Group 62  
Group Software Project  
  
Software Requirements  
  
  
  
  
  
  
  
  
  
  
  
Turris  
  
  
  
  
  
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# Mission Statement

Turris is an ancient Rome themed tower defence strategy game where the goal is to defend a player’s territory by obstructing the enemy’s path, in this case defensive towers can be placed alongside the path which cause damage to enemies. The player will start on round one, as each round increases so does the difficulty of the enemies. The goal is for the player to reach a certain round before losing all their lives. Turris also has a continuous mode where there is an endless onslaught of enemies and the goal is to survive as long as you can. When killing an enemy, the player receives a reward of gold, this gold can be used to upgrade and place more defensive towers. Turris allows the player to select from 3 different maps before playing the game, these maps each have a difference in difficulty with easier maps having longer paths for the enemies and harder maps having shorter paths. Players can also save and load their progress on the game.

# Mission Objectives

## Gameplay

1. Players can buy towers with coin.
2. Players will start with a certain amount of coins and will obtain this currency during game-play by defeating enemies.
3. Players can see their current amount of coin in the game.
4. The player loses the game after a certain number of enemies breach the defences and reach the destination.
5. The player can win the game by surviving a certain number of rounds.
6. Enemies spawns in waves and will be spawned over a distributed amount of time in around.

## Game menu

1. The player can read the rules of the game any time before game-play.
2. A win/lose message should be shown when the game ends with game statistics.
3. Two different types of game play must be selectable. You may invent one or use the two popular versions of game-play:
   1. **Continuous**: Enemies continuously spawn, and the player builds towers to defend the destination. There is no end to continuous but can be a challenge to those who want to get to the highest amount of time spent surviving.
   2. **Waves**: A collection of enemies form one wave. Each wave of the enemy spawns with a short pause In between waves. The game ends when all 50 waves have been defeated.
4. The player can pause and resume the game.
5. Save/Load Games: When in the playing state, the player can choose to save the game and play at a later time with all the same towers (at the same level) in the same places on the same wave. A Save/Load Game option can also be found in the main menu and the pause screen.

## Towers

1. Towers will attack enemies that pass by (in its range of attack).
2. Each tower has a different damage output, range of attack, and rate of attack.
3. A player can view information about a tower before purchasing it and/or by clicking one that has been placed.
4. Towers should be upgradeable to have more range, fire rate, or damage.
5. Tower upgrades change the look of the tower.
6. A tower's range is visible when a tower is clicked. If a tower is upgraded, this information should also be updated.
7. Tower attacks are animated.
8. Towers cannot be built such that they block the path of the enemies.
9. Towers will be placed in a grid format and snapped to a coordinate.
10. Towers cannot be placed on top of each other.
11. Towers can be sold - which removes the tower on the map and refunds 25% of the coins is was purchased with (including upgrades).

## Enemies

1. Enemies continuously emerge from the map at 1 location.
2. Movement of enemies is animated.
3. Enemies move towards a destination that the player will defend.
4. Each enemy has certain stats/characteristics. This can include speed and health.
5. The game will have at least three different types of enemies and each will differ in strength.
6. Stronger enemies passing the player’s defence will punish the player by reducing more lives.

## Maps

1. Each map has a background image and contains a pre-defined path for enemies such that enemies originate at their start location and move along this path towards the target.
2. Different maps have different backgrounds and paths that enemies travel.
3. A player can select at least one map that contains more than one path for enemies to travel on (so it presents a more difficult gameplay).
4. Different maps will be rated with different difficulties.
5. Each map will have its own name.

## Art

1. The game will be in 2d pixel art style which is roman themed.
2. The UI of the game will have a border which has the selections of turrets to click on. Displayed will be an image of the turret and the cost.
3. The background will be a 2d image loaded into the background displaying the path in which the enemies are to travel
4. Turrets and enemies and the background will be viewed as if it’s a birds eye view.

