# Institute of Geographical Information Systems

## CS-212 - Object Oriented Programming

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| **Semester: Fall 2025** | **Class: SCEE-IGIS - 2024** |
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| **Submitted to: Ma'am Alvina Anjum** | **Due Date: Oct 31, 2025** |

## Assignment # 2

### Objective

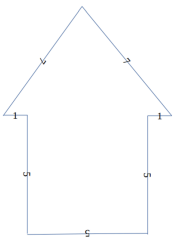
Upon completing this assignment, you should be able to implement a simple class, as well as gain a better understanding of the building and use of classes and objects.

### Task

You are to write a class called **House**, using filenames **house.h** and **house.cpp** that will allow creation and handling of House objects as described below.

### House Dimensions

- Each house object should be pictured as follows
- The base of the house is a square with a given side length. Minimum length is 3,maximum is 37. This will be referred to as the base size of the house.
- The roof of the house is an equilateral triangle. An equilateral triangle is a triangle in which all three sides are equal length
- The roof will always overhang the base by one length unit on each side, so the length of the triangle's side will always be 2 units more than the length of the square's side
- Any calculations for the object are based on the dimensions described above. The ASCII drawing, we will do is an approximation of this.



## Class Details

1. The single constructor for the House class should have 3 parameters: an integer size (required), which is the base size of the house; a border character (optional, with a default of uppercase 'X'); and a fill character (optional, with a default of '*'). If the size provided is less than 3, set the size to 3. If the size provided is greater than 37, set the size to 37. Border and fill characters should also be checked, see SetBorder/SetFill for valid characters. The class will need to provide internal storage for any member data that must be kept track of.

2. There should be member functions **GetSize**, **Perimeter**, and **Area**, which will return the house's base size, the perimeter of the house, and the area of the house, respectively. The first 2 should return *integer* results. The Area function should return its result as a *double*. Note that for Area, you'll need to compute the areas of the triangle root and the square base, and combine them.

3. There should be member functions **Grow** and **Shrink**, which will increase or decrease respectively the base size of the house by 1 unless this would cause the size to go out of bounds (out of the 3-37 range). If the size would go out of bounds, Grow and Shrink should make no change to the size.

4. There should be member functions **SetBorder** and **SetFill**, which each allow a new border or fill character respectively to be passed in as a parameter. Find a chart of ASCII characters in the online. The characters that should be allowed for the borderor fill characters are any characters from the '!' (ASCII 33) up through the '~' (ASCII 126). If an attempt is made to set the border or fill characters to anything outside the allowable range, the function should set the border or fill back to its original default (the ones listed for the constructor – the border default is 'X', the fill default is '*').

5. There should be a member function called **Draw** that will display a picture of the house on the screen. You may assume that the cursor is already at the beginning of a line when the function begins, and you should make sure that you leave the cursor on the line following the picture afterwards (i.e. print a newline after the last line of the house). Use the border character to draw the border of the house, and use the fill character to draw the internal characters. Separate the characters on a line in the picture by a single space to make the house look more proportional (to approximate the look of an equilateral triangle and a square). You may not use formatting functions like setw to draw the figure. This must be handled with loops. You will only print out the newline, spaces, the border character, and maybe the fill character on any given line. Note that the bottom of the root and the top of the base will be on a shared line – the overhand area will be border characters, but everything internal will be fills. See the sample run to see exactly how this should look.

6. Provide a member function called **Summary** that displays all information about a house: its base size, perimeter, area, and a picture of what it looks like. When displaying the area (decimal data), always show exactly 2 decimal places. Your output should be in the exact same format as mine (seen in the linked sample on the assignments tab).A sample driver program is provided that uses objects of type House and illustrates sample usage of the member functions. Your class declaration and definition files must work with the main program as is (do not change the program to make your code work). You are encouraged to write your own driver routines to further test the functionality of your class as well. Most questions about the required behavior of the class can be determined by carefully examining the driver and sample execution. Keep in mind this is just a sample, your class must meet the requirements listed in the specification and not just satisfy this driver program (for instance, not all illegal fill characters are tested).

Your class will be tested with a larger set of calls than this driver program represents.

