Computer Science Tripos Part IB

Group Design Projects 2013–2014

<group-project@cl.cam.ac.uk>

Project Briefing – Michaelmas 2013
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1. Timetable

Candidates for Part IB of the Computer Science Tripos are required to undertake a group design project as part of their practical work in Lent term. The following timetable summarizes critical dates that students must be aware of.

Thursday 21/11/2013 - 12noon, LT1	Briefing lecture
Wednesday 4/12/2013	Deadline for project topic preferences
Thursday 16/1/2014 - 2pm, LT1	Project kick-off meeting
Wednesday 29/1/2014 to Friday 31/1/2014	First formal review meeting
Tuesday 4/2/2014 - 2pm, LT1	Lecture on presentation skills
Wednesday 12/2/2014 to Friday 14/2/2014	Second formal review meeting
Wednesday 26/2/2014 to Friday 28/2/2014	Third formal review meeting
Monday 3/3/2014	Code completion deadline
Wednesday 5/3/2014	Public presentation of results

In addition, the lecture timetable reserves slots from 11:00 to 12:00 on each Tuesday and Thursday of Lent Term. These are to give time for groups to meet in order to conduct their internal co-ordination.

Our intention is that all group projects should be successful, and all students are expected to contribute to their own project in accordance with the above timetable. Groups often encounter problems, and students are expected to manage these as they arise. However, if serious problems are encountered, such

that members of the group are unable to resolve them, students should contact the project organizers immediately rather than waiting until a deadline is missed. The contact address for the group project organizers is: `<group-project@cl.cam.ac.uk>`.

2. Course structure

There will be a briefing lecture towards the end of the Michaelmas Term, as specified in the timetable. Students may state preferences for topics during the following two weeks. The class will be advised of group allocations on the first Thursday in Lent term.

Each group will be allocated a client, whom they will meet on three occasions during the Lent term to present their work as it progresses. There will also be a lecture on presentation skills between the first and second review meetings. After the final meeting, group members may each be awarded two ticks towards their practical portfolios, one for the combined group product and one for an individual contribution. Group projects are expected to take students 30–60 hours of work, spread over six weeks, and to enable students to display their understanding across a broad range of subjects:

Selection and use of appropriate tools will play an important part in the project. It is anticipated that most software projects will be implemented in Java, although in some cases it may prove appropriate to implement a small number of modules in a different language. In such cases, the project documentation will be expected to justify this. Programmers' preferences for, or familiarity with, alternative languages will not count as good cause in this context.

The use of appropriate data structures and algorithms will be expected, as will familiarity with appropriate Unix tools. Special topics such as concurrency, graphics, hardware, architectures or compiling may also be required. The most relevant preparatory courses are Part 1a Software Design and Part 1b Software Engineering. Groups will be expected to exhibit professional skills in design, quality and management. Specifically, they will have to show that the work has been carefully planned, that components and systems have been properly tested, and that members of the group have cooperated effectively.

The exercise also gives students experience of working against rigid deadlines, with a team of colleagues not of their own choosing, using externally prescribed

tools to undertake a fixed project. This gives some idea of the problems encountered in normal professional practice. The fortnightly review meetings provide an opportunity to monitor group progress and for general discussion. Supervision on specific topics remains a College responsibility.

3. Preliminaries

The briefing lecture in Michaelmas Term will cover administrative arrangements, general advice on the design process, and a review of the selection of design briefs for the projects themselves. The full list of design briefs can be viewed at:

`http://www.cl.cam.ac.uk/teaching/group-projects/design-briefs.html`

Students will then have an opportunity to nominate three design briefs in order of preference. Each student may advise the project organizers `<group-project@cl.cam.ac.uk>` of an interest in up to three briefs. Preferences must be received by noon on the last Wednesday in Michaelmas Term (see timetable). Anyone who fails to express a preference will be assumed to be happy with any project brief.

The class will then be divided into groups, each with around six members, taking into account interests expressed in particular design briefs. Personal preferences for colleagues will be disregarded. The group memberships and assigned briefs will be announced at the kick-off meeting on the first Thursday of the Lent Term.

