Technical Solution Description

for eCare web application

Developed by
Andrew Golubev
golubevcg@gmail.com

Java School, Deutsche Telekom IT Solutions
2020

Content

1. Introduction

ECare it is a web application for telecommunication company, which is focused on improving relationships between mobile operator and client. Application have ability to quickly manage all contracts, tariffs and options with deep dependencies for business needs for clients and company employees both. It improve the way we interact with mobile operator by providing strict and clear system of option dependencies, multiple contract management and option rules editing.

Company employee can register new clients, add new tariffs, options and contracts and edit option dependency rules. Also app provides for employee quickly changing of Ad’s, content of which can be edited in real-time update in the advertisement stands.

Clients of a company can check new options, tariffs and edit their contracts in their accounts. All with great and intuitive interface take this experience to a whole new level of convenience.

Second part of the application is an advertisement stand, which receives an information from main application and updates it in a real time.

2. Technologies

List of technologies and frameworks, which were used inside application:

- Spring Framework;
- Hibernate;
- Lombok;
- Jquery, css;
- JSP, JSF;
- EJB;
- Maven;
- Wildfly;
- ArtemisMQ;
- Apache Tomcat;
- PostgreSQL.

3. Model.

3.1 Entity description.

In Application was used 6 types of entities:

1) User entity consist with user_id, login, first and second names, date of birth, passport info, email, password, is active, set of roles and list of contracts, currently owned by user.

2) Contract it is a contract with a phone number, which is connected to every company client. It have contract_id field, contract number (equals to phone number), is blocked – which is used for blocking a contract, user, set of options and connected Tariff.

3) Tariff have also tariff_id, name, price, connection price, short description, set of contracts, which chose this tariff, set of available for this tariff options and is active attribute, in case it needs to be removed.

4) Option entity have option_id, name, price, connection cost, short description, is active attribute, set of tariffs, which have this option as available, set of contracts which have this option added to them and two sets of obligatory and incompatible options.

5) Ad – advertisement entity, used in advertisement stands. Have id field, active(if it deleted or not), name field and List of Tariffs, which will be used in stand for advertisement.

6) Role have role id, role name and set of users with this role.

3.2 Database scheme.

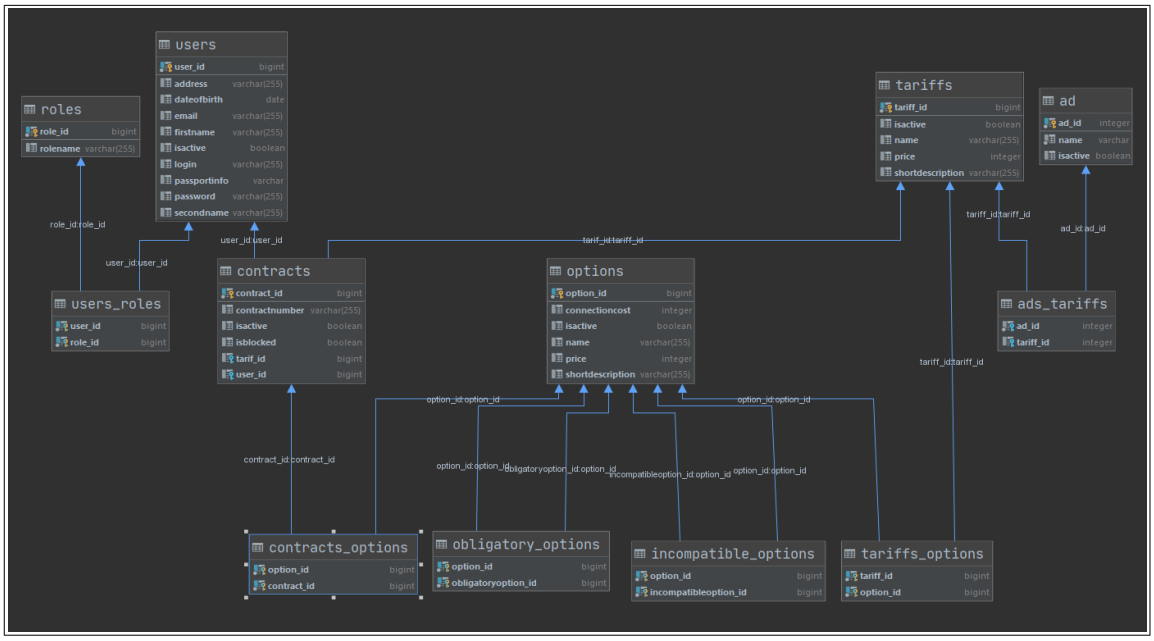


Table	Relationship
users_roles	Many to many relationship.
contracts_options	
obligatory_options	
incompatible_options	
tariffs_options	
ads_tariffs	One to many relationship.
Tariffs with contract	
Users with tariffs	

4. Architecture description.

Application consists of two modules – main app and advertisement stand. Both at it core use Model View Controller architectural pattern, but have different implementations on it’s basis.

Main app base on Spring MVC for controllers and requests handling, for view responsible JSP – Java Server Pages framework, which helps to render server information on html pages. Model is handled by Hibernate ORM (wish goes as Object Relational Mapping) for connecting entities with database. For this application I choose relational data base PostgreSQL. For connections between this two modules (main app and advertisement stand) I used message queen and Java Messaging Service – industry standard API for sending messages to message broker. Messages are sended to build-in message broker inside ad stand application server. First app is deployed on Apache Tomcat server. All database connections are wrapped in dao (Data Acces Objects) interfaces and it’s implementation, also for efficient using of queries there is included Transaction Manager inside all dao related service methods.

