Politecnico Di Milano
Facoltà di Ingegneria dell' Informazione
(Computer Science Engineering)

SOFTWARE ENGINEERING II PROJECT

Part I: **DD**

Prof.ssa: **Di Nitto**

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Project Title: **BidWin**

Project Repository: **https://github.com/EmanueleLM/BidWin**

Emanuele La Malfa

Matr: **841042**
emanuele.lamalfa@mail.polimi.it

Davide Malvestiti

Matr: **773345**
davide.malvestiti@mail.polimi.it

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1.System Architecture

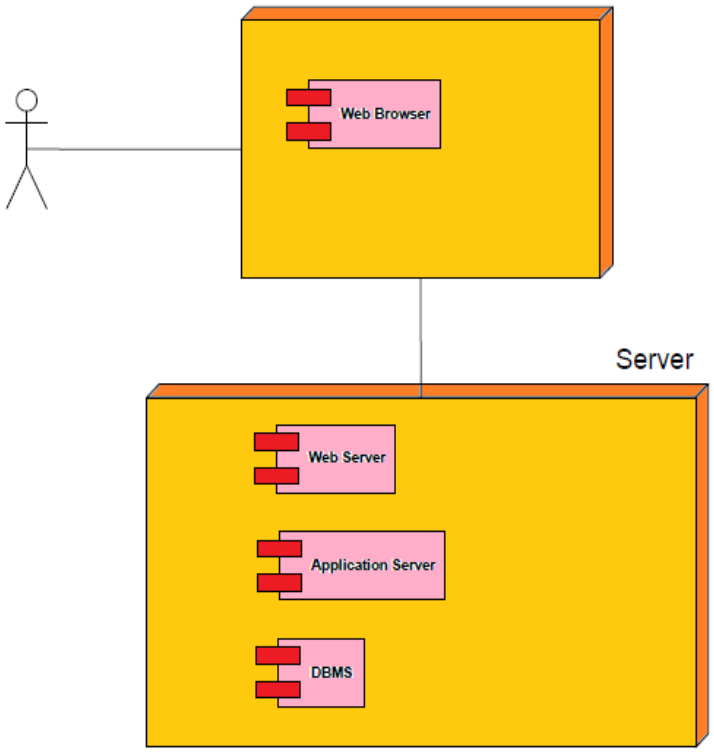
1.1 Brief Introduction

We develop the system by using the Java EE Platform: since the final result is a web application, we rely on the most typical structure composed by a - central - server, several clients and a database.

We will deepen these concepts in the further section, seeing how the single components are subdivided and how they collaborate in order to offer the required functionalites: moreover we present the technologies we will use to manage each of the tiers.

Since we are in a distributed scenario, we have to guarantee that our system is reliabale and robust: thus we keep the components separated as much as possible - Java EE natively supports the separation between tiers-.

By far we can present a simplified overview of our architecture:



Pic#1: appserver.png

1.2 System Tiers

Now we can go deeper into our system implementation, specifying what kind of technologies we use for each of the tiers.

Application Server

An application server is a program resident on a machine server which offers a set of services - in this case the Java EE services - which are the core of our application.
The main features are:

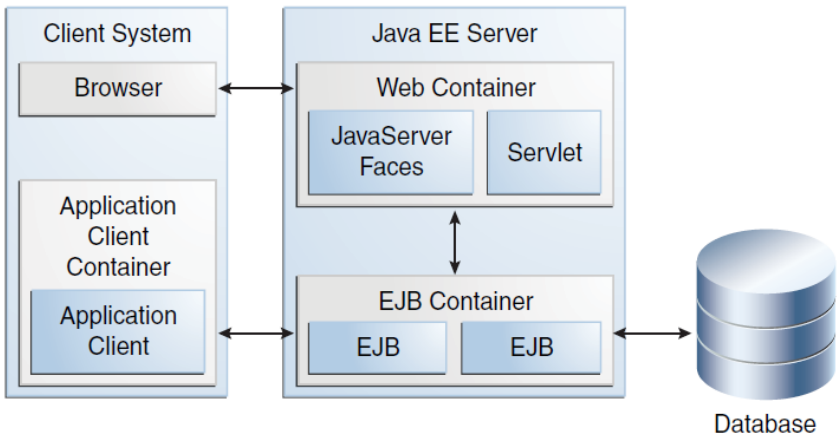
- Static and dinamic presentations to the final user, thanks to web-based interfaces
- Managing business logic components
- Access to the data

We use the Oracle Glassfish Server 4, which comes with a prepared community that helps solving a great variety of problems that usually arise in this distributed scenario.

Web Application Logic

The web part is meant to allow interacting with the system in an easy way: we will shape it by the JSF - Java Server Faces -.
A JSF is composed by a Faclet and a Bean: the Faces Servlet manages the http requests as specified in the Facelets files - which are substantially markup text -. This markup includes bindings between the html elements and methods of the Beans.
Please notice that these technologies mix up java code and html markup in an MVC manner.
Historically there's another way to approach this web application part, by the JSP method: we will not use it because since the JSF took place, it has been marked as deprecated by both the community and Oracle.

Picture #2 represent the same system as in the picture #1, but in this case it is focused on the technologies implemented in each part.



Pic#2: appserver_tech.png

1.3 The Enterprise Java Beans

In the next session we present the Enterprise Java Beans - EJB -, which are inflected in three diferent ways: each of them offers a specific service which is standalone, modular and independent form the other Beans.
Please note that this does not mean that we can't combine 2 different EJB: actually we use them togheter. In the end of the section we provide a meaningful example where we combine them.

