



Gameplay Mechanics Development

Coursework Report

Gavin George

1501029

# Document Version History

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Table of Contents

[Document Version History 2](#_Toc1843457)

[Preface 5](#_Toc1843458)

[Requirements Specification 6](#_Toc1843459)

[1.1 Introduction 6](#_Toc1843460)

[1.1.1 Objective 6](#_Toc1843461)

[1.1.2 Intended Audience 6](#_Toc1843462)

[1.1.3 Project Scope 6](#_Toc1843463)

[1.2 Product Overview 6](#_Toc1843464)

[1.3 External Interface Requirements 6](#_Toc1843465)

[1.3.1 User Interface 6](#_Toc1843466)

[1.3.2 Hardware Interface 6](#_Toc1843467)

[1.3.3 Software Interface 6](#_Toc1843468)

[1.4 Project Features 7](#_Toc1843469)

[1.4.1 Demo Environment 7](#_Toc1843470)

[1.4.2 Camera Movement 7](#_Toc1843471)

[1.4.3 Mouse Selection 7](#_Toc1843472)

[1.4.4 Worker Units 7](#_Toc1843473)

[1.4.5 Resources 7](#_Toc1843474)

[1.4.6 Construction 7](#_Toc1843475)

[1.5 Non-functional Requirements 7](#_Toc1843476)

[1.5.1 Performance Requirements 7](#_Toc1843477)

[1.5.2 Software Quality Attributes 7](#_Toc1843478)

[UML Diagrams 8](#_Toc1843479)

[Method 9](#_Toc1843480)

[3.1 Summary of Techniques 9](#_Toc1843481)

[3.2 Detailed Descriptions 9](#_Toc1843482)

[Development 10](#_Toc1843483)

[4.1 Development Process 10](#_Toc1843484)

[4.2 Concept Design 10](#_Toc1843485)

[4.3 Prototyping 10](#_Toc1843486)

[4.2 Documentation 10](#_Toc1843487)

[Conclusions 11](#_Toc1843488)

[5.1 Shortcomings 11](#_Toc1843489)

[5.2 Areas for Improvement 11](#_Toc1843490)

[5.3 Possible Solutions 11](#_Toc1843491)

[5.4 Extending the Application 11](#_Toc1843492)

[5.5 What I have Learned 11](#_Toc1843493)

[References 12](#_Toc1843494)

[6.1 Brief 12](#_Toc1843495)

[6.2 Techniques 12](#_Toc1843496)

[6.2.1 C++ 12](#_Toc1843497)

[6.2.2 Blueprints 12](#_Toc1843498)

[6.3 Research 12](#_Toc1843499)

[6.4 Resources 12](#_Toc1843500)

# Preface

This document is a comprehensive report intended to accompany the submitted coursework project, “CMP302 Gameplay Mechanics Development” by the author, Gavin George. Included within this report is a detailed specification of each facet of the chosen mechanic. A summary description of the mechanic is as follows: the mechanic features RTS style camera controls, selectable units, base-building and resource management. These features are typical of a real time strategy game, which was the intended objective; to implement RTS base building mechanics. The system allows the user to direct units to construct buildings and harvest resources, navigating and viewing the environment using a scrollable/panning/rotatable spring arm camera. The aim of this report is to deliver an in-depth explanation of the requirements and specifications of the system, to delineate the technical aspects and techniques used to achieve the implementation and finally to explain the development process of the project, providing UML diagrams as a visual aid and an online video demo to present the system.

# Requirements Specification

## 

## Introduction

### 1.1.1 Objective

The overall objective of this project was to provide a solution to a concept that the author synthesized in accordance with the coursework brief [6.1]. The concept of real time strategy base building was popularised through games such as Warcraft [6.3, 1] & Age of Empires [6.3, 2]. The RTS genre has bloomed over the last ten years with the same mechanics at its core and this project exists to fulfil and demonstrate said mechanics.

### 1.1.2 Intended Audience

Users of the application are expected to use this report as a guide to understand the applications functionality. Assessors will use the document to critically evaluate the project as part of the coursework submission. Furthermore, the project is intended as an academic resource for any who wish to use it for educational purposes.

### 1.1.3 Project Scope

The scope of this project limits it to an application with a single scene to act as a demo environment, with the intention of keeping the project compact and minimising un-necessary features. The scene will contain all the necessary elements to thoroughly present and demonstrate the full range of features available in the system. This approach is not that of a regular game project but more that of a specific system prototype that can be used for demonstration purposes.

The essential elements of the project are the five core features of the system, forming the base building mechanic. Stretch goals for this projected included: building and unit stats, simple AI other than pathfinding and a small variety of different building types, resource types and unit types. Graphics was the stretch goal with the least priority.