## General Requirements

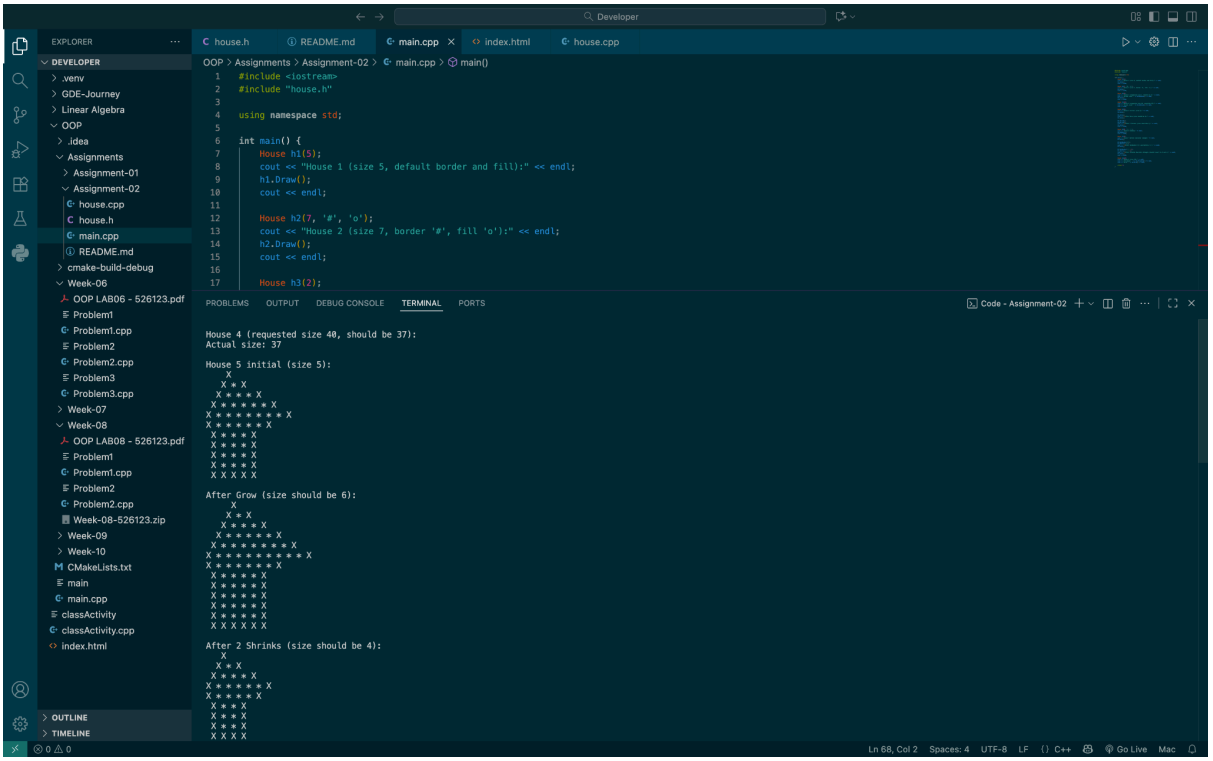
- No global variables, other than constants!
- All member data of your class must be private
- You will need to use the <iostream> library for output. You may use the <iomanip>
- library for formatting your decimal output to two places if you wish to use the
- parameterized stream manipulators, but you may not use setw or other output
- formatting functions for drawing the actual figure. You may use the <cmath>library
- Do not use language or library features that are C++11 only
- When you write source code, it should be readable and well documented
- Your **house.h** file should contain the class declaration only. The **house.cpp** file should
- contain the member function definitions.

## Submitting

Submit your **house.h, house.cpp**, and **README** files.