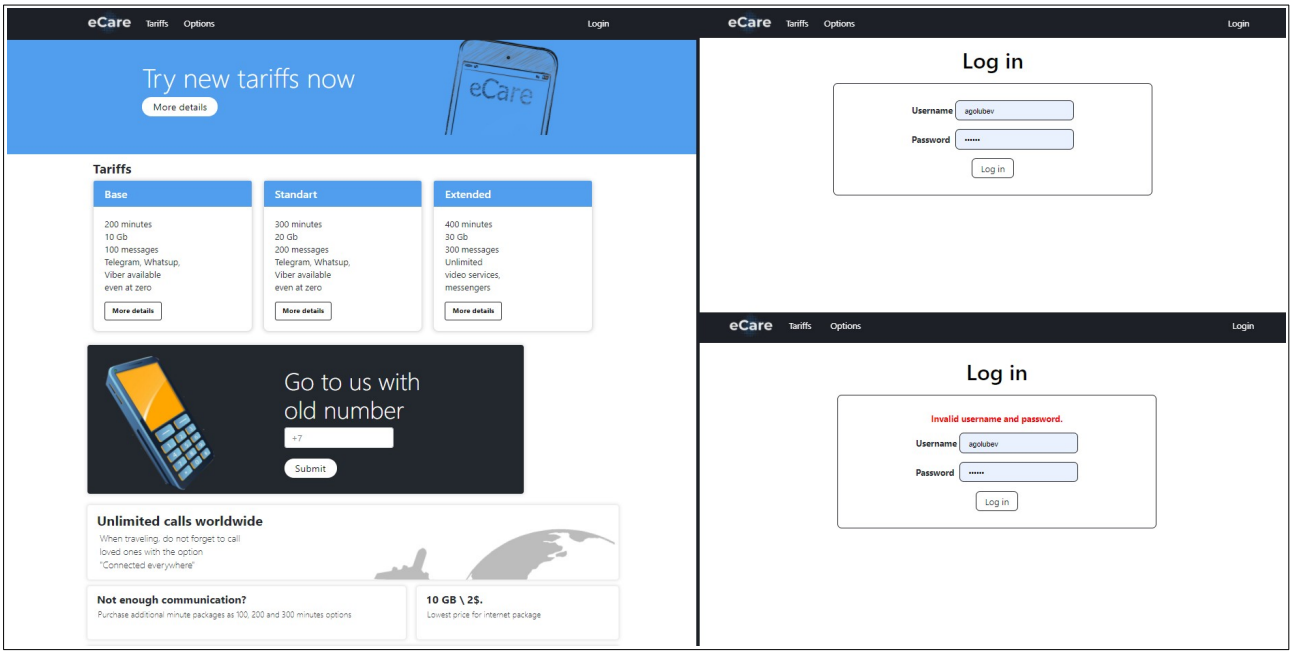
Second application based on WildFly application server, with the same usage of MVC pattern, but with different technology stack. In this one heavily used JSF for view-server connection, it in a real time updates any changes received from first application. To process and listen messages there was written Message Driven Bean.

5. User interface.

5.1 Client account.

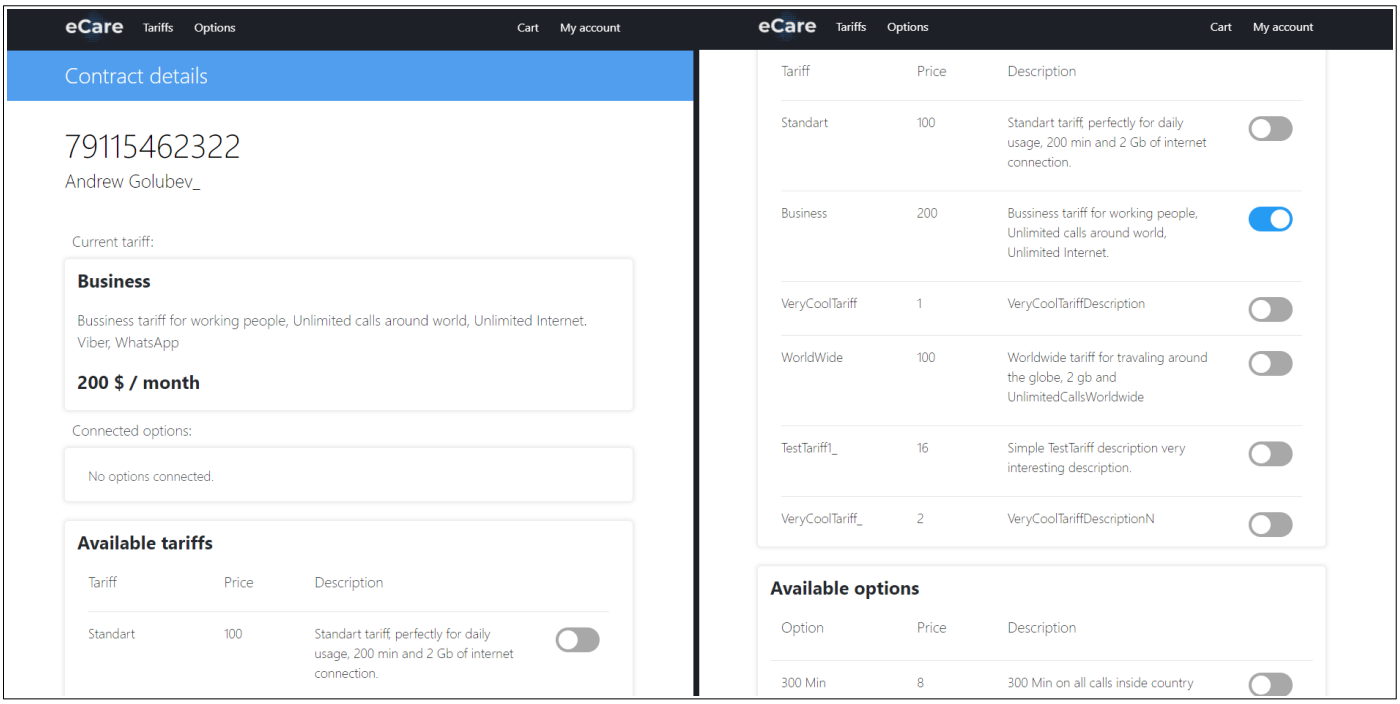
5.1.1. Entrance and login pages.

