ICS 499 Software Engineering Capstone

Requirements Specification

Version 3.0

October 28, 2015

# Executive Summary

## Project Overview

The video game industry is rapidly producing console games that represent a popular alternative and accompaniment to television and movies. The intended audience is Professor Armitage, instructor of ICS 499 Software Engineering Capstone, and perhaps more generally upper division course instructors in the ICS department.

## Purpose and Scope of this Specification

**Purpose**

This requirements specification will aid in the preliminary modeling, definitions and use cases necessary for the inception phase of the capstone project. The specific requirements are addressing high risk factors that need to be handled primarily within the first iteration of the agile development process.

**Scope**

1. Requirements pertaining to the game engine are included within the scope of this specification.
2. Requirements pertaining to user management and scoring are included within the scope of this specification.
3. Requirements pertaining to configuration are included within the scope of this specification.
4. Requirements pertaining to the web site are included within the scope of this specification.
5. Requirements pertaining to file storage are included within the scope of this specification.
6. Requirements pertaining to the game model are included within the scope of this specification.
7. Requirements pertaining to gameplay are included within the scope of this specification.
8. Requirements pertaining to sprite animations and similar resources are within the scope of this specification.
9. Requirements pertaining to game states and modes are within the scope of this specification.
10. Requirements pertaining to the execution environment are within the scope of this specification.
11. Requirements pertaining to physical devices are within the scope of this specification.
12. Requirements pertaining to performance are within the scope of this specification.
13. Requirements pertaining to usability are within the scope of this specification.
14. Requirements pertaining to extensibility are within the scope of this specification.

# Product/Service Description

An interactive game that is available to play via PC on computers running the Java Runtime Environment (JRE). Players will be able to compete for high scores and view their ranking via mobile devices with Android OS installed. In order to access the ranking system, users will need to provide a valid e-mail address and create a password in order to access the system via the game web site. News about recent patches and features will be visible via the web site.

## Product Context

This game is surely one of many existing within the market, probably of the platformer genre. The product will be portable to any platform with the JRE, and may become accessible via mobile devices. The game will be accessible via keyboard, but may also become accessible via joystick or XBOX controllers.

## User Characteristics

Create general customer profiles for each type of user who will be using the product. Profiles should include:

*Intended audience*

* Adult | Male | Older | Masculine | Scientific | Direct
* Users have a reasonable level of technical expertise with a sharper learning curve than average
* Users are highly critical and knowledgeable of technical aspects present in the java classes

## Assumptions

* Server availability for web site
* User expertise
* Sprite availability
* Animation availability
* Map availability
* General visual resource availability
* Java APIs exist to support necessary functionality

## Constraints

Describe any items that will constrain the design options, including

* Number of players
* Animations, sprites and graphics platform (limitations of java 2D or 3D)
* Hardware (CPU speed, RAM, graphics card, disk space etc.)
* 4 month timeframe

# Requirements

## Physical Requirements

D : Device Requirement B : Bandwidth Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| D0 | Only Android devices will be guaranteed to support gameplay features. |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## Environmental Requirements

C : Container Requirements B : Browser Requirements OS : System Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| C0 | The container must be able to host multiple instances of the game application simultaneously. |  | 1 |  |
| B10 |  |  |  |  |
| B0 | The client browser must have javascript enabled to view the web site. |  |  |  |
| B10 | The server must the most current version of JRE installed. |  |  |  |
| OS0 | The operating system must have installed the most current version of JRE (Java Runtime Environment). A stable release used in the test environment, generally they are legacy compatible but not prophecy compatible. |  |  |  |

## Design Requirements

Pt : Pattern Requirements F : Framework Requirements Pd : Paradigm Requirements Ar : Architectural Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| Pt0 | The design shall adhere to a principle of high cohesion. |  |  |  |
| Pt10 | A principle of reusable code will be adopted as much as possible. Reusable classes should be implemented. |  |  |  |
| Pt11 |  |  |  |  |
| Pd0 | The game design will use the Object Oriented paradigm. |  |  |  |
| Pd10 | The web site is not constrained to use only the Object Oriented paradigm. |  |  |  |
| Ar0 | Sprites and animations should be cached if they are used more than once in the program. |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## Functional/Performance Requirements

