Preliminary Project Briefing for CST IB Students

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May 2021

For students reading Part II in 2021–2022

(With thanks to all prior project briefing officers for slides)

What's this all about?

Next year you submit a dissertation

Worth one paper

What's this all about?

Next year you submit a dissertation

Worth one paper

Which is a quarter of your total marks!

So what kind of project can I do?

Here are some titles from prior years

- Software IPv6 Router In Rust
- An Optimising Compiler from Haskell to Java Bytecode
- Removing Gender Bias from Word Embeddings
- Implementing a Dependently Typed Language
- A Secure USB Keyboard

Aims of the project

The main goals are to

- Demonstrate computer science skills
- Design, implement, test something substantial
- Select suitable methods and tools
- Prepare a convincing report

In addition to

- Demonstrate ability to select appropriate
  - Languages, techniques, algorithms, tools, data structures, etc
- Demonstrate understanding of the project's area
  - Professional use of appropriate standard algorithms, tools, etc
  - Relationship to computer science
  - Awareness of standard results & literature
  - Avoid inadvertently re-inventing the wheel

Aims continued

Also, to show ability to

- Prepare a well-structured and readable document
- Demonstrate technical writing skills
- Prepare a report that convinces its readers that stated objectives are achieved

Brief CST project timetable

Start of Michaelmas term

- Phase 1 project proposal deadline

Start of Michaelmas lectures

- Formal project briefing

A week later

- Proposal deadline

February

- Progress report

Early May

- Dissertation deadline

Key people

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- You need to find someone to supervise your project
- You will likely meet with them weekly during term

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Directors of Studies

- Your DoS can help advise on projects and supervisors
- And will also take a keen interest in your progress!

Overseers

Overseers help plan the project and monitor progress

- They oversee selection and approval of
  - A suitable project
  - Its plan
- They check requirements are satisfiable
  - Computing equipment to be used
  - Other special equipment or resources
  - IPR, human experiments and other legal obligations
- Liaise with your DoS, especially mid-project

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Overseers do not suggest projects or find project supervisors

- Your **Director of Studies** is responsible for helping with both

The project briefing officer (i.e. me) will help if you have problems with your overseers

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Getting a project proposal accepted is broken into three phases:

- Phase 1 - selecting a topic
- Phase 2 - filling in the details
- Phase 3 - final proposal

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- Approach potential supervisors
- Write 100 word outline of project idea
- Submit the *Phase 1 Project Selection Form* on the website

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Phase 1 deadline: first day of Michaelmas term

(But ideally earlier)

Phase 1: project selection form

Please complete this form and submit it on the website

```
Phase 1 Project Selection Status Report

      Name:
      College:
      User Identifier:
      Director of Studies:

Please complete 1, 2 and 3 below.

      1. Please write 100 words on your current project ideas.

      2. Please list names of potential project supervisors.

      3. Is there any chance that your project will involve any
         computing resources other than the Computing Service's MCS
         and software that is already installed there, for example:
         your own machine, machines in College, special peripherals,
         imported software packages, special hardware, network access,
         substantial extra disc space on the MCS.

        If so indicate below what, and what it is needed for.
```

Ideas and requirements

The main sources of project ideas are

- Your own (moderated) ideas
- Supervisors and Directors of Studies
- Suggestions on the projects webpage
- Previous years' projects
- Industry

In order to get your proposal accepted, you must

- Have a named project supervisor
- Ensure both your overseers are happy
- Obtain written permission for special resources and experiments
  - E.g. tests using human subjects

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- Choose something with significant technical content
- Ideally implement some complex algorithm
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Evaluation

- Choose a project amenable to structured evaluation
- *'It worked according to plan'* is not sufficient
- Components ideally separately testable
- Composition ideally evaluatable using several metrics

Use appropriate tools

Think about tools carefully

- Need a parser: use a parser generator
- Need to optimise in multiple dimensions: use a hill-climbing library
- Need to solve NP problem: use a standard SAT solver
- Need to visualise networks: output via dot

Many projects are done in Java or C++,

- But consider OCaml/F#, Scala or C#
- (Or Rust, Swift, Go, ...)

Use the long vacation to explore tools, libraries and languages

Equipment

Standard resource is the MCS facility

You can use other and/or non-standard equipment or libraries

- Needs written permission from resource owner

Certainly use git or some other version control system

Relying **only** on your own PC is very risky

- Have a backup plan identifying a second PC or MCS
- Keep backups on MCS filespace or cloud server

Your tasks now

After IB exams are done

- Look at old projects
  - Available online through the project web pages
- Read up background material
- Think about tools
  - Read documentation
  - Play with toy examples
- Start a project log book
  - A hard-back notebook is ideal
- Submit your phase 1 project proposal by the start of Michaelmas

Can I start implementing now?

In short, no!

You must get approval from your overseers

- And they may not give this approval

However, more importantly, your proposal defines a **starting point**

- This is the state of the world in October when you start
- It does not matter whether someone else or you yourself did the previous work

FAQ

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How can I prepare for my project?

- Think about potential projects
- Contact potential supervisors
- Do background reading and investigating tools
- Arrive back in October with a proposal draft

Units of assessment

Many (almost all) of you will be doing two units of assessment

- Hopefully one in Michaelmas, one in Lent

It is very important to think carefully about the work

- Students mainly get into difficulties through a lack of planning
- Don't underestimate the time required for coursework

Know your deadlines for your units of assessment

- Plan when you will do the coursework for them
- Plan when you will do project work around them
- Plan when your supervisions will fit around them

More information

The project web page is

`https://www.cst.cam.ac.uk/teaching/part-ii/projects`

Here you'll find links to:

- These slides
- The pink book, your project bible
- Project suggestions

Any questions, any time, please ask

`timothy.jones@cl.cam.ac.uk`

That's it

Good luck in your exams!