1) **Session Beans:** they are EJB dedicated to the business logic, which carry out operations such as arithmetic calculation and so on. For example if a user needs to recharge his/her pocket, he performs the operation by filling up a form in a specific page: the calculation of the new credit count is executed by a Session Bean.
2) **Entity Beans:** they are generally used to represent the data - which is a relational one in our system, but nothing forbids from using a different kind of database. As regards our system, the will be used to interact with a lot of information: please take a loot at the ER model presented in the next session.

3) **Message Drive Beans:** they are EJB dedicated to the excahnge of asynchronous messages - usually dispatched form the system to the user(s) -. E.g. a specific Message Drive Beans will notify the user when an auction ends up by sending him/her informations about the final result - the winner, the final price etc. -.

2.Database Definition

2.1 Conceptual Project

ER diagram represent the logical structure of the database where we memorize the information, whereas the class diagram the logical structure of the data that we use with our application.
As regard this section we provide the data structure of the system: follows the UX diagrams, which will help to describe the logical structure of whole the system.
As mentioned before, we use a entity relation database which is accessed by an Entity Beans, but nothing forbids from using - in the future versions - a non relational database.

2.1.1 ER Model

Picture #3 shows the **ER model**.
Please Notice that Auction is a weak-entity: this means that it cannot exists without the related object.

2.2 Logical Schema

2.2.1 Logical ER

Here we provide the logical schema related to the previous ER model.
Primary keys are **bold and underlined,** foreign key are *italic:* these information are mixed up if necessary.(e.g. **BID**: user and auction are both primary and foreign keys).

USERS(**Username**, Password, Name, Surname, Email, Rank, PaymentInformations, Birthdate, AuctionCounter, Credits, Address);

OBJECTS(**Object-id**, *Username*, ObjectName, ObjectType, Description, ImageLink);

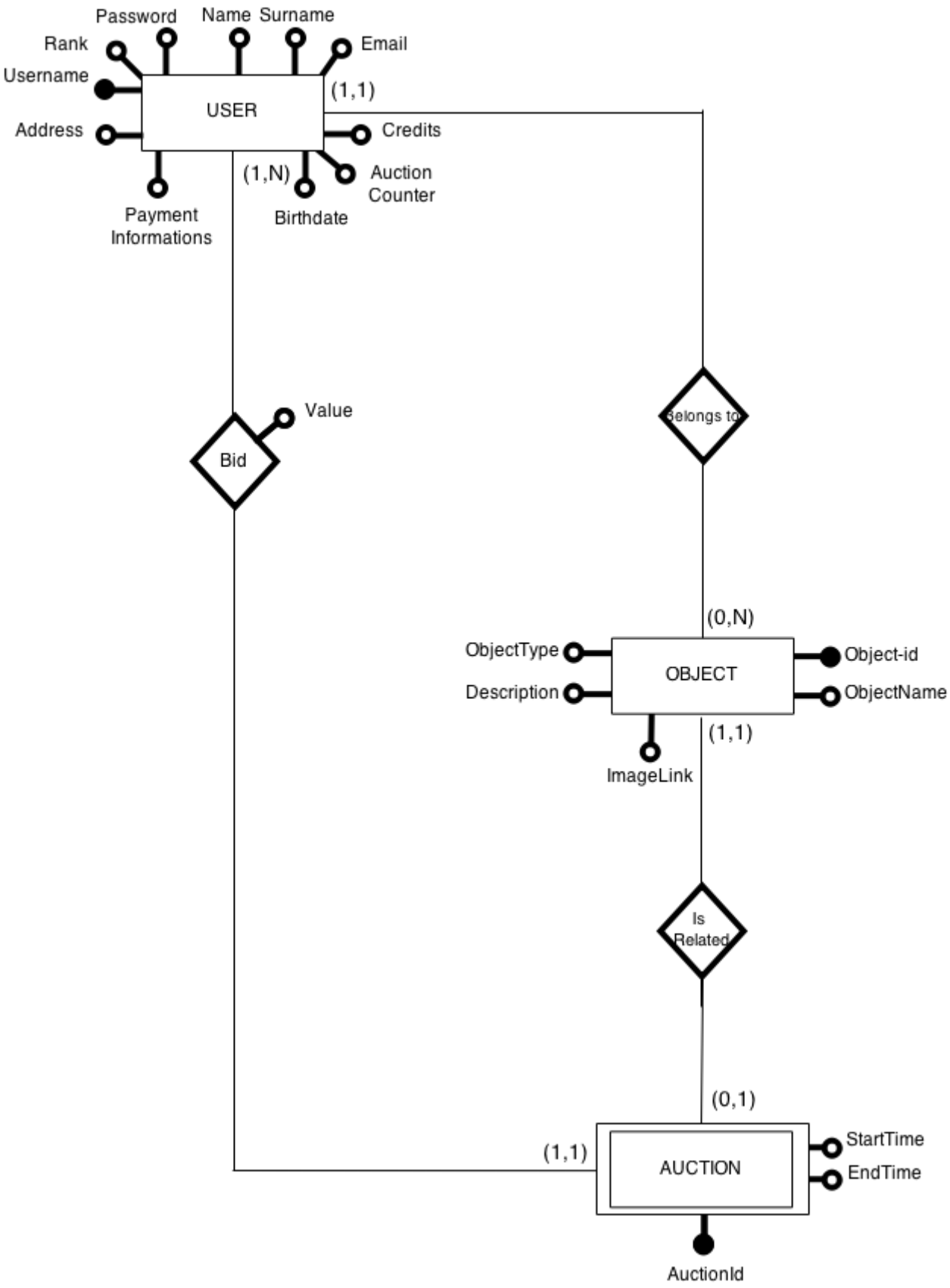
AUCTION(**Auction-id**, *Object-id*, StartTime, EndTime);

BID(***Username***, ***Auction***, Value);

2.2.2 Foreign Keys

In this section we provide the foreign keys related to the previous ER schema.
Bid is a relation ("connector") which uses 2 foreign keys: that's because the relation between **Auction** and **Users** could be simply represented in this way without any meaning loss.

