

CS 319

Object-Oriented Software Engineering  
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**Conquerors**

Analysis Report

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# INTRODUCTION

“Conquerors” is an arcade game which is inspired from the Atari game “*Volfied*”. The aim of this game is to conquer the castle by drawing lines before time runs out. However do not think it will be easy. During the game you will face with different enemies that will obstruct our hero to reach the goal. Following you will find the *YouTube* video of the influenced game to understand how it will work better.

<http://www.youtube.com/watch?v=RxuMVqkLD7o>

The game which we plan to develop will have many different features than the original game. Unlike the original game, there will be various bonuses, -both positive and negative, and the user will be allowed to start the game from the desired level using special codes which will be given to users when they start that level. Moreover you will be able to choose your own hero from selection of three.

Our purpose of creating that game is to make a project which will allow us to use Object-Oriented Software Programming and general programming techniques. During that process we will create an arcade game which can be played by any person who has beginner (or more) knowledge of computers. In the game there will be many different objects, levels, bonuses and time factor. Those factors make that game a good choice to work on for our course since our goal is to learn the principles of Object-Oriented Software Engineering.

In this report the overview of game, principles of the game, requirements, use-case’s models including scenarios and use-case diagrams will be explained.

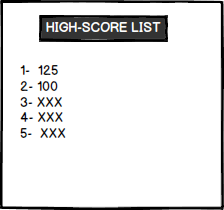
# GAME OVERVIEW

The game “Conquerors” has a purpose of conquering the land where castle stands before time runs out. Similar to its ancestor the lands are occupied by drawing lines around them. After user completes the drawing process, that land will be conquered. The drawing line process is made by the “hero” (see section 2.1. Hero). The name hero is chosen since it is the protagonist character of our game. The game has a military theme so we give names to objects according to this factor.

The game is controlled by the arrows on the key board. You move the hero according to them. Moreover space bar is used to fire a bullet (see section 2.4. Bonuses).

The game has 5 different levels which will be harder than the previous one (see section 2.5. Levels). There is an option of selection of levels for the user. However to start from the level you want, you should know its code. You learn the codes of desired level when you unlock that level. Thus if user wants to start with level 3, s/he must play that game before and at least come to the level 3 and got the code. That selection is allowed at the beginning of the game. You will press the “Level Selection” button. Then you press the desired level and enter the code into the box. If it is true then you can start from that level.

The score system is based on the time. At each level different time intervals are given. After one passes a level, time left is taken and multiplied by the coefficient which is different for each level (see 2.5. Levels). You earn points for each level and that point is added to the previous level(s) points. For example you pass level 2 and you had 15 points from level 1 and you got 10 seconds left. That 10 will be multiplied by 2 which is 20 and your final point will be 35. However you can win or lose point by bonuses (see section 2.4. Bonuses). Those points will be added or subtracted from your point at the end of the level. For instance the user from the previous example got one point plus bonus. That means that his final 35 point will be 45 now. Furthermore, high-score list consists of 5 highest scores of all time. If there is not enough scores created yet, the empty places will be look like as following;



**Image 1:** A Mock-up image of High-Score List

To win the game you should pass all 5 levels. If time runs out, before conquering the castle, game will end. Moreover when any of the enemy will touch to the hero or the unfinished lines the game will be over too (game over criteria for each enemy is given at section 2.3. Enemies).

## Hero

The hero is the object that user controls in the game with the keyboard (arrows for the movement and space bar for firing a bullet). User is allowed to choose his/her hero from three options: a sword, a shield or a helmet. Selection of hero is allowed at the beginning of the game. To choose the hero you should click the “Settings” button and then user can see the options. Hero will perform the drawing lines process. At the beginning of each level, hero will locate at the leftmost bottom corner of the screen. It cannot move directly to the other corners which are at the top. You should first conquer bottom parts to move up, which makes the game harder.

## Castle

The castle object is the key for passing a level or winning the game. When hero conquers the land of the castle user wins. Its location is fixed for each level. When you go to next level its location changes and it will locate a place which is harder to conquer. We decided to put it in the middle of the map at the first level. Then we will move it up a little for each level and at level 5 it will be at the top (see section 2.5. Levels).

