The Use of Mobile Technology on the Example of Health and Sports Statistics Application

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Abstract - **Writing mobile application is very complex process. Programmer has to decide about lot of things. He has to choose best solution for him and application. The article describe example of tools kit which can be used in every project. It shows their advantages and benefits from using them. In next chapter described used technologies and showed their key properties. All solutions were chosen for mobile application for system Android. In last part showed application which was created using all before mentioned mechanism.**

Keywords - **Android, Java, Spring, IDE, mobile application.**

I. Introduction

Lots of mobile application can not working without other application. It must connect through the Internet to global database or communicate with server to get needed information. Application which is described in next part of article is set of three different apps. Main application is of course mobile application for system Android. It provides some functionality for users using Internet. Application communicates with other part through REST (Representational State Transfer). It's time to mention about second application. RESTful Web Service which provide way to communicate with database and also way for registration, login to app and all other functionality. Last part of this project is website as administrator panel. Owner of application or people who managed through this WWW site can edit all information which appears in app.

II. Tools

Choose best tools, technologies and solution would be very hard for young but also for experienced programmer. First we need to choose IDE (Integrated Development Environment). IDE is the program, place where we can write our code. It's not simple notepad but big software with a lots of useful feature. It can tells word before we type all or looking for our mistakes. Two part of application were developed using Java, so we are looking for best Java tool. Nowadays the biggest and the smartest tool are Eclipse IDE and Intellij IDEA. In project was used second one. Software is available in two versions. One of them is free to use but it not provide us support for all framework. I used the second one, Ultimate Version. It's pay, but if you are student, you can get free Student License. Ultimate version support all technologies which I need to my application for example Spring and HTML (HyperText Markup Language). One more tool was used in creating application. Version control system named Git. It's free and open source software for small and very large project. It follows every change in files in our project creating new versions. Easily we can go back every version which we want. Git provide us branches. In master branch we have the production version of code. We can work on other branch, copy the master branch. Also we can create new branch for every task. In every time we can merge one branch to other to get new version. Using this software we can work in big group on one project and even one document. That structure in git reposity could be very complicated, like on this photo below, but don't worry. We can create, commit, merge and Git will take care of everything.

Fig.1 Example of repository structure using Git.[2].

III. Technologies

If we chose tools it's time to get some know about technologies. When we want to create big application alone, we need to know a lot of them. There is hundred of different framework but we must choose the best combination. If we chose smart we our application will grow faster and it be easily to improve. Main mobile application was created in native language of system Android. Why Android? So, it's the most popular system for mobile platform. It can be run on phone, watch, car on even on glass. Android provide us one more big benefit from using them. When we create account on Google Play Market as developer, it provides us full statistics about everything what happen with our application. So we know how many people install it or uninstall, and much more other information. User using mobile application generates some data, which must be store. In some of cases we can't store it on phone memory. Why? When user creates some data, we need to save it on database which will be available for every user. Outside database is needed because every

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user has to have access in every time to data. As database I user MySQL. It is fast, safe and could be used in every size of project. Of course some information like name of last logged user we can store in memory of phone. Android provides us three types of saving data. We can store data in small SQLite database, save file on phone memory or outside SDcard. Last type of storing data is providing to store data in structure key-value. It name is SharedPreferences. It's working little like as session on website. We can store them all primitive value like Integer, String or Boolean but also some Set of String. We must remember that, when user turns of application we lost all before saved data. When we have our application and database, we need to find way how to communicate them together. For this I used before mentioned RESTful Web Service. It is second application which I created.

Fig. 2 Communications between mobile application and database.

It provides us all functionality through the Internet. Using REST API user can register or get some information from database. Apart from the eyes of the user REST using JSON to transport information, and URL addresses to run the appropriate action. To create REST service I used Spring but about it I will tell later. Administrator panel, last part of the project, was made using Java and Spring. Java is one of the biggest programming language and one of the most popular. It provide us thousand of libraries and framework to create not only web application but every what we want. Java could be run on every type of device because their code is compile to code which is understand for Java Virtual Machine. When we have database and some data which we must store we must create some input query to insert our data. After that we must create next queries to get data from database and so on and so on. It's of course good way, but we can use special framework with create it so much easily to us. In project is used Hibernate for that. Adding some configuration on annotation in java models, hibernate could create all tables in database without our help. Additionally it provides us so many methods to get, save and update our data in database. Two part of project was made using Spring, but what is it? Spring is an open source framework. It was created to make creating dynamic website easier. It contains around of twenty modules. Each module is responsible for a different function. This enables us to use only this module which we want and need, not all frameworks. It's good to speed of our application. One of the most using words when talking about Spring is MVC (model-view-controller). And this module was used to make administrator panel.

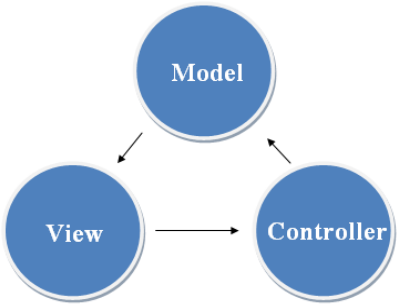

Fig. 3 Architecture diagram of model-view-controller.