## General Advice

- Make sure to double check your LMS submission to make sure everything works when downloaded.
- Periodically (e.g. nightly) make a backup of your assignment to another machine (e.g. personal computer, email). Computers die and accidents happen, having a backup prevents youfrom having to start from scratch.
- Make sure to include the README file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.venv
GDE-Journey
Linear Algebra
OOP
.idea
Assignments
Assignment-01
Assignment-02
house.cpp
house.h
main.cpp
README.md
cmake-build-debug
Week-06
OOP LAB06 - 526123.pdf
Problem1
Problem1.cpp
Problem2
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Week-07
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Problem1
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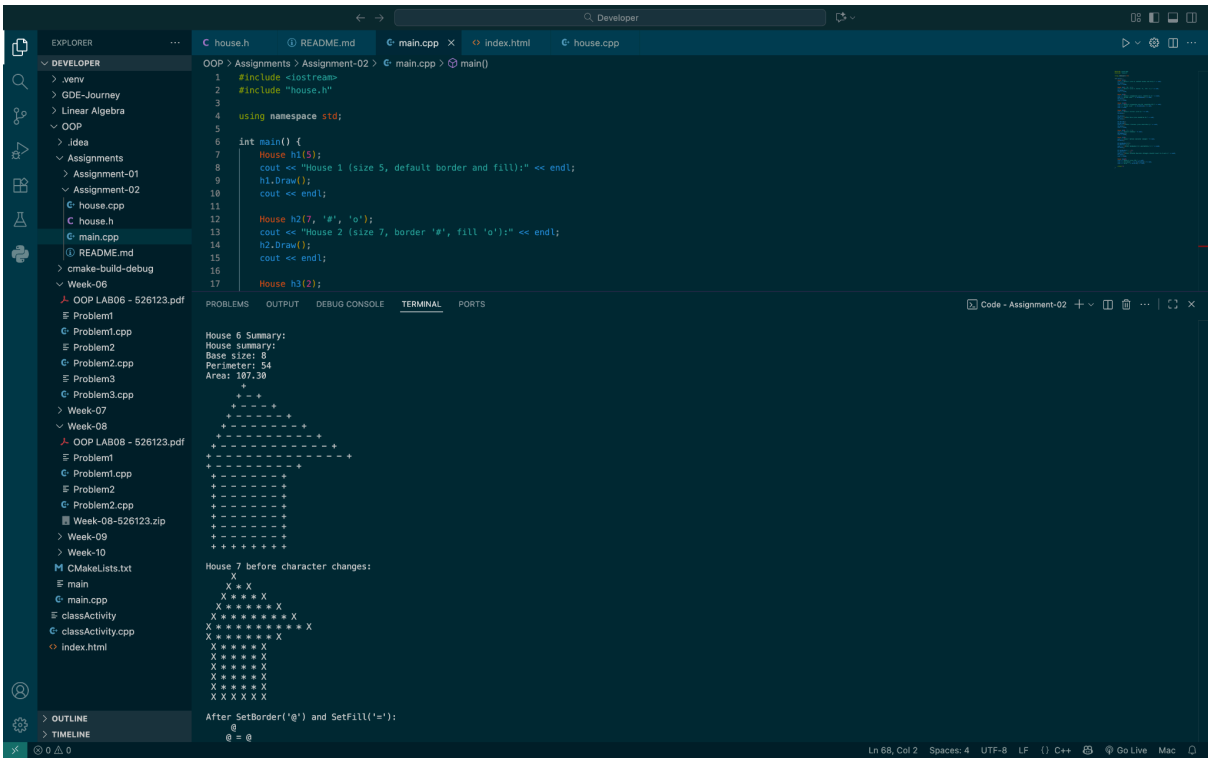
Week-09
Week-10
CMakeLists.txt
main
main.cpp
classActivity
classActivity.cpp
index.html
OUTLINE
TIMELINE
house.h
README.md
main.cpp
index.html
house.cpp
OOP > Assignments > Assignment-02 > main.cpp > main()
#include <iostream>
#include "house.h"
using namespace std;
int main() {
House h1(5);
cout << "House 1 (size 5, default border and fill):" << endl;
h1.Draw();
cout << endl;
House h2(7, '#', 'o');
cout << "House 2 (size 7, border '#', fill 'o'):" << endl;
h2.Draw();
cout << endl;
House h3(2);
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Code - Assignment-02
House 4 (requested size 40, should be 37):
Actual size: 37
House 5 initial (size 5):
After Grow (size should be 6):
After 2 Shrinks (size should be 4):
Ln 68, Col 2
Spaces: 4
UTF-8
LF
C++
Go Live
Mac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h1.Draw();
cout << endl;