BID.UserName → USERS.Username
BID.Auction-id → AUCTION.Auction-id
OBJECTS.UserName → USERS.UserName
AUCTION.Object-id → OBJECTS.Object-id



Pic#3: DesignDocumentER.png

2.2.3 Tables

Tables are the most significant representation of our data: the information are stored on the system in this way, and can be easily retrieved with some query language (as SQL). This is the syntax used:

FieldName Type (INTEGER, VARCHAR, DATE …) Relation (Foreign key, Primary key, Foreign + Primary)

USER:

Username VARCHAR Primary key	Password VARCHAR	Name VARCHAR	Surname VARCHAR	Email VARCHAR	Rank INTEGER
Address VARCHAR	Payment Information VARCHAR	Auction Counter INTEGER	BirthDate TIME	Credits INTEGER	

OBJECT:

Object-id VARCHAR Primary key	Username VARCHAR Foreign key	ObjectName VARCHAR
Description VARCHAR	ObjectType VARCHAR	ImageLink VARCHAR

AUCTION:

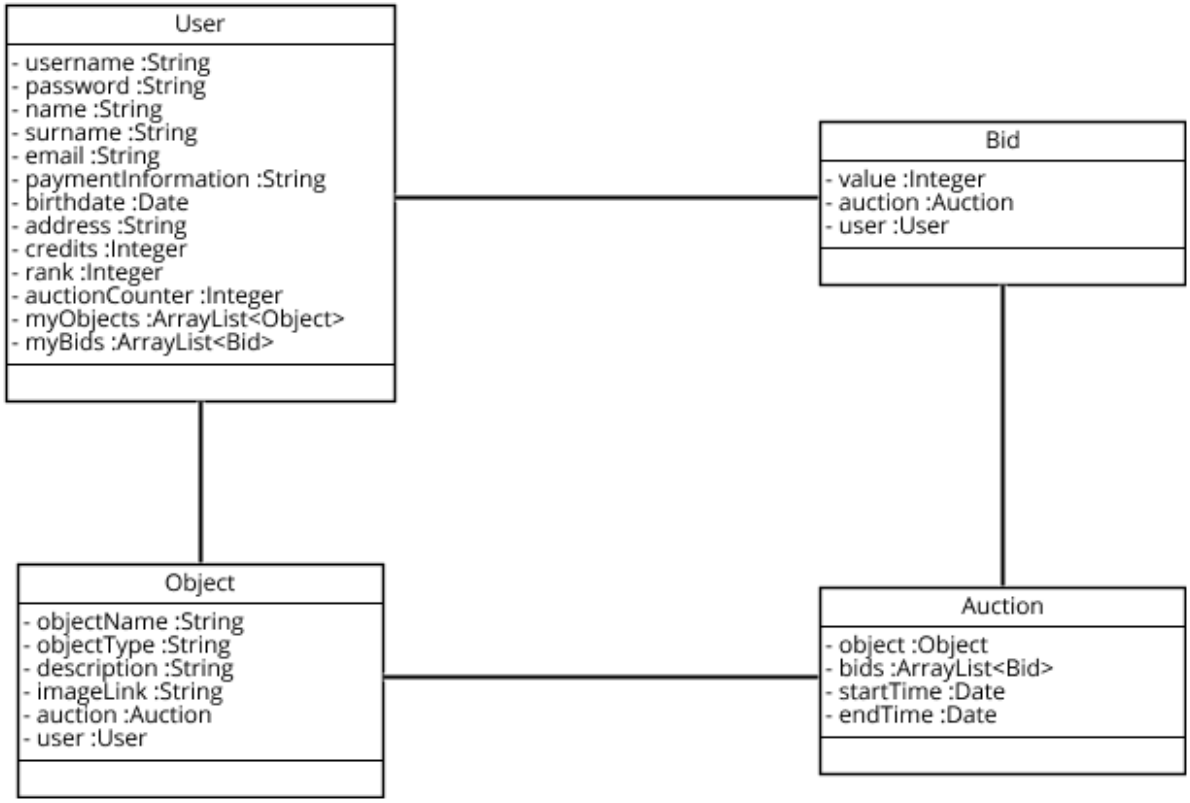
AuctionId VARCHAR Primary key	ObjectId VARCHAR Foreign key
StartTime TIME	EndTime TIME

BID:

Username VARCHAR Primary key + Foreign key	AuctionId VARCHAR Primary key + Foreign key	Value INTEGER

