

## **Software Requirements Specification**

Graze Save Survive

Version 2.0

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<https://github.com/holiday-pettijohn/GrazeSaveSurvive> (currently private)

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**Overview.** This document describes and formally defines the agreed requirements, including expected software features, constraints, interfaces, and other attributes. It also provides the basis for design and system testing.

**Target Audience.** Stakeholders, Scrum Product Owner, Project Manager

**Project Team Members.** Holiday Pettijohn, Jacob Shiota, Caleb Zuniga, Nicklas Kuo

### Version Control History

Version	Primary Author(s)	Description of Version	Date Completed
0.1	Jacob Shiota	Initial documentation	01-21-2024
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### Signatures of Approval

Version 2.0		
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Holiday Pettijohn		
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**Table of Contents**

<b>1. Introduction.....</b>	<b>4</b>
1.1. Product Overview.....	4
<b>2. Specific Requirements.....</b>	<b>4</b>
2.1. External Interface Requirements.....	4
2.2. Software Product Features.....	5
2.3. Software System Attributes.....	9
2.4. Database Requirements.....	10
<b>3. Additional Material.....</b>	<b>10</b>
3.1. Definitions.....	10

## 1. Introduction

### 1.1. Product Overview

Graze Save Survive is a 2D rogue-lite game inspired by *Vampire Survivors* which consists of various menu interfaces and a gameplay map in which a user-controlled sprite will be able to move around the screen and interact with continuously spawning entities, which appear in waves until a certain threshold is reached. From within certain menus, the user will also be able to make persistent unlockable changes to gameplay. It can be played by anyone with a Windows or Linux computer.

## 2. Specific Requirements

### 2.1. External Interface Requirements

#### 2.1.1. User Interfaces

2.1.1.1. *Mandatory*: The software is capable of opening in a window.

2.1.1.2. *Optional*: The software is capable of opening in dedicated fullscreen mode.

2.1.1.3. *Desirable*: Any text presented over a background has a minimum contrast ratio of 4.5:1.

2.1.1.4. *Desirable*: Mobile Entities and other moving gameplay elements (eg. projectiles) have a minimum contrast ratio of 4.5:1 to the background.

2.1.1.5. *Optional*: Users are able to select different keyboard control mappings.

#### 2.1.2. Hardware Interfaces

2.1.2.1. *Mandatory*: Menus and gameplay can be controlled with the keyboard only.

2.1.2.2. *Highly Desirable*: Menus can be navigable with the mouse, in addition to the keyboard.

2.1.2.3. *Optional*: A modern game controller (eg. Xbox, Playstation, MFi-Enabled) can be used to perform all the functions of a keyboard.

2.1.2.4. *Desirable*: The software must run with the following minimum hardware requirements:

2.1.2.4.1. Processor: Dual-core 2GHz CPU.

2.1.2.4.2. Memory: 4GB of RAM.

2.1.2.4.3. Graphics: OpenGL 2.1 compatible video card

#### 2.1.3. Software Interfaces

- 2.1.3.1. *Mandatory*: The software must run on Windows and Linux computers.
- 2.1.3.2. *Mandatory*: The software will interact with a SQLite database using the Godot-SQLite plugin.
- 2.1.3.3. *Mandatory*: The database will be hosted on the User's system. No external database server will be used.

## 2.2. Software Product Features

### 2.2.1. Menus

- 2.2.1.1. *Mandatory*: Menu consists of several buttons which can be interacted with via single-key presses.
- 2.2.1.2. *Mandatory*: A Start Menu exists to allow the User to navigate the software.
- 2.2.1.3. *Highly Desirable*: An Upgrades Menu exists to allow the User to modify their attributes using picked up Items.
- 2.2.1.4. *Desirable*: An Options Menu exists to allow the User to change audio volume, screen resolution, and the controller connection.
- 2.2.1.5. *Mandatory*: There is a button in the Start Menu that allows the User to start a Run.
- 2.2.1.6. *Mandatory*: There is a button in the Start Menu that allows the User to exit the game.
- 2.2.1.7. *Highly Desirable*: There is a button in the Start Menu that allows the User to navigate to the Upgrades Menu.
- 2.2.1.8. *Desirable*: There is a button in the Start Menu that allows the User to navigate to the Options Menu.
- 2.2.1.9. *Optional*: There is a button in the Start Menu that allows the User to modify User profiles.
- 2.2.1.10. *Highly Desirable*: There is a button in the Upgrades Menu that allows the User to navigate to the Start Menu.
- 2.2.1.11. *Highly Desirable*: The Upgrades Menu contains a field which displays Items picked up by the Player.
- 2.2.1.12. *Optional*: There is a way for the User to display only certain Items (eg. Melee-boosting Items vs Ranged-boosting).
- 2.2.1.13. *Highly Desirable*: The Upgrades Menu contains a grid field, into which the User is able to move Items from the display field.
- 2.2.1.14. *Highly Desirable*: The User is able to remove Items from the grid field back to the display field.
- 2.2.1.15. *Highly Desirable*: Multiple Items may be on the grid field at once.