When entering app, any user will see entrance page with tariffs and options advertisements. In top right corner there is a button for login. After clicking on it he will be redirected to login page, in which login and password validation are implemented, and all the rest pages (except options and tariffs information) will be blocked by Spring Security.



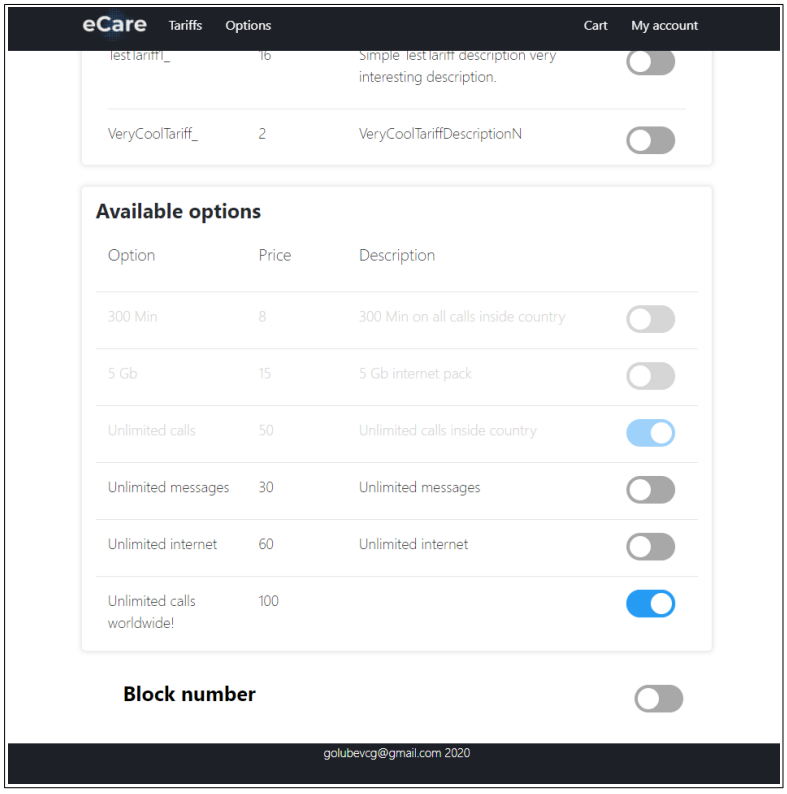
In view a lot of used Bootstrap forms, which is a free set of tools includes HTML and CSS design templates for web forms, buttons, labels, navigation boxes and other web interface components.

5.1.2. Clients account page and contract page.

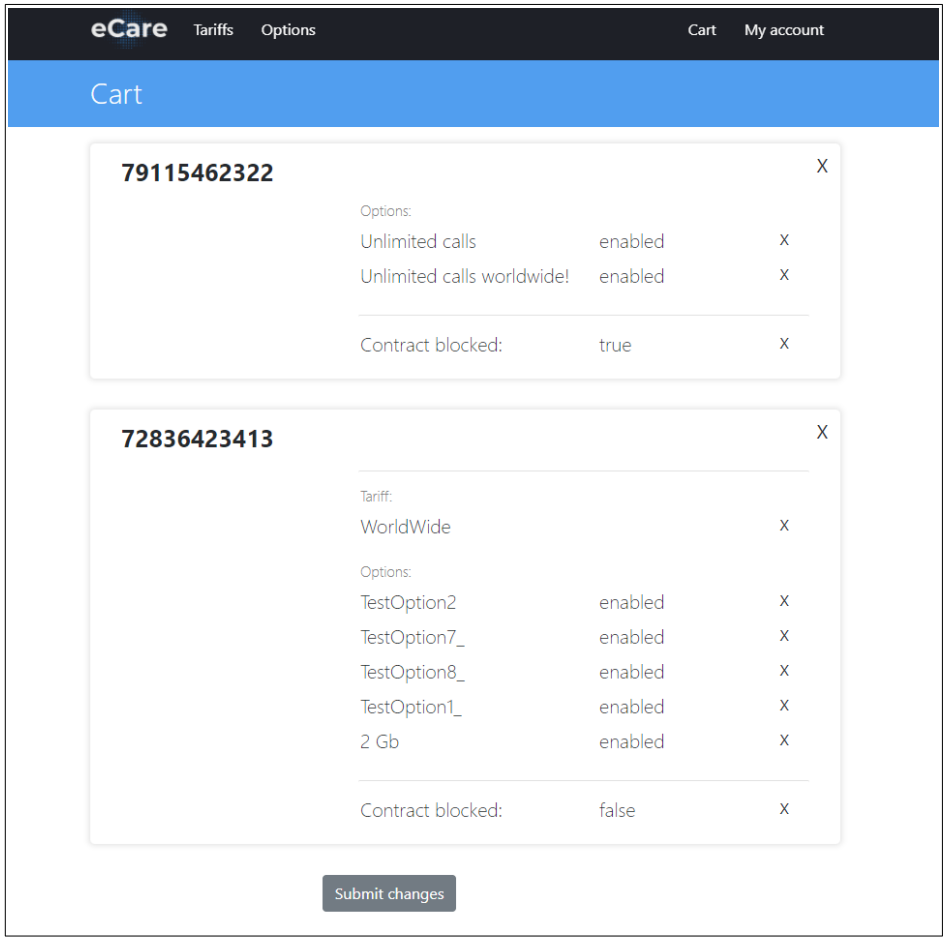


Client account page consist of a list with connected contracts. Clicking on details button will transfer user to contract page, in which client can edit contract, based on his needs – change tariff, change option or even block a contract. In this page heavily used JQuery and Ajax request with JavaScript, to update page information, based on clients choice. For example during the tariff selection, options available for this tariff will be automatically updated without page refreshing.

