Preliminary Project Briefing for CST IB Students

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For students reading Part II in 2020–2021

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

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

CST project timetable

Start of Michaelmas term
    Formal project briefing

A fortnight 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

- The briefing officer (i.e. me!) assigns two per student
- 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

The briefing officer will help if you have problems with your overseers

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

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 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 in the 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

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 mid-October
- 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
- Arrive back in October with a proposal draft

Units of assessment

Those of you reading the 75% option take two Part II units of assessment
- Take note of the assessment dates and include them in your project plan
- Session timetables will have hardly any clashes with other Part II material
  - So there is a good chance you can attend sessions you are not registered for
  - (But seminar and practical class space may be limited)
- Bear in mind that these may involve extra coursework alongside your dissertation
  - Plan when you'll do unit work vs project work

More information

The project web page is

> `https://www.cl.cam.ac.uk/teaching/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

See you next year!

Virtually, if not otherwise