Curtin University
Department of Computing
Software Engineering Testing (CMPE4001)

Semester 2, 2016
Assignment

Due date: Tuesday 1st November 2016 (This assignment counts for 30% of the final marks in CMPE4001 - Submission during Week 12 lecture)

Assignment Description

This assignment is divided into three tasks. You will work on the assignment in **groups of three students**. All tasks are compulsory.

Task 1 (worth 35%): This task requires your team to research one category of testing tools and create a recommendation based on whether or not they should be purchased by a software development house specialling in IT solutions aimed at the medical industry (see the relevant **scenario** on next page).

This task consists of two parts: a presentation and a written summary. It is up to the members of each team to decide on the distribution of work amongst members, the allocation of tasks, etc.

In the preparation of both the presentation and the summary you may consider the following general issues:

- The purpose and functionality of the given class of tools (what they are for, what they do)
- At what stage(s) of the software development cycle they can be used
- Inputs and outputs
- How do they work (a general description)
- Illustrative examples
- Merits and pitfalls
- Views of the Software Testing community on your class of tools
- Examples of commercially available tools and open source tools in your category, commenting on
  - their software and hardware platforms
  - their ease to learn
  - price (if commercial)
  - evaluation by the users
- Your evaluation:
  - How well this class of tools would meet the needs of the software house described in the "Scenario"?
  - What are the advantages and disadvantages of the tools regarding these specific needs?
  - If the tools were introduced, would the software house need to make additional investments (e.g. employ additional people, buy additional equipment, install additional networks, etc)?

This list is indicative only; you are free to present and discuss any tool related issues that you consider important.

The web page
   (http://www.softwareqatest.com/qatweb1.html)

contains many useful links, some specifically to the sites concerned with Testing Tools. You may use these as your *starting point*, but do not limit your research to just these sources.

Scenario

You have recently joined a small software house specialising in the development of IT solutions within the medical industry (hostpitals). Current applications include support of drug databases and development of a rules-based drug prescribing system. Technical aspects include quality control, complex data entry and retrieval, patient data encryption and wireless networking.

The software house has 10 technical staff with expertise in system design and production, database management and analysis, instrument control, decision support, knowledge of software engineering and communications, project management, statistics and training.

The manager is considering the introduction of software testing tools to ensure that all of the software products produced are highly reliable and absolutely correct. You have been asked to evaluate one specific group of software tools and to provide a recommendation as to whether or not they should be purchased by the software house.

The current employees are not familiar with software testing tools, so you will need to provide a concise introduction outlining functionality, etc, of your selected group of tools.

Presentation

Your team will prepare and deliver an **8 minute presentation** on your chosen category of Software Testing Tools (Presentation date and time, During Week 12 lecture - 1ˢᵗ November, 12 – 2pm). Schedule of the presentation will be chosen by a lucky draw – to provide equal opportunity to all teams. Every group will be given an opportunity to select one person to present on their behalf (presentation worth 5%).

Written summary

The submission should include a **short** summary and a discussion which addresses the points suggested above. The document length should be approximately **1,500 words** (about 2 pages of text) but it should not exceed 2,000 words. Please state the word count on the title page of your document. While preparing the document please keep in mind that it will be used by your fellow students for study and revision.

You must include as an appendix a copy of your presentation slides (6 slides per page format if possible). The slides do not count towards the word / page limit stated above.

It is likely that much of the material you use for the preparation of both your talk and the documentation is web based. It is necessary to appropriately acknowledge the use of all such material to avoid the allegation of plagiarism. It would be helpful for other students, who are going to use your document, if you could also include a list of the best web sites relevant to your tools.

Marking

A single mark will be given for both parts of this assessment. All members of the team will be given the same mark.

The following are the key factors for the assessment of the presentation:

- Topic introduced clearly and at the appropriate level;
- Key points covered clearly and logically;
- Effective use of appropriate visual materials;
- Clear recommendation.

The following are the key factors for the assessment of the written summary:
- Topic covered at the appropriate level;
- Factually correct;
- Excellent range of source materials;
- Discussion demonstrates critical analysis and the ability to evaluate evidence;
- Clear recommendation, well justified;

- Adequate acknowledgement of sources;
- Correct citation of references.

Task 2 (worth 35%): Consider the stutter and cal programs (*stutter and cal programs are available at* http://cs.gmu.edu/~offutt/softwaretest/edition2/java/ or http://cs.gmu.edu/~offutt/softwaretest/edition2/java/Stutter.java and http://cs.gmu.edu/~offutt/softwaretest/edition2/java/Cal.java individually). For both of these programs, perform the following tasks for each function that they contain:

a) Draw the control flow graph
    i. Outline the def and use nodes as well as what variables they refer to
    ii. Enumerate the requirements for all-def and all-use coverage
b) Provide N_0, N_f, N and E sets
c) Enumerate the requirements for node, edge and prime path coverage (at least 5 prime paths)
    i. Provide test sets which would achieve each of them
d) Create JUnit tests which can properly test it (as many possible scenarios as possible)

Task 3 (worth 30%): Consider the pattern indexing program (*PatternIndexA* program available at http://cs.gmu.edu/~offutt/softwaretest/edition2/java/ or http://cs.gmu.edu/~offutt/softwaretest/edition2/java/PatternIndexA.java). For this *PatternIndexA* program, complete the following coverage criteria by identifying predicates, filling in all values, and creating appropriate test sets (sets of test cases) that achieve each form of coverage (if possible). Download the program, compile it, and run it with your resulting test cases to verify correct outputs.

a) Predicate coverage (PC)
b) Clause coverage (CC)
c) Combinatorial coverage (CoC)
d) General active clause coverage (CACC)
e) Restricted active clause coverage (RACC)

NOTE:

(a) All the programs (*used in this Assignment*) are available as ready reference at:
    http://cs.gmu.edu/~offutt/softwaretest/edition2/java/
(b) You are welcome to make assumption on any part of the Assignment (*but provide justification!*).

Deliverables

You may submit work in a group of three students. Each group need to submit *one report* in hardcopy on the due date ***before the commencement of the lecture*** (also include a CD/usb – submit any programs supporting your tasks).