All option rules – obligatory and incompatible dependencies already included in selection. If client will turn on some option which he liked, application will immediately check it dependencies, and if it will found some, then related options will be enabled or blocked, based on the option rule.



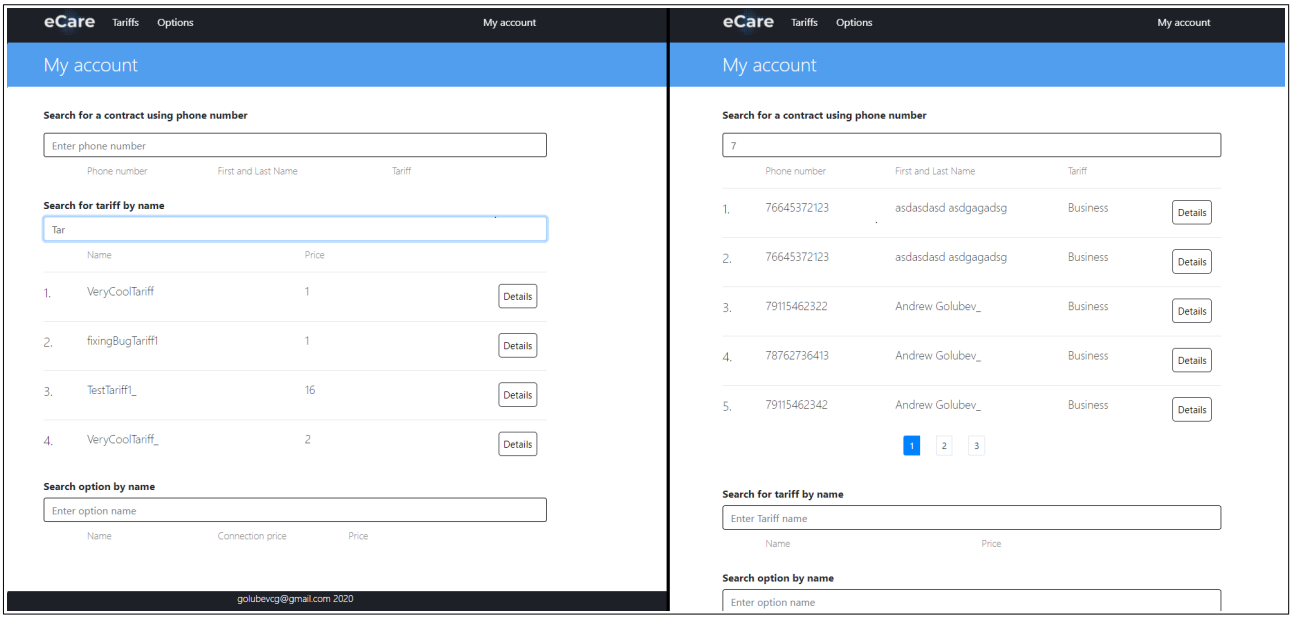
5.1.3. Cart page.



To submit changes from contracts client need to proceed in cart page, before submitting with created changes he can for example remove any of them if he changed his mind. All changes during this contracts editing are stored in session. When client entering contract list page in session stored set with users contracts, and this set duplicated. On duplicated version applied all changes created in contract page. In cart page this changes compared with values from db(which already stored in session attribute) and difference is revealed in page.

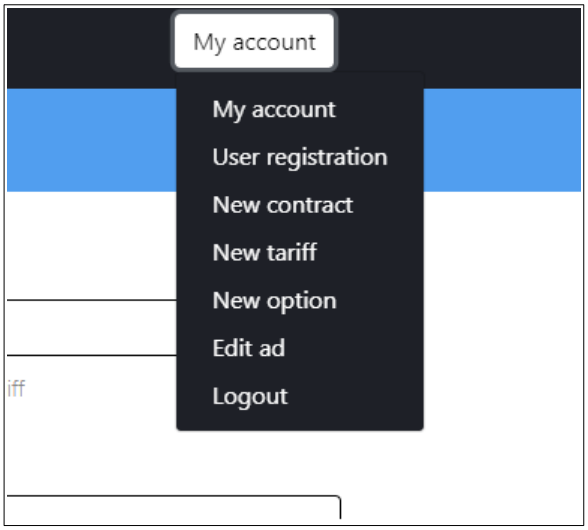
5.2 Employee account.