If there is a serious reason for members of a group to feel that they will not be able to work together, they must make representations to the project organizers immediately. No requests for changes in group membership will be entertained after the kick-off meeting. Group members are expected to work together in a professional manner with colleagues they did not choose, and a dim view will be taken of unprofessional conduct such as bullying.

4. Review meetings

Each group must attend three formal one-hour project review meetings with the project client during the Lent term. The clients are guests of the Computer Laboratory, invited to share their experience of professional software project management. They volunteer for this work, and will appreciate an appropriately

professional approach from the project groups. They are not expected either to supervise the work, or to provide technical assistance – as clients, their role is to negotiate objectives, and then monitor whether those objectives are achieved within an appropriate budget.

At the first of the review meetings, the group will present a requirements specification and an overall design in the form of annotated interfaces; at the second, implementations will be presented together with the result of module testing; and at the final session they will demonstrate the product and give their final report. In addition, at the end of the Lent term, each candidate must submit a brief individual report. All deliverables should be sent by email as Acrobat PDF attachments to the project client for that group, with a copy sent to the group project organizers `<group-project@cl.cam.ac.uk>`. Communication with clients should be restricted to formal documents and discussion during project meetings. Group members should not expect the client to engage in any discussion regarding specifications or project progress by email. **It is essential that copies of all deliverables are sent to the project organizers, as these copies will be used for assessment**.

Groups will be able to express preferences for meeting times, consulting the Student Administrator after the kick-off meeting in the Lent Term. Actual meeting times will depend on availability of rooms and appointments with clients, but the first meeting (requirements specification and module design) should be scheduled for the afternoon of the Wednesday, Thursday or Friday in the third week of term. Subsequent meetings will be at fortnightly intervals thereafter, again subject to availability of rooms and clients. All members of the group must attend all three sessions. **Failure to attend a project meeting will jeopardise one of the project ticks**. In this event, a final decision on whether or not to award the tick will be made at the end of the project. A note from a Tutor may be presented in mitigation, preferably forwarded to the client and project organizers in advance of the meeting. Other group members should also be kept informed of the situation.

Different deliverable documents are required in advance of each meeting:

- Meeting 1: Specification and project plan
- Meeting 2: Progress report on implementation and testing
- Meeting 3: Group report and personal reports

The content of these documents is described in the following section. Deliverables must be emailed to the project client and to the project organizers by noon precisely on the day preceding the meeting. Considerable importance is attached to deadlines; organisation and management are among the skills being tested by the exercise. There will be no facility for late submission of work, and project managers will be expected to reschedule work assigned to members who prove unable to complete it for any reason.

It is important that the group could complete the project even if its membership were to change, for example through illness. This may be tested by the Project Coordinators randomly moving students between groups.

5. Deliverables

Each project phase gives rise to documents which must be sent to the client in advance of review meetings. In addition every student must deliver an individual report.

Functional specification

Project topics are presented in the form of an outline design brief. Part of the work is to undertake a proper requirements analysis for the chosen project. However, it is important not to develop an over-elaborate specification which commits the group to more work than is necessary. The first major task is therefore to turn a relatively open and informal design brief into a proper specification of requirements. This will involve a number of different activities:

- a general investigation of the problem and its background;
- deciding on the facilities to be provided;
- planning the major components of the system;
- specifying the acceptance criteria for the finished product;
- deciding on a management strategy for the group including the technical responsibilities to be taken by each member; and
- documenting all of these.

The outcome of each group's deliberations on these topics will be a formal ***requirements specification*** which will address all the points outlined above. The whole document should be three to five thousand words long.

It is then necessary to divide the system into a set of relatively independent modules. Some of these will be standard library modules, but many will be

written as part of the project. At this stage it will be important to have identified the components and specified their interfaces.

The easiest way to do this will be by means of Java abstract classes decorated with suitable comments, explaining how the class is expected to work.

Project plan

Once this is settled, you must produce a project plan which sets out who will do what, the time needed for developing and testing each module, dependencies between modules, etc.

