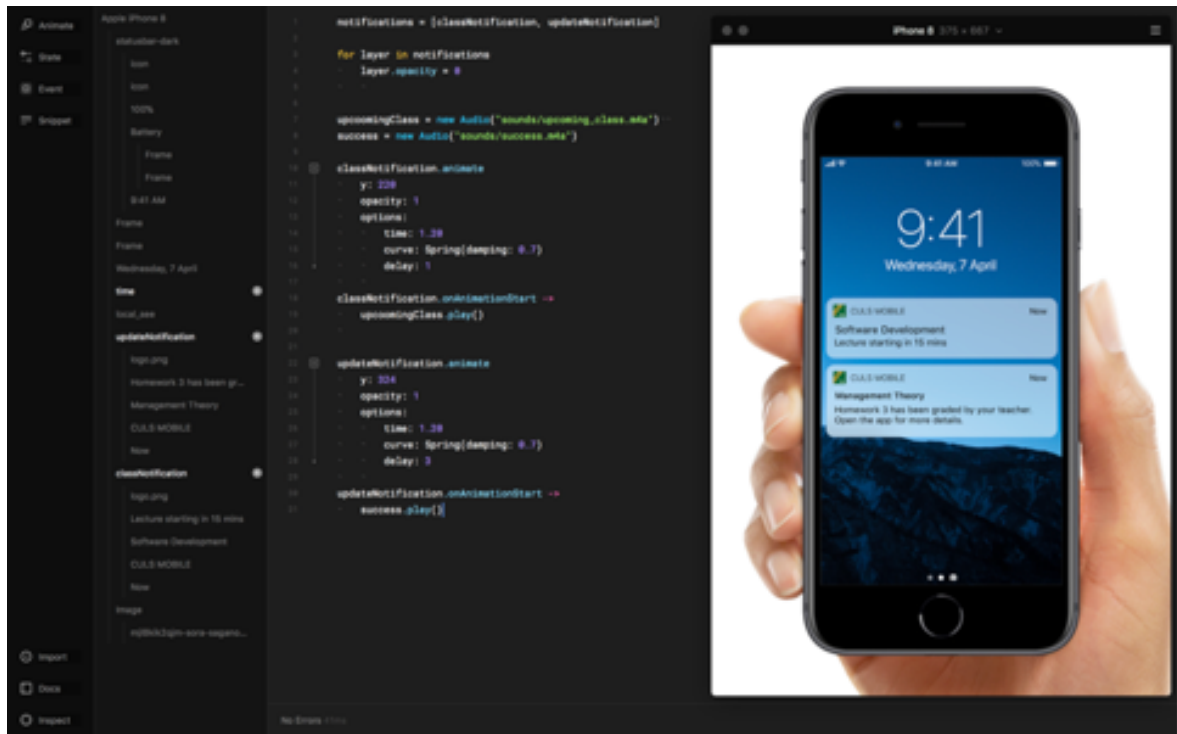
Figure 28. Framer notifications prototype. Source: Author

When the animation starts, Framer will play Upcoming Class sound for Upcoming Class Notification and Success sounds for successful event (in this example - grading of a homework).

The main point of such detailed prototypes is to test something really close or identical to the real application, before actually implementing anything. Designers can test their ideas in a very precise way and users can rarely understand that this prototype is not a real application which makes them interact with it like if it was a real application indeed. Also it provides an understanding of how it should be implemented when sending the designs for development.