5.2.1 Searches and header.

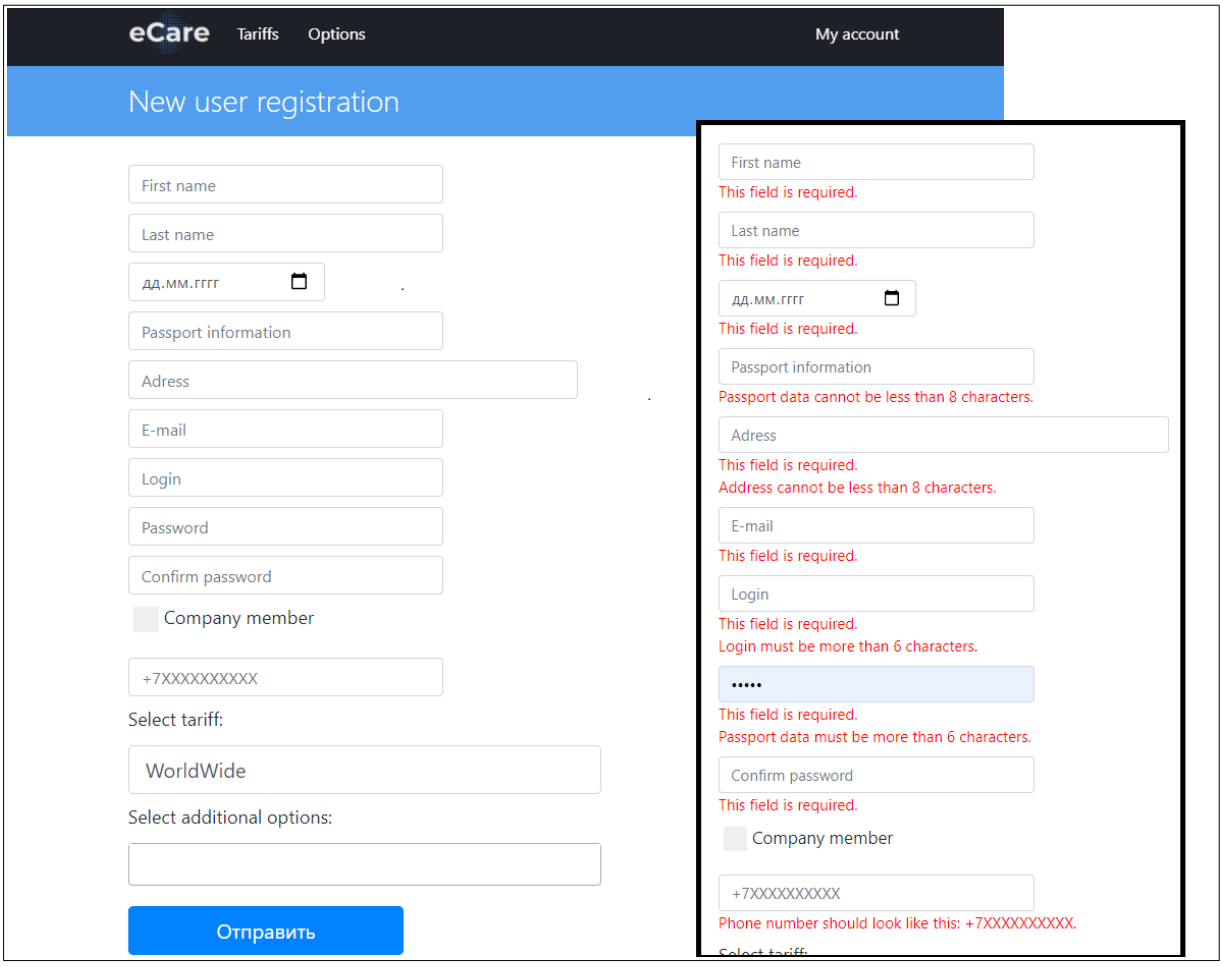


All employees inside application have “Admin” role and extended functionality. Such user after login in will see admin account homepage. It consists from three searches, in which worker can search for contract, tariff or option, typing in search field. Results are links, from which employee can proceed for editing of entities, if he need so. Search results can be pretty big, so to escape this problem in this page was pagination created, which returns 5 results at single page.

Header will depend on currently logged User role, if will change menu items, for example if user logged as “Admin” he will see drop-down list with items like this:



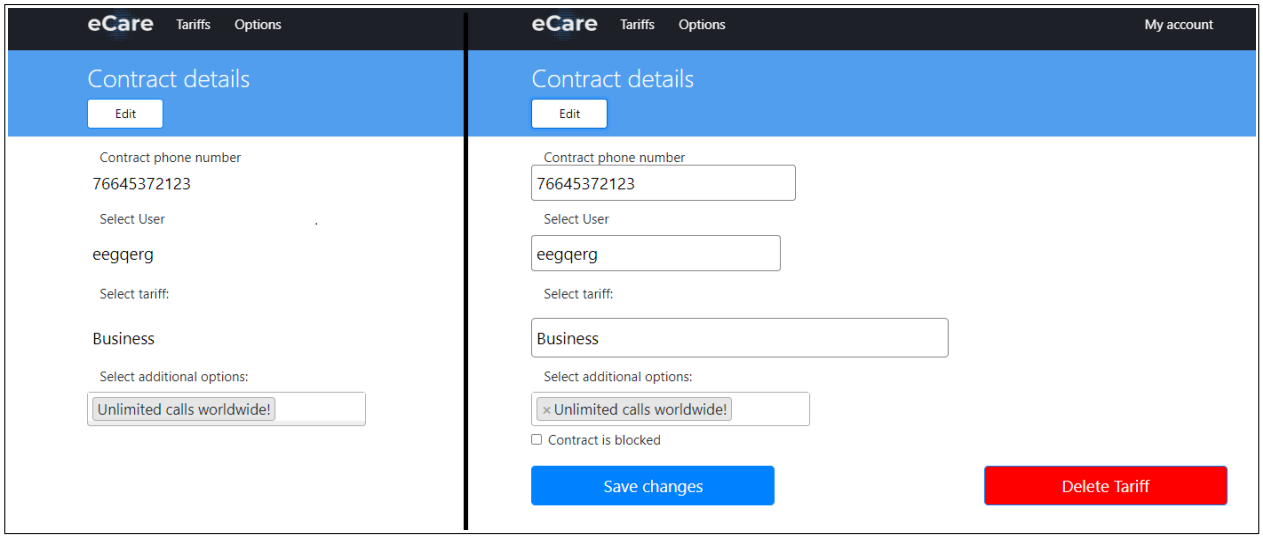
5.2.2 New user registration.



By clicking on user registration employee will be transferred to the user registration page, in which he can register new user, add a contract to him, select tariff and set additional options. Option list will be updated based on tariff selection. All field values have validation underneath and after submitting this request all values will be checked and if with one of it will be something wrong it will reveal validation message.