MVC contains three modules. Controller is responsible for support communication with user and business logic. View is to present object for user and model is place when we have all object using in application. When we remove View part and change Controller to RestController we easily get REST API. In this application I used one new module of Spring. Spring Boot is part of Spring which provides us much easily start with project. Developers of Spring give us some tool named Spring Initializr. Using it we can create simple application with basic configuration by choosing from list. For example if we want to use Hibernate to communicate with database we must only check it on the list. After that we will get simple "Hello World" wchich can be import to our Ide. When we want to create some web application we have to think about view of our site. Spring Boot of course can help us. We can choose from list of template engine like Thymeleaf of Freemarker. But engine is not everything what we must have. CSS (*Cascading Style Sheets)* are the way to provide user nice to eye view of our application. But typing all new css is very hard job. So in this project I used Bootstrap. What is it? Bootstrap is the package of useful css which could create some beautiful component by adds some short class. E.g. if we want to create some nice to look button we must only add "btn" class to our html element.

IV. Application

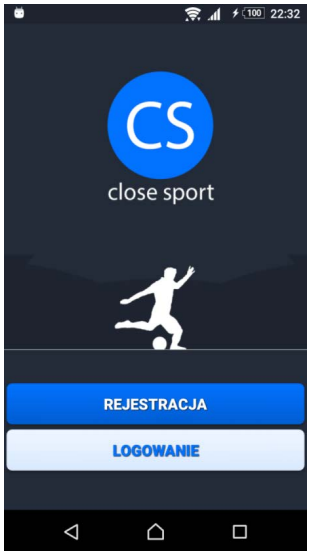

Fig. 4 Welcome view in mobile application.

Application which was created using before mentioned tolls and technologies enables us to schedule sport matches and count statistic during the match. Logged user can create match and add to them own statistic or chose from list of proposed. From now all of users could see this match and also can get all details about the meeting. When user starts match, he can count events to before created statistics. All details about match, like place, date and full list statistics is available to view by other application user. Implemented module allows using it without internet and created account. This demo version limits some functionality but main, counting statistics is still available.

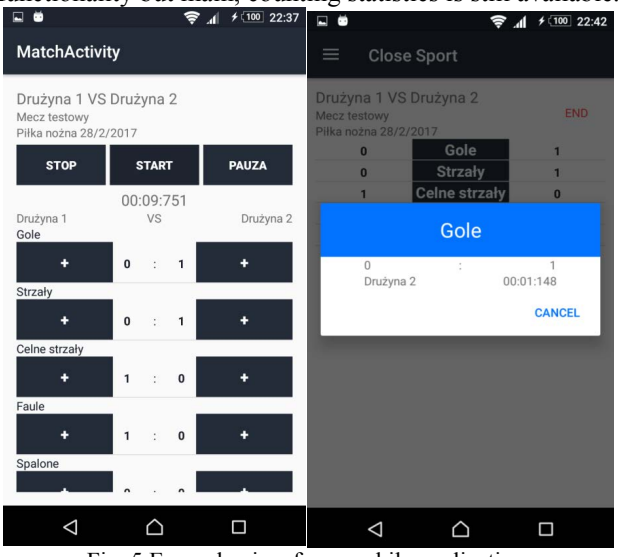

Fig. 5 Example view from mobile application.

This application was created in native programming language for Android. It contains some activities which are responsible for some big functionality like registration process or counting statistics. Except activities application contains lots of smaller fragments which are replaced during application working. Why fragments? It's so much easier to provide user some of helpful component like toolbar or left pushed hamburger menu which are available on almost all views. These components are written only once and they are visible all time and only other content are changing. For communication with user I used dialog windows. It small window which appear on the middle front of all content. It contains some basic question or content. E.g. question "Are you sure?" or show time of last goal. Application could not look like much complicated but it contains more than 50 classes and several dozen of xml files with definition of view and configurations files. Why some many files? This is because I wanted to create easily extend application. So we have many isolated services and many interfaces. This provide us easily way to add some new functionalities and modules. E.g. all showed texts were moved to special file. We can create copy of that with text translate to other language and that is way how we get application for other countries.

Created application provide to users simple way to say about next matches to people who could be interested to come and see. This could be very good tools also for some coach because now they don't have to write all statistic about who shoot more goals or who made some mistake in notes. They can type it on the application and analyze them from every place where they have Internet access.

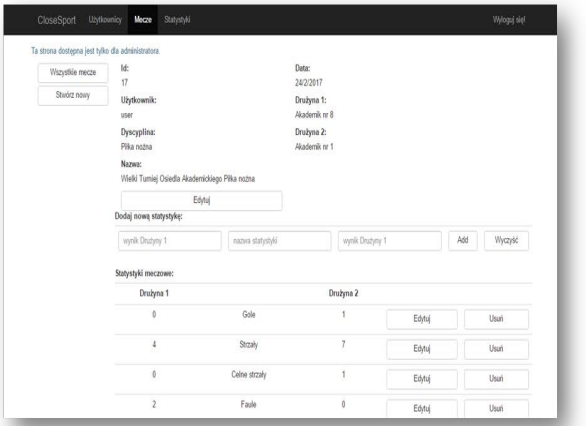

Fig. 6 Example view from administrator panel.

After enter to the website simple user couldn't see too much of content, it's only some information page. But administrator could be redirected to the login site. After successfully login process, administrator will be redirect to administration page. There he can go into three tabs. In first "Users" administrator can add new user, delete or edit all information. Next tab "Matches" provide similar option but there we operate on matches created by user. He can add new statistic or edit their value. Last tab is "Statistics" where we have full list of all statistic and with search option we can find and modify them.

III. Conclusion

In this article showed example kit of tools and technologies which can be used to create mobile application. Of course, each application is different so the using technologies could be different. We have thousand of libraries and framework which we can use so choose best is hard task. Our choice should be thought out and adequate for our needs.

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