NANYANG TECHNOLOGICAL UNIVERSITY

SCHOOL OF COMPUTER ENGINEERING

GUIDELINES FOR WRITING

THE FINAL YEAR PROJECT REPORT

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Contents

1. Introduction

One of the major requirements of your final year course (SC409 - Project) is to conduct an in-depth project, submit a project report and an oral presentation. The report is probably more complex and longer than any required reports in the course. It is certainly regarded by the School as the most important and formal. Hence, it is in your interest to have it carefully prepared and written to high standards. This guide contains guidelines to help you write your final year project reports, i.e., the Final Report and Amended Final Report. It gives you the necessary hints on how to write a good technical report and suggests some principles of effective writing. The final year project (FYP) is carried out by an individual student. **An individual report is required for each student.**

Section 2 contains the administrative details of project submission, layout and typing of the report and general hints for carrying out a good project. Section 3 describes in detail the framework and elements of a formal technical report especially where they are relevant to your final year project report. It also explains the functions and contents of these elements and where necessary, examples are included. Section 4 deals with the choice of languages, style and vocabulary for technical report writing. It introduces a positive style of technical writing that is direct and easy to understand. It also discusses ways of organizing and ordering the information of your main text for maximum effectiveness. Section 5 covers the revision and re-writing of your drafts.

It is useful that, early in your project, you read and consider the points discussed in this guide since planning the outline and logical arrangement of your report can also help you in reviewing the sequence of your projects. Also, writing rough drafts of sections of the report after each stage of your project can clarify your findings and reveal discrepancies.

Take note that copying from the web (or anywhere) is plagiarism which is not acceptable in NTU with serious consequence.

2.   Submission of Report

2.1   Submission

Each student is required to submit **two** copies of the final report, one to the supervisor and the other to the examiner, at the specified date for assessment. The final reports will be returned to the students about two weeks after the submission. If there is any correction or amendment to be made, the students will be duly informed. Students will be given about one week's time to make the required changes in their **final reports** and subsequently submit them as the **amended final reports**. Students who fail to make the required changes will be penalized accordingly and asked to amend the reports again.

For both the final report and amended final report, the expected length of the main body of report excluding charts, diagrams, appendices, tables and references **should not be more than 10,000 words**. The Standard International System of Units (SI) should be used throughout. Please take note and adhere to the submission dates, which are published separately, for the following documentations:

(a)   Project Plan/Strategy
(b)   Interim Report
(c)   Final Report
(d)   Amended Final Report.

2.2   Layout and Typing

Use white A4 size bond paper of at least 809 weight. Leave a 35 mm margin on the left and 30 mm on the top, bottom and right hand side of each page. Allow one and a half line-spacing for the text of the report. When using a word-processor for your report, ensure that the same font is used throughout the text and that the printing is of good letter quality. Paint-jets, ink-jets, laser printouts, dot matrix with near-letter quality printouts are all acceptable. For the appendices, dot matrix print-outs are acceptable.

2.3   Suggestions for Carrying out A Good Project

In order to carry out a good piece of project work, the following points are worth noting:

(a)   Report presentation

- Correct grammar, spelling, punctuation and style
- Logical and orderly layout of report.

(b)   Development, discussion and conclusion of project work

- Ability to analyze all factors in the problem noting
- Dependency on constraints
- Good use of reference materials
- Results, discussion, conclusions and suggestions for further work so
- Demonstrating the student's perception of the value of the work completed.

(c)   Approach during the whole year

- Good project management skills (planning, strategy, costing, use of tools, testing etc.)
- Interim report
- General initiative and sense of responsibility
- Ability to extend ideas and expand on suggestions.

3.   The Final Year Project Report

3.1   The Formal Technical Report

Elements of a technical report

The format of a formal technical report is generally made up of three sections:

(a)   Preliminaries
(b)   Body
(c)   Reference.

The table below shows the elements that make up these three sections:

1. Preliminaries	1. Front Cover/Title Page 2. Abstract 3. Acknowledgments 4. Table of Contents 5. List of Figures/illustrations
2. Body	1. Introduction 2. Body (divided into chapters and sections) 3. Conclusions 4. Recommendations 5. Footnotes (optional)
3. Reference	1. Bibliography/References 2. Appendix (optional) 3. Glossary (optional) 4. Index (optional)

3.2   The Preliminaries

This section is to supply **background information** of the project. Each element of this section is to start at a new page. The pages here are usually numbered in small Roman numerals, e.g. (i), (ii), etc.

