

Software Testing Tutorial LO 4

There are *five* tutorial topics scheduled for the Software Testing course. Each of these will be discussed over two weeks. In the first week the group will work on a preparatory task without a tutor and in the second the group will work with the tutor. The goal is to use the software you are working with to demonstrate your capability in relation to the specific learning outcome.

Recall LO 4 is "*Evaluate the limitations of a given testing process, using statistical methods where appropriate, and summarise outcomes.*" so this section of your portfolio should consider:

- the requirements for the software,
- the planned set of tests (or test specifications) derived from those requirements,
- the software

Then you should consider the (in)adequacy of the tests to establish that the requirements hold of the software with full certainty. For all but the most trivial requirement there will always be a gap between the requirement and what can be achieved through testing.

There are some key points to note in developing this section of your portfolio. It may be that some parts of the portfolio section will not be possible to write until later in the semester:

- Ideally you will have some test case specifications developed but these may still be in development, and you may not have the tests that meet the specifications and the software is still in development.
- It is likely that your evaluation of tests will reveal possible areas for improvement in your tests. So, you should try to capture the evolution of your tests and test case specifications as you evaluate your testing.
- Remember you have limited time to evaluate your approach to testing and so you will not be able to do all the work to improve your test suites. Being able to identify such limitations whether you do anything about them is an important part of your testing evaluation effort.

The LO 4 section should build on the LO 3 section of your portfolio. The LO 4 section should provide good evidence that you understand how to identify limitations of your test suites and evaluate the test suites. This can comprise some detailed analysis of a small subset of some requirements and a summary of what could be done for the whole test suite.

Preparation session, week 8 (7 Nov – 11 Nov)

A good preparation for this activity is to read Young & Pezze chapters 09 and 16. These chapters consider the adequacy of test suites and coverage notions to help in the evaluation of a test suite. Chapters 12 and 14 consider approaches that take the structure of the code into account. These are useful in considering the evaluation of testing.

It is likely that your testing activity will not be complete (or will even have started) when you begin the work of considering your LO3 portfolio section. In the preparation tutorial you should split into small groups and do the following three activities. After each, have a short

discussion on the issues raised across all the groups. This should identify similarities and differences in approach across the groups

1. Choose one of the functional requirements at least one of the group members is considering. You should each have a small set of requirements you have been considering recently. Then consider:
 - The requirement.
 - What code you intend to implement the requirement.
 - Your planned testing to see if the requirement has been satisfiedCan you see any clear deficiencies in the proposed testing? How would you think about improving the testing to overcome the deficiencies? Can you think of ways to systematically assess how good your testing is?
2. As in 1. above, but this time choose one of the measurable attributes you have been working with. Again, think of potential deficiencies in your approach to measurement. How would you go about evaluating the tests for the measurable attribute?
3. Now, compare the deficiencies you have identified – are they similar or different? Why do you think this is the case. To what extent do you think the evaluation of the test suites could be automated?

Tutored session, week 9 (14 Nov – 18 Nov)

The goal of this tutorial is to consider what would be a good section on LO 4 for your portfolio. This involves considering the grading scheme. Here are the four sub-criteria LO 4 is graded on (recall each is graded in the range 0-5) with the interpretation provided in the Marking Scheme.

In the tutored session the tutor will briefly present an outline of the sorts of evidence that could support your LO 4 portfolio section and the groups will assess the document and consider the construction of a portfolio section for LO 4.

4. Evaluate the limitations of a given testing process, using statistical methods where appropriate, and summarise outcomes. This section of the portfolio should provide an overall evaluation of the testing process.
 - 4.1. Identifying gaps and omission in the testing process. Any testing process is limited by time and budget so in this section you should aim to point out things you see as significant omissions or deficiencies in the testing carried out and how it could be improved. For example: absence of data; absence of appropriate tools; insufficient computational resource; lack of development resource etc. You should have a list of what you see as the main deficiencies and how they might be remedied.
 - 4.2. Identifying target coverage/performance levels for the different testing procedures. This section should identify and discuss the setting of target levels for the tests motivating these adequately. Think about both functional requirements and measurable attributes of the code. It may be that measurement may be more challenging than meeting functional requirements.
 - 4.3. Discussing how the testing carried out compares with the target levels. There should be discussion and explanation of how well testing targets have been met by the testing motivating variations from target. Notice that the target levels should be “realistic” in the sense that they reflect what you might expect given appropriate amounts of testing resource. Your work may fall short of these levels but you

should be aware of the sort of targets you would need to achieve in a production setting

- 4.4. **Discussion of what would be necessary to achieve the target levels.** This section should discuss what could be done to achieve or exceed the target levels. In this you should take some of the identified deficiencies in the testing and suggest ways these could be repaired in order to lead to a better collection of tests.