

Term Paper

CS410 Fall 2015

Motivation

This course is about graphics, but it is also a Capstone course for the CS department. That means that in addition to learning a new subject (i.e. graphics), you are supposed to integrate and build on what you learned in previous courses as part of this course. It also means there is a writing requirement.

This class focuses on the underpinnings of graphics: computational geometry via linear algebra, surface reflectance and refraction, and pin-hole projection models. Although it does discuss some algorithms, for example intersection algorithms, it does not discuss programming. The idea is that you already know how to program, and will apply what you learned in previous classes to translate ideas about graphics into working code. In particular, you will write a ray tracing system from scratch, in either C++ (which you learned in CS253) or Java (CS 160/161/200).

To encourage introspection about this process, you will write a term paper identifying one programming technique and one software tool that you learned in an earlier CS class, and describing how you employed that technique and that tool in the process of designing, implementing and/or testing your ray tracer. To make sure that you do employ techniques and tools from earlier classes, you will identify the technique and tool you will write about early in the second week of classes. This should remind you to use the technique/tool, and to record how and when you used it in your notes, for later inclusion in the term paper.

Requirements

Your term paper will describe one programming technique and one software tool that you learned in CS253 or in a higher level (300-level or above) CS course. Your paper will be not longer than 3 pages (11 point font or higher, at least one inch margins) and will be divided into two sections: one section for the programming technique (2 pages maximum), and one section for the software tool (1 page maximum).

The programming portion of your term paper will be evaluated according to whether it (1) briefly describes the technique, (2) justifies why you chose it, (3) describes how it was used in your project, and (4) provides evidence of its use. For example, if your technique is a design pattern from CS314, you would describe the pattern, why you chose it, and then show how your software implements the pattern. The software tool section will be evaluated according to how well it (1) briefly describes what the tool does, (2) relates the tool to the programming technique in the other section, and (3) provides evidence that the tool was used,

In addition, both sections will be evaluated according to the quality of writing. This includes using proper English grammar, standard spellings (for American English), and well-structured paragraphs. Also, *all writing must be your own*. Use of other people's words without attribution or in large chunks is

plagiarism. Plagiarized papers will be reported to the university academic integrity office as well as receive a grade of 'F'.

Possible Topics

There are many possible programming techniques you might choose, some of which depend on the language that you choose to implement your ray tracer in. .

Examples of programming techniques include:

- Systematic dynamic memory management (from CS253, C++ only)
- Multiple Inheritance (from CS253, again only in C++)
- Test-driven programming (from CS314)
- Design Patterns (from CS314)
- Multithreading (from CS370)

Examples of tools include (but are not limited to):

- Test frameworks (such as JUnit or Google Test)
- Profilers (such as valgrind)
- Configuration management tools (such a Subversion or Git)

Deadline #1: Tuesday, Sept. 1

By the start of class on Tuesday, Sept. 1 you will submit a bullet list with two items on it, specifying which technique and which tool you will write about. If I believe the technique and/or tool is inappropriate, I will explain why and give you one more week to choose more appropriate ones.

Please choose your technique and tool carefully. They should be things you are comfortable using, as you will not be allowed to change. Your final term paper must address the technique and tool you list here.

Deadline #2: Thursday, Dec. 3

By the start of class on Thursday Dec. 3rd you will submit your term paper. That is the Thursday of the penultimate week of classes.

Submission

Writing assignments, like programming assignments, are to be submitted through the checkin page of the class web site.