*\*E : Engine Requirement \*C : Configuration Requirement \*S : Site Requirement*

*\*M : Model Requirement \*GP : Gameplay Requirement \*ST : Storage Requirement*

*\*AI : AI Requirements*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| E10 | The engine must govern and render the environment according to context (level and players) |  | 1 |  |
| E20 | The engine must govern the conditional and default behavior of sprites. |  | 1 |  |
| E21 | The engine must be able to detect collisions between sprites and respond with the appropriate function. |  | 1 |  |
| E30 | The engine must govern the forces that act upon the sprites such as gravity, submergence in water, damage, powerups... |  | 2 |  |
| E31 | The engine must be able to differentiate between the player and enemy sprites, and apply the appropriate forces based on the context. |  | 1 |  |
| M10 | The model must update context, progress, and have a representation of the state to be persisted (High Scores and Player) |  | 1 |  |
| M11 | The background image must scroll to match the position of the player based on a predefined center or pivot point that triggers the view to be updated. |  | 1 |  |
| M20 | User input should alter the state through the model in the case of a pause, resume, or restart. |  | 1 |  |
| C10 | The default configuration will be based on a set of minimum system requirements and for optimal performance. |  | 1 |  |
| C20 | The user will be able to configure their input keys as desired. |  | 1 |  |
| S10 | The user must register their account in order to download the installer. |  | 1 |  |
| S11 | Only players that are connected to the internet can compete in multiplayer mode. |  | 1 |  |
| S12 | There can only be a maximum of two players per multiplayer game. |  | 1 |  |
| S20 | An administrator will govern addition or subtraction of users, changing passwords, and any other changes to user accounts. |  | 1 |  |
| S30 | Each individual will be awarded a high score based on their in-game performance that can be accessed via the site’s user interface. |  | 1 |  |
| S31 | In a multiplayer game, each player will be awarded a score that is based on clear time, coins grabbed, and enemies defeated. |  | 1 |  |
| S32 | Only the top 20 scores will be displayed on the site. |  | 1 |  |
| S40 | The administrator must be given the capability to utilize existing assets to create and customize content. |  | 1 |  |
| S41 | The administrator must be given the capability to upload new assets that can be used to create and customize content. |  | 1 |  |
| S42 | The administrator must be able to create new levels, as well as customize or delete existing levels. |  | 1 |  |
| S50 | Users will be able to purchase additional skins through a store application. |  | 1 |  |
| S51 | The administrator will be able to update the store content via the administration interface. |  | 1 |  |
| GP0 | There will be a character select screen in single and/or multiplayer mode that will allow the player to choose from the available skins. |  | 1 |  |
| GP1 | Additional skins that have been purchased will be available at character select. |  | 1 |  |
| GP10 | A countdown will be issued at the beginning of each match whether single or multiplayer mode that indicates the race is about to start. |  | 1 |  |
| GP11 | There will be a finish line at the end of each level that, after it is crossed, will end that level. |  | 1 |  |
| GP20 | The player will have the ability to issue a jump command. |  | 1 |  |
| GP30 | The player will have the ability to climb ladders. |  | 1 |  |
| GP40 | When coming into contact with an enemy, the player will respond by either taking damage or being stunned. |  | 1 |  |
| GP50 | The player will have access to at least 5 different levels, each with a different look and feel: tropics, ice/snowy, spooky, castle, and basic/meadow. |  | 1 |  |
| GP60 | Each level will have a distinct tune that plays in the background and repeats. |  | 2 |  |
| AI10 | Enemy behavior will begin as the player reaches that point in the map, and continue until they reach a specified distance away from the enemy. |  | 1 |  |
| AI20 | Enemy behavior will be the same for each type of enemy. Multiple enemies of the same type will behave the same. |  | 1 |  |
| AI21 | The frequency of enemy movement will vary. |  |  |  |
| AI30 | Enemy behavior will be constant and without regard to player movement. |  | 1 |  |
| AI40 | Enemies will be able to inhabit terrain that the player cannot touch. |  | 1 |  |
| AI50 | Enemies will circumvent the dynamics of player movement. |  | 1 |  |
| ST10 | The placement and types of sprites within a level must be stored in JSON or XML format. The paths to these files will be stored in a MySQL DB. |  | 1 |  |
| ST11 | Information about the number and usage of sprite animations as seen as a part of a sequence will be stored in JSON or XML format. The paths to these files will be stored in a MySQL DB. |  | 1 |  |
| ST12 | The behavior and sequences for sprites within a given level must be stored in JSON or XML format. The paths to these files will be stored in a MySQL DB. |  | 1 |  |
| ST20 | Sound files will be stored only in .wav, .midi, or .mp3 formats. |  | 2 |  |

