

## What's this all about?

## Preliminary Project Briefing for CST IB Students

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For students reading Part II in 2021–2022

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

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

Supervisor

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

Overseers

- ▶ You will be assigned two overseers to guide you at key times

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

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

## Choosing a project

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

You need to focus on Phase 1 for now:

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

Phase 1 deadline: first day of Michaelmas term  
(But ideally earlier)

## 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

## 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.

## Content, narrative and evaluation

Content

- ▶ Choose something with significant technical content
- ▶ Ideally implement some complex algorithm
- ▶ Do not do something big yet simple

Narrative

- ▶ Choose something interesting
- ▶ Phrase a question or two at the outset
- ▶ Answer the questions in the conclusion

Evaluation

- ▶ Choose a project amenable to structured evaluation
- ▶ '*It worked according to plan*' is not sufficient
- ▶ Components ideally separately testable
- ▶ Composition ideally evaluable 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 filesystem 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

How much time should I spend on my project?

- ▶ One paper's worth

What's the format of the dissertation?

- ▶ There will be more information in your formal project briefing in October
- ▶ But you can look at the project web pages and old projects to get an idea now

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

## 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

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## 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

## That's it

Good luck in your exams!