There is Company member checkbox, when it pressed, fields, related to contract will be hidden. This checkbox is created to register new company employees. If this checkbox will be set, then “Admin” role will be assign to this user, after proceeding this registration.

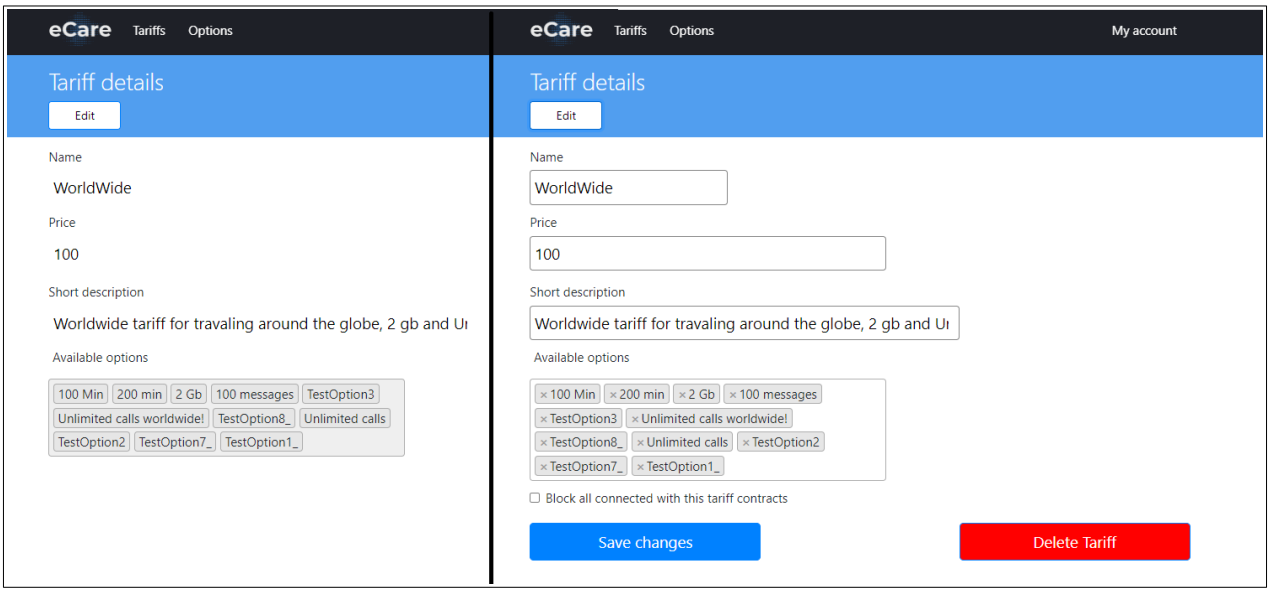
5.2.3 Contract editing.



If in the search field find some contract and click to it, then you will be redirected to contract editing page, in which existing contract can be changed. By default all fields are disabled, to edit it, user need to click on edit button. This button only seen by users with “Admin” authority.

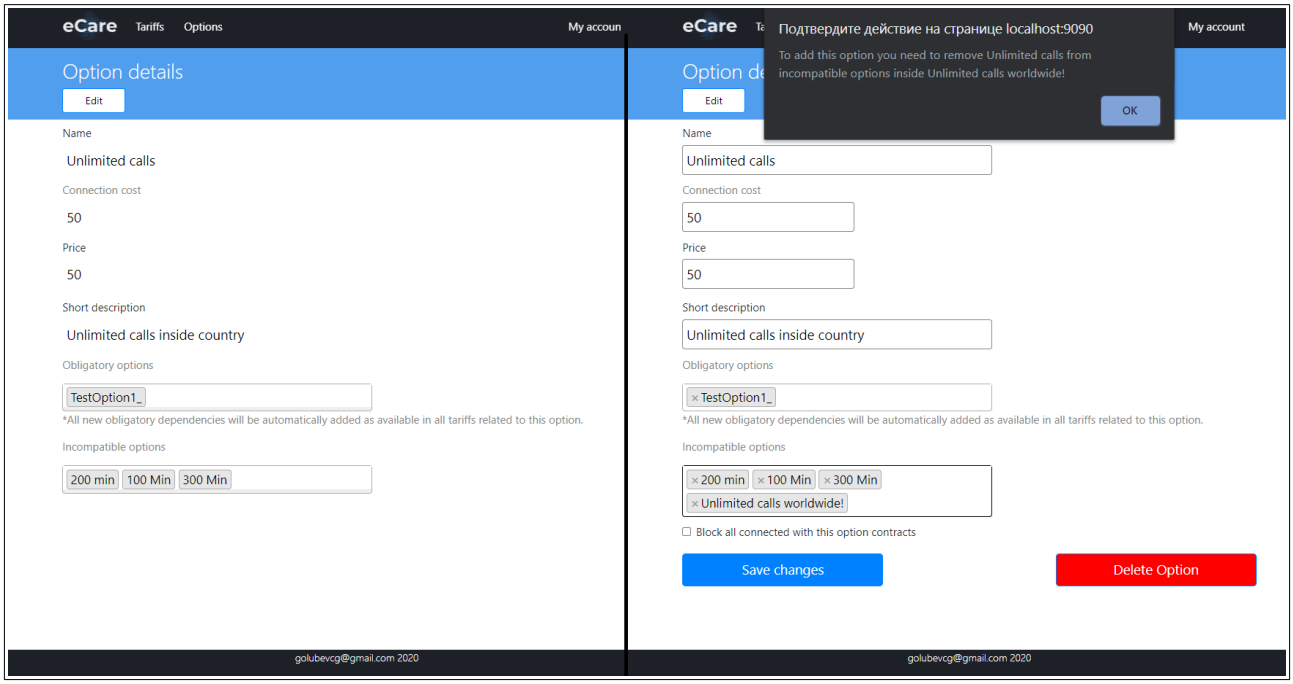
Selected user field if basically search for user by login, so if you want to change user of current contract, you need to pick one from drop down list, which will popup during the search. If login will be from non existing in database user, this field will be refused by validation. New contract window looks almost the same.

