Study Guide for Quizzes

Quiz 1 - Friday 2/24/17

Quiz one will cover all of the lectures and labs we have done so far up to and including Lab 5 (See Spring2017Schedule.md for more info). Format will be some multiple choice questions and some free response (see previous example test posted in the slack channel). Review all lecture/guest lecture notes and all labs. Make sure you have a solid understanding of how Github works.

For this quiz I would recommend having the following software installed beforehand.

Python

Latex

For the lecture Bill Hoffman presented on CMake, use the OFFLINE version of it.

Additionally since this quiz is open notes (but closed internet), I would recommend bringing whatever notes you have taken to the quiz as well as cloning the class repository(git clone https://github.com/rcos/CSCI2963-01-Spring2017.git). You can then access all the lecture notes from the HTML Lectures folder. You can go to the HTML Lectures/index.html and open all of the lecture notes from there.

Make sure all of your lab code is on your local computer as you are allowed to refer to it during the quiz and may find it helpful to do so.

Topics that I would review for the quiz are:

- Principles of Open Source (What is the definition of Open Source? What are the Four Freedoms of Open Source?)
- Know CMake and what is going on when you use it (Review Build Systems Lecture)
- Why is it important to have community?
- Why is documentation important?
- Why is testing important?
- Given a program, implement a new feature or add unit tests (know how to do both)
- Know how to analyze a program (describe what is going on in a program)
- Know the basic flow of github/git from the command line (Review GitHub Tutorial)
  - Basic flow is add->commit->push
  - Know how branching works and what checkout command does

  - Know how pull requests works

- Know what is a merge conflict, how it can arise and how to resolve it.
- Know how to solve and write Regular Expressions (RegEx) (Review RegEx Tutorial)
- Why is it important to choose a license? What are some licenses and what advantages or disadvantages do they have compared to others?
- Given a mathematical expression or equation know how to write it in Latex

If you have any more questions feel free to contact the Undergraduate Programming Mentors or Professor Moorthy (preferably on the slack channel) before the quiz! Good luck everyone!

Sample Questions -

Find the bugs in the testing program. If you want to run this, compile using with the -std=c++11 flag (g++ -std=c++11 testing.cpp -o main.exe). How could you write unit tests to easily identify these bugs? Write a prev and next function and write unit tests for them. Prev/Next should choose the previous and next days from the starting vector based on the current day selected (Be careful about edge cases!). For example if I have "WEDNESDAY" currently selected prev() should give me "TUESDAY" and next() should give me "THURSDAY". If I have "SUNDAY" selected next() should give me "MONDAY" and if I have "MONDAY" selected prev() should give me "SUNDAY". Write unit tests for prev/next/randomize functions (think about what the program is changing and how to check it). Specifically write tests to show - * 1 day from a SUNDAY will be a MONDAY * 2 days before a TUESDAY will be a SUNDAY * 40 days from a FRIDAY will be a WEDNESDAY * 87 day before a WEDNESDAY will be a SUNDAY

Write the following formulas in Latex (optional integrate the integral ignoring the y = 0 and y = 5 limits and write the formula for it using c for the constant)

Formulas

Write a regex expression to check if a string contains only AlphaNumerical (A-Z, a-z, 0-9) characters

How would you resolve the following merge conflict (pick whichever one you feel is correct)-

<<<<<<< HEAD To whom'st'd've'ed it may concern, ======= To whom it may concern, >>>>>>> da18a796d6f3715b9bb0c58b8ef63a96aebf8511 Hello from the other side I must have called a thousand times

What git commands would you run after resolving this conflict (Let's assume this file is called Adele.md)?

Solutions are here - Look at comments at the bottom of the file.

Quiz 2 - Friday 4/14/2017

Quiz two will cover everything that we have covered between quiz 1 and now. You should know all material from Lab 6 to Lab 10 and all the lectures covered (See Spring2017Schedule.md for more info).

For this quiz I would recommend having the following software installed beforehand.

MongoDB

R/RStudio

Additionally since this quiz is open notes (but closed internet), I would recommend bringing whatever notes you have taken to the quiz as well as cloning the class repository(git clone https://github.com/rcos/CSCI2963-01-Spring2017.git). You can then access all the lecture notes from the HTML Lectures folder. You can go to the HTML Lectures/index.html and open all of the lecture notes from there.

Make sure all of your lab code is on your local computer as you are allowed to refer to it during the quiz and may find it helpful to do so.

Topics that I would review for the quiz are:

- Definition of Open Hardware
  - What are some devices that are Open Hardware and some that are not?
- What is Scientific Computing?
- What is Statistical Computing?
- How can you find more information about a Github project you have downloaded?
  - What are some meaningful statistics you can use to analyze a project?
- Given a dataset in CSV format, how would you go about extracting useful information from it?
  - What are some ways to graph this data?
- How could you simulate games of chance (think dice rolls, flipping a coin) and graph meaningful results?
- Know how arduino code works and how you can implement functions to interact with it
- You should know the basics of how graphs works
- Know basics of probability (See Part B b of the sample quiz), permutatoins and combinations (related to scientific computing).

- Know how commands work in MongoDB
  - How would you look up, update and insert into an existing database?
  - What are some advantages and disadvantages to using MongoDB over traditional relational databases?
- What are some key aspects of community in Open Source Projects? How can projects be sustainable?
- Review :
  - Scientific Computing Lecture
  - Statistical Computing Lecture
  - Open Hardware
  - Mongo DB

Sample Questions -

Given an unfair coin that has a 40% chance of landing on heads and 60% chance of landing on tails, what is the chance of landing 3 heads in a row?

Simulate flipping this coin 100 and 1000 times and plot the relative histogram and relative frequency of heads and tails.

If you have a fair coin and have gotten 100 heads in a row, what is the probability the next flip will be a heads?

Given a 12 sided dice (numbers 1-12) with the following odds -

1 - 5%

2 - 3%

3 - 7%

4 - 12%

5 - 18%

6 - 21%

7 - 8%

8 - 6%

9 - 3%

10 - 11%

11 - 1%

12 - 5%

Simulate rolling this dice 100 and 1000 times and plot the relative histogram and relative frequency of (1-12).

Given two normal six sided dice (with numbers 1-6), what number are you most likely to roll? Plot the the relative histogram and relative frequency of each result (2-12).

How many ways are there to seat 4 people at a 4 person table?

What is the probability of picking 3 cards and getting 3 spades in a row from a standard 52 card deck without replacing cards? What is the probality of getting 3 spades out of 3 cards picked with replacing cards after you pick them?

What is an algorithm to find the shortest path between two nodes in a graph?

Using the Database from Lab 9, generate a random 4 letter word consisting of only lowercase alphabetical characters and generate a random 4 letter defintion consisting of only lowercase alphabetical characters and insert it to the database.

Redefine each word with length four to have the definition “Four”

Redefine each word starting with the letter R to have the definition “Redacted”

Add a new field to the word “Beer” containing a list of the following beers - [“Stella Artois”, “Heineken”, “Coors Light”]

Insert the following word/definition into the database - word: “If True” definition “Big”

If you would like more MongoDB practice this tutorial is very helpful -

Online MongoDB practice exercise

How could you make an arduino blink 3 times in a row at random time intervals? How you could make it blink every 10 seconds?