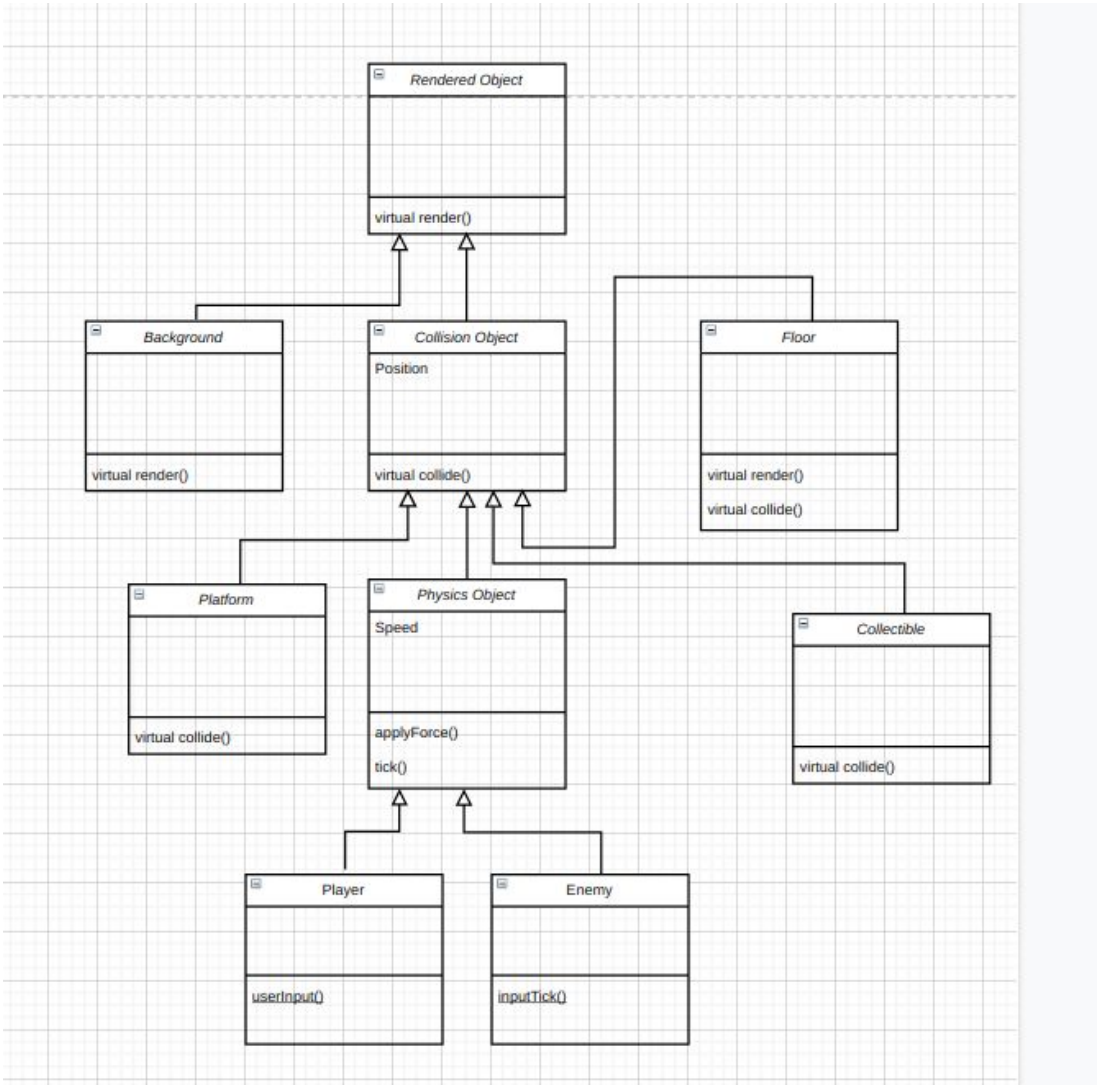
Introduction

Our project is a text-based platformer game built using ncurses. It will allow the user to select a level and maneuver through it by controlling a player object and avoiding enemies and environmental hazards. They will move the player using input from the keyboard in the form of the arrow keys, allowing them to jump and move from side to side. The program will track the player's score and allow them to input a name and store it on a leaderboard.

