



ASSIGNMENT OF BACHELOR'S THESIS

Title: RPG game with augmented reality features - server part
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Instructions

The aim of the thesis is to specify, design, and implement a functional prototype of the server part of a RPG game with features of augmented reality (AR).

1. Create a story line and rules for the game. Consider intensive usage of geolocation and AR features.
2. Formalize the following requirements for the implementation of the server part:
 - the data layer consists of a database engine and a caching,
 - users can use their Google accounts to login and play,
 - the client part provides an API,
 - the communication between client and server parts of the application must be secure.
3. Design the server part of the game.
4. Design a suitable front-end part for server administration.
5. Discuss and choose a suitable implementation platform and related technologies (databases etc.).
6. Implement the functional prototype, document it, and perform suitable testing.
7. Tightly cooperate with Tomáš Zahálka who works on the client part.

References

Will be provided by the supervisor.

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Prague March 6, 2017

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FACULTY OF INFORMATION TECHNOLOGY
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Bachelor's thesis

Location-based Role Playing Game

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Supervisor: Ing. Miroslav Balík, Ph.D.

14th March 2017

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I would like to thank myself for doing this. I am an awesome and humble person. With great power comes great responsibility and no one else is as good or worthy as I am to be thanked. Ave Kuba!

Declaration

I hereby declare that the presented thesis is my own work and that I have cited all sources of information in accordance with the Guideline for adhering to ethical principles when elaborating an academic final thesis.

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In Prague on 14th March 2017

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Abstrakt

Hvězdy jsou krásné, protože je na nich květina, kterou není vidět. Poušť je krásná právě tím, že někde skrývá studnu. Ať je to dům, hvězdy nebo poušť, to, co je dělá krásnými, je neviditelné!

Klíčová slova #deep, #thoughtoftheday, #follow4follow

Abstract

Place the 2 cups of crushed ice into a cocktail shaker. Pour the rum, lime juice, and simple syrup over the ice, cover, and shake well. Remove the ice from your serving glass and strain the drink into it. Serve immediately.

Keywords Daiquiri, Coctail, Rum, Cuba

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Introduction

The world of mobile devices is quickly evolving. Smartphones and tablets are becoming more and more powerful and not only in terms of computational power and available memory. Mobile devices nowadays are packed with various sensors. It is possible to integrate data from GPS (Global Positioning System), accelerometer, gyroscope, magnetometer, and camera to quickly determine device's position and orientation. This opens us doors to augmented reality. In my bachelor thesis, I, in cooperation with Tomáš Zahálka, will create a mobile game for Android which will utilize elements of augmented reality. The game is set in a fantasy world and its genre is RPG (Role Playing Game).

Project overview

1.1 Project timeline

1. **Analysis** – finished by the end of February
2. **Design** – finished by the end of March
3. **Implementation** – finished in the middle of May
4. **Testing** – begins with implementation and will be finished by the end of May
5. **Releases**
 - a) **Pre-alpha** - 16. 4. 2017
 - b) **Alpha** - 30. 4. 2017
 - c) **Beta** - 14. 5. 2017
 - d) **Final** - 1. 6. 2017

1.2 Specification and features

The content of this section is temporary.

1. Bare minimum
 - Zobrazení pohybu hráče po mapě
 - Generování monster
 - Generování budov
 - Interakce s herními objekty
 - Ukládání postupu, stavu postavy

1. PROJECT OVERVIEW

- Inventář
- Statistiky

2. Should be there

- Mise, úkoly
- Multiplayer
- Skill systém
- Dialogy

3. Nice to have

- Navigace k objectives
- Trading
- Tutorial
- Částečná offline podpora

Analysis

2.1 Similar solutions

2.1.1 Parallel Kingdom - Age of Ascension

This game was on market for 8 years (2008-2016). Parallel Kingdom is a closest solution to ours.

”Parallel Kingdom is a mobile, location based, massively multiplayer game that uses GPS location and Google Maps to place users in a virtual world. Parallel Kingdom is the first location based RPG for the iOS and Android platforms. The game is set in a virtual world or ”Parallel Kingdom” where users claim their territories based on their GPS location or by making friends who invite them to travel to new places. Parallel Kingdom is a freemium game and utilizes a virtual goods revenue model.”

2.1.2 Ingress

Developed by Niantic, which was then part of Google, this game was released in 2013 for Android and in 2014 for iOS.[4] It is a location based, massively multiplayer game. A player have to choose one of the two factions, Enlightened or Resistance, and then as a part of his team capture regions of the game map. A faith of each faction relies on players’ cooperation. Thanks to that players meet in real life and coordinate their actions.

Ingress was the first very successful augmented reality game with more than 10 000 000 installs.

2.1.3 Pokémon GO

After its success with Ingress, Niantic started working on a new game Pokemon GO. Once released, the game became incredible hit. Even though the game faced many problems during its launch, mainly caused by the unexpected

2. ANALYSIS

success and more active users than Pokémon GO was able to handle, in the first 80 days Pokémon GO reached about 550 million downloads and earned about \$470 million.

The game is very similar to Ingress and uses the same crowd-sourced geographical data.