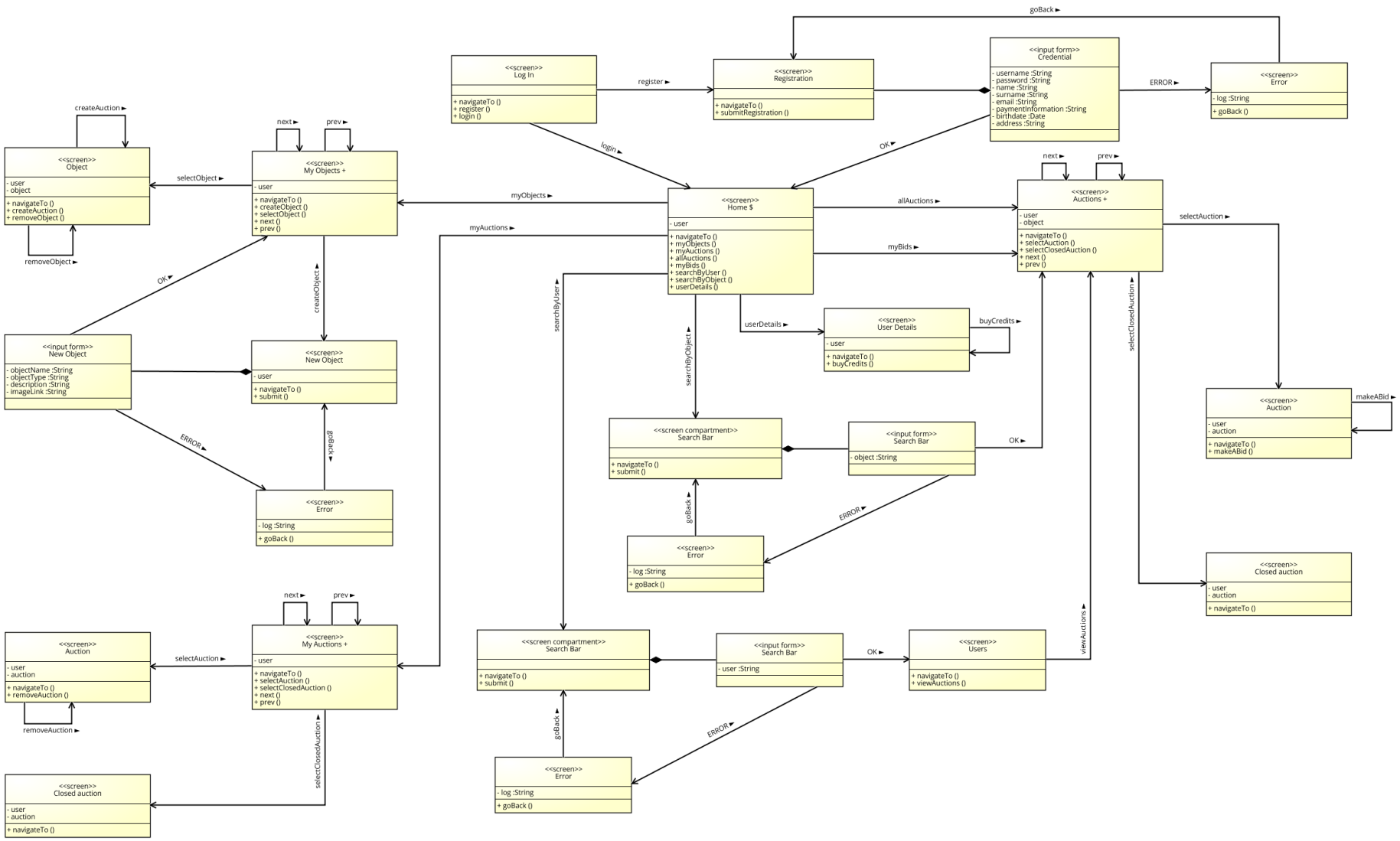
3.Model

3.1 Class Diagram

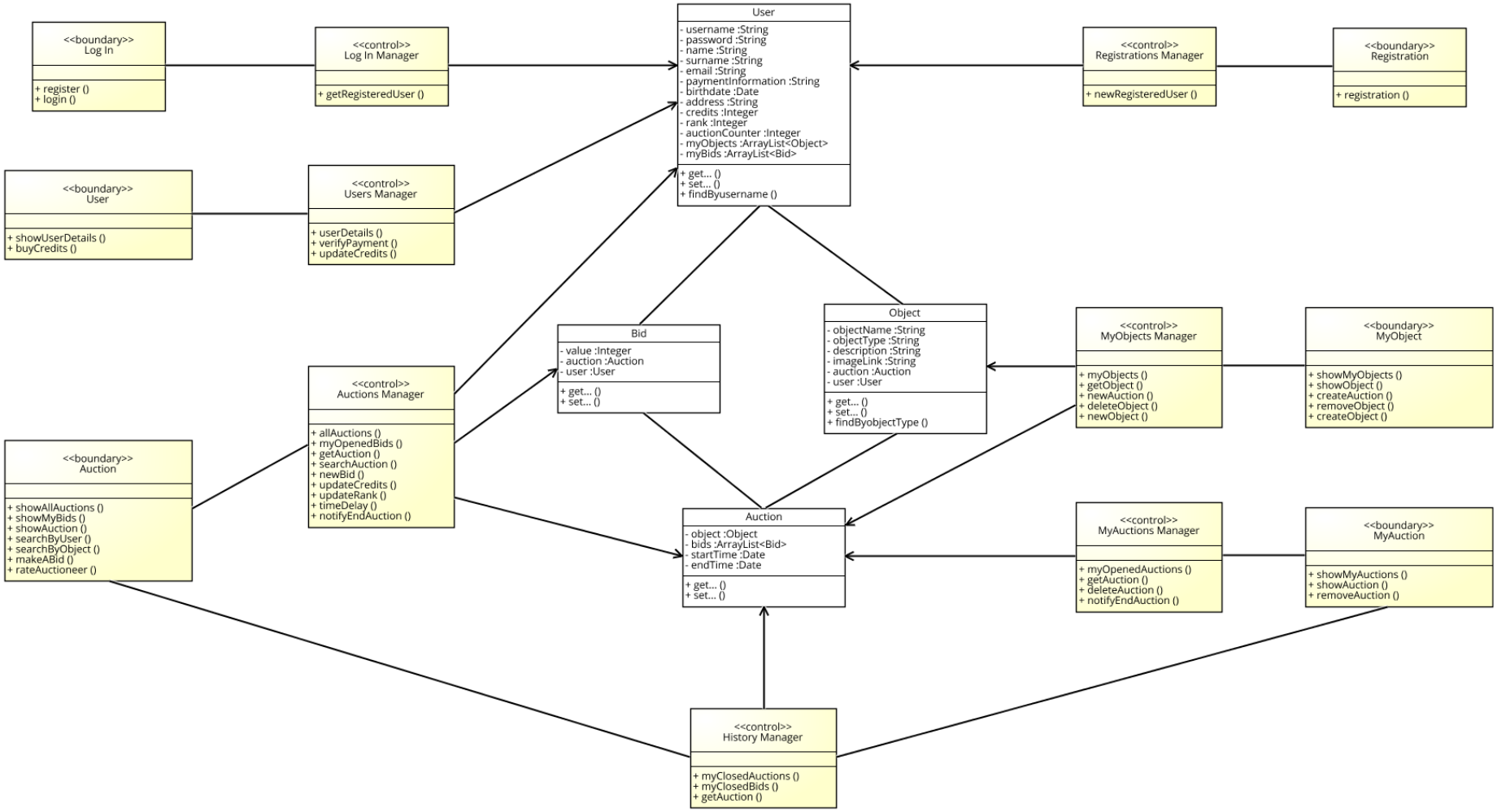


Pic #4: ClassDiagram.png

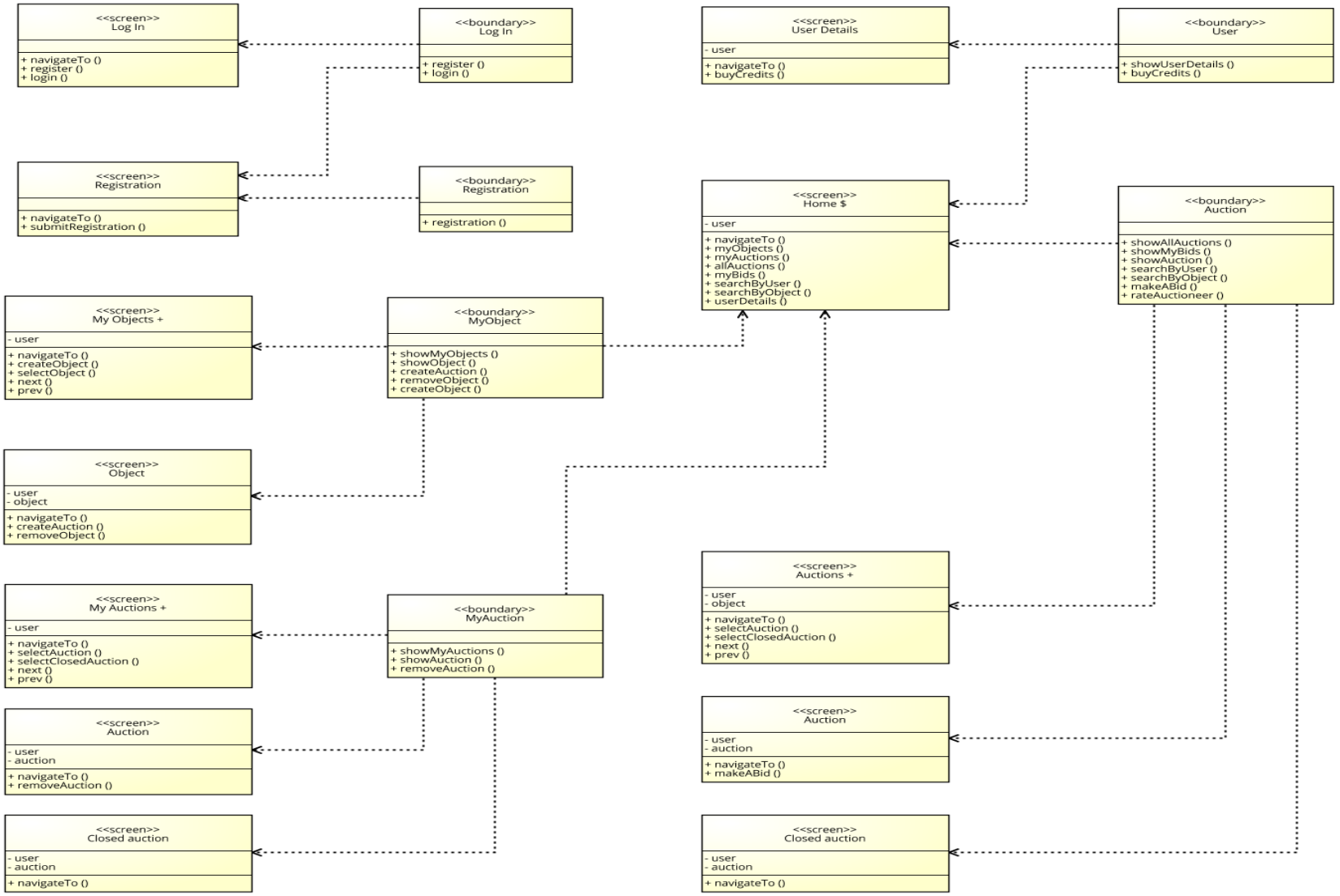
See picture #7



Pic #5: UxDiagram.png



Pic #6: BCEDiagram.png



Pic #7: UX-BCE.png

3.3 Sequence Diagrams

In this section we provide several sequence diagrams which are the same presented in the RASD document: this time they refers to the BCE diagram - see the previous section -.