5.2.4 Tariff editing.



Tariff editing window look very similar to contract editing, except one thing. Because our option have rules, in which one can be obligatory to other, we need to think about it during new tariff registration or editing. To escape problem in which obligatory option will not be connected to tariff, so it will be impossible to enable, so it will impossible dependency. So all connected obligatory options to selected option will be added automatically to list. Recursively, so dependency of depended options will be included.

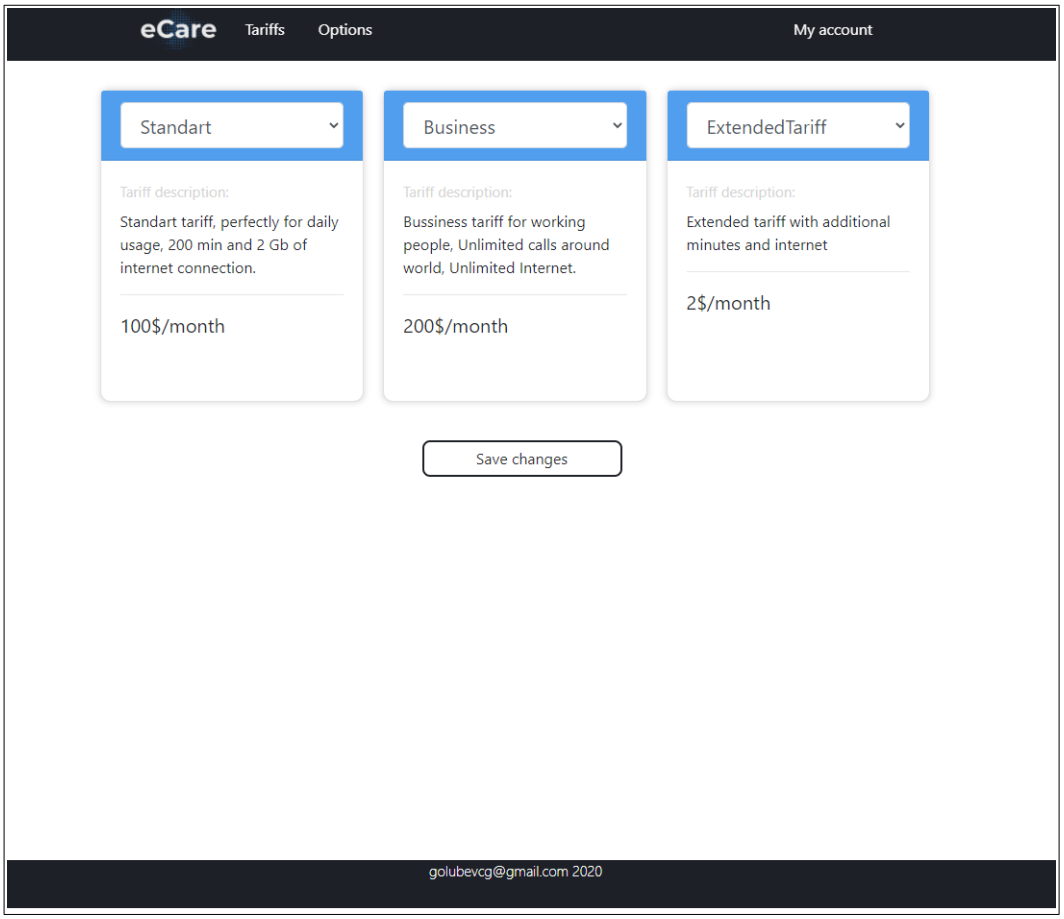
5.2.5 Options editing.



If you need to edit option you need to type option name in a search field and click on one of the result. In option editing page you can also edit all rules, which you can apply to selected option.

