Prelude

A typical dissertation will be structured according to (somewhat) standard sections, described in what follows. However, it is hard and perhaps even counter-productive to generalise: the goal is *not* to be prescriptive, but simply to act as a guideline. In particular, each page count given is important but *not* absolute: their aim is simply to highlight that a clear, concise description is better than a rambling alternative that makes it hard to separate important content and facts from trivia.

You can use this document as a LaTeX-based [1, 2] template for your own dissertation by simply deleting extraneous sections and content; keep in mind that the associated `Makefile` could be of use. deal with the associated bibliography. Alternatively, upload this template, dissertation.bib, dissertation.cls, dtklogos.sty and the "logo" folder to Overleaf (an online LaTeXeditor and compiler) and work on your thesis there.

Do not include this section in your final dissertation — just delete it from the source.

SCHOOL OF COMPUTER SCIENCE

Some Structural Guidelines for CS Project Dissertations With a Second Line Added to the Title

And Even A Fancy Subtitle

Daniel Page

A dissertation submitted to the University of Bristol in accordance with the requirements of the degree of Bachelor of Science in the Faculty of Engineering.

Friday 13th September, 2024

Abstract

A compulsory section, of at most 300 words

This section should précis the project context, aims and objectives, and main contributions (e.g., deliverables) and achievements; the same section may be called an abstract elsewhere. The goal is to ensure the reader is clear about what the topic is, what you have done within this topic, *and* what your view of the outcome is.

The former aspects should be guided by your specification: essentially this section is a (very) short version of what is typically the first chapter. If your project is experimental in nature, this should include a clear research hypothesis. This will obviously differ significantly for each project, but an example might be as follows:

> My research hypothesis is that a suitable genetic algorithm will yield more accurate results (when applied to the standard ACME data set) than the algorithm proposed by Jones and Smith, while also executing in less time.

The latter aspects should (ideally) be presented as a concise, factual bullet point list. Again the points will differ for each project, but an might be as follows:

- I spent 120 hours collecting material on and learning about the Java garbage-collection sub-system.
- I wrote a total of 5000 lines of source code, comprising a Linux device driver for a robot (in C) and a GUI (in Java) that is used to control it.
- I designed a new algorithm for computing the non-linear mapping from A-space to B-space using a genetic algorithm, see page 17.
- I implemented a version of the algorithm proposed by Jones and Smith in [6], see page 12, corrected a mistake in it, and compared the results with several alternatives.

Dedication and Acknowledgements

A compulsory section

It is common practice (although totally optional) to acknowledge any third-party advice, contribution or influence you have found useful during your work. Examples include support from friends or family, the input of your Supervisor and/or Advisor, external organisations or persons who have supplied resources of some kind (e.g., funding, advice or time), and so on.

Declaration

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's Regulations and Code of Practice for Taught Programmes and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, this work is my own work. Work done in collaboration with, or with the assistance of others including AI methods, is indicated as such. I have identified all material in this dissertation which is not my own work through appropriate referencing and acknowledgement. Where I have quoted or otherwise incorporated material which is the work of others, I have included the source in the references. Any views expressed in the dissertation, other than referenced material, are those of the author.

Daniel Page, Friday 13$^{\text{th}}$ September, 2024

Contents

List of Figures

List of Tables

Ethics Statement

A compulsory section

In almost every project, this will be one of the following statements:

- "This project did not require ethical review, as determined by my supervisor, [fill in name]"; or
- "This project fits within the scope of ethics application 0026, as reviewed by my supervisor, [fill in name]"; or
- "An ethics application for this project was reviewed and approved by the faculty research ethics committee as application [fill in number]".

See the unit Handbook for more information. If something went wrong and none of those three statements apply, then you should instead explain what happened.

Summary of Changes

A conditional section

If and only if the dissertation represents a resubmission (e.g., as the result of a resit), this section is compulsory: the content should summarise all non-trivial changes made to the initial submission. Otherwise you can omit it, since a summary of this type is clearly nonsensical.

When included, the section will ideally be used to highlight additional work completed, and address criticism raised in any associated feedback. Clearly it is difficult to give generic advice about how to do so, but an example might be as follows:

- Feedback from the initial submission criticised the design and implementation of my genetic algorithm, stating "there seems to have been no attention to computational complexity during the design, and obvious methods of optimisation are missing within the resulting implementation". Chapter 3 now includes a comprehensive analysis of the algorithm, in terms of both time and space. While I have not altered the algorithm itself, I have included a cache mechanism (also detailed in Chapter 3) that provides a significant improvement in average run-time.
- I added a feature in my implementation to allow automatic rather than manual selection of various parameters; the experimental results in Chapter 4 have been updated to reflect this.
- Questions after the presentation highlighted a range of related work that I had not considered: I have make a number of updates to Chapter 2, resolving this issue.

