CMPSCI 521/621
Idea Proposal

Due: **Sept 18, 2012, 9:00 AM EDT** via Moodle. Late assignments will not be accepted without **prior** permission.

The goal of this assignment is to get great research ideas out on the table and expose them to others to see and think about. The assignment consists of:

1. An up to 1-page description of the research idea, and
2. A 3-minute, in-class presentation either on Tuesday September 18, or Thursday September 20 (chosen at random by the professor).

Overview

Your primary job in this assignment is twofold:

1. To describe your proposed research goal so that people understand what it is and why it is valuable. This must include a *research question* you will try to answer.
2. To describe how you will accomplish your research goal and how you will evaluate it so that it is clear how a team of up to four students can answer the research question in approximately 11 weeks.

You may work either individually or in pairs (your choice) on this assignment.

You will present your idea to the class. Everyone will then have the opportunity to review the presentations and vote on the research ideas they find most compelling and would most like to work on. At that point, the course staff will reorganize you into teams up to four students to actually explore the research idea!

One of the purposes of identifying the research idea is to find an area of software engineering research that is interesting to you. The idea will evolve over time, especially as you read the related work. While this initial idea may differ significantly from the final research question you tackle, the initial idea will serve an important role in focusing you on a particular area of software engineering.

Deliverables

- An up to 1-page description of the research idea, in a .pdf, uploaded to Moodle, clearly identifying you and your partner's (if any) names.
- A digital presentation (keynote, powerpoint, or pdf) also uploaded to Moodle, clearly identifying you and your partner's (if any) names.
- An in-class presentation. The delivery should take a maximum of 3 minutes whether working alone or in a pair. You will be cut off after 3 minutes! Prepare and rehearse your presentation. If two students work together, it is OK for one or for both to present, but both should be in attendance and in the front of the class for the presentation and to answer questions. On Tuesday, at the start of class, you will find out whether you are presenting on Tuesday or Thursday (for fairness to everyone, to avoid giving some people extra time).

The description **and** the presentation must **each** contain:

- Research question. This must be in the form of a question and describe what you will know after this project is finished that the world does not know today. Examples of reasonable research questions include: "RQ1: Can mutations used in mutation testing generate the kinds of bugs observed in real, open-source development?" and "RQ2: Can the k-tail algorithm for model inference be augmented with information about pre- and post-conditions (inferred by dynamic analysis) to improve the inferred models' precision and recall?"

- The key idea behind the new technique you will develop. For example, for RQ2, the idea may be "Preventing k-tail from merging states if the pre- and post-conditions do not match."

- A concrete evaluation plan that you will use to determine when answering your research question is a success. For example, for RQ1, the plan may be "We will survey the mutation testing literature to enumerate at least 10 top mutation operators. We will then find, on `github.com`, at least 6 open-source programs. Each program will have at least 10K lines of code, 100 actively maintained tests, and at least 1000 commits in its history. We will analyze the commit history to find regression bugs (times when a test that previously was passing but then started failing), isolate the changes that resulted in each of these bugs, and determine whether these changes could be been generated automatically using the mutation operators we identified."

You may use any resource you wish in this assignment but you must list your collaborators and cite all your sources. Failure to do so will result in a grade of 0.