House h2(7, '#', 'o');
cout << "House 2 (size 7, border '#', fill 'o'):" << endl;
h2.Draw();
cout << endl;
House h3(2);
PROBLEMS
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DEBUG CONSOLE
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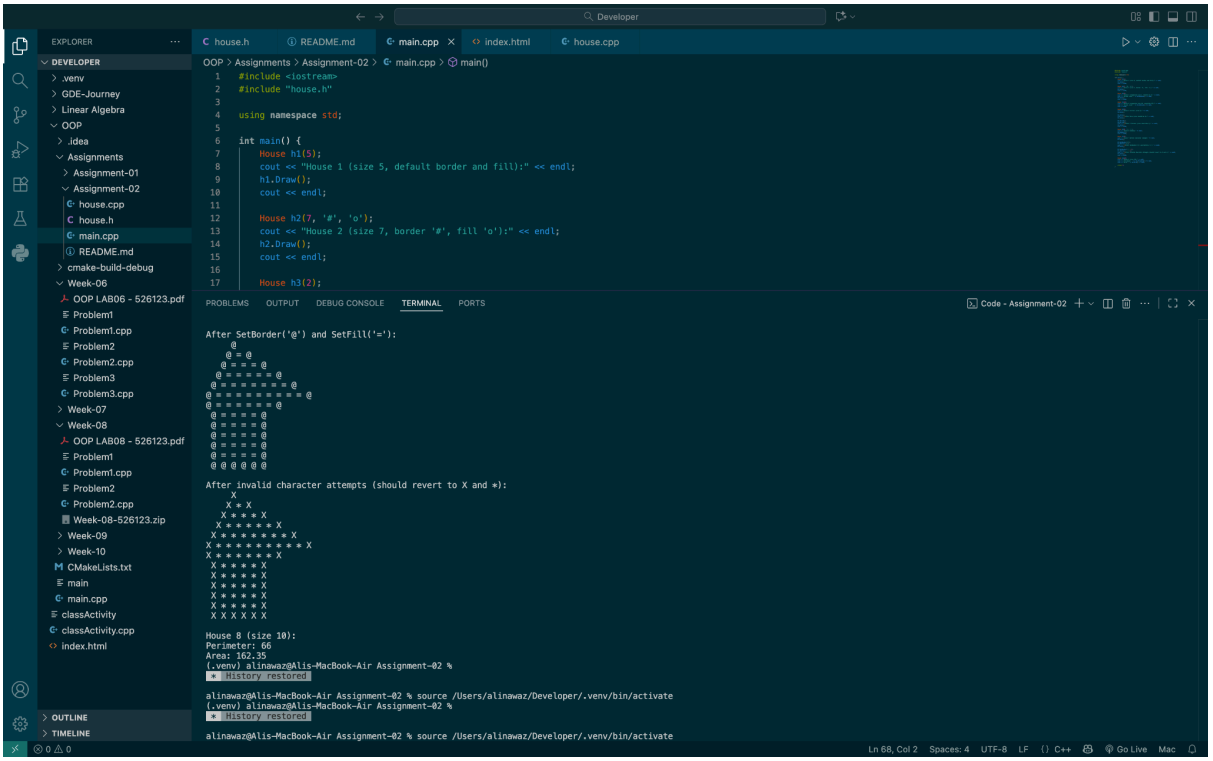
PORTS
Code - Assignment-02
House 6 Summary:
House summary:
Base size: 8
Perimeter: 54
Area: 107.30
House 7 before character changes:
After SetBorder('@') and SetFill('='):
Ln 68, Col 2
Spaces: 4
UTF-8
LF
C++
Go Live
Mac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#include "house.h"
using namespace std;
int main() {
House h1(5);
cout << "House 1 (size 5, default border and fill):" << endl;
h1.Draw();
cout << endl;
House h2(7, '#', 'o');
cout << "House 2 (size 7, border '#', fill 'o'):" << endl;
h2.Draw();
cout << endl;
House h3(2);
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Code - Assignment-02
After SetBorder('@') and SetFill('='):
@
@ = @
@ = = @
@ = = = = @
@ = = = = = = @
@ = = = = = = = = @
@ = = = = = = @
@ = = = = @
@ = = = = @
@ = = = = @
@ = = = = @
@ @ @ @ @
After invalid character attempts (should revert to X and *):
X
X * X
X * * * X
X * * * * * X
X * * * * * * * X
X * * * * * * * * * X
X * * * * * * X
X * * * * X
X * * * * X
X * * * * X
X * * * * X
X X X X X X
House 8 (size 10):
Perimeter: 60
Area: 162.35
(.venv) alinawaz@Alis-MacBook-Air Assignment-02 %
History restored
alinawaz@Alis-MacBook-Air Assignment-02 % source /Users/alinawaz/Developer/.venv/bin/activate
(.venv) alinawaz@Alis-MacBook-Air Assignment-02 %
History restored
alinawaz@Alis-MacBook-Air Assignment-02 % source /Users/alinawaz/Developer/.venv/bin/activate
Ln 68, Col 2
Spaces: 4
UTF-8
LF
C++
Go Live
Mac