2.2 Use Cases

2.2.1 Use case diagram

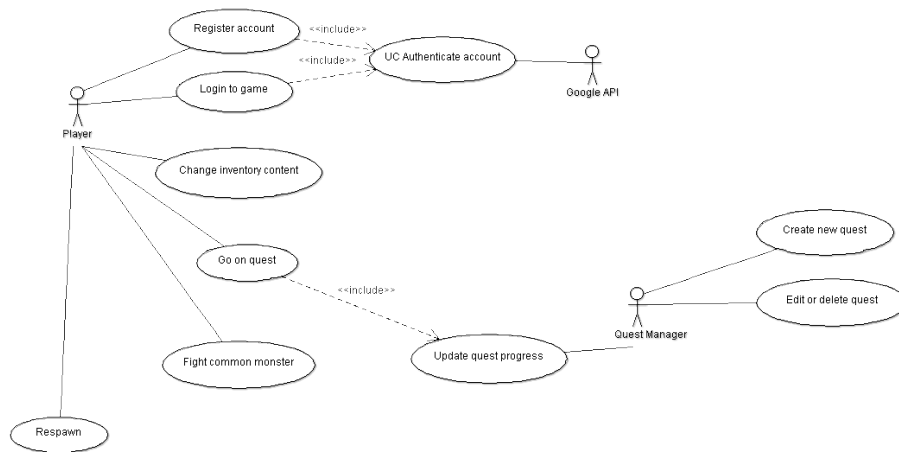


Figure 2.1: Use case diagram

2.2.2 Use case descriptions

The following section refer to the use-cases introduced in Figure 2.1.

1. **Register account**
2. **Login to the game**
3. **Change the inventory content**
4. **Go on a quest**

5. **Fight a common monster**
6. **Respawn**
7. **Update a quest progress**
8. **Create a new quest**
9. **Edit or delete a quest**

2.3 Requirements

2.3.1 Functional

1. **Users can use their Google accounts to login and play**
For player's convenience, a Google account is required to play. The application does not have to store any password.
2. **Client can request nearby game locations**
Upon client's request, the server has to respond with all game locations near the position of the client. The request can contain a filter.
3. **Client can add, delete and update the player's inventory**

2.3.2 Non-functional

1. **The data layer consists of a database engine and a caching**
Game Server never accesses database directly. Data are retrieved from the database upon request and then cached. Upper layers communicate exclusively with cache.
2. **The server provides an API for client**
The API support at least following:
 - a) Retrieve nearby game locations
 - b) Create player
 - c) Update player's data (inventory, experience, resources, quests progress etc.)
 - d) Provide information about a quest

2. ANALYSIS

3. **The communication between client and server parts of the application must be secure**

All data sent from and to a client has to be encrypted.

4. **Client can only connect to a Connection Server**

Several Connection Servers exist to prevent a bottle-neck. Client selects the Connection Server by an algorithm. Client does not have an access to any other part of the server.

2.3.3 System and Interface

1. **System uses Java 8 SE as an execution environment**

2. **Operating system for the server is Debian 8**

3. **Database engine is MySQL**

4. **Cache engine is Redis**

2.4 Technology

2.4.1 Frameworks

Design

3.1 Server-Client communication

How the data are exchanged between client and server. Will contain format, technologies and protocol specification.

3.2 Security

Basic methods for verification of legitimacy of the data. How the server API will be secured.

3.3 Architecture

Diagrams and overall architecture of the server belongs here.

3.4 Deployment Diagram

3.4.1 Logical view

3.4.2 Development view

3.4.3 Process view

3.4.4 Physical view

3.4.5 Scenarios

3. DESIGN

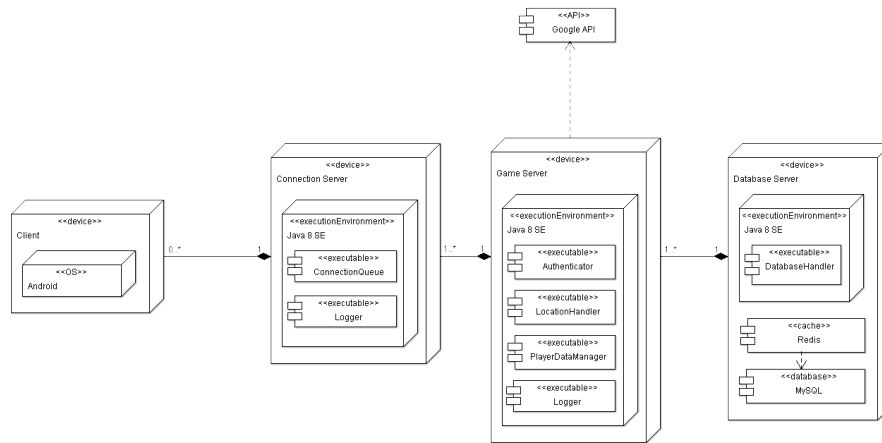


Figure 3.1: Deployment diagram for the game

Geo-data mining

Description of how the geographical data for the monsters and building will be obtained.

4.1 Methodology

4.2 Output

Implementation

Implementation-specific aspects of the game. Will include a description interesting parts of the server.

Deployment

Testing

- 7.1 Unit testing
- 7.2 Pre-alpha version
- 7.3 Alpha version
- 7.4 Beta version
- 7.5 Release
- 7.6 User feedback

Results

Acronyms

GUI Graphical user interface

XML Extensible markup language

Contents of enclosed CD

	readme.txt.....	the file with CD contents description
	exe	the directory with executables
	src.....	the directory of source codes
	wbdcm	implementation sources
	thesis.....	the directory of \LaTeX source codes of the thesis
	text	the thesis text directory
	thesis.pdf	the thesis text in PDF format
	thesis.ps	the thesis text in PS format