- 2.2.1.16. *Highly Desirable*: An unlocked Item in the Upgrades Menu can only be in the display field or the grid field. It cannot be in both simultaneously.
- 2.2.1.17. *Highly Desirable*: A single square in the grid field cannot be occupied by two Items at once.
- 2.2.1.18. *Desirable*: Items can be rotated in intervals of 90°.
- 2.2.1.19. *Desirable*: There are two buttons in the Options Menu which allow the User to raise or lower the audio volume.
- 2.2.1.20. *Desirable*: There is a maximum and minimum volume that cannot be surpassed using the Options Menu buttons.
- 2.2.1.21. *Optional*: There is a method in the Options Menu that allows the User to select a different keyboard key mapping.
- 2.2.1.22. *Optional*: There is a method in the Options Menu that allows the User to connect a modern game controller.
- 2.2.2. Items
  - 2.2.2.1. *Highly Desirable*: The Player may receive certain buffs depending on which Items are in the grid field of the Upgrades Menu.
  - 2.2.2.2. *Highly Desirable*: Each Item is associated with one or more buffs.
  - 2.2.2.3. *Highly Desirable*: Items are represented by Sprites resembling Tetris-pieces, consisting of multiple adjacent square “tiles” that form a single object.
  - 2.2.2.4. *Highly Desirable*: The tiles forming an Item must not go beyond the dimensions of the grid field in the Upgrades Menu (ie. they “fit”)
  - 2.2.2.5. *Desirable*: The value of an Item’s buff is dependent on their size in tiles.
  - 2.2.2.6. *Desirable*: The size and buff type of an Item dropped by an Enemy is dependent on the type of Enemy.
  - 2.2.2.7. *Optional*: Weapons, a special type of Items, allow the Player to perform attacks other than the default attack when equipped.
- 2.2.3. Runs
  - 2.2.3.1. *Mandatory*: A Run begins only when the User selects the appropriate button from the Start Menu.
  - 2.2.3.2. *Mandatory*: A Run ends when the Player ‘wins’ or is ‘defeated’.
  - 2.2.3.3. *Mandatory*: While a Run is active, the Player sees their character sprite and other Entities which are generated.
  - 2.2.3.4. *Highly Desirable*: While a Run is active, the Player sees a bar indicating their current HP, current XP and Level.

- 2.2.3.5. *Optional*: While a Run is active, the Player sees a number indicating the current wave of enemies (“Wave Counter”)
- 2.2.3.6. *Mandatory*: While a Run is not active, the User sees one Menu.
- 2.2.3.7. *Mandatory*: At the beginning of a Run, the only Entity is the Player.
- 2.2.3.8. *Mandatory*: Enemies are gradually generated throughout the course of a Run.
- 2.2.3.9. *Mandatory*: At the end of a Run, prior to returning to Menus, a Results Screen is displayed with information about the Run, such as whether the Player won or was defeated.
- 2.2.3.10. *Optional*: The Results Screen displays information such as time, collected XP, Enemies defeated, and others.
- 2.2.3.11. *Mandatory*: There is a button in the Results Screen which allows the Player to return to Menus.
- 2.2.4. Mobile Entities
  - 2.2.4.1. *Mandatory*: Mobile Entities have an amount of HP at the beginning of a Run.
  - 2.2.4.2. *Mandatory*: Mobile Entities are ‘defeated’ and removed from a Run when their HP reaches or goes below 0.
  - 2.2.4.3. *Mandatory*: There is only one Player during a Run.
  - 2.2.4.4. *Mandatory*: When a Player is defeated, the Run ends.
  - 2.2.4.5. *Highly Desirable*: The amount of HP a Player has at the beginning of a Run is determined by the Items equipped in the Upgrades Menu.
  - 2.2.4.6. *Highly Desirable*: The amount of Damage a Player causes to an Enemy is determined by the Items equipped in the Upgrades Menu.
  - 2.2.4.7. *Highly Desirable*: Several types of Enemies exist.
  - 2.2.4.8. *Highly Desirable*: The amount of HP an Enemy has at the beginning of a Run is determined by their type.
  - 2.2.4.9. *Highly Desirable*: The amount of Damage an Enemy causes to a Player is determined by their type.
  - 2.2.4.10. *Desirable*: The amount of XP an Enemy can drop is determined by their type.
  - 2.2.4.11. *Desirable*: Boss Enemies have more HP than standard Enemies.
  - 2.2.4.12. *Desirable*: Boss Enemies deal more Damage than standard Enemies.