# Use Case Diagram

# Use Case Descriptions

|  |  |
| --- | --- |
| **ID** | **UC 1** |
| **Name** | New Game |
| **Description** | Allow the player to start a new game |
| **Actor** | Player |
| **Pre-condition** | Game is launched and player ready to play |
| **Post-condition** | Map options displayed |
| **Main flow** | 1. System displays available maps |
| **Includes** | UC 5 (Select Map) |
| **Extensions** | UC 17 (Play Again?) |

|  |  |
| --- | --- |
| **ID** | **UC 2** |
| **Name** | Load Game |
| **Description** | Allow the player to start a saved game |
| **Actor** | Player |
| **Pre-condition** | The player Saved previously a started game |
| **Post-condition** | Map options displayed |
| **Main flow** | 1. Player select desired saved game 2. Player loads in the desired saved game |
| **Includes** | Selected Saved Game |
| **Extensions** | None |

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| --- | --- |
| **ID** | **UC 3** |
| **Name** | Help/How to play |
| **Description** | The system will display a rules and mechanics of the game  It can be also selected when you pause during a game |
| **Actor** | Player |
| **Pre-condition** | Game is launched |
| **Post-condition** | Help and guides displayed |
| **Main flow** | 1.Player get initial idea of how the game work and how to play it |
| **Includes** | None |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 4** |
| **Name** | Exit |
| **Description** | Allow the player to shut down the game and back to the desktop |
| **Actor** | Player |
| **Pre-condition** | Game is launched and plyer not willing to play |
| **Post-condition** | Game is exited |
| **Main flow** | 1. Player stops desiring to play 2. Game exited |
| **Includes** | None |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 5** |
| **Name** | Select Map |
| **Description** | Allow the player to choose a desired map |
| **Actor** | Player |
| **Pre-condition** | Game is launched and player ready to play |
| **Post-condition** | Map options displayed |
| **Main flow** | 1. Player given option to select map |
| **Includes** | UC 6 (Choose difficulty) |
| **Extensions** | None |

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| --- | --- |
| **ID** | **UC 6** |
| **Name** | Choose Difficulty |
| **Description** | Allow the player to pick the desired difficulty in a new game |
| **Actor** | Player |
| **Pre-condition** | Player has already chosen the map |
| **Post-condition** | Map difficulties displayed |
| **Main flow** | 1. Player given option to select map difficulty |
| **Includes** | UC 7, UC8, UC 9 |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 7** |
| **Name** | Easy Difficulty |
| **Description** | Player is playing game on easy |
| **Actor** | Player |
| **Pre-condition** | Player has chosen the difficulty |
| **Post-condition** | Map ready to start |
| **Main flow** | 1. Player selected difficulty 2. Map ready to start |
| **Includes** | UC 10 (Start Game) |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 8** |
| **Name** | Normal Difficulty |
| **Description** | Player is playing game on normal |
| **Actor** | Player |
| **Pre-condition** | Player has chosen the difficulty |
| **Post-condition** | Map ready to start |
| **Main flow** | 1. Player selected difficulty 2. Map ready to start |
| **Includes** | UC 10 (Start Game) |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 9** |
| **Name** | Hard Difficulty |
| **Description** | Player is playing game on hard |
| **Actor** | Player |
| **Pre-condition** | Player has chosen the difficulty |
| **Post-condition** | Map ready to start |
| **Main flow** | 1. Player selected difficulty 2. Map ready to start |
| **Includes** | UC 10 (Start Game) |
| **Extensions** | None |

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| --- | --- |
| **ID** | **UC 10** |
| **Name** | Start Game |
| **Description** | After player settled desired options the game will finally start |
| **Actor** | Player |
| **Pre-condition** | Player decided map and difficulty |
| **Post-condition** | Map started |
| **Main flow** | 1. Player selected options 2. Map started |
| **Includes** | UC 12, UC 13 (Lose Game, Win Game) |
| **Extensions** | UC 11 (Pause) |

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| **ID** | **UC 11** |
| **Name** | Pause |
| **Description** | When the player is playing the game and want a break or want to exit or save the game |
| **Actor** | Player |
| **Pre-condition** | Player is currently playing the game |
| **Post-condition** | Game paused |
| **Main flow** | 1. Player decides to take a break 2. Game is paused |
| **Includes** | None |
| **Extensions** | UC3, UC 14, UC 15, UC 16 (Help/How to play, Exit to menu, Continue, Save game) |

|  |  |
| --- | --- |
| **ID** | **UC 12** |
| **Name** | Lose Game |
| **Description** | Player lose the game after reaching a limit |
| **Actor** | Player |
| **Pre-condition** | Player is playing the game |
| **Post-condition** | Player is not able to defend a certain amount of enemy |
| **Main flow** | 1. Player is playing 2. Player cannot defend a certain amount of enemy 3. Player loses the game |
| **Includes** | None |
| **Extensions** | UC 17, UC 14 (Play Again?, Exit to menu) |

