

EE2E: Object-Oriented Design (UML)

Assessed Assignment

Microscope Simulation

Specification

You are to create a design for a virtual optical microscope working in transmitted light with standard illumination, i.e. not in polarised light, phase contrast or fluorescent modes of operation. An optical microscope has controls to focus an illumination aperture, change the diameter of the illumination aperture and to centre the illumination aperture (in two axes). There are also controls to move the specimen on a stage in two axes, to focus the aperture, to image the specimen and to change the brightness of illumination. The magnification can be changed in steps of x4, x10, x16 x24, x32 x 64, x100 and x 132. At magnifications of x100 and x132 immersion oil must be added between the objective lens and the specimen. In addition the magnification can be changed continuously from x1.0 to x1.6. Colour filters can also be placed in the illumination path. The focal length of the eye pieces and the distance between the eyepieces can be adjusted to suit the user. As settings are changed the virtual microscope programme must change the image seen on the screen. Consideration should be given to providing controls that reflect the physical construction of the microscope.

Virtual Microscope software exists, notable in the Virtual Lab package designed by NASA. This program is a very basic implementation.

Manufacturers literature describing microscopes might be useful. Literature for the Nikon Biological Microscope can be found at: http://www.nikon-instruments.com/pdf/brochure_Ys100.pdf There is also a "How to Use" booklet at: http://www.nikon-instruments.com/pdf/brochure_HowtoUse.pdf This booklet goes into considerable detail. The basic operation of the microscope and the primary controls is as described above.

Assessment

This is a group assignment for students working in pairs. Assessment is based on a written report that should contain **NO MORE THAN 35 PAGES** and accounts for **20%** of the assessment for EE2E. You should therefore expect to spend at least 35 hours each on this assignment. This effort will also help you prepare for the written examination. There are tutorial assignment(s) that account for 5% of the module assessment.

Please agree and indicate the apportionment of effort between each contributor on the assessment form. Where students indicate that one person contributed more to the assignment this will be reflected in the allocation of marks. If no indication of the apportionment of effort is given it will be assumed that each contributed equally.

Group Composition

You should work in the pairings that were used for your Java Lab groups. No one should work in a group of three or more. Anyone who cannot find a partner should speak to me by 31st January. Anyone who does work alone will not be given any special consideration.

Presentation of the report

You are required to submit a written report. The report should be stapled in the top left corner. Other forms of binding may be used but should be permanent and should not include loose pages in a folder or pocket wallet. Use reasonable margins, e.g. 2 cm left right, top and bottom, and a reasonable font size (e.g. 10 pt Arial or 12 pt Times Roman). The figures, tables and pages should be numbered. Captions for figures should be beneath figures and above tables.

The report should contain, in order:

Submission form

The assessment form

Title Page

Contents List: with page numbers

An introduction

This is a discussion and interpretation of the specification, which should identify any issues that require clarification.

Use-Case Model

This is a formal statement of user requirements with Use-Case views, survey descriptions, simple interaction, statechart, class diagrams and CRC cards. Remember the diagrams should be in outline form at this stage.

Analysis Model

This is a technical specification. The class descriptions should be detailed with attributes and methods and relationships to define architecture. Detail should be added to the interaction and statechart diagrams to show events actions and qualifiers. Non-function requirements should be identified. The analysis model should identify service and analysis packages as appropriate.

Design Model

This should include detailed design classes in which all methods and attributes and their visibility is identified. Arguments and return data types should be identified and defined. Key implementation mechanisms should be defined. Interaction diagrams statecharts should also be detailed. The mechanisms for the implementation of non-functional requirements should be defined.

You are not required to provide Implementation and Test Models.

Resources available

This assignment involves the development of designs on paper. It is possible to draw good quality design diagrams using Word or some other word processing package. There is no need to use any Object-Oriented Design Tools. I say this because learning curve associated with object-oriented design tools is normally steep. Many design consultants use graphical design programs and not object-oriented design tools to document designs. You may wish to use Visio which is available to Engineering students via the MSDNAA scheme.

Submission

The complete report should be submitted by **noon on Monday 19 March at reception in EECE**. Late submission will be penalised. Submission before 19 March is possible and would again be at the reception desk in EECE.

It is vital that the submission form is completed in full before it is taken to the submission point to avoid congestion. In completing the declaration that the work submitted is your own work you are stating that all contributions have come from yourself and the other student who is identified on the assessment form.

These reports will not be returned as they are part of the final assessment for this module and must be kept for inspection by the external examiners. Late submission will be penalised at 5% per day, the standard scheme used in the University.

If you are submitting late due to ill-health or other mitigating circumstances you must seek permission for late submission and provide evidence of the mitigating circumstances. Computer problems are not normally regarded as mitigating circumstances.

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Presentation

Structure, clarity and presentation of report. Contents page, page numbering, presence of correct front cover, labelling of diagrams.

/ 5

Introduction and Conclusion

Interpretation of specification. Identification of appropriate elaboration.

/ 5

The Use-Case Model

Correct use of notation. Complete set of diagrams. Appropriateness of use-case structure, survey descriptions, CRC cards, interaction diagram(s), class diagram, class identification and statechart diagrams. Remember these are outline diagrams.

/ 40

Analysis Model

Appropriateness of elaboration. Identification of methods and attributes. Definition of class architecture. Identification of non-functional requirements. Consideration and appropriateness of package diagrams.

/ 25

Design Model

Appropriateness of elaboration. The visibility of attributes and methods. The identification of arguments, return data types, class creation and destruction, process forks and joins as appropriate. Definition non-functional requirement implementation.

/ 20

Discretionary marks

Evidence of special insight.

/ 5

Total (Assessors Name:)

/100

Apportionment of effort

Please enter your student numbers and a joint agreement of the percentage contribution of each person. The sum of the percentage contributions should sum to 200%)

1. Student ID No.: Effort:

2. Student ID No.: Effort:

Assessors Comments