- 2.2.4.13. *Desirable*: Boss Enemies drop a guaranteed amount of XP.
- 2.2.4.14. *Desirable*: Boss Enemies are capable of performing unique Special Attacks.
- 2.2.4.15. *Highly Desirable*: Projectiles are generated whenever another Entity performs a Ranged Attack.
- 2.2.4.16. *Highly Desirable*: The amount of Damage a Projectile causes to another Entity is determined by the Entity which generated it.
- 2.2.5. Gameplay
  - 2.2.5.1. *Mandatory*: During a Run, the Player can move around the 2D space using four keyboard keys.
  - 2.2.5.2. *Mandatory*: During a Run, Enemies move in the 2D space according to an algorithm.
  - 2.2.5.3. *Optional*: The algorithm dictating Enemy movement is capable of detecting when the Player comes within a certain distance of the Enemy and then continuously moving towards the Player.
  - 2.2.5.4. *Optional*: The Player sprite remains in a fixed location on the screen when moving.
  - 2.2.5.5. *Optional*: Mobile Entities do not all move at the same speed.
  - 2.2.5.6. *Mandatory*: When an Enemy comes in contact with the Player, the Player is dealt Damage.
  - 2.2.5.7. *Mandatory*: The Player can perform a melee Attack using a single key.
  - 2.2.5.8. *Mandatory*: When a Player performs a melee Attack within a certain distance of an Enemy, the Enemy is dealt Damage.
  - 2.2.5.9. *Optional*: There is an option which enables the Player to perform melee Attacks automatically.
  - 2.2.5.10. *Optional*: Certain melee Attacks can increase or decrease the distance which an Entity needs to be within to be dealt Damage.
  - 2.2.5.11. *Highly Desirable*: The Player can perform a ranged Attack using a single key. This Attack produces a Projectile.
  - 2.2.5.12. *Highly Desirable*: When a Player or Enemy comes in contact with a Projectile, they are dealt Damage.
  - 2.2.5.13. *Desirable*: Certain Enemies can perform ranged Attacks.
  - 2.2.5.14. *Highly Desirable*: After a Player performs an Attack, they must wait a certain amount of time before they can perform another.
  - 2.2.5.15. *Optional*: Players can reduce the amount of time they must wait to perform an Attack using Items in the Upgrades Menu.