## Enemies

We decided to create different objects as enemies to make our game harder and more fun. There are four different enemy types which will act differently.

### Soldiers

Soldiers are the primer enemies in our game. Since we are making a game which has military elements, we think that we should give this name to one of the enemies. Those soldiers will be in the game in all of the levels (see section 2.5. Levels). They will move randomly on the unconquered lands but they are not allowed to pass the occupied lands. In order to get rid of them, you can shoot them if you have fire bonus (see section 2.4.1. Power-ups) or you can conquer the land they are walking on by drawing lines around that place. When your hero or the line you are drawing will touch one of them you will die if you did not get any extra life bonuses (see section 2.4.1. Power-ups). If you have that bonus you will lose one of your lives.

### Cannonball

Like soldiers cannonball objects are inspired by the military elements. They are not able to move but they will throw balls which will move in a horizontal line. They will throw a ball every 5 seconds. They will locate at the rightmost or leftmost places in the screen. Their amount will change according to the level (see section 2.5. Levels). They are fatal just like soldiers. You can destroy them by occupying the land that cannonball sits or by shooting them with fire bonus.

### Walls

Walls will prevent our hero move freely. They will be the obstacles on its way. They will be placed in random places and they are not able to move. Their existence will differ from one level to another (see section 2.5. Levels). Touching them will make hero to lose its life. User can break them by shooting if you have fire bonus or user can conquer the area they will stand. In level 4, you need to shoot them once to break them and in level 5, 2 shoots are required for destroying them.

### Mine

Mine is the worst enemy of our hero. It cannot be destroyed with bonuses other than enemies gone bonus (see section 2.4.1. Power-ups). Its position will be fixed (near to the castle). If you think conquering the land, which mine stays, will destroy it, you are wrong. When you occupy that land, you will lose the game and having life bonuses does not matter. Thus user needs to run from the mine if s/he wants to win.

## Bonuses

We decided to have both positive and negative bonuses in our game. As levels go up their ratio of positive to negative will change (see section 2.5. Levels). 10 bonuses will appear at each game. They will come up at a random time of the game and will appear at only 8 seconds. Two or more bonuses can appear at the same time, there is no limitation for that. Their location will be random too. They will be in treasure chests. If user wants to get them their location should be occupied. After that, user can get either a power-up (positive bonus) or a bad surprise (negative bonus). It will be the user’s luck.

### Power-ups

**Life Bonus:** As it can be understood from its name, it will add a life to our hero. If they hit an enemy they will not die instantly thanks to that bonus.

**Bigger Hero:** When user gets that bonus, the hero’s size will be bigger. That feature will allow it to conquer more lands easily.

**Faster Hero:** That feature will help our hero to move faster, which will help it to run away from enemies easily and conquer lands in a smaller time interval.

**Fire:** After getting that bonus, the hero will be able to shoot enemies. Space bar will be used to shoot and the bullets will only move vertically from the place hero stands.

**Time Plus:** It will increase the game time by 5 seconds.

**Point Plus:** It will increase user’s point by 10 points.

**Enemies Gone:** All enemies are destroyed when this bonus is taken.

### Bad surprises

**Smaller Hero:** That bonus will decrease the size of the hero which will make it harder to conquer lands.

**Time Minus:** It will decrease the game time by 5 seconds.

**Point Minus:** It will decrease user’s point by 10 points.

**More Walls:** After getting that bonus, suddenly walls will be built around the castle. When walls are built, the land which should be occupied to pass the level will be bigger. That will make hero’s work harder.

## Levels

As mentioned before the game will consists of 5 levels. Each level will be harder than the previous one. All of them have the same purpose: conquering castle’s land.