Front Page/Title Page

The title page of the report gives all particulars of the project. They include:

(a)   Project ID
(b)   Title of the project
(c)   Name of the author
(d)   Name of the school for which the report is written
(e)   Requirements of the University, for the degree of Bachelor of Computer Engineering
(f)   Date.

The report title should be complete, comprehensive and concise. If the title is very long, break it into two or three manageable parts. Avoid using unnecessary expressions like "A study of ...", "An investigation of ..." since most technical reports are about investigations or studies. If they are necessary for further classification, specify what type they are, e.g. "experimental investigation", "design investigation", "feasibility study" and so on. A sample of the front cover and title page is shown in Appendix 1. **This format must be strictly adhered to in the Final Report and Amended Final Report.**

Abstract

The abstract is a highly condensed version of the whole project. Its function is to draw the reader's attention to the main points or findings of the project. It should include:

(a) A concise statement of the problem investigated, hardware to be designed, or software to be written
(b) Purpose of the project
(c) A concise description of how the information was collected, the design methodology or the software approach used in the project
(d) The results
(e) A concise summary of conclusions and recommendations.

The ordering of the above varies according to the type of readers and the purpose of the report. The general rule is to start with information that is most important or interesting. This part of the report should be written **only after** the whole report is completed and not before. The abstract can be broken up into a small number of paragraphs but the length is usually limited to **one A4 page.** Single line spacing is allowed in the Abstract.

Acknowledgments

The writer uses this section to thank all those he or she is indebted for guidance, financial or any other assistance rendered during the course of the project.

Table of Contents

The table of contents gives the reader an accurate outline of the contents of the report. It enables the reader to search specific items easily and quickly.

The following is a list of suggestions for a good table of contents:

(1) Include the headings of all the major divisions and perhaps major subdivisions of the report. Show the relationship between major and subdivisions through typography (e.g. capitalization and indentation).

(2) Put down the page number of each of the above items.

(3) The titles of all headings and sub-headings must correspond exactly with those in the body.

(4) Use decimal numbering system rather than a, b, c, etc. to indicate a hierarchy of sections and sub-sections clearly.

A sample contents page is shown in Appendix 1.

List of Figures/Illustrations

Make a list of all the figures, tables, graphs or other illustrations used in the report if there are more than five in number for each different category. The purpose of this list is to enable the reader to look up an individual item in the report easily.

The heading "List of Tables" should be centered on a new page. Two spaces below "List of Tables" are headings "Table" and "Page" placed near the left and right margins respectively. The tables must be numbered and the exact caption or title of the table be labeled with the corresponding page number shown. This same layout applies to figures or other illustrations used in the report.

3.3   The Body

Introduction

This section is independent and different from the abstract. It should be concise although the length may vary. It can be a single short section of one or two paragraphs, or a short chapter. Generally, the introduction includes the following:

(a)   Any background information needed to understand the problem.

(b)   A statement of the problem being investigated or the purpose of the study. The objectives of the project should be stated clearly.

(c)   A summary of the history of related work and/or theoretical analysis of problems related to your topic. If this portion is lengthy, a separate chapter could be written for this purpose. It is important to discuss the contribution of each of these to the problem investigated and to show how the present investigation arises from contradictions or inadequacies of earlier investigations. This section is optional and will depend on the nature of the project carried out.

(d)   In some disciplines, it is appropriate to indicate the limitations of the project.

(e)   A brief statement of the source of data and the procedure of the project.

(f)   A preview of the organization of the report to assist the reader in grasping the relationship between the various parts.

Main Text

This section includes information obtained during the project work, the analysis and discussion of the information.

Material/Equipment Resources and Costing

Give a brief but adequate description of the resources you have used in your project. These resources include equipment, materials, hardware or software used. The description should be detailed enough for one to follow and carry out the same project if desired. For hardware-based projects, it is imperative to include information on the hardware costing of the project. The total hardware cost and also a detailed breakdown of all the hardware component costs must be provided.

