A Guide to Writing
4th Year Project Reports

by

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This guide provides advice on how to prepare a 4th year project report. The guide is organized into the following parts:

Perspective Who is your audience?

Contents What's in the report?

Tips and Traps How to avoid some common problems

Perspective

Your report is a major component of your project, and plays a central role in determining your final grade. Regardless of the effort you put into the development of the project, a poor report will always result in a poor grade. Take the writing of your report as seriously as any component of the project.

A report is a written communication. To communicate successfully, you must understand your audience and present the information the audience needs. The readers of 4th year project reports (your audience) are interested in answers to the following **BIG 3** questions:

- What is the problem being solved?
- What is your solution to the problem?
- What did you accomplish?

The readers will use your answers to these questions to arrive at a final grade for the project.

Each report is read by the project supervisor and a 2nd reader. The readers often have different motivations for reading a report and they have different roles in determining the project grade. The supervisor has been involved throughout the project, often with hopes that the project will yield useful results. The report is typically the 2nd reader's first exposure to the project, and although the project may be interesting, the 2nd reader is less likely to use the results in the future. The supervisor usually pays closer attention to the technical details of the solution and evaluates: the report (does the report clearly answer the BIG 3 questions?), the accomplishments (how do the student's accomplishments rate as a 4th year project?), and the student's performance during the project (organization, effort, ability to work independently, etc.). The 2nd reader evaluates only the report and the accomplishments.

Your report is the primary source if information used by your supervisor, and the only information used the 2nd reader, when evaluating your project. Be sure your report emphasizes your answers to the BIG 3 questions.

Contents

As a written document, the report is a one-way transfer of information from you to the reader. The reader does not have the opportunity to ask you clarifying questions, and therefore you must simplify the reader's job whenever possible. One way to help the reader is to organize your report's contents to direct the reader through your answers to the **BIG 3** questions.

The general contents of a report are listed below in (approximately) the order they should appear. The contents have been grouped into parts labelled **A** through **F,** and each part will be discussed in more detail. (The names and labels given to the parts are intended to help organize this discussion and should not necessarily appear in your report.) All reports have certain formal parts (parts **A** and **E**). The format beyond the formalities may vary (Highlight : check with your supervisor as to their preferences); however, the reader will expect sections that elaborate on the project and your accomplishments (part **C**), and then some closing remarks (part **D**). Parts **B** and **D** are normally given as separate chapters (or sections) with part **C** consisting of several chapters (or sections).

Common sense advice:

- If a section is only one or two sentences long, perhaps it should be a paragraph, not a section
- Avoid deeply nested sections (eg. 1.2.1.1.1). Try to limit it to a nested depth of three.

A) Opening Formalities
   - Report Cover
   - Title Page
   - Abstract
   - Acknowledgements (optional)
   - Table of Contents
   - List of Figures
   - List of Tables

B) Introduction
   - Problem Background
   - Problem Motivation
   - Problem Statement
   - Proposed Solution
   - Overview of Remainder of Report

C) Technical Sections
   - Background and Terminology
   - Project Details (elaborate on the accomplishments)

D) Conclusions and Recommendations

E) References

F) Supporting Appendices

A) Opening Formalities

Report Cover: The report must be bound with a department report cover. Covers are available from the departmental office when you are ready to bind the two copies you will submit (your supervisor keeps one copy and you may obtain the second copy back from the department office about 2 weeks after the end of classes). The cover has a window (a small portion cut out near the middle of the cover) to allow the title (printed on the title page) to be read without opening the cover.

Title Page: Should include: report title, author's name and student number, date, supervisor's name. The report title and author should be arranged on the page so that they can be read through the window in the report cover. A sample title page is attached to this guide.

Abstract: The abstract is a short (half a page), high-level overview. The abstract should (briefly) identify: the problem, the solution, and the accomplishments (sound familiar?). Write this last!

Acknowledgements: (option) a brief statement to acknowledge anyone who had input that contributed to the project and or report. The Project supervisor is often acknowledged; however, this is not required. Examples of other people who are often acknowledged include technical support staff who have helped in some way, and people who have answered questions or made suggestions.

Table of Contents: A list (titles and page numbers) of all sections and subsections.

List of Figures: A list (captions and page numbers) of all figures.

List of Tables: A list (titles and page numbers) of all tables.

All pages in the opening formalities should be numbered using lower case Roman numerals. None of the opening formalities appear in the table of contents.

The remainder of the document (including the references and appendices) should be numbered in Arabic numerals.

B) The Big Picture

For the large majority of projects, Part B can be presented simply as one section, with each of the parts (motivation, statement, solution) simply being separate paragraphs within the section. Separate into sections only if the complexity warrants in-depth discussions.