### Level 1

* It will last for 210 seconds
* There will be 2 soldiers
* There are no cannonballs
* There are no walls exist
* There is no mine
* 8 power-ups and 2 bad surprises features
* Castle is at the middle of the screen
* The left-time will be multiplied by 1 and that will be the points earned

### Level 2

* It will last for 180 seconds
* There will be 2 soldiers
* 1 cannonball exists
* There are no walls
* There is no mine
* 7 power-ups and 3 bad surprises features
* Castle locates upper position than level 1 (x coordinate is same)
* The left-time will be multiplied by 2 and that will be the points earned

### Level 3

* It will last for 150 seconds
* There will be 2 soldiers
* 2 cannonballs exist
* There are no walls
* There is no mine
* 6 power-ups and 4 bad surprises features
* Castle locates upper position than level 2 (x coordinate is same with other levels)
* The left-time will be multiplied by 3 and that will be the points earned

### Level 4

* It will last for 120 seconds
* There will be 3 soldiers
* 2 cannonball exists
* There will be 3 walls which can break by one shot
* There is no mine
* 5 power-ups and 5 bad surprises features
* Castle locates upper position than level 3 (x coordinate is same with other levels)
* The left-time will be multiplied by 4 and that will be the points earned

### Level 5

* It will last for 90 seconds
* There will be 3 soldiers
* 2 cannonball exists
* There will be 3 walls which can break by two shot
* There will be a mine near to the castle
* 4 power-ups and 6 bad surprises features
* Castle locates at the top of the screen(x coordinate is same with other levels)
* The left-time will be multiplied by 5 and that will be the points earned

# 3. FUNCTIONAL REQUIREMENTS

## 3.1 Play Game

Player can use the arrow keys to draw lines so that they can conquer the lands. There are random power-ups and power-downs which makes the game easier / harder. When any of the enemy will touch to the hero or the unfinished lines the game will be over. Player is able to change the appearance s/he is playing with from the settings screen.

If player can conquer the castle in given time, he will have access to the next level. To win the game, our hero has to complete 5 levels which have different types of enemies and object which makes harder the game. These extra features makes game much more challenging and enjoyable. However, having good time is not only positive effect of this game. The game “Conquerors” also increases hand-eye coordination of a person.

## 3.2 View Credits

Player can reach the game developers’ contact information in here. Therefore player can have a chance to communicate and most importantly help designers to develop game by using his creative ideas.

## 3.3 View Help

Player can get the information about the game with very detailed explanation. These explanations are

* Rules and main purpose of the game.
* Player controls.
* Power ups and power downs that can be gained by Player during game.

Player is provided chances to learn rules and game controls. When Player learned and used all these information during game, he will have much more fun.

## 3.4 Change Settings

Player can change some of the game settings according to his own demands. These are

1-sound on/off

2-hero type

Player can turn off or turn on sound of game from Change Settings. Additionally, Player is provided by 3 choices for hero types. Player can select hero type before starting game from Change Settings.

## 3.5 High Scores

Player can see highest 5 scores of all time are recorded in the High Score List with ranked player names.

## 3.6 Level Selection

The game will consist of 5 levels. Each level will be harder than the previous one. All of them have the same purpose: conquering castle’s land. From level 1 to 5, time and power-ups are decreased and number of enemy and power-downs are increased. In addition, if player can finish the level, before the next level vision comes, the code appears which is used for skipping levels.

# 4. NON-FUNCTIONAL REQUIREMENTS

## 4.1 Game Performance

The Conquerors game will work as high as possible in terms of performance. As the game has some dynamic displays, sound and some objects that move randomly, we want these features not to effect speed of the game. In addition, system requirements will be kept as low possible since it is new version of old fashioned game.

## 4.2 Graphical Smoothness

We will try to make our game work good and look good at the same time. There are a lot of smooth dynamic graphics such as death of enemies and movement of object randomly. We plan to keep these graphic as smooth as possible.

## 4.3 User Friendly Interface

Playing and understanding shouldn’t be very hard for players. And most importantly feeling comfortable during playing the game is one of our goals. Therefore the game will include very friendly and understandable interface.

# 5. SYSTEM MODELS

## 5.1 Use Case Model

This section is to give detailed information about the use cases of the Conquerors Game as well as to demonstrate the UML Use Case Diagram that represents the capabilities of this game system.