#1: User Registration: this seq. Diagram shows how a "*non-registered user"* interacts with the registration form provided by the system itself: first of all he/she has to perform a registration request, than he/she inserts a valid nickname - which will have not already been adopted by another user - a password, and a list of information such an address where the delivery pack will be sent.
If all the operations are executed correctly, the registration is successfully performed and he/she becomes a "*registered user"*.

Picture #2 shows the use case diagram.

#2: Bid_auction: this seq. Diagram shows how a "*registered user"* interacts with the *"bidding system"* functionalities provided by the system: first of all he/she needs to looks for an object - we already discussed about the search engine -, than he will choose a specific Auction from the list. Now it is up to the user to make or not an offer.
If the system accepts the offer - action time not ended and many others constraints -he will be notified whether or not he/she has won.
We describe the winning scenario, which includes the notification of the winning, the shipment of the object and the Auctioneer evaluation.

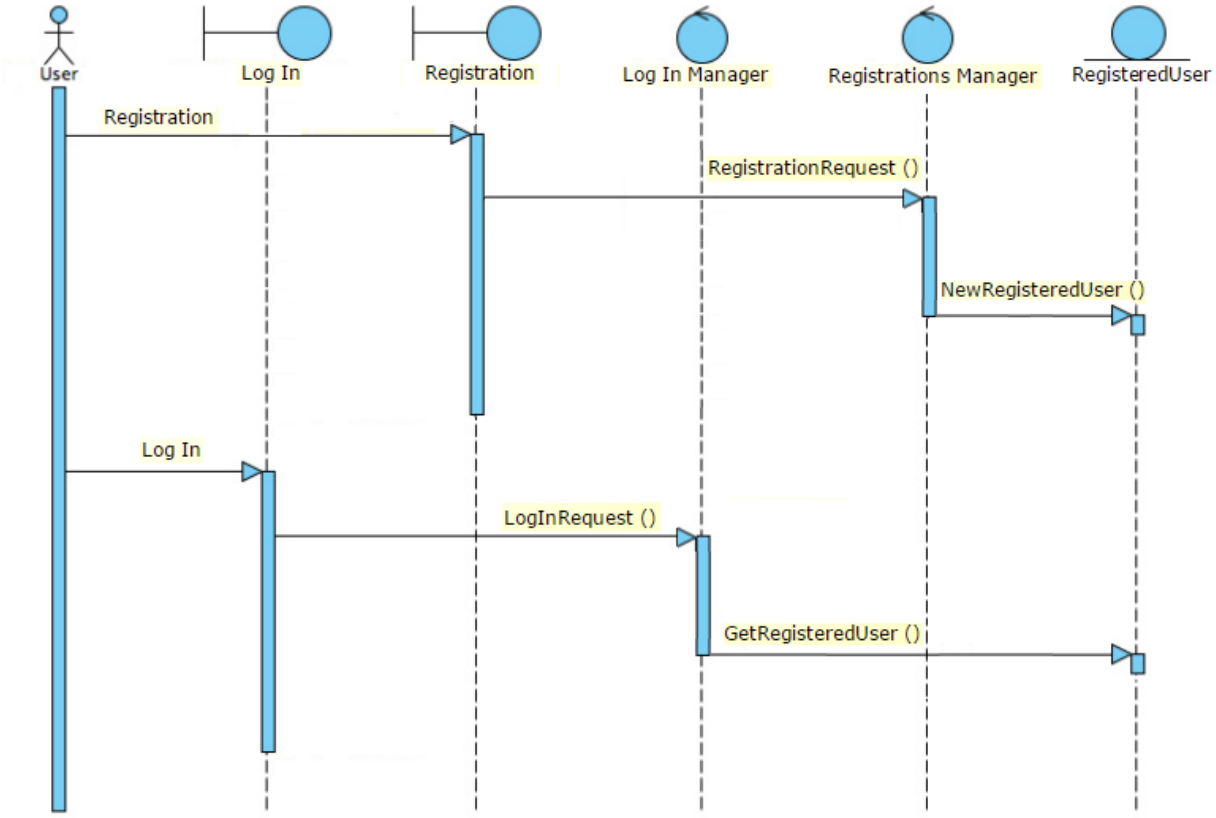
Picture #4 shows the use case diagram.

