Introduction to Computer Graphics
Project Notes

Oregon State University

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Oregon State University
Computer Graphics

Why Are These Notes Here?

These notes are here to:

1. Help you setup and run your projects
2. Help you get everything in the right format for submission
3. Help you get a **better grade** by doing all of this correctly!

better grade!
better grade!
better grade!
better grade!
better grade!

Office Hours

- The TAs and I will host Office Hours on Zoom. We will set those hours as soon as we see (from the web form on the Class Resources Page) what hours people are most likely to attend.

- There are no Office Hours exclusively assigned to particular sections. *Anybody* can go to *any* Office Hours.

- Try different people's Office Hours. The TAs and I all have different OHs days, times, and styles. See whose OHs best fit your schedule and needs.

- If Office Hours are not working for you, let me know right away. We will find a way to make them work for you.

- We enthusiastically encourage Office Hour "Lurkers". That is, it is OK to come to OHs without any specific questions and just listen to the other questions and answers. Because we will be on Zoom, you can get other things done while you listen in. I have noticed that lurking on OHs is an extremely effective way for you to catch hints and advice on doing the projects. Take advantage of this! Others will. Don't be left out.

Running Your Projects

- As this is a computer graphics course, you need to find *somewhere* to run your programs that have graphics display hardware on them. ***flip* is not one of these places.**

- If you don't have access to your own graphics system, then you can use what we have at OSU. **On-campus users** will have access to Windows and Linux systems on-campus.

- **Off-campus users** can access our Citrix system. This is a good solution, but not a great solution. Your life will be smoother if you can find a local graphics system. See the next slide.

Compiling and Running Your Projects via Citrix

Citrix allows you to get remote desktop access to other systems. To put Citrix on your own machine, go to **https://citrix.com/downloads**, select your operating system, and click on **Download**

Click **Add Account** and enter your ONID email (e.g., jgraphics@oregonstate.edu)

Click on **Continue** to configure your account

Enter your ONID email and password in the dialog box, and click **Logon**

When you run Citrix, click on the **Desktops** icon at the top

Go to: **https://it.engineering.oregonstate.edu/citrix/** for more information

Visual Studio Compilation Notes

If you are on your own ***Windows system***, you can get Visual Studio 2022 by going to:

https://azureforeducation.microsoft.com/devtools

Click the blue **Sign In** button on the right.

Login using your onid@oregonstate.edu username and password.

I recommend you get **Visual Studio 2022 Enterprise**. Don't get Express.

Note that *vscode* is not a compiler. It is a way to interface to your file system.

Once you have Visual Studio, download the class file **SampleWindows.zip**, unzip it on your system, and then double-click on the **.sln** file

Linux Compilation Notes

If you are on your own ***Linux system***, compile using g++:

The typical g++ compile sequence is:

```
g++   -o sample   sample.cpp   -lGL  -lGLU  -lglut  -lm
```

Note that the second character in the sequences "-lGL", "-lGLU", and "-lglut" is an ell, i.e., a lower-case L. This is how you link in the OpenGL libraries.

Note that the second character in the 3-character sequence "-lm" is an ell, i.e., a lower-case L. This is how you link in the math library.

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Download the file **SampleLinux.tar**, un-tar it on your system (tar -xvf SampleLinux.tar), and then type ***make***

Mac Compilation Notes

If you are on your own ***Apple Mac system***, compile using g++:

The typical g++ compile sequence is:

```
g++ -framework OpenGL -framework GLUT sample.cpp -o sample -Wno-deprecated
```

Download the file **SampleMac.tar**, un-tar it on your system (tar -xvf SampleMac.tar), and then type ***make***