**Use Case1:**

**Use Case Name:** View Help  
  
**Primary Actor:** Player  
  
**Stakeholders and Interests:**  
- Player can learn how to play game.  
- System shows an image that explains the purpose of game, controls of game, bonuses and enemies.  
  
**Pre-conditions:** Player should be in Main Menu.  
**Post-condition:** -  
  
**Entry Condition:** Player selects button “View Help” from Main Menu.  
**Exit Condition:** Player selects button “Back” to return master page.  
  
**The Main Success Scenario:**

1. Player selects button “View Help” from Main Menu.  
2. System displays an image giving instructions about controls, bonuses and enemies of the game.

**Alternative Scenarios:**

A. If player wants to return Main Menu; player selects “Back” button to return main menu.

**Use Case 2:**

**Use Case Name:** Change Game Settings  
  
**Primary Actor**: Player  
  
**Stakeholders and Interests**:  
-Player wants to change game settings that are disabling or enabling game sound and changing the hero type.  
-System updates the new settings which are changed by player.  
  
**Pre-condition:** Player should be in Main Menu.   
**Post-condition:** Game settings are updated.

**Entry Condition:** Player selects button “Change Settings” from Main Menu.  
**Exit Condition:** Player chooses button “Back” to return Main Menu.  
  
**The Main Success Scenario:**

1. Player selects button “Change Game Settings” from Main Menu.  
2. Game settings are displayed by the system.  
3. Player arranges the settings.  
4. System updates the game settings accordingly.

**Alternative Scenarios:**

A. If player wants to return Main Menu; player selects “Back” button to return main menu.

**Use Case 3:**

**Use Case Name:** Play Game

**Primary Actor:** Player  
  
**Stakeholders and Interests:**   
- System aims to provide an entertaining game environment with visually enriched graphics for the player. Besides that the game system calculates the score of the player till the end of game in order to evaluate player’s score for list of the high scores.  
- Player wants to spent enjoyable time while playing the game and aims to successfully finish all levels and rank among the high scores list.  
  
**Pre-condition:** Unless the player changes the game settings, game starts with the predefined features which are image of the hero and game music. If player changes the game settings, the system will accordingly adjust these settings and then starts the game with these new features.  
**Post-condition:** System records the score of the player among the high scores if the player gets a sufficient score, which is higher than one or more scores in the list, from the game.  
  
**Entry Condition:** Player chooses the option of ‘Play Game’ from master page.

**Exit Condition:**

1. Player chooses the option of ‘Main Menu’ from the game screen.

2. Player loses all lives in any level.  
 3. Player chooses to click ‘Exit’ button at any time in the game.

**The Main Success Scenario:**

1. Player chooses the option of ‘Play Game’ from the ‘Main Menu’ screen.  
2. System initiates a new game starting from the first level.

3. When each level is successfully completed system displays a pop-up screen including a code of that recently passed level in order to enable player to start from that level instead of beginning from level 1 when the game is over.   
4. Player passes all of five levels by conquering the castle in each level.  
5. System calculates and demonstrates the final score of the player on a new pop-up page:

a. If the player’s score is high enough to rank among the high scores list, system asks player for entering his/her name, then records that name and score in the high scores list .   
 b. If the player’s score is not high enough to rank among the high scores list, system returns to the master page of the game when the button of ‘OK’ is clicked by the player.

**Alternative Scenarios:**

A. While the game is running, player loses all lives by getting a hit from an enemy, then the system displays a pop-up page that tells to player that the game is over and returns to the master page of the game when the button of ‘OK’ is clicked by the player.

B. In the stream of the game player conquerors the land which is including mine, then system displays a pop-up page that tells to player that the game is over and returns to the master page of the game when the button of ‘OK’ is clicked by the player.

C. At any time player clicks on the button of ‘Exit’ while the game is running, system automatically closes down the game.

**Use Case 4:**

**Use Case Name:** Select Level  
  
**Primary Actor**: Player

**Stakeholders and Interests:**  
-Player wants to play any desired level of the game.  
-System starts the desired level.  
  
