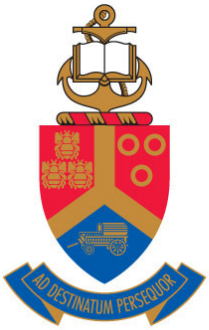

UNIVERSITEIT VAN PRETORIA
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COS 301

Department Of Computer Science

Architectural Requirements and Initial Architecture Design Functional Requirements

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IMPAKD link

For further references see gitHub. May 27, 2016

Contents

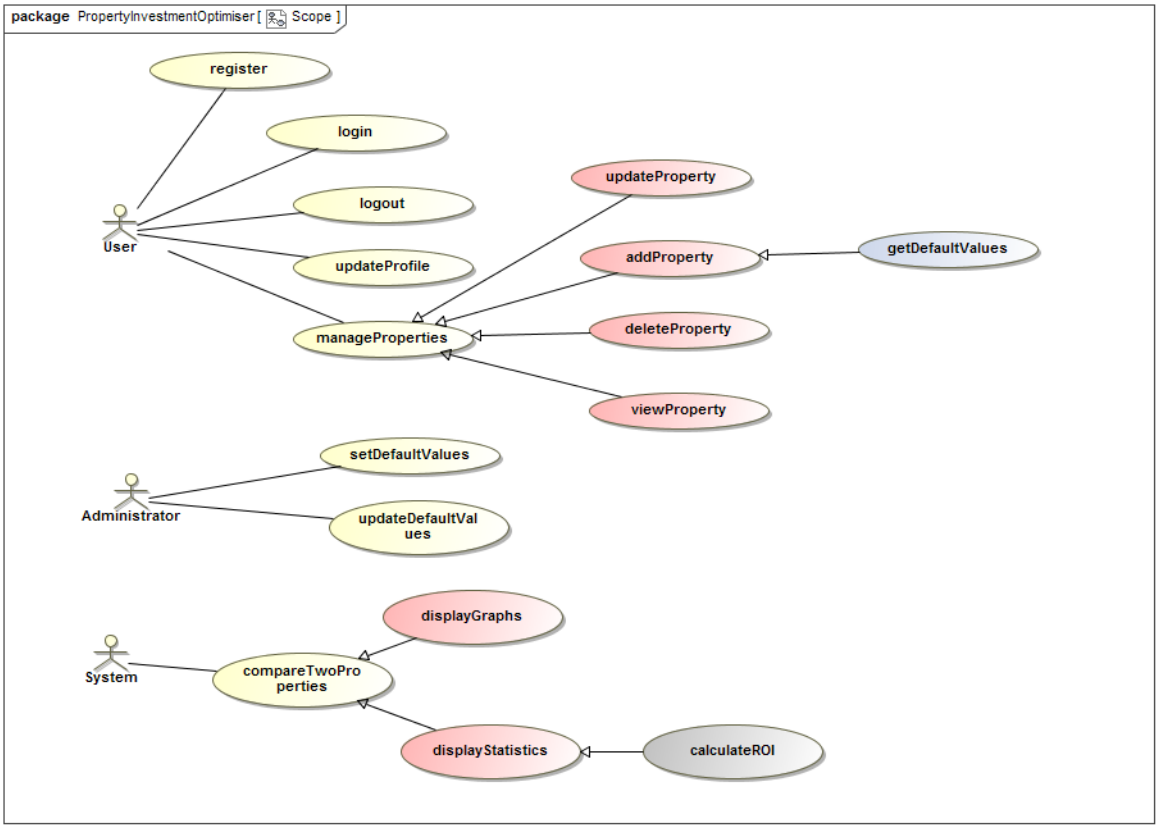
1 Vision

The Property Investor Optimiser project is objective is to evaluate whether a certain rental propery is worth buying. It does this by calculating the Return of Investment (ROI) of a property, which can be compared with another property's ROI, to assist a user to optimise their investment strategy according to their portfolio.

The project will assist the user by helping to answer the following questions:

- Given a certain bond (interest rate, deposit as a percentage of property value), rental (occupancy rate,agent commission, rental amount) and environmental conditions (Interest rate, inflation) what is the ROI?
- When is it better to pay a higher or lower deposit for a bond?
- Between two rental scenarios which provides the greater ROI?
- Is it better to try and pay off the bond as fast as possible by paying in extra capital?
- How does purchasing another property influence a users ROI and at which point would this be a good idea?
- At which point does it make sense to buy another property?
- How much tax will the user have to pay?