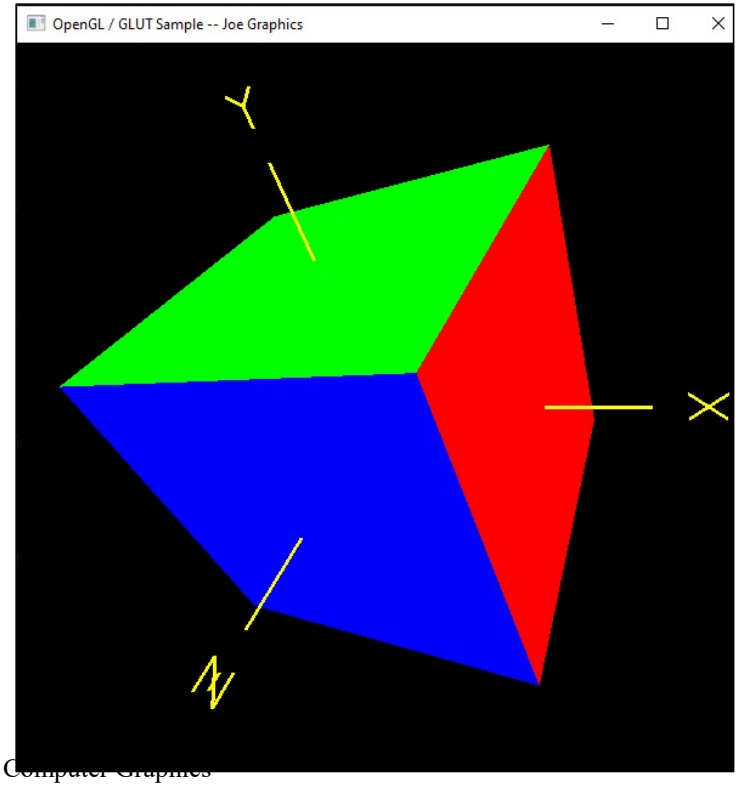
The standard place to put OpenGL include files looks like this:
#include <GL/gl.h>

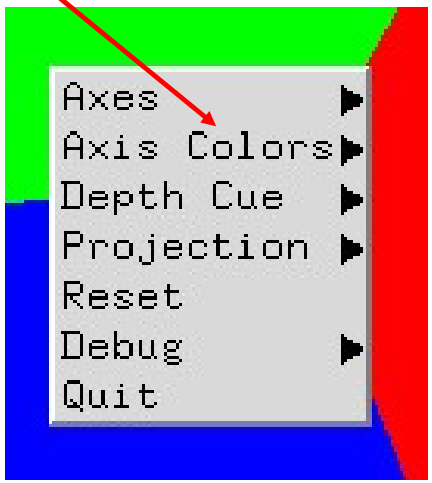
Apple changed this to:
#include <OpenGL/gl.h>

This change has been made in your sample code.

Here's What the sample.cpp Program Should Look Like

- Holding down the left mouse button and moving the mouse causes a 3D rotation
- Holding down the middle mouse button and moving the mouse causes a scaling
- Holding down the right mouse button brings up this menu:





Project Turn-in Procedures

Your project turnins will all be electronic.

Your project turnins will be done at **http://teach.engr.oregonstate.edu** and will consist of:

1. Source files of everything (.cpp, .vert, .frag)
2. A report in PDF format.

Submit these files separately. Don't zip or tar (etc…) anything!

Electronic submissions are due at 23:59:59 on the listed due date.

Your PDF report will need to include:

1. A title area on the first page: your name, email, project number, and project name
2. A description of what you did to get the display that you got
3. A couple of screen captures to show your program in action
4. A web link to a video showing your program in action

Your project will be graded and the score posted to Canvas.

If you did not get full credit, your grade will have an attached Canvas note telling you why.

Teach Doesn't Work the Way You Think It Does

The Scenario:

Joe Graphics submits his project PDF file to *Teach* on time. He then realizes he didn't submit his .cpp file, so he makes another *teach* submission with just the .cpp file, thinking that he is *adding* the .cpp file to the PDF he already submitted.

What happens to his grade?

He gets a big fat ***zero***, because *Teach* does not add new submissions to old submissions. *Teach starts new submissions over from nothing.* So, Joe Graphics's project Teach folder just shows his .cpp file. His PDF is not there. We didn't find it, so we didn't grade it.

The moral of the story: if you need to add more files to your *Teach* submission, re-submit *everything*.