Supporting Technologies

This section should present a detailed summary, in bullet point form, of any third-party resources (e.g., hardware and software components) used during the project. Use of such resources is always perfectly acceptable: the goal of this section is simply to be clear about how and where they are used, so that a clear assessment of your work can result. The content can focus on the project topic itself (rather, for example, than including "I used LaTeX to prepare my dissertation"); an example is as follows:

- I used the Java `BigInteger` class to support my implementation of RSA.
- I used a parts of the OpenCV computer vision library to capture images from a camera, and for various standard operations (e.g., threshold, edge detection).
- I used an FPGA device supplied by the School, and altered it to support an open-source UART core obtained from http://opencores.org/.
- The web-interface component of my system was implemented by extending the open-source WordPress software available from http://wordpress.org/.

Notation and Acronyms

Any well written document will introduce notation and acronyms before their use, *even if* they are standard in some way: this ensures any reader can understand the resulting self-contained content.

Said introduction can exist within the dissertation itself, wherever that is appropriate. For an acronym, this is typically achieved at the first point of use via "Advanced Encryption Standard (AES)" or similar, noting the capitalisation of relevant letters. However, it can be useful to include an additional, dedicated list at the start of the dissertation; the advantage of doing so is that you cannot mistakenly use an acronym before defining it. A limited example is as follows:

AES	:	Advanced Encryption Standard
DES	:	Data Encryption Standard
	⋮	
$\mathcal{H}(x)$	:	the Hamming weight of x
$\mathbb{F}_q$	:	a finite field with q elements
x_i	:	the i-th bit of some binary sequence x, st. $x_i \in \{0, 1\}$

Chapter 1

Introduction

Unlike the frontmatter up to and including the Summary of Changes, which you should not deviate from, Chapters 1–5 represent a suggested outline only. This outline will only be appropriate for a specific type of project. You should talk with your supervisor about the best way to structure your own dissertation, but ultimately the choice is yours. However, almost every project will want to include the content discussed in these chapters in some way. For more advice on structuring your dissertation, see the unit handbook.

This chapter should introduce the project context and motivate each of the proposed aims and objectives. Ideally, it is written at a fairly high-level, and easily understood by a reader who is technically competent but not an expert in the topic itself.

In short, the goal is to answer three questions for the reader. First, what is the project topic, or problem being investigated? Second, why is the topic important, or rather why should the reader care about it? For example, why there is a need for this project (e.g., lack of similar software or deficiency in existing software), who will benefit from the project and in what way (e.g., end-users, or software developers) what work does the project build on and why is the selected approach either important and/or interesting (e.g., fills a gap in literature, applies results from another field to a new problem). Finally, what are the central challenges involved and why are they significant?

The chapter should conclude with a concise bullet point list that summarises the aims and objectives. For example:

> The high-level objective of this project is to reduce the performance gap between hardware and software implementations of modular arithmetic. More specifically, the concrete aims are:
>
> 1. Research and survey literature on public-key cryptography and identify the state of the art in exponentiation algorithms.
> 2. Improve the state of the art algorithm so that it can be used in an effective and flexible way on constrained devices.
> 3. Implement a framework for describing exponentiation algorithms and populate it with suitable examples from the literature on an ARM7 platform.
> 4. Use the framework to perform a study of algorithm performance in terms of time and space, and show the proposed improvements are worthwhile.

Chapter 2

Background

This chapter is intended to describe the background on which execution of the project depends. This may be a technical or a contextual background, or both. The goal is to provide a detailed explanation of the specific problem at hand, and existing work that is relevant (e.g., an existing algorithm that you use, alternative solutions proposed, supporting technologies).

Per the same advice in the handbook, note there is a subtly difference from this and a full-blown literature review (or survey). The latter might try to capture and organise (e.g., categorise somehow) *all* related work, potentially offering meta-analysis, whereas here the goal is simple to ensure the dissertation is self-contained. Put another way, after reading this chapter a non-expert reader should have obtained enough background to understand what *you* have done (by reading subsequent sections), then accurately assess your work against existing relevant related work. You might view an additional goal as giving the reader confidence that you are able to absorb, understand and clearly communicate highly technical material and to situate your work within existing literature.