**Pre-conditions:** Game always starts from first level. If player enters the code of the desired level, game starts from that level.  
**Post-condition:** Player must know the code of desired level which is given by the system.  
  
**Entry Condition:** Player chooses “Select Level” from Main Menu.  
**Exit Condition:** Player selects “Back” to return Main Menu.  
  
**The Main Success Scenario:**   
  
1. Player clicks the button “Select Level” from the Main Menu

2. System asks for a level code and a particular level.

3. System starts the game from the desired level.

**Alternative Scenarios:**

A. If player wants to return main menu at any time, player selects “Back” button to return Main Menu.

B. If given code is not appropriate for desired level; system displays a warning message pop-up in order to inform the player.

**Use Case 5:**

**Use Case Name:** View High Scores  
  
**Primary Actor**: Player

**Stakeholders and Interests:**  
-Player wants to see top scores with names.  
-System shows the list containing top five scores with names.  
  
**Pre-conditions:** System registers top five scores.  
**Post-condition: -**  
  
**Entry Condition:** Player selects “View High Scores” from Main Menu.  
**Exit Condition:** Player selects “Back” to return Main Menu.  
  
**The Main Success Scenario:**

1. Player clicks the button ‘View High Scores’ from the Main Menu screen.  
2. System displays top five scores with names.  
  
**Alternative Scenarios:**

A. If player wants to return Main Menu; player selects “Back” button to return main menu.

**Use Case 6:**

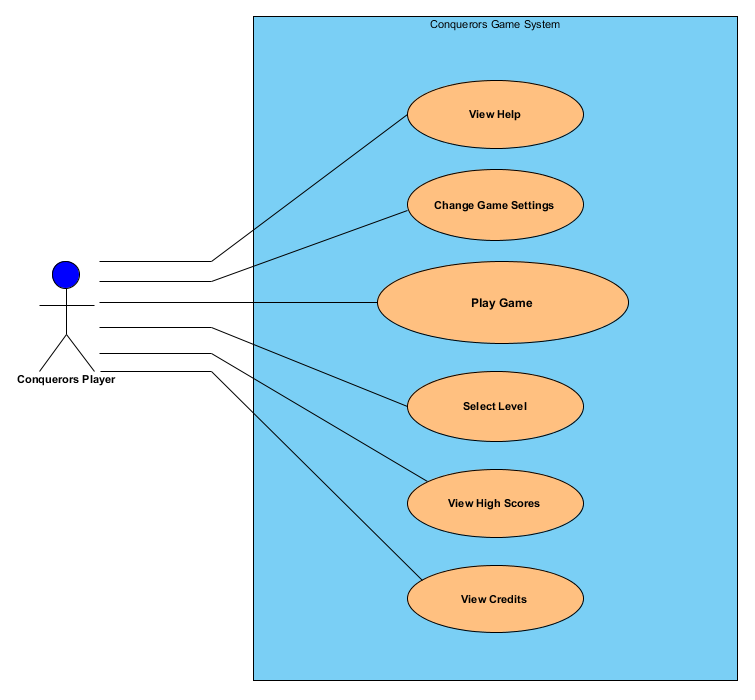
**Use Case Name:** View Credits  
  
**Primary Actor**: Player  
  
**Stakeholders and Interests**:  
- Player wants to learn names who developed the game and contact information.  
- System shows the developers contact information.  
  
**Pre-conditions**: Player should be in Main Menu.  
**Post-condition**: -  
  
**Entry Condition**: Player chooses button “View Credits” from Main Menu.  
**Exit Condition**: Player selects button “Back” to return master page.  
  
**The Main Success Scenario:**

1. Player chooses button “View Credits” from Main Menu.

2. System displays contact information of developers of Conquerors.  
  
**Alternative Scenarios:**

A. If player wants to return Main Menu; player selects “Back” button to return that menu.

The following diagram illustrates the indicated use cases in detail above as a summary.



**Image 2:** A UML Diagram of Use Cases made by Visual Paradigm