## Product Overview

### 1.2.1 Overall Function

### 1.2.2 User Guide

### 1.2.3 Technical Requirements

## External Interface Requirements

### 1.3.1 User Interface

* Project files are interfaced via the Unreal Engine
* The demo environment via the level editor & inspector
* Editable class attributes via hooks in the BP editor
* System interaction via gameplay using input peripherals

### 1.3.2 Hardware Interface

* The application is developed for the Windows PC platform
* Input requires keyboard and mouse

### 1.3.3 Software Interface

* The application was built in Unreal Engine 4 v\_4.19
* Blueprints were created in the Unreal Engine Blueprint Editor
* IDE used for programming was Microsoft Visual Studio 2017

## Project Features

### 1.4.1 Demo Environment

#### 1.4.1.1 Description

#### 1.4.1.2 Functional Requirements

### 1.4.2 Camera Movement

#### 1.4.2.1 Description

#### 1.4.2.2 Functional Requirements

**(Req.1) WASD and Edge Scroll:**

The camera must be transformed left, right, up and down using the keyboard. The camera must also move if the mouse is moved past the related screen edge.

**(Req.2) Pan and Rotate:**

The camera must be tilted up and down and rotated using the mouse. The pan value will have a reset button.

**(Req.3) Zoom:**

The camera must be zoomed in and out using the mouse wheel. The zoom level will have a reset button.

**(Req.4) Editable Settings:**

The camera settings for move speed and maximum & minimum zoom must be alterable in the blueprint editor for the use of artists or designers.

### 1.4.3 Mouse Selection

#### 1.4.3.1 Description

#### 1.4.3.2 Functional Requirements

### 1.4.4 Worker Units

#### 1.4.4.1 Description

#### 1.4.4.2 Functional Requirements

### 1.4.5 Resources

#### 1.4.5.1 Description

#### 1.4.5.2 Functional Requirements

### 1.4.6 Construction

#### 1.4.6.1 Description

#### 1.4.6.2 Functional Requirements

## Non-functional Requirements

### 1.5.1 Performance

### 1.5.2 Design Attributes

# UML Diagrams

# Method

## 3.1 Summary of Techniques

## 3.2 Detailed Descriptions

# Development

## 4.1 Development Process

## 4.2 Concept Design

## 4.3 Prototyping

## 4.2 Documentation

# Conclusions

## 5.1 Shortcomings

## 5.2 Areas for Improvement

## 5.3 Possible Solutions

## 5.4 Extending the Application

## 5.5 What I have Learned

# References

## 6.1 Brief

*Bett, M. (2019). [online] Blackboard.abertay.ac.uk. Available at:* [*https://blackboard.abertay.ac.uk/webapps/blackboard/content/listContent.jsp?course\_id=\_8571\_1&content\_id=\_524873\_1&mode=reset*](https://blackboard.abertay.ac.uk/webapps/blackboard/content/listContent.jsp?course_id=_8571_1&content_id=_524873_1&mode=reset%20) *[Accessed 30 Jan. 2019].*

## 6.2 Techniques

### 6.2.1 C++

### 6.2.2 Blueprints

*YouTube. (2015). Unreal Engine 4: RTS Tutorial Series. [online] Available at:* [*https://www.youtube.com/watch?v=FZK5T-vAVFA&list=PLDnygpcOYwFW2XtNyiandrLDG\_\_OAZs7Q*](https://www.youtube.com/watch?v=FZK5T-vAVFA&list=PLDnygpcOYwFW2XtNyiandrLDG__OAZs7Q) *[Accessed 23 Feb. 2019].*

## 6.3 Research

[1] *En.wikipedia.org. (2019). Warcraft: Orcs & Humans (1994). [online] Available at:* [*https://en.wikipedia.org/wiki/Warcraft:\_Orcs\_%26\_Humans*](https://en.wikipedia.org/wiki/Warcraft:_Orcs_%26_Humans) *[Accessed 19 Feb. 2019].*

[2] *En.wikipedia.org. (2019). Age of Empires (video game) (1997). [online] Available at:* [*https://en.wikipedia.org/wiki/Age\_of\_Empires\_(video\_game)*](https://en.wikipedia.org/wiki/Age_of_Empires_(video_game)%20) *[Accessed 19 Feb. 2019].*

## 6.4 Resources

*Docs.unrealengine.com. (2004). Unreal Engine 4 Documentation. [online] Available at:* [*https://docs.unrealengine.com/en-us*](https://docs.unrealengine.com/en-us%20) *[Accessed 24 Feb. 2019]. -> Unreal Engine 4 -> Starter Content*