Project Schedule

A chart-form project schedule that illustrates work to be done at various time intervals throughout the FYP duration must be included. This project schedule should be the same one presented in the "Project Plan/Strategy" submitted earlier in the year. If appropriate, explain why the work was planned in this manner. If during the course of the FYP, the student's work deviates from the original schedule, a revised project schedule that reflects the actual progress

of the student's work must be included. The student is expected to discuss the deviation in the report.

Design documentation/Work done

Give a full account of how the project work was carried out. This shall include the various phases in a typical project life cycle, namely planning, requirement analysis, design, implementation, testing etc. The use of design and testing tools/procedures are to be included. For ease of presentation, you may need to divide the project into relevant parts or smaller modules and tackle each one separately. Observations as a result of experimentation should not be included in this section. In addition **past tense** should be used since you are reporting what has already been done. Finally, complex and inter-related procedures could be presented as lists, algorithms or flow-charts.

Data and results

The results should be limited to the more important facts. Include only those that support and explain your ideas or arguments. If there are graphs, charts, diagrams or tables etc. to be included, they should be of a summary nature.

Discussion of results

The primary purpose of the discussion of results is to indicate your inferences from your observations. Discuss the meaning of the facts, their underlying causes, their effects and their theoretical implications. Do not repeat the detailed data presented in the tables and graphs. **It is important that you should discuss to what extent the project objectives have been met.**

In discussing the results, you may:

(1)   Compare experimental results with theoretical or expected values.

(2)   Describe the interrelationship of the experimental results.

(3)   Speculate on causes and effects.

(4)   Comment on trends and changes.

(5)   Analyze and state implications or limitations.

(6)   Analyze and explain errors.

(7)   Comment on the cost of hardware components in building the project.

Conclusions

The conclusions should derive directly from the results. It summarizes the findings in the light of the project's objectives. This means stating:

(1)   What is important

(2)   Why the results are valid

(3)   What the gaps and limitations of the findings are

(4)   Possibility of future work or research in the area.

Recommendations

They should derive directly from the conclusions and specific recommendations should be numbered and stated separately.

Footnotes

Footnotes are used for the following purposes:

(1)   Explain or amplify materials in the main body

(2)   Acknowledge quotations or sources

(3)   Provide cross-reference to other sections of the body.

If a footnote is used to identify a source, it should give the author's name, title of the work, page reference, date of publication and name of the publisher. Footnotes are placed at the foot of a page. They may be numbered continuously through a chapter or through a whole report. Footnotes should be as short as possible and they should not be used frequently as they may distract the reader.

Citing References in Text

In the main text of the report, you very often have to refer to or quote specific reports, papers or books. The sources of reference would have to be listed and described in full in the References. Presented here is a standard system of citing reference in the text so that the reader can identify which reference entries you are referring to.

>   - Articles   References are to an author and date.

>   e.g. Ting (1981)

If a reference is made to a particular page of an article, it would be shown as follows:

>   Goughnour and Andersland (1968 p. 941)

Should there be two publications by the same author(s) in the same year, the format of (1981a) or (1981b) would be used and the bibliographic listings would be in that order.

>   - Books   References are to an author and date.

>   e.g. Mitchell (1976)

If a reference is made to a particular page of the book, it would be shown as:

>   Mitchell (1976 p 123)

Should two books be published by the same author(s) and both referred to in the text of the report, the convention used in articles will apply (e.g. (1976a), (1976b)).

Note - where reference is made to an article or book by 3 or more authors, the reference will be shown as:

Barnes and others (1971)

3.4   End Section

Appendices

Appendices, if any, are placed at the very end of your report. You can include here any detailed and lengthy information and data from your project that are not of interest to a normal reader but which might be useful for documentation. Number each appendix in the order as it is mentioned in the text, e.g. Appendix 1, Appendix 2, etc.

Appendix material may include:

-        Statistical tables
-        Detailed results of experiments
-        Series of graphs
-        Summaries of results obtained elsewhere
-        Detailed maps, charts and diagrams
-        Pseudo codes
-        Schematic diagrams
-        Program listings.

References

The reference section lists all the reports and published materials referred to in the report. The list has to be done systematically. Presented here is a system commonly used:

(1)   All entries will be listed alphabetically by first author's family name without numbers.