- 2.2.5.16. *Optional*: Certain Attacks inflict additional changes in Enemy or Player stats (such as reducing the amount of Damage dealt per Attack).
- 2.2.5.17. *Highly Desirable*: There is a chance that an Enemy drops an Item when defeated.
- 2.2.5.18. *Highly Desirable*: Players can pick up Items.
- 2.2.5.19. *Highly Desirable*: Players cannot gain a gameplay advantage from Items they pick up until after the Run ends.
- 2.2.5.20. *Highly Desirable*: Items that are picked up during a Run are displayed in the display field of the Upgrades Menu.
- 2.2.5.21. *Desirable*: Enemies can drop XP when defeated.
- 2.2.5.22. *Desirable*: Players can pick up XP.
- 2.2.5.23. *Desirable*: Players receive certain boosts, such as increased Attack Damage, reduced Enemy Damage, or extended HP, depending on how much XP they have.
- 2.2.5.24. *Desirable*: When a Run begins or ends, XP is reset to 0.
- 2.2.5.25. *Highly Desirable*: The Run ends and the Player ‘wins’ after they survive a specific amount of in-game time.
- 2.2.5.26. *Desirable*: The Player can ‘win’ by collecting a certain amount of XP before the timer reaches the usual ‘win time’.
- 2.2.6. Assets
  - 2.2.6.1. *Mandatory*: All Entities are represented by 2D sprites.
  - 2.2.6.2. *Mandatory*: During a Run, Entities appear over a stylized background.
  - 2.2.6.3. *Desirable*: Background music plays during each Run.
  - 2.2.6.4. *Desirable*: Background music plays when the User is in a Menu.
  - 2.2.6.5. *Optional*: Sound effects play when various game events happen (e.g. Player Attacks, Player collects XP, Enemy Attacks).
- 2.2.7. Endgame
  - 2.2.7.1. *Optional*: Game content after the Player first wins a Run may be more experimental.
  - 2.2.7.2. *Mandatory*: The ‘core game’, up until the Player’s first win, will be the main subject of polish if debugging time is limited.

## 2.3. Software System Attributes

- 2.3.1. Reliability
  - 2.3.1.1. *Highly Desirable*: The User does not encounter any crashes during gameplay or user interface interaction.

### 2.3.2. Security

- 2.3.2.1. *Desirable*: The game is built using up to date versions of the Godot software in order to reduce the likelihood of security vulnerabilities being introduced to the user's systems due to the game.

### 2.3.3. Maintainability

- 2.3.3.1. *Highly Desirable*: The project will be hosted on GitHub.
- 2.3.3.2. *Mandatory*: Contributors will use good Git practices, such as meaningful commit messages, in order to minimize and prevent conflicts, bugs, and miscommunications.

### 2.3.4. Performance

- 2.3.4.1. *Desirable*: The game is able to maintain at least 30 FPS on hardware of the recommended specifications in non-endgame content.

## 2.4. Database Requirements

- 2.4.1. *Mandatory*: Items picked up by the Player will be saved to a persistent database.
- 2.4.2. *Highly Desirable*: The equipment and configuration of Items in the Upgrades Menu will be saved to a persistent database.
- 2.4.3. *Highly Desirable*: Multiple Players, each with different Items and Upgrades Menu configurations, can be saved on a single system.
- 2.4.4. *Mandatory*: A Player may have up to a fixed number of each Item at once. This number varies depending on each Item.
- 2.4.5. *Mandatory*: There is no limit to the number of Players that can have each Item.

## 3. Additional Material

### 3.1. Definitions

- 3.1.1. Run – the event which the User initiates when they begin gameplay. Users are considered to be 'in' a Run so long as they have control over their character sprite.
- 3.1.2. Entity – a sprite which can be interacted with by other Entities during a Run.
- 3.1.3. Player – the User, represented by a character sprite, during a Run. Players are Entities.
- 3.1.4. Enemy – a CPU-controlled Entity.
- 3.1.5. Boss Enemy – a specialized type of Enemy which only spawns during specific waves

- 3.1.6. Attack – a specific action that can be taken by a Player or Enemy during a run that causes Damage.
- 3.1.7. HP – health points, an integer quantity used to measure whether or not an Entity should be removed during a Run.
- 3.1.8. Damage – a reduction of an Entity's HP.
- 3.1.9. Defeated – the state reached by an Entity when their HP is reduced to 0 or lower.
- 3.1.10. Drop – when a non-mobile Entity is generated into a Run, typically in response to another Entity being removed.
- 3.1.11. Pick-up – when a non-mobile Entity is removed from a Run
- 3.1.12. Item - a non-mobile Entity which augments player statistics and abilities. These persist between Runs and are stored in the database.
- 3.1.13. Buff – a beneficial modification to the Player's stats and abilities, such as an increase in the amount of Damage they deal to Enemies.
- 3.1.14. Equipped – the state an Item is in when it is on the grid field of the Upgrades Menu and not the display field.
- 3.1.15. XP - experience points, a non-mobile Entity, the quantity of which determines enhancements to player statistics and abilities in a Run.