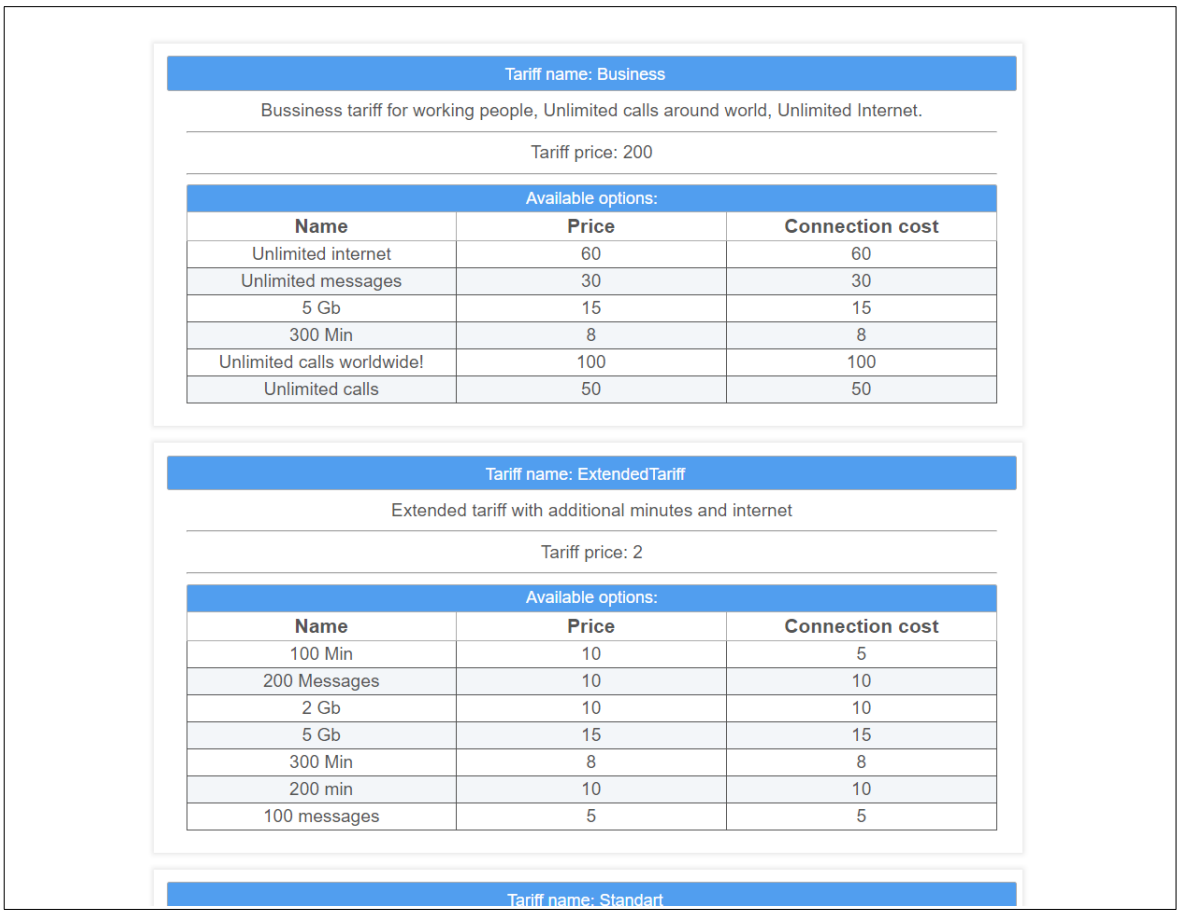
For example you want to add more obligatory option for this one. Obligatory options – options, which should be enabled in contract for enabling this option. Incompatible options – options, which should be disabled for this option to be enabled. In order to escape from impossible dependencies, on this page written a lot of checks. When user add new option, it will be checked for obligatory options in parent dependencies and selected one will be checked to be compatible with already selected ones. It all happens without page reloading, using Javascript Ajax requests. If there is will be found some incompatible dependencies, then there is will alert window pop up, which say which option should be changed to enable option which user chooses.

6. Ad editing, message sender.



If administrator will proceed to Ad editing page, he will see three cars of tariffs, which is currently displayed on second application advertisement stand. Changing of tariffs will result as an immediate change in advertisement stand. For such purpose application have separate class message sender, which connects to message broker Artemis MQ, which is included in WildFly application server, on which eCare advertisement stand runs. Any editing of and tariff or an option will update tariffs in ad too.

7. ECare advertisment stand.



Tariff name: Business

Bussiness tariff for working people, Unlimited calls around world, Unlimited Internet.

Tariff price: 200

Available options:

Name	Price	Connection cost
Unlimited internet	60	60
Unlimited messages	30	30
5 Gb	15	15
300 Min	8	8
Unlimited calls worldwide!	100	100
Unlimited calls	50	50

Tariff name: ExtendedTariff

Extended tariff with additional minutes and internet

Tariff price: 2

Available options:

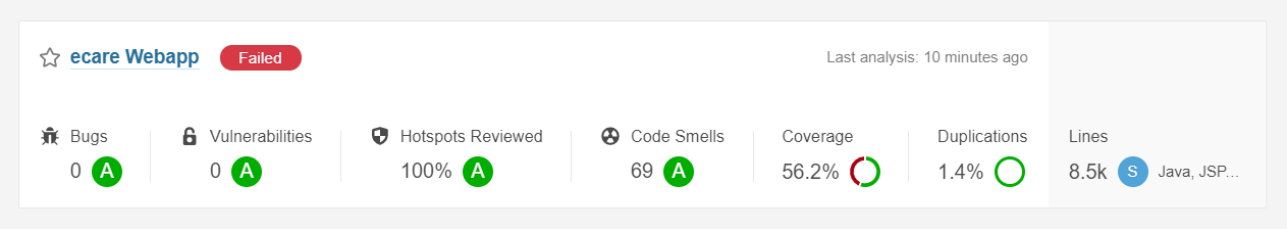
Name	Price	Connection cost
100 Min	10	5
200 Messages	10	10
2 Gb	10	10
5 Gb	15	15
300 Min	8	8
200 min	10	10
100 messages	5	5

Tariff name: Standart

Second application used as advertisement page, which should show dependencies from first application. So, there is a written a rest method, which takes tariffs from first application during first deploy and each time a message received in queue it get new information from a first app. Queue is always listened by Message Driven Bean with listener method. As a Message broker user build in WildFly Artemis MQ, which works great. Messages in queue used only to say that first application have some changes, please check to render page in this part we use Java Server Faces technology and, for a real time update, without using Javascript AJAX request manually – it’s great tool to work with.

6. Code quality and testing. + logs and comments javadoc.

Application is checked using Sonar Qube, which is used for code quality analysis. To project added Jacoco library, which measure test coverage of a whole project. This lib is connected to Sonar, for showing coverage inside Sonars report. Sonar results you can look at this image:



Quality gate pass is failed because code coverage not more than 80%, there is a field to improve, currently only 56.2% of application covered with tests.

7. Further development.

Future development will depend on business needs, but already in a current state of application there is a field for improvement. It would be a great idea to add another role in an app, for example an employee, and give him part of a privileges. Because it is now so good when all employee have all admin privileges. Also app needs a messaging system between user and employee, for ability to send messages and receive ones on a daily basis inside this app. Next, almost all entities have fields with price or connections cost, so adding payment system would make sense. Ad system can be much more improved, in which there should be an ability to choose not only tariffs, but options too. Would be a good idea to add functionally for adding new adds, and connected them to this application. The currently developed application has a good basis for further development and improvement of the functionality.