

POLYTECHNIC COMPUTER SCIENCE - SPRING 2012

PROGRAMMING PROJECT #7

INDEPENDENT PROJECT #3

ASSIGNMENT OVERVIEW

In this assignment you'll be working on an independent project of your own choosing, subject to the approval of the instructor. Some possible options that you might consider—either as actual topics of study or as inspiration for something similar—are listed below.

This assignment, including both the project and your presentation, is worth a total of 200 points and is due during the last week of class.

BACKGROUND

We've spent the last twelve weeks in this course investigating various aspects of computer science, computer programming, and technology. As a culminating project in here, you will be pursuing further study in one of the topic areas that we've covered, or of investigating some aspect of computers and technology that we haven't yet had a chance to cover in much detail.

ASSIGNMENT SPECIFICATIONS

Pursue an independent study of some aspect of computer science, computer programming, or technology. Prepare a "document" of a nature appropriate to your project—hardware, software, code loaded onto the server, a written report—and present your project in a 10-15 minute presentation to the class during the last week of the semester.

Projects that you might consider:

a. **Computer Game - Graphics Based**

Pygame, available at pygame.org, is a powerful module that can be used to develop a graphics-based games and projects. Use Pygame to create a computer-based game of your own design, or use **graphics.py** to create a computer-based game: Hangman? Scrabble?

b. **Computer Game - Text Based**

There are lots of games that can be programmed without having to resort to developing graphics: Rogue, Mastermind... Use Python to create a computer-based game of your own design.

c. **Website**

We built a small-ish website over the course of a couple of days. Build a more extensive and professional website using HTML, or investigate PHP/MySQL and create a dynamic site.

d. **Study of Recursion**

Recursion can be a powerful tool for studying the behavior of certain functions, or even solving certain types of problems such as "The Towers of Hanoi." Learn more about this subject, and build programs to demonstrate the process of recursion.

e. **Research**

Find some aspect of computers, computer programming, or technology that you find interesting and investigate it. Possible topics:

- i. "What is *Stuxnet*?"

- ii. “Cellular Automata”
- iii. “Turing Machines and Artificial Intelligence”
- iv. “The Twitter Hack: an example of social hacking”
- v. “Encryption Methods: Are we secure?”

f. **Hardware-based Project**

Build something that is computer or microprocessor related. Possibilities:

- i. Something with an Arduino board (\$50-\$150)
- ii. Your own gaming PC (\$200 - \$2000)

You may consider other options as well, subject to the approval of the instructor.

DELIVERABLES

Deliverables for this assignment are going to vary depending on your chosen project:

- Regular (almost daily) updates on the Progress Report spreadsheet, located online at the URL emailed to you. Complete your update as instructed on the shared document every day at the end of class, and feel free to supplement your update based on work you do in the evening.
- Program-based projects require a zipped file (**independentproject3-lastnamefirstinitial.tgz**) containing a directory with all supporting files, including programs, non-standard python modules, external files, and documentation as necessary. At the very minimum, your zipped directory will need to include a single program file and a README.txt file that explains the program and provides supporting documentation as necessary. Your program file will also need more specific documentation as discussed in this course.
- Research-based projects and hardware-based projects require a zipped file (**independentproject3-lastnamefirstinitial.tgz**) containing a directory with a PDF version of a written report (minimum 7 pages, including cover page and References page), a PDF copy of your PowerPoint-style presentation, and a README.txt file that explains the contents of the directory.
- All projects require a live presentation in class of your project, 10 minutes minimum in length, with additional time for question/answer session afterwards as necessary. The format of your presentation will vary depending on your topic, but all presentations must include a multimedia component: PowerPoint-style presentation in the case of research or projects, or code presentation and run in the case of software projects. A handout for the presentation is a nice touch, but not required.

You should keep a copy of your files in your home folder on the server—see additional comments on backup strategies below. To submit your assignment for grading, zip your deliverables as specified above into a .tgz file and upload it to the instructor’s Dropbox folder at *crashwhite.polytechnic.org* before the deadline.

1. Please be sure to use the specified file-naming convention.
2. Save a copy of your file on your hard drive, flash drive, etc..
3. Your grade will be based on the files you upload and your presentation to the class.

ASSIGNMENT NOTES

- Now is an especially important time to consider your digital backup strategy. The experts recommend that you have:
 - *Three* copies of your data
 - *Two* different types of media (magnetic disk, CD/DVD, flash drive, or hard copy)
 - *One* copy offsite

Thus, if you have one copy of important files on your home computer, one copy on a USB drive, and one copy on the school's server (offsite), you'll be covered.

You are *strongly* encouraged to consider buying an automatic, offsite backup plan. Backblaze, Mozy, and Carbonite all offer backup solutions that copy your computer's data over the Internet for around \$5/month. You *will* lose data sometime in your life—photos, music, college essays, emails, financial records—and your only solution at that point will be to restore from a backup.

- For program-based projects, you can expect that there will be good days and bad days in terms of the progress you make. It's not uncommon for several days worth of work to be discarded after trying an approach to a problem that ultimately doesn't work—some of you have experienced this fact already. Be patient with yourself, and make sure to leave some time for unforeseen circumstances.
- For research-based projects, you've already had the experience of performing research: looking for materials of suitable quality, assembling those materials, creating a presentation and report based on those materials. References used in your project must be cited, appropriate, and "legitimate." An online article from *Slashdot* or *TechCrunch* isn't good enough, but a white paper published by Symantec is. If you have questions about the whether or not a specific reference is acceptable, it probably *isn't*, but check with me.
- The purpose of this project is to give you some freedom to explore an aspect of this course that is interesting to you. The quality of that work should represent the 15-20 class days that you have to work on it. Impress us!

GETTING STARTED

1. Take a day or three to give some thought to what you want to do for your project, and submit your proposal on the spreadsheet online. I'll be doing the same thing (doing an independent project, filling out the spreadsheet), so if there's any question about what to do, copy me. :)
2. Make a general game plan for what you plan on doing over the next couple of weeks. This might be a little difficult, especially if you're taking on something that you're not quite familiar with, like using Pygame. Make sure you budget a day for comments and sprucing up your code, and a day for preparing your files for delivery and creating your PowerPoint presentation for the class. Those things take time too.
3. If you've chosen a project that's appropriately difficult—and you *should!*—you might find yourself slipping behind self-imposed deadlines. In that case, you've got a few options:
 - a. accept that it's crunch time and get busy—with enough time, you can solve any problem
 - b. make appropriate modifications to your game plan and document them on the progress report spreadsheet
 - c. keep going, and accept that your project is not going to be as successful as you'd hoped it would be. That happens sometimes.

QUESTIONS FOR YOU TO CONSIDER (NOT HAND IN)

1. Working with computers is typically considered a solitary activity, and many people consider tech-savvy people to be "geeky" and socially awkward. Is there something inherent in technology or in computer programming that rewards working alone? What are the advantages and disadvantages to working alone

on a project?

2. Have you ever lost data from a computer or cellphone? If the hard drive on your computer were to crash right now, what would be the impact on your life?