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| --- | --- |
| **ID** | **UC 13** |
| **Name** | Win Game |
| **Description** | Player win the game after defending a certain number of rounds |
| **Actor** | Player |
| **Pre-condition** | Player is playing the game |
| **Post-condition** | After several rounds if player health is more than zero |
| **Main flow** | 1. Player is playing 2. Player kills a needed amount of enemies 3. Player win the game |
| **Includes** | None |
| **Extensions** | UC 14, UC 18 (Exit to menu, Next Map) |

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| --- | --- |
| **ID** | **UC 14** |
| **Name** | Exit to menu |
| **Description** | A option for the player to exit from the current map and back to the menu, game datas will be lost if player decides or forgets to save, it will also display in situation where the player lose the game of wins it |
| **Actor** | Player |
| **Pre-condition** | Player is currently playing in a map |
| **Post-condition** | Player wants to go back the menu |
| **Main flow** | 1. Player currently in a map 2. Player pause and want to save the game or the player won or lost the game 3. Exit to main menu option taken |
| **Includes** | None |
| **Extensions** | None |

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| --- | --- |
| **ID** | **UC 15** |
| **Name** | Continue |
| **Description** | Continue is an option when the game is paused by the player |
| **Actor** | Player |
| **Pre-condition** | The game is paused |
| **Post-condition** | Player decides to continue |
| **Main flow** | 1. Game paused 2. Game unpaused |
| **Includes** | None |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 16** |
| **Name** | Save Game |
| **Description** | Save game is an option displayed when the game is paused, and it is a very important feature to preserve the player’s progress |
| **Actor** | Player |
| **Pre-condition** | Game paused |
| **Post-condition** | Player decides to save his progress |
| **Main flow** | 1. Game paused 2. Progress saved |
| **Includes** | None |
| **Extensions** | UC 19 (selected saved game) |

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| --- | --- |
| **ID** | **UC 17** |
| **Name** | Play Again? |
| **Description** | Option displayed when the player lose the game |
| **Actor** | Player |
| **Pre-condition** | Player lost the game |
| **Post-condition** | Player decides to play or no to play again |
| **Main flow** | 1. Player lose the game 2. System displays play again message 3. Player play again |
| **Includes** | None |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | UC 18 |
| **Name** | Next Map |
| **Description** | Option displayed when the player wins the game |
| **Actor** | Player |
| **Pre-condition** | Player wins in current map |
| **Post-condition** | Player decides to play the next map |
| **Main flow** | 1. Player wins in current map 2. Next map option displayed 3. Player enters in the next map |
| **Includes** | None |
| **Extensions** | None |

|  |  |
| --- | --- |
| **ID** | **UC 19** |
| **Name** | Selected saved game |
| **Description** | Player in the menu can choose a saved progress through the load game option |
| **Actor** | Player |
| **Pre-condition** | Player has saved at least one progress previously |
| **Post-condition** | Map ready to start |
| **Main flow** | 1. Player select saved game 2. Player loads in saved game 3. Map starts |
| **Includes** | None |
| **Extensions** | None |

# System Specification

## Non-functional requirements:

### Design and implementation constraints

It has been agreed that the system must be written using Java, this is as all members of the project are comfortable in using this language. The game will be developed using the light weight java game library with OpenGL. Due to there being multiple developers, all code written should follow Java conventions to allow for consistency and the ability for others to understand work completed by another person.

### Operating environment

The game will be developed to run on Windows systems, as this is the most widely used operating system with good support and ease of use. The target operating system will be Windows 10, but the game must be capable on operating on any systems using Windows 7 or above. Any system running the game must have support for OpenGL with the most recent driver installed. The system requires the Java runtime environment installed and up to date on the system.

### Performance

* Game must be able to run on systems with a minimum of 2048MB of RAM and 2GB free storage space.
* Game must be able to run at an average of 30 frames per second on any system meeting the minimum requirements described above.
* System must be able to respond to the users input within a maximum time of 200ms.

### Reliability

* An error should not occur more than once per 500 hours of system operation.
* The minimum amount of times a user can use a system without any errors occurring should be at least 1000.
* If an error occurs while a user is trying to save their game progress, any save data already present on the disk should not be affected.

### Usability

* The interface of the game should be simple and easy to use so that a user with no experience can fully operate the system with a maximum of one error after viewing the help screens or by reading the documentation.
* The user interface of the system must use English for all displayed information.

### Documentation

* The features of the system should be documented, and the user must be able to access this documentation through the game.

# Gantt Chart

## Contributing Team members:

* Oliver Legg
* Daniel Taylor
* Tom Coupe
* Matthew Smith
* Kieran Baker
* Alessandro Wang

## Signatures:

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