The "Big Picture" provides an executive-level summary of the project and the report. The exact layout of this part may vary, depending on the project, the student's style, and the supervisor's preferences. For example, sometimes the introduction and the problem motivation are combined. Remember, you will help the readers if you **clearly** identify the problem statement, solution and accomplishments.

Introduction: Provide a general context for the problem (introduce the problem area). This should be brief, since the readers are familiar with the problem area (the supervisor has been involved with the project and the 2nd reader has been selected because they are familiar with the problem area).

For example, a project might deal with some aspect of data communication for a particular application. The introduction would say a bit about the application and the role of data communication in that application.

Problem Motivation: Analyze, or expand on, the introduction to show that one or more problems exist in the problem area. This may include some discussion of related work in the area; however, don't get too detailed here! (Instead of details, give short statements of the relevant points and give citations to references that contain the details.) If more detail needs to be provided to understand your solution or accomplishments, include a relevant technical section (in part C) or an appendix (in part F) and give a forward reference to the section or appendix.

Problem Statement: Give a short, clear statement of the problem(s) being solved. The problem(s) must have been identified in the motivation discussion. Make sure that you have identified the problem(s) that your accomplishments have solved. A project often solves only a small part of a larger problem. In case, the motivation will identify the larger problem and the sub-problems, while the problem statement must clarify which problem is being solved.

Proposed Solution: Describe the proposed solution to the stated problem. Do not go into details here! (Give details in parts **C** and **F**)

Accomplishments: List your accomplishments towards your solution. Remember, this is crucial information that will be used to determine your final grade. Do not make the reader sift through the entire report to determine what you actually completed.

Sometimes, a project does not completely solve the stated problem. This might be due to unexpected technical problems, or perhaps an initial under-estimation of the amount of work involved. If this is the case, be sure to point this out.

Overview of Report: Let the reader know what information is included in the report, and where the information is located. Give a brief statement of why the information has been included so the reader will be better prepared to relate the information to the **BIG 3** questions.

C) Technical Sections

The technical sections contain details that are relevant to the problem, the solution and the accomplishments.

Background and Terminology: Provide only the background information needed to clarify the problem. This might include details of the problem, an analysis of related work, and a clear statement of terminology. Any terminology introduced here should relate to the problem, not your solution.

Project Details: Elaborate on the rationale behind your solution, and in particular, give the details of your accomplishments.

Project development is a creative process. Periods of learning , thinking, and experimenting are interspersed with discoveries that clarify many issues but often point out weaknesses and flaws in earlier work. The readers are not interested in the sequence of events in the creative development of a project, or the personal discoveries that helped to clarify issues in your mind. The readers want to know about the results that you are submitting as evidence of solving the problem. Regardless of the order of discoveries during development, present your details in an order that clarifies the results.

An important part of problem solving is the generation and analysis of alternative solutions. If you consider alternative solutions at various points in the project, include brief discussions of the alternatives and why you chose not to pursue the alternatives.

Some technical details do not belong in the body of a report and should be moved to appendices (for example, a lengthy mathematical derivation, or a user's manual for a software package). These are useful accomplishments that should be included in the report, but placing the details in the body might unnecessarily distract the reader. In such cases, the body should include a summary of the relevant highlights, and refer the reader to the appropriate appendices for further details. When in doubt, ask your supervisor for suggestions about what should not be moved to appendices.

As stated in the project guidelines, all SYSC-4907 projects must demonstrate elements of engineering requirements, design, implementation and testing. It is natural that the report reflects this progression.

D) Conclusions and Recommendations

Briefly summarize the problem, the solution and your accomplishments towards the solution. (Remember, you want to be very clear about the answers to the BIG 3 questions!) Be sure to point out any features that might make your solution more desirable than other existing solutions to similar problems.

Make suggestions about how the project might be extended or modified to solve bigger or related problems. You do not have to give lots of details here, but a brief description will help the reader follow your suggestion.

During a project (and particularly near the end), it is not unusual for new alternative solutions to be discovered. Often, the project is committed to a particular solution and too much work would be involved to incorporate the new solution. If this happens, you might want to describe the new solution and recommend that the new solution might be preferable to the one you implemented.

E) References

List all references material that you cite in your report. For each document list: the author(s), title publisher, relevant pages (if appropriate), and date of publication. Check with your supervisor as to how references citations should appear in the text of your report. Be sure that your table of contents includes an entry for the reference list. Use IEEE publications as a guide to the format for bibliographical entries.

F) Supporting Appendices

Appendices should be labelled with upper case letters rather than numbers (i.e. A, B,…), and each appendix should have a title. Be sure all appendices are listed in the table of contents. Make sure each appendix is referenced at least once from the report body (parts **B** through **D**)

Tips and Traps

The following notes and suggestions are intended to help you avoid some of the mistakes that are often made in 4th year project reports.