## 

## Resource Requirements

DB : Database Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| DB0 | What library in every instance required (java, php, javascript) |  | 1 |  |
| DB10 | Creates and updates to the High Scores will be queued using a locking mechanism. |  | 1 |  |
| DB11 | Reads from the High Scores table will not require locking, and will capture a snapshot of its current contents. |  | 1 |  |
| DB12 | Deletes from the High Scores table will be queued along with creates and updates using the same locking mechanism (see D10). |  | 1 |  |
| DB20 |  |  |  |  |

## 

## State/Mode Requirements

GP : Gameplay Requirements S : Site Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| GP200 | Signals and data may be exchanged between state, but a change in state will present a different set of options for the user. |  |  |  |
| GP210 | A character select state will be made available that allows both players to make a character selection before the game is started, and that starts after the last player selects a character. |  |  |  |
| GP220 | A matchmaking state will search for players also in the matchmaking state before turning to character select. |  |  |  |
| GP230 | A pause state will save the current view and its components but discontinue processing events and inputs. |  |  |  |
| GP240 | A resume state will retrieve the save state of the current view and its components before initializing the processing of events and inputs. |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## 

## User Interface Requirements (Non-functional Requirements)

GP : Gameplay Requirement S : Site Requirement C : Configuration Requirement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Artifacts** |
| GP300 |  |  |  |  |
| S300 | The high scores will be displayed in ascending order with 1st place being #1, 2nd place #2, etc. until 20 users have been listed, along with the username of the player that achieved each score. |  | 1 |  |
| S301 | High scores will be given a uniform padding and margin and either as listed elements or in tabular format without the usage of bullet points. |  |  |  |
| S310 | The web application view of the game will be available in minimized and full screen modes. |  |  |  |
| C200 |  |  |  |  |

## Usability Requirements

I : Install Requirements HCI : Human Computer Interaction Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Date Reviewed w/Initials** |
| I0 | A single installer file must facilitate all transfers of resources between the server and the mobile device. |  |  |  |
| I1 | FTP will be used to transfer necessary resources between devices. |  |  |  |
| I10 | A progress bar must inform the user of remaining install items and predicted wait to complete installation. |  |  |  |
| I20 |  |  |  |  |

## Extensibility Requirements

GP : Gameplay Requirement S : Site Requirement C : Configuration Requirement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Priority** | **Date Reviewed w/Initials** |
| S400 | The administrator must be able to add new maps to be used as assets. |  |  |  |
| S401 | The administrator must be able to place enemies, blocks and decorations within levels that can be later accessed by players. |  |  |  |
| S402 | The administrator must be able to add new enemies as assets and determine their behavior for the gameplay experience. |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Deferred Requirements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Status** | **Comments** | **Pri** | **Date Rvwd** | **SME Reviewed /Approved** |
| S43 | A moderator must be able to ban users threatening other users or posting the personal information. | Not Started | Users will not be able to communicate. | 3 | 10/14 |  |
| S44 | A user can issue a warning to another player before contacting the moderator. | Not Started | Users will not be able to communicate. | 3 | 10/14 |  |
|  |  |  |  |  |  |  |

# Requirements Confirmation/Stakeholder sign-off

Include documentation of the approval or confirmation of the requirements here. For example:

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees (name and role)** | **Comments** |
| 9/16 | Kong, Jamil, David, Christopher |  |
| 9/21 | Jamil, David, Christopher |  |
| 10/5 | Kong, Jamil, David, Christopher |  |
| 10/14 | Kong, David, Christopher |  |
| 10/19 | Kong, David, Jamil, Christopher |  |
| 10/21 | Kong, David, Jamil, Christopher |  |