2 Scope


package PropertyInvestmentOptimiser [Scope]
register
login
logout
updateProfile
User
updateProperty
addProperty
getDefaultValues
manageProperties
deleteProperty
viewProperty
setDefaultValues
Administrator
updateDefaultVal
ues
displayGraphs
System
compareTwoPro
perties
displayStatistics
calculateROI

3 Software Architecture

3.1 Architecture requirements

3.1.1 Architectural scope

The project will be implemeneted using the Model View Controller, MVC, strucutural pattern. The system will consist of:

- A website that the user will interact with in order to use the system.
- A database that will be used to persist objects that need to be saved.
- A server that will deal with the process execution and calculations of the system.
- A notification system that will be used to notify the user of important information that concerns them.

3.1.2 Quality requirements

- **Flexibility**

  The system must be be able to be accessed by more than one access channel, mainly via a computer and a smartphone. It must also not be locked to any one persistence technology. We will be using MongoDB as our persistence infrastructure.

- **Maintainability**

  The system will be implemented with the Model View Controller structural pattern, which allows for modularisation. This allows the different components of the system to be maintained independently of each other. Ember.js, a widely-used technology with extensive support, will be used to implement MVC.

- **Scalability**

  The system must be able to support as many users as possible since it is a website that will be available to a very large audience. Enterprise Java Beans (EJB) will be used because it can be used to develop scalable and robust enterprise level applications.

- **Reliability**

  The webiste must have as little downtime as possible, and must display correct and accurate information at all times.

- **Usability**

  Users of the system must find it very easy and intuitive to use, even to users without extnsive computer literacy. The system must be as efficient as possible. This will be done by implementing the latest trends in website user interface design.

- **Performance**

  The system must execute processes smoothly between users' actions and the website, along with the graphs and statisitcs it will provide, must respond in a reasonble amount of time.

- **Security**

  There must be no direct manipulation of the database and the server. Users will be required to login or register to be able to use the system. The database will be backed up to a CSV file.

- **Auditability**

  Users' activities must be logged for reporting purposes.

- **Testability**

  The system must be tested to ensure that each of its components are working properly. Each service contract must meet its pre-conditions and post-conditions. Unit and integration tests will be used to this end.

- **Integrability**

  All the MVC components must be independent of each other so that they can be developed separately and integrated smoothly if any one of them are changed.

3.1.3 Integration and access channel requirements

- **Integration**
  - Logging into the system is done over a HTTPS POST method.
  - The user's login details are kept in an HTTP session so the user does not need to log in everytime he/she makes a request to the server.
  - The HTTPS sessions are invalidated when the user terminates his/her session by logging out.
  - Communication between the server (back-end) and the webpage (front-end) will be facilitated by the REST method which uses JSON objects and HTTPS methods to send requests and get responses.
  - The "Create, Read, Update and Delete" or CRUD actions that will make changes to the databse will be logged automatically. This will ensure auditability of the system.

- **Human Access Channel**
  - End-users interact with the Web client to display the required information and do desired actions.

- **System Access Channel**

  - The Web-based component of the system will be implememted in "Ember.js" which utilises JavaScript, HTML and "Handlebar.js".

3.1.4 Architectural constraints

- User
  - Has to be registered and his/her details in the system inorder to login and be able to use the system
- Time
  - If a user is logged in and remains inactive for more than 30mins the user will have to login again before they can use the system again

3.2 Architectural patterns or styles

MVC (*Model View Controller*)
Allows the system's states to change and it encapsulates the interactions from the user and transforms these intercations into business logic.
Reason:

- Reduce presentation layers complexity and improves flexibility
  - Separates responsibilities
    - Provide view onto information - ***View***
    - React to user events - ***Controller***
    - Provide business services and data - ***Model***
  - Allows each component to change independently
- Full decoupling
  - Model from both *view* and *controller*
- Simplification
  - Through separation of concerns
- Reuse
  - *Model* components and *View* components
- Maintainability
  - Different components can be used, developed and maintained by different memebers of a team
    - *Model* - backened developers
    - *View* - UI designers
    - *Controller* - Front-end developers

- Improved Testability
  - Model/business services tested independently of UI
  - UI tested with mock model

3.3 Architectural tactics or strategies

3.4 Use of reference architectures and frameworks

- JavaEE
  - JavaEE contains most of the frameworks and technologies we need to develope and deploy our system.

3.5 Access and integration channels

- This is a stand-alone application and therefore will not use other applications for all the required functionality.
- Plug-ins and APIs will be included, and will therefore be integrated with the main application to add specialised functionality.

3.6 Technologies

- *HTML5 :* It will be used to create the front end of the system
- *Javascript :* front end to verify the log in details for each user it will keep track of the user logged in.
- *JPA:* It will be used to manage the relational data in JavaEE
- *EJBs:* It will be used to manage concurrency control in the system
- *Ember.js:* To implement the MVC patten

.

- *QUnits:* QUnit It is powerful framework for javaScript unit testing,it is easy to use.It can test any generic javaScript code
- *CSS:* It will be used for the styling of the web page
- *Bootsrap:* It will be used for the styling of the web page
- *Web browsers:* Any web browser that supports HTML 5

4 Design overview