Project Video

In order to get your project graded, you need to make a video of your program in action:

- You can use any video-capture tool you want. If you have never done this before, I recommend **Kaltura** **or** **Zoom**.
- You can get Kaltura instructions here: **http://cs.oregonstate.edu/~mjb/cs557/Handouts/kaltura.1pp.pdf**
- If you use Kaltura, be sure your video's permissions are set to ***Unlisted*****.** If the permission isn't set to **Unlisted**, then we won't be able to see it and we can't grade your project. *You need to proactively do this through http://media.oregonstate.edu -- this is not what the default setting is.* A good way to see if this is set properly is to give the link to a friend and see if they can open the video.
- Although not required, we love it when you narrate your video so you can tell us what you did. We have found that our grading of your project is far more fair and accurate when there is narration..
- Don't make your video overly long! Show what we need to see to grade it. ***Do not walk us through your code!!*** If we want to see your code, we will look at your .cpp file.
- Be sure that you include the web-link to your video in your PDF report!

Silly Ways to *Lose Points* on Your Project

- You didn't put your name and email on the title page of the PDF report (-5)
- You submitted some other file type for your report other than a PDF (-5)
- You zipped or tarred (etc.) some of your submission files (-5)
- You didn't put a link to your video in your PDF report (-5)
- You didn't change your video permission to *Unlisted* (-5)

Bonus Days

Projects are due at 23:59:59 on the listed due date, with the following exception:

Each of you has been granted **5** Bonus Days, which are no-questions-asked one-day project extensions which may be applied to most projects, subject to the following rules:

1. You cannot use any Bonus Days on Project #1, the Final Project Proposal, the Final Project, and the 550-only Paper Project.
2. Of the other projects, no more than **2** Bonus Days may be applied to any one of them.
3. Weekends and holidays count as “days late”.
4. Really what I do is look at your turnin *date*. Your turnin date minus the due date is how many “days late” your project is.
5. The project grade is zero if you turn it in later than you have Bonus Days left to cover.
6. The project grade is zero if you turn it in more than 2 days late.

Bonus Days

To use Bonus Days on a given project:

- You don't need to let me know ahead of time.
- Turn-in promptness is measured ***by date, not by time***. Don't worry if *teach* tells you it's late because it is between 23:30:01 and 23:59:59. But, *after* 23:59:59 on the posted due date, **it's late!**
- *teach* has been instructed to allow your turn-in, no matter when you do it. But, we will only grade it if it is turned in ≤ 2 days after the due date.
- I run a script to identify the projects that need to have Bonus Days deducted.
- I keep my own spreadsheet of who has used how many Bonus Days. If you are not sure how many you have left, send me an email and ask.

Keys to Succeeding on Your Programming Projects, I
(based on me having been through this a lot with your predecessors)

Start early! Stop rolling your eyes at me. You don't have to *finish* early but make a small start as soon as you can. Get the project folder setup. Bring in any other files you will need. Make sure it still compiles. Once you are over the speed bump of *starting*, you will be surprised by how easy it is to do little bits of the project during those nooks and crannies of time we all have. Also, you will be surprised by how much more meaningful all those hints are that you are going to be hearing in class, Live Lecture, and Office Hours. Starting early really does smooth the path to finishing.

Lurk in Office Hours! Because they are on Zoom, you can still be doing other things, but just lurk and listen for hints or for questions you realize you need to know too.

Work through the projects a small chunk at a time! Don't try to do the whole project at once. It won't work, and you will be stuck with a big, fat, confusing debugging mess. Do something really small and get that to work. (Draw the object all by itself at the origin.) Use simple, trusted, objects at first (e.g., OsuSphere). Then add another small piece. Then another. Then another. If a step doesn't work, you will know *exactly* what additional code was at fault.

Keys to Succeeding on Your Programming Projects, II
(based on me having been through this a lot with your predecessors)

Track what your program is doing! It sounds old-fashioned, but I have noticed that many of you are best at visualizing what your program is doing when you read print statements like you are reading a story. Use strategic print statements! Guessing is futile and a waste of your time. And, don't use printf – fprintf to stderr, like this:

fprintf(stderr, "I am now drawing to x=%f, y=%f, z=%f\n", x, y, z);

The text still shows up in the same place as a printf does, but if the program crashes, you get to see *all* the printout.

Backup your code! Something with version control, like git is best, but simply zip'ing or tar'ing the entire project folder, giving it a filename of the current date (e.g., Oct06b.zip), and storing it in your Google Drive or Dropbox (or something else in the cloud, not on your local machine) works wonders for when you accidentally delete multiple lines of code that used to work.