Chapter 3

Project Execution

This chapter is intended to describe what you did: the goal is to explain the main activity or activities, of any type, which constituted your work during the project. The content is highly topic-specific, but for many projects it will make sense to split the chapter into two sections: one will discuss the design of something (e.g., some hardware or software, or an algorithm, or experiment), including any rationale or decisions made, and the other will discuss how this design was realised via some form of implementation.

This is, of course, far from ideal for *many* project topics. Some situations which clearly require a different approach include:

- In a project where asymptotic analysis of some algorithm is the goal, there is no real "design and implementation" in a traditional sense even though the activity of analysis is clearly within the remit of this chapter.
- In a project where analysis of some results is as major, or a more major goal than the implementation that produced them, it might be sensible to merge this chapter with the next one: the main activity is such that discussion of the results cannot be viewed separately.

Note that it is common to include evidence of "best practice" project management (e.g., use of version control, choice of programming language and so on). Rather than simply a rote list, make sure any such content is useful and/or informative in some way: for example, if there was a decision to be made then explain the trade-offs and implications involved.

3.1 Example Section

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Figure 3.1: This is an example figure.

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0	0	0
1	1	1
⋮	⋮	⋮
9	9	9

Table 3.1: This is an example table.

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3.1.1 Example Sub-section

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for $i = 0$ **upto** n **do**
  $t_i \leftarrow 0$
end

Algorithm 3.1: This is an example algorithm.

```
for( i = 0; i < n; i++ ) {
  t[ i ] = 0;
}
```

Listing 3.1: This is an example listing.

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Example paragraph. This is an example paragraph; note the trailing full-stop in the title, which is intended to ensure it does not run into the text.

Chapter 4

Critical Evaluation

A topic-specific chapter

This chapter is intended to evaluate what you did. The content is highly topic-specific, but for many projects will have flavours of the following:

1. functional testing, including analysis and explanation of failure cases,
2. behavioural testing, often including analysis of any results that draw some form of conclusion wrt. the aims and objectives, and
3. evaluation of options and decisions within the project, and/or a comparison with alternatives.

This chapter often acts to differentiate project quality: even if the work completed is of a high technical quality, critical yet objective evaluation and comparison of the outcomes is crucial. In essence, the reader wants to learn something, so the worst examples amount to simple statements of fact (e.g., "graph X shows the result is Y"); the best examples are analytical and exploratory (e.g., "graph X shows the result is Y, which means Z; this contradicts [1], which may be because I use a different assumption"). As such, both positive *and* negative outcomes are valid *if* presented in a suitable manner.

Chapter 5

Conclusion

The concluding chapter of a dissertation is often underutilised because it is too often left too close to the deadline: it is important to allocate enough attention to it. Ideally, the chapter will consist of three parts:

1. (Re)summarise the main contributions and achievements, in essence summing up the content.
2. Clearly state the current project status (e.g., "X is working, Y is not") and evaluate what has been achieved with respect to the initial aims and objectives (e.g., "I completed aim X outlined previously, the evidence for this is within Chapter Y"). There is no problem including aims which were not completed, but it is important to evaluate and/or justify why this is the case.
3. Outline any open problems or future plans. Rather than treat this only as an exercise in what you *could* have done given more time, try to focus on any unexplored options or interesting outcomes (e.g., "my experiment for X gave counter-intuitive results, this could be because Y and would form an interesting area for further study" or "users found feature Z of my software difficult to use, which is obvious in hindsight but not during at design stage; to resolve this, I could clearly apply the technique of Smith [7]").

Bibliography

[1] L. Lamport. *LaTeX: A Document Preparation System*. Addison-Wesley, 1986.

[2] F. Mittelbach, M. Goossens, J. Braams, D. Carlisle, and C. Rowley. *The LaTeX Companion*. Addison-Wesley, 2nd edition, 2004.

Appendix A

Appendix A: AI Prompts

List of prompts/references that were used in the project and/or dissertation with an Artificial Intelligence model. This can include Large Language Models (LLMs) such as ChatGPT, or AI translation tools such as DeepL.

Failure to include this list can result in a Contract Cheating allegation.

Appendix B

An Example Appendix

Content which is not central to, but may enhance the dissertation can be included in one or more appendices; examples include, but are not limited to

- lengthy mathematical proofs, numerical or graphical results which are summarised in the main body,
- sample or example calculations, and
- results of user studies or questionnaires.

Note that in line with most research conferences, the marking panel is not obliged to read such appendices. The point of including them is to serve as an additional reference if and only if the marker needs it in order to check something in the main text. For example, the marker might check a program listing in an appendix if they think the description in the main dissertation is ambiguous.