Final Visuals
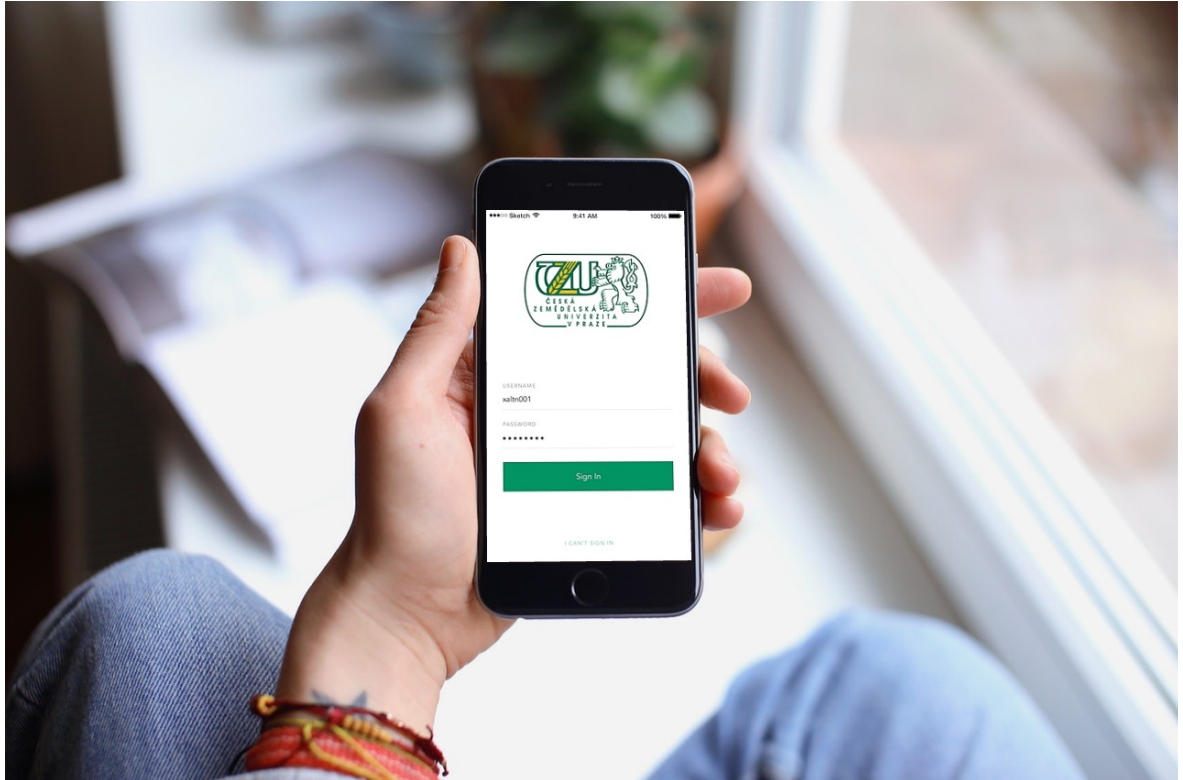
Figure 29. Final visual design for the app first screen. Source: Author
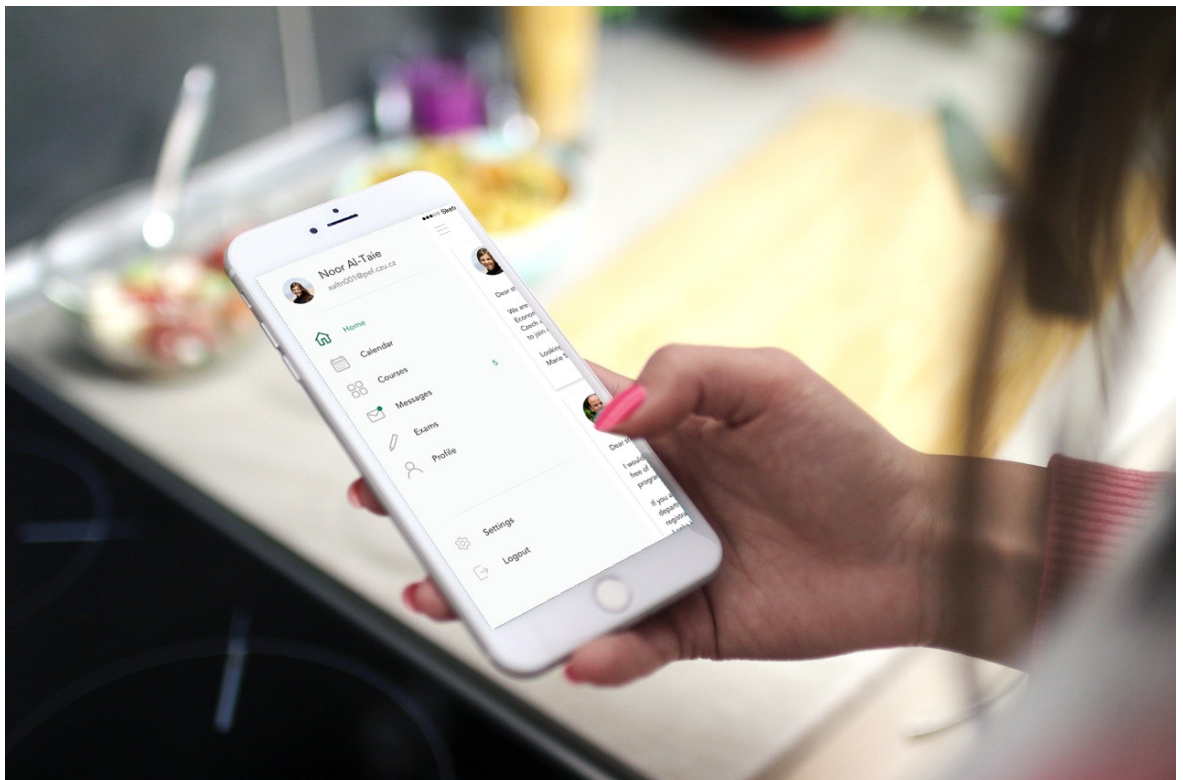
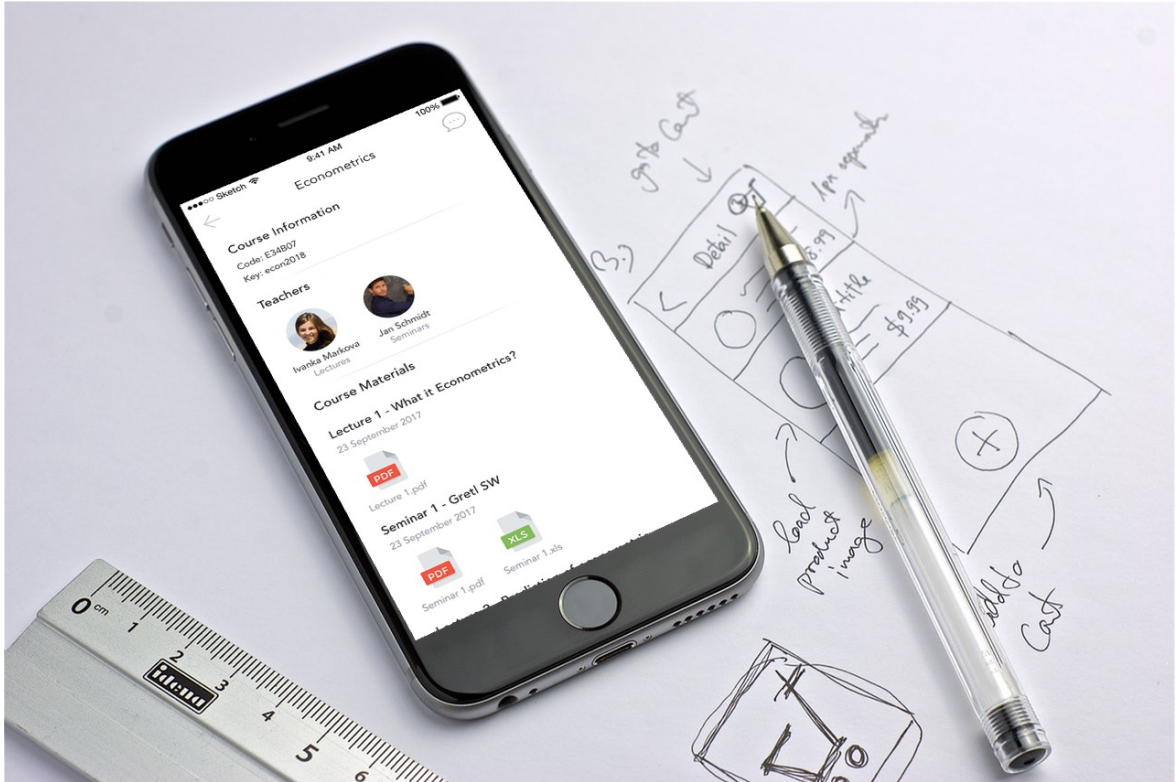Figure 30. Final visual design for the app side-bar. Source: Author

Figure 31. Final visual design for the app courses. Source: Author

Figure 32. Final visual design for the app Home. Source: Author

Conclusion

The idea of this work was to create a mobile application which covers the major parts of Moodle and IS, the application met all the users' requirements and it was created based on the research that was made with CULS participants.

The app prototype was tested and analysed on iOS and Android devices, it worked perfectly and no usability issues were reported.

To complete this work, I have learned and applied various skills such as creating a prototype with very detailed interactions and sounds, written in the CoffeeScript language in Framer, which was then used for creating the app notifications that will appear on the mobile lock screen, as well as creating click-through prototypes, wireframes, visual designs and analysing users' needs to form the application requirements.

These designs are properly prepared for development using Zeplin, Sketch and Framer and are ready to be implemented.

The app met all the requirements described previously, students will be able to access all the information they required during the research. Also, the application was carefully designed to make sure that it's fast and very easy to use without any complications.

I believe this application would be helpful and widely used and appreciated by CULS students.

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