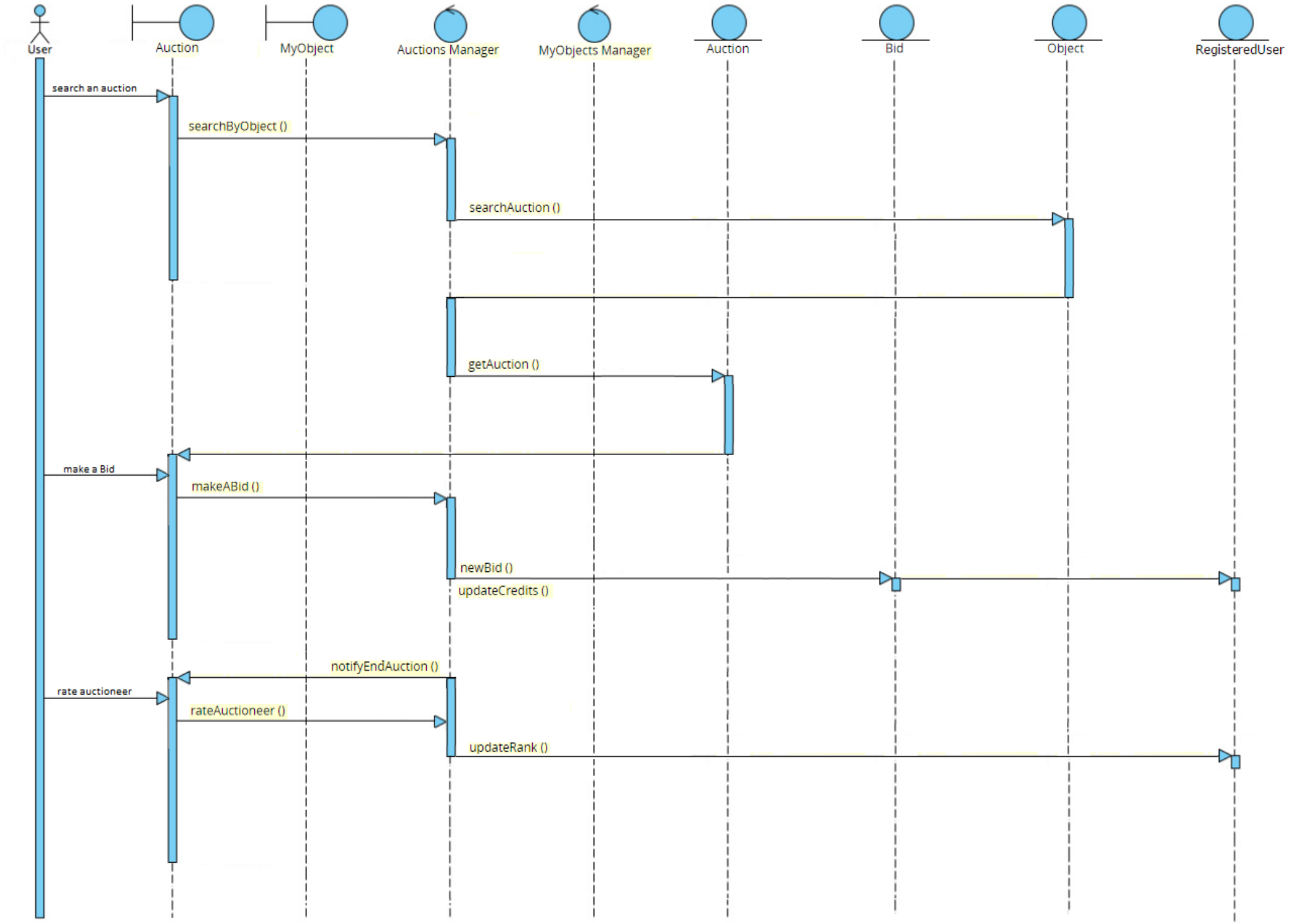
#3: Create Auction: this seq. Diagram shows how a "*registered user"* interacts with the *"auction creation"* functionality provided by the system: first of all he/she has to choose an object, than he will get the object details and a menu where he can create the Auction by specifying the duration.

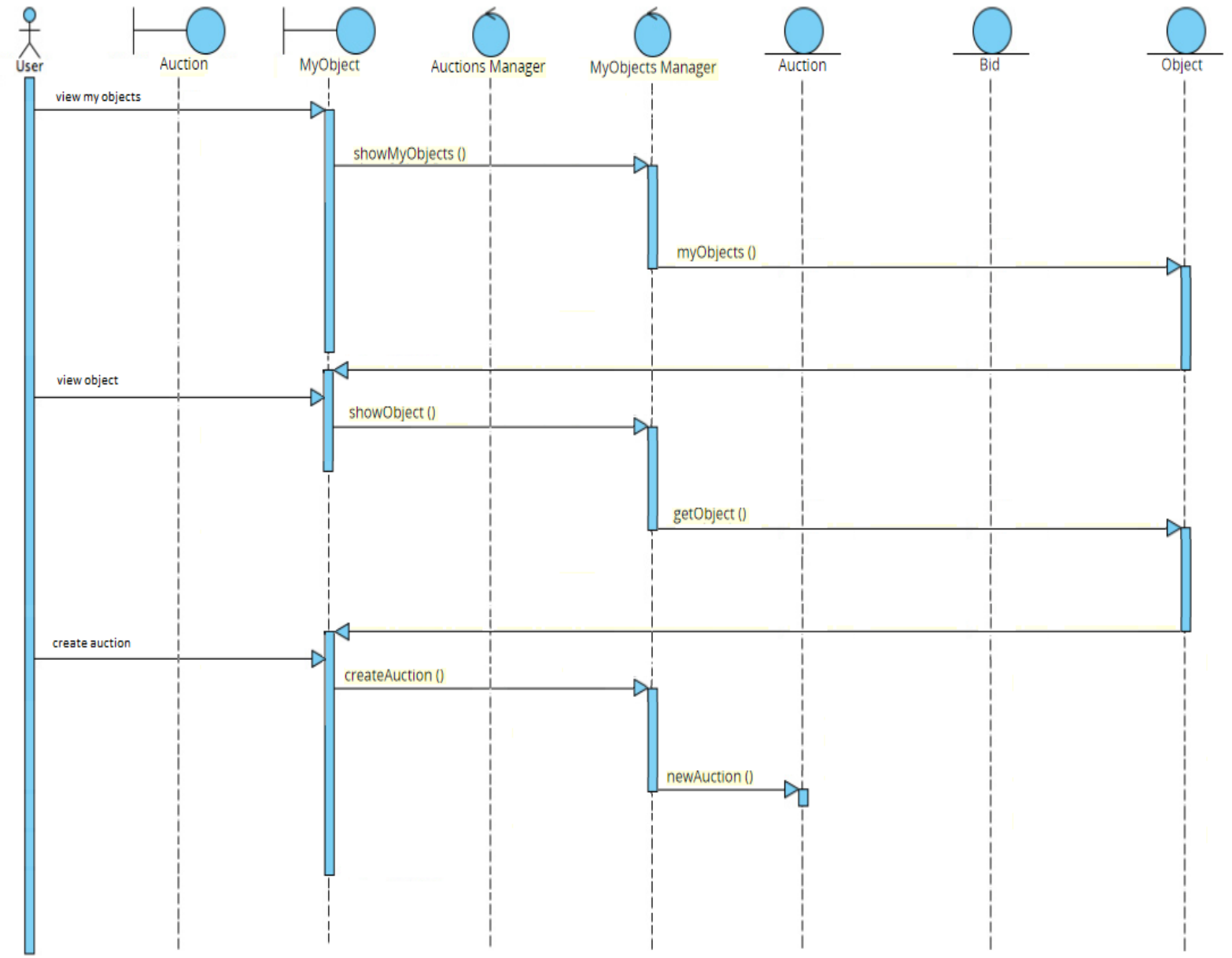
Picture #4 shows the use case diagram.

