H62PEP Software Project: Viva

General Guidance (Read me first!!!)

This document contains a list of 24 questions, covering 6 main subject areas that you will have encountered and studied during the Software project. In the viva, your Assessor will use 6 of these questions, picked at random, to form the basis for the interview. The Assessor will then discuss your response to the main question so that you can demonstrate your level and depth of understanding of the topic. This will form the basis of the assessment. It is therefore essential that you do not just learn an answer for each question – but that you know an answer and can explain it in a discussion including supplementary questions.

This viva is worth 40% of the Software project, which is a significant proportion of the marks, and will test your understanding of all the tasks undertaken. Although we will aim to make the atmosphere as relaxed as possible on the day - you must prepare for this viva the same way you would for an exam.

The questions:

A. C++ and OOP
1. Explain what is meant by encapsulation.
2. Explain what is meant by inheritance.
3. Explain what is meant by polymorphism.
4. What are templates?

B. Version Control, Git and Github
1. What is a version control system, what are the main advantages of using one?
2. Explain the procedure you would follow to obtain a copy of an online Git repository, make some changes, and then update the online repository with your changes.
3. What is a fork on Git, how do you create a fork and obtain a local copy of the fork?
4. You have a fork of a Github project on your local computer that you have been working on, but the original project has changed. How would you update your local fork?
5. What is the difference between and pull and a fetch operation in Git?
6. What should and shouldn't be uploaded to a Git repository and why?

C. Building software
1. Explain the differences between static and dynamic libraries.
2. Describe the steps involved in building a program using command line compiler tools.
3. When using CMake to build software that must be linked against a library (e.g. Qt or VTK), what configuration options might you need to supply to CMake?

D. Qt
1. Explain how user actions, such as the click of a button, can be linked to useful code in a Qt application.
2. You have created a Qt application with a GUI that was designed in Qt designer, the GUI contains a checkbox. How might you determine the state of the checkbox from within the C++ code of your application?
3. You have an application with a Qt based GUI that includes toolbars and menus with icons. How might these icons be stored/accessed by the application when it runs?
4. An application linked with Qt compiles without any errors or warnings but when you try to run it from within Visual Studio it will not launch. Why might this be?

E. VTK
1. What VTK classes must be used to render a simple object, e.g. a cube, in an application?
2. What is a vtkSmartPointer (or a smart pointer in general)?
3. How can vtkCell3D derived classes (e.g. vtkPyramid) be used to render 3D primitive shapes?
4. Explain how filters work in VTK.

F. Secondary Issues
1. What are unit tests and why might they be used?
2. How could you create documentation for your code?
3. You are generating a Windows installer for your software. How might you do this and what does the installer need to do/include in the install?

Marking Scheme (from Assessor guidance sheet)

The students will need to answer 6 questions from above- supplementary/follow-up questions should be used to ensure that they have not memorised an answer and that they therefore understand what they have said.

After you have finished each question, mark the response out of five in the spreadsheet according to the following mark scheme.

1- Poorly answered showing limited understanding

2- Basic concept understanding demonstrated

3- Understood but unable to answer supplementary questions

4- Well understood but follow-up in supplemental questions incomplete

5- Clearly well understood and handled main and supplementary questions