Assessment Concepts

1. **Memory allocation from the stack and the heap**
    - **Arrays:** A dynamically allocated array will be used to store the different objects that need to be loaded in as the player progresses through the environment.
    - **Strings**: The player can store their name as a string, which will be displayed on a leaderboard along with their score.
    - **Objects:** Each aspect of the environment that needs to be rendered will be stored as an object.
2. **User Input and Output**
    - **I/O of different data types:** The environment will consist of characters and boxes, and will be rendered with printw() and similar ncurses functions. The player's score, represented as an integer, will be displayed on the screen, as well as the name's of the highest scorers on the leaderboard, stored as strings. The player controls the character with the arrow keys, which will be input as key codes / integers. The player can input their name as a string to be represented on the leaderboard.
3. **Object-oriented programming and design**
    - **Inheritance:** A rendered object class is the ancestor to all of the other classes. These classes can then inherit from more specific classes such as one for objects that can be collided with or one for objects that have their own physics.
    - **Polymorphism:** Objects to be displayed on the screen will be stored as generic rendered objects, and then polymorphic behaviour can be invoked to make use of the specific method for rendering whatever type of object they actually are.
    - **Abstract Classes:** The rendered object class will be an abstract class with a generic, virtual render() method. The classes that inherit from it can then implement their own versions of this method.

Class Diagram



Class Descriptions

Rendered Object
A generic, abstract class that all objects that need to be rendered inherit from.

Background
Represents the background to be displayed at the back of the window throughout the game. Inherits directly from the rendered object class because it has no special behaviour aside from being rendered.

Collision Object
A class for objects that have behaviour upon being touched by the player object, but do not have their own physics.

Floor
A class representing the platform that the player can walk along at the bottom of the screen, without falling through.

Platform
A class with similar behaviour to the floor, which the player can walk along without falling through. However, unlike the floor, platform objects are rendered intermittently above the ground, allowing the player to jump onto them.

Collectible
A class for objects that the player can touch in order to gain bonuses such as a higher score or more lives.

Physics Object
An abstract class for objects that are not only rendered, but also can move according to their own physics.

Player
A class representing the object that the user controls with the arrow keys. Includes the implementation for the player's physics, including what happens when they jump and move to the left and right.

Enemy
Represents enemies that the player must avoid or else they will lose lives or score. May have different physical behaviour such as moving across the screen, jumping, and so on.

User Interface

The user interacts with the program through an ncurses window. The different levels are displayed in boxes on the screen, and they can use the arrow keys to select their preferred one. The environment of the level will then be displayed to them, and they can use the arrow keys to maneuver through it. At the end of the game, they can use the keyboard to enter a name that will be displayed on the scoreboard along with their score.

Code Style
All code should be indented properly with 4 spaces. Lines should generally not be longer than 120 characters.

Each class should be in its own file. Classes will be separated into separate interface (.h) and implementation (.cpp) files. Preprocessor include guards should be used in each header file.

Classes should be named in UpperCamelCase according to the function of the class. Variables and functions should be named in snake_case. For variables with short lives (eg, loop index variables), short names (i, n, etc) can be used for terseness and readability. Other variables should have a descriptive name according to their purpose. Class member variables should always have a descriptive name, with no affixes.

Unless a function is trivial, or the behaviour is obvious from the name (ie, getters and setters, basic calculations), a comment should be given to describe the function's behaviour. In

general, comments should be written for any code that has behaviour that isn't obvious at a glance. Abstract classes should generally have all methods documented to describe the behaviour they should be implementing. Comments should be written as the code they're documenting is written.

The code should be periodically checked to ensure these standards are being followed.

Testing

Multiple different testing methods are going to be employed during our testing process, including automated testing, regression testing and white and black box testing.

Our files would be tested by executing the makefile to compile the completed components of our code. This is an example of regression testing to ensure all previous components are present when tested, and that the new code is able to behave as intended in synchronisation with the previously implemented code. Integration testing is also exhibited through this process, as the different classes and their interactions are being tested.

Automated, unit testing will be also utilised to test each class code in order to both reliably cover all the components, as well as reduce the resources and requirements per individual test trial. For example, each new class will likely be tested using automated testing through specific inputs within the test files. The test files will be executed among compiling and would consider a wide variety of inputs, such as regular expected inputs as well as edge cases.

Both white box and black box testing will also be utilised in the testing process to cover a wide boundary of what the user may do. White box testing will be employed through testing the program as intended for the user, to see how the program generally runs if any improvements are required, and black box testing would be used to test for edge cases, or specific features.

Schedule

Prior to Week 9 Assessment

- Write the specification document
- Set up the code structure and code sharing
- Create a makefile to compile and run all of the code and tests
- Outline the testing strategy

Prior to Week 10 Assessment

- Code the different abstract classes
- Develop the player physics
- Create the behaviour for rendering and colliding with the basic aspects of the environment, including the floor, platforms, and background
- Create a basic level by storing these environmental aspects to be rendered in a dynamic array

- Develop and progressively run automated tests for each of these aspects of the code
- Plan how to split the workload for the rest of the project

Prior to Week 11 Assessment

- Develop non-essential classes for the enemies and collectibles
- Implement a mechanic to track the player's score
- Allow the player to enter their name to be stored on a leaderboard
- Implement additional levels
- Review the code for efficiency
- Develop additional tests and ensure existing ones are exhaustive and cover all aspects of the code
- Ensure that the code is readable and in-line with the outlined code style
- Review the rubric and ensure the project covers all aspects of it