Thesis

University of Miskolc

Cross-Platform Game Development in C++

Prepared by:

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Advisor:

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Miskolc, 2026

Miskolci Egyetem
Gépészmérnöki és Informatikai Kar
Alkalmazott Matematikai Intézeti Tanszék **Number:**

Thesis Assignment

For the candidate: Péter Orosz (WO02D7), Computer Science major.

Thesis topic: Software Development

Thesis title: Cross-Platform Game Development in C++

Task details:

The aim of the thesis is to develop a cross-platform game in C++ that demonstrates the application of modern software development principles and design patterns. The graphical rendering of the game should be implemented using the OpenGL library. However, the main focus of the project is not on the complexity of the gameplay itself, but on the reusability, extensibility, and maintainability of the code.

Supervisor: Dr. Péter Mileff (associate professor)

Date of assignment: 2025-09-01

.....
szakfelelős

Declaration of Originality

I, **Péter Orosz**; Neptun code: `WO02D7`, a final-year Computer Science student at University of Miskolc, Gépészmérnöki és Informatikai Kar, hereby declare under penalty of law and disciplinary responsibility that my thesis entitled *Cross-Platform Game Development in C++* is my own independent work; all referenced literature has been used according to the rules of source management.

I acknowledge that in the case of a thesis, plagiarism includes:

- presenting a literal quotation without quotation marks and reference;
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..... program protocol (list, user manual)
..... electronic data carrier (detailed)
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Contents

Chapter 1

Introduction

In recent years, the video game industry has experienced rapid growth, with games becoming increasingly complex and available on a wide range of platforms. This expansion has created a demand for software solutions that are not only visually appealing and engaging, but also maintainable, extensible, and reusable. Developing games that run seamlessly on multiple operating systems, such as Windows and Linux, presents unique challenges for software engineers. These challenges include handling platform-specific differences, managing graphical rendering, and ensuring consistent user experiences across devices.

The motivation behind this thesis is to address these challenges by designing and implementing a cross-platform game using C++. C++ remains one of the most popular programming languages in game development due to its performance, flexibility, and extensive ecosystem. By leveraging modern software development principles and design patterns, this project aims to create a game that is not only functional but also serves as a demonstration of best practices in code organization and architecture. The graphical rendering of the game is implemented using the OpenGL library, which is widely used for high-performance graphics applications and supports multiple platforms.

While the gameplay itself is kept relatively simple, the primary focus of the project is on the quality of the codebase. Special attention is given to reusability, extensibility, and maintainability, which are essential attributes for any long-term software project. The thesis also explores the use of libraries and frameworks that facilitate cross-platform development, such as GLFW, which simplifies window management and input handling across different operating systems.

This work is relevant not only to game developers, but also to anyone interested in software engineering and the application of design patterns in real-world projects. By documenting the development process and the decisions made along the way, the thesis provides insights into the practical aspects of building cross-platform applications and highlights common pitfalls and solutions.

The structure of the thesis is as follows:

- Chapter 2 provides a literature review of existing cross-platform game development techniques, tools, and related work.
- Chapter 3 discusses the design and architecture of the game, including the choice of patterns and technologies.
- Chapter 4 details the implementation process, presenting code examples and explanations of key components.

- Chapter 5 presents the results of testing the game on different platforms and concludes with a discussion of future work and potential improvements.

Through this thesis, the reader will gain a comprehensive understanding of the challenges and solutions associated with cross-platform game development in C++, as well as practical guidance for applying modern software engineering principles in similar projects.