When planning and executing the project, it is important to work to a budget. The entire project should take no more than 60 hours per team member, and records should be kept of time invested. Groups should set realistic targets and achieve them; there will be no additional marks for over-elaborate projects, or for individuals who offer or do more than is required. Each member of the group is expected to gain experience of programming in the course of the project – this may possibly involve test harnesses or scripts, data conversion utilities, a tutorial system, external interfaces, demonstration examples, or other code as appropriate to the project and the individuals in the team.

Module implementation and testing

The next task is to write the code of the classes and to test them in isolation. This is likely to require the construction of special test harnesses for separate classes. The deliverable for this task is a written ***progress report*** by the team manager, including contributions from other group members that document the implemented components, and that describe the testing procedures and results.

System integration and testing

The final task is to piece the whole system together, test it and ensure that it is adequately documented.

At the final group meeting, the project manager must submit a ***group report***. This should describe the project's successes and failures, elaborate on any lessons learned, and include a summary of the work undertaken by different team members in completing the system.

The deadline for group project code completion is noon on the Monday preceding the presentations. At that time, a copy of the group file space will be

taken for the benefit of the examiners. No credit will be given for any bugs removed, or features added, thereafter.

Personal report

Each group member must also submit a brief personal report in advance of the final review meeting, giving details of their individual contribution to the project. This should include a representative part of their contribution which might be program code or documentation, project management logs or minutes of meetings as appropriate. It should also give their own assessment of the individual contributions made by each of the other members of the group.

The group project organisers will forward group and personal reports to the examiners for inclusion in the practical portfolio work of all group members.

6. Resources

Group projects will use the University Computing Service's MCS Linux System. A shared file space `${CLTEACH}/grpproj` will be available, divided into directories `alpha, bravo, ...` for the different groups. Each group is expected to keep its disc usage below 100 Mbytes, which should be ample for work in progress, current versions, test data, documentation and CVS archives. (in summary, a sub-directory called "public_html" in your file space will map to `http://groups.ds.cam.ac.uk/clteach/grpproj/{group name}`

The disk quota for each group should be more than adequate. If further storage is required beyond this, it must be found elsewhere, such as in individual file spaces. If personal machines are used, groups must ensure that adequate backups are kept to survive fire, flood etc (for example, on removable media kept in a different building).

If you wish, Group project web pages can be set up along the general lines described in: `http://www.cam.ac.uk/cs/docs/leaflets/m350/`

The full set of software tools available under MCS Linux is documented at:

`http://www.ucs.cam.ac.uk/desktop-services/mcs/software/copy_of_linuxlist`

Note that some projects involve use of special purpose hardware, and may include construction of further electronic and mechanical components. These groups will be issued with a storage box for work in progress. At the end of the project, all hardware must be returned to the box, if possible in a form that

would allow further demonstration of the system if required later. The group tick will not be awarded until this has been done.

In cases where a project involves significant hardware design, a small number of groups may be provided with technical assistance, including advice on selection and purchase of electronic components. In those cases, a demonstrator will be appointed to provide that assistance.

7. Public presentation

On the penultimate Wednesday afternoon of Lent term (see timetable) there will be an opportunity for groups to present their work to students, members of the Department, project clients and other guests. This will take the form of practical demonstrations in the workstation area of the Gates building from 2:00 to 4:00 followed by a seminar at 4:15 pm where groups will take turns to describe their projects in no more than 5 minutes each. The Coordinators, clients and members of staff who attend the seminar will vote to award achievement prizes.

8. Behaviour

A key objective of this exercise is to give you experience in working within a group to agree and achieve a common objective. While we leave the organization within the group to the group itself, we will not tolerate offensive or bullying behaviour. Any such behaviour should be reported to us.

Inappropriate behaviour may include a number of specific behaviours - such as bullying, or harassment on account of sex (including gender reassignment), race, ethnic or national origin, colour, disability, sexuality, religion or belief, or age.

Bullying is a form of psychological harassment; it is intimidation, which serves to undermine the self-esteem, confidence, competence, effectiveness and integrity of the bully's target. Bullying behaviour may include continual, undeserved criticism, belittling remarks, shouting, swearing and offensive language, constant interruption in discussion, and the display of overbearing or intrusive behaviour.

You should report any such behaviour to the course organizers (whether or not it is directed at you).