(2)   Author's family name precedes initials; full first names are not used. Second, third and other authors' family names also appear before initials. The final author's name in the case of multiple authorship will be preceded by 'and'.

(3)   All entries will be in the language and spelling of the source consulted.

(4)   <u>Articles</u>

Family name of author/comma/initials/comma*/single/quote mark/title of article with only the initial work and proper names capitalized/single quote mark/comma/source (underlined if published/comma/volume number expressed as 'Vol' followed by numeral/comma/ part number expressed as 'No' followed by numeral or 'Pt' followed by numeral/comma/year (with month if known in full, preceding year)/comma/pp (for a run of pages) or p (for a single page) with page number(s). There will be no full stops throughout except for a final full stop at the end of each entry.

* multiple authorship will be shown as in Reference above.

(5) <u>Books</u>

The convention will be:

Family name of author/comma/initials/comma*/title of book (underlined, with nouns, verbs, adjectives and adverbs capitalized)/comma/short form name of publishers**/comma /place of publication/comma/year of publication.

<u>Notes:</u>

(i) 'Short form name of publisher' means e.g. 'Wiley' not 'John Wiley & Sons'. However, to avoid confusion between place and publisher, the words 'Press' or 'University Press' will be included in full where relevant.

(ii) Where a text is edited the editor will appear as author, with the letters 'ed' following his name and initials e.g.

Ardus, D A, ed, <u>Offshore Site Investigation</u>

(iii) Where an edition subsequent to the first is consulted, the number of the edition followed by the letters 'ed' will follow the title e.g.

<u>Foundation Engineering 2nd ed</u>

(iv) Abbreviations in the bibliography are restricted to 'ed' for editor/edition, 'p' for page, 'pp' for pages, 'Vol' for Volume, 'No' or 'Pt' for number or part. initials for first names of authors or degrees, and states of the United States, Australia and other large countries where the publisher's office is located in a place other than a major or uniquely-named city e.g.

Potmac, Md

Cambridge, Mass

(The names of cities or towns without qualification refer to the original localities bearing the name, e.g. 'Paris' refers to Paris, France. not Paris in Arkansas, Idaho, Illinois, Kentucky, Missouri, Ontario, Tennessee, or Texas).

(v) The titles of journals must therefore be written in full.

(vi) Thesis titles are capitalized as for books and are in single inverted commas, but are not underlined.

4. Writing The Report

4.1 Selecting and Ordering The Information

In order to prepare an effective report, the writer must have a very clear idea of the following so as to decide on the selection and ordering of information.

(l) Purpose of the report (i.e. why the report is written)

(2)	How it will be used
(3)	Who the readers are.

Your information should be arranged in a logical sequence and the following are some basic ways of doing so.

(1)	Chronological order - events and actions are arranged according to time sequence, from past to present or future, or the reverse order.

(2)	Spatial order - facts and events are presented according to their geographical location, i.e. north, south east, west, far, near, district by district etc.

(3)	Cause and effect - the causes of a certain problem or situation are identified first and then the effects are discussed.

(4)	Topical order -- the facts are classified into topical headings which form the different aspects of the situation/problem being examined. The topical headings can be arranged in order of importance, with the important ones being given larger and more thorough treatment. Development of ideas can base on the generalization to specific order, i.e. a general statement is first given and then backed up by expansion and examples.

## 4.2	Use of English

Sentence Structure

Sentences should be short as they are easier to understand. Do not place too much information into one sentence length. Vary the sentence length according to the complexity of the information presented as this would increase interest.

Vocabulary

(1)	Technical Jargon

Since the report is prepared for people who know the subject well, technical terms can be used without explanation. However, if you think your reader may not understand the specific way it is used, state clearly its meaning.

(2)	Long Words

Avoid using long, complicated words when there are shorter and simpler ones. Short, specific and familiar words help the reader to understand better.

(3)	Voice

Active voice is more direct than passive though passive structures seem to be very common in scientific and technical writing. Therefore, if you wish to obtain a more forceful effect, use active voice. Compare the following:

The existence of a stable flow pattern is suggested by this.

This suggests that a stable flow pattern exists.

(4)	Tenses

(a)   Experimental facts should be given in the <u>past tense,</u> e.g. 80% of the interviewed <u>were</u> in favour of the suggestion.