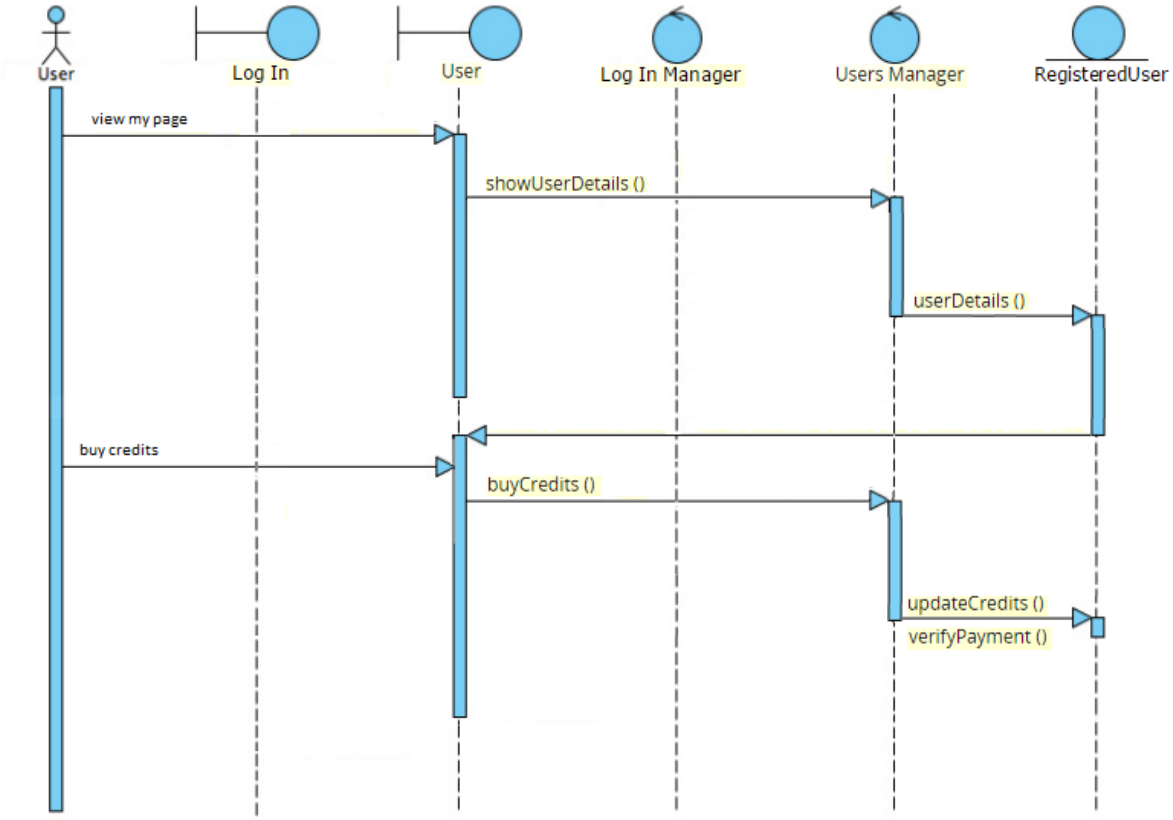
#4: Recharge_pocket: this seq. Diagram shows how a "*registered user"* interacts with the *"pocket"* functionalities provided by the system: first of all he/she needs to navigate to the user profile, than he/she will insert some values into an input form: these values are the method that he/she would like to use to buy credits, how much of them he/she wants to purchase and some other stuff related to the security side - e.g. the credit card number and its secure code -.

Picture #5 shows the use case diagram.


User
Log In
Registration
Log In Manager
Registrations Manager
RegisteredUser
Registration
RegistrationRequest ()
NewRegisteredUser ()
Log In
LogInRequest ()
GetRegisteredUser ()


User
Auction
MyObject
Auctions Manager
MyObjects Manager
Auction
Bid
Object
RegisteredUser
search an auction
searchByObject ()
searchAuction ()
getAuction ()
make a Bid
makeABid ()
newBid ()
updateCredits ()
notifyEndAuction ()
rate auctioneer
rateAuctioneer ()
updateRank ()


User
Auction
MyObject
Auctions Manager
MyObjects Manager
Auction
Bid
Object
view my objects
showMyObjects ()
myObjects ()
view object
showObject ()
getObject ()
create auction
createAuction ()
newAuction ()


User
Log In
User
Log In Manager
Users Manager
RegisteredUser
view my page
showUserDetails ()
userDetails ()
buy credits
buyCredits ()
updateCredits ()
verifyPayment ()