Drafts: Reports are often 30-35 pages. This is likely to be the first time you have written a report of this length, and you will probably require several attempts to complete a good report. The project deadline for the first draft is more than a month before the final version is due. Don't miss the draft deadline! If you get the first draft in on time, then your supervisor can make suggestions to help you refine it closer to the final version. An often-heard comment during project evaluations is: " The report is one draft away from making this an A project".

For most students, one draft is not enough. The first draft is often very thin on details, and poorly organized to answer the BIG 3 questions. When a draft is incomplete, supervisor's cannot make detailed comments. After completing the second draft, students often remark that they really had no idea what was involved when they wrote the first draft. Typically, the second draft is much closer to the final version.

Getting Started: When writing the first draft, don't be too concerned with exact wording. You know that you will have to come back to clean up and smooth out the text, so don't spend time trying to pick perfect words. Make sure you get the important ideas down before worrying about writing style.

Some students have found it convenient to start with a skeleton table of contents and then flesh it out in point form. This helps with the overall organization and allows flexible brainstorming (its easier to add a point to a list than to integrate new text into existing sentences!). Also, turning a structured set of point form comments into sentences and paragraphs is easier than writing text off the top of your head.

Some approach writing as a communication that is supposed to convey information to the reader. They start the first draft by listing the questions they think the readers might want answered, and then fill in the answers.

If you normally quite eloquent, but have difficulty putting your thoughts on paper, try dictating 3 or 4 paragraphs at a time to a tape recorder. Playback the recording, type exactly what you said, and then read the paragraphs and do any necessary editing.

Log Book: Keep a project log book with entries about technical details, ideas, supervisor meetings, etc. In addition to helping to keep you organized during the project, the log book will be a valuable source of information while writing your report.

Write as You Go: Writing grief statements of the problem and proposed approach early in the project will focus the project and provide material for the final report. Get in the habit of writing weekly progress reports to your supervisor and "memos to file" on issues you have studied and/or solved. These items will save you a great deal of time in constructing the progress report (due at the end of the fall term), the oral presentation (around mid-January), and the final report (first draft due in early March). Integrating notes into draft report will be easier if references to the relevant sections of your draft table of contents are included when the notes are written.

Proofreading: Too often, students spend many hours assembling a draft or final report and then submit it without proofreading. Readers are easily distracted and discouraged by simple writing mistakes (spelling and grammar), and obvious technical flaws, that should have been eliminated by proofreading.

Spelling mistakes are easily found and corrected using a spelling checker (word processors like WordPerfect and Word have built-in spelling checkers).

Grammar is a bit more difficult to correct, but there are grammar checking programs available. If you know that you have a problem with grammar, then write a few paragraphs and get someone to help you proofread

them. Don't write an entire draft before addressing possible grammar problems in your writing style. If you improve your writing style early, then subsequent text will contain fewer problems that need correction.

Diagrams and Examples: Diagrams and examples are included as figures to help the reader understand what you are trying to say. Each figure must always be referenced from at least one point in the report text. Do not fall into the trap of assuming that diagrams and examples are self-evident. If a diagram, table or graph contains data, make sure it's significance is discussed in the text. Do not leave it up to the reader to interpret data. You are the expert—tell the reader what they should see in the diagram.

For the first draft, don't spend a lot of time making diagrams "laser perfect". Hand-drawn diagrams are quite acceptable.

Re-Read: Read over your draft from start to finish from the reader's point-of-view. Have you addressed the BIG 3 questions? Can the reader tell what you have done? Have you included everything you meant to tell the reader? Avoid "fuzzy" language. Get to the point! Sentences should be concise but not cryptic.

Timing: Beware! Printing, assembling the final document, and making copies takes time. Allow yourself enough time for the final document.

Writer's Block: You will likely experience times when you just can't seem to get anything out of your head into text. This will be frustrating, but you will have to find some way to get around it. Keeping a list of ideas/topics yet to write about will help. Start by brainstorming a wide range of topics without concern for the order they are listed in the table of contents. Pick a "hot" topic from your list that you think you are ready to write about and expand on it. While writing on one topic, don't be too worried about knitting it together with other topics (it is often easier to edit and integrate existing text than to formulate some initial text about topic). When you are writing comfortably on one topic, don't allow yourself to get distracted by other topics. Write the words that come easiest first.

Insert the Title of the Engineering Project Report Here

By

My Name Here

Supervisor: Professor Supervisor

A report submitted in partial fulfillment of the requirements
of SYSC-4907 Engineering Project

Department of Systems and Computer Engineering
Faculty of Engineering
Carleton University

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