(b)   Presentation - use the present tense, e.g. The graph (Figure 4) <u>shows</u> the increase in the application of grants and loans.

(c)   Discussion of results - best to be put in the <u>past tense,</u> e.g. The proportion of workers opposed to the proposal <u>was</u> highest in area A.

(d)   General truths should be stated in the <u>present tense,</u> e.g. There are three terms in one academic year.

(e)   Specific conclusions and deductions should be given in the past tense to avoid confusion with general conclusions, e.g. the 1983 in-service training **proved** to be most successful.

4.3   Numbering

There are two ways of numbering:

(1)   A mixture of Roman numerals (I, II, III) together with Arabic numerals (1, 2, 3) and small letters (a, b, c).

(2)   The decimal system starting with 1 and numbering sub-paragraphs 1.1, 1.2, and their sub-divisions 1.1.1, 1.1.2, etc. The numbering changes to 2.1, 2.2, 2.3, etc. when a new subject matter is introduced into a new section.

<u>**Note**</u> - Use numbering with discretion because overusing it will produce a confusing appearance.)

4.4   Illustrations, Tables and Graphs

Tables

Tables are best in showing figures quickly and accurately. There are two ways of setting tables:

(1) Vertical
(2) Horizontal.

Vertical tables are the ones that are displayed when the page is in the normal position for reading. Horizontal tables are those that run over the length of the normal page. The heading of a vertical table is placed at the top, while a horizontal table has the heading underneath.

Charts and Graphs

Charts and graphs are best for showing significance, trends or making comparisons. The title of a graph is usually placed underneath the graph. All units should be stated and the writing which states them should be set out parallel to the top of the page.

Diagrams

Pictorial presentation is useful for covering statistical information particularly for those who are unimpressed by figures. All drawings should have captions and are labeled. All illustrations, tables and graphs should be numbered.

5. The Final Draft

5.1 Revising The Manuscript

After you have written the first draft of your report, begin to revise it. In the first revision, give attention to the order and development of the larger divisions of the report - the sections and paragraphs. In the next revision of the rough draft, focus attention on the sentences. Study and revise the sentences in groups. Make each group of sentences develops the exact ideas you wish to express.

5.2 Correcting The Typewritten Copy

A spelling checker, which is found in most word processors, should be used to ensure that the script is spelling error free prior to printing. Thereafter, the output should be checked to pick up any other errors. All figures, tables, names, quotations, and citations in the copy must be verified by comparison with the original copy. A convenient way of checking is to have another person read aloud slowly from the original while you follow and correct the output copy.

6. Conclusions

The writing of the project report is very time consuming as it needs planning, selecting and organizing. You must give yourself ample time to do the writing, correcting, rewriting, typing and binding. Therefore, do not leave things till the last minute. The task of writing the report is a difficult and time-consuming one, therefore it cannot be done quickly and haphazardly. This Guide will only be useful if you allow sufficient time for writing the report, and thinking about the report at all stages of the project. Do not forget to allow time for correcting and rewriting the drafts before the final copy is ready for submission. Allow sufficient time for typing and binding.

References

[1] H.-K. Kim and J.-D. Kim, "Region-based shape descriptor invariant to rotation, scale and translation," *Signal Processing: Image Communication*, vol. 16, pp. 87-93, 2000.

[2] F. Mokhtarian and A. K. Mackworth, *The curvature scale space representation: theory, applications and MPEG-7 standardization*: Kluwer Academic Publishers, 2002.

[3] S. Berretti, A. Del Bimbo, and P. Pala, "Retrieval by shape similarity with perceptual distance and effective indexing," *IEEE Trans. Multimedia*, vol. 2, pp. 225-239, 2000.

Appendix 1

Front Cover

NANYANG TECHNOLOGICAL UNIVERSITY

A KNOWLEDGE-BASED

INVENTORY CONTROL SYSTEM

Lim Eng Chong, Jimmy

School of Computer Engineering
2002

Title Page

NANYANG TECHNOLOGICAL UNIVERSITY

SCE02001

A KNOWLEDGE-BASED

INVENTORY CONTROL SYSTEM

Submitted in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Computer Engineering
of the Nanyang Technological University

by

Lim Eng Chong, Jimmy

School of Computer Engineering
2002

Contents Page

<div align="center">**TABLE OF CONTENTS**</div>