Scientific method, Previous work, Literature study, Plagiarism, …

23 January 2009

Some useful tips for those doing a masters thesis project

Lecture notes of G. Q. Maguire Jr.

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**KTH Information and
Communication Technology**

Two tips

1   Do **not** panic.

2   Get in the habit of writing *at least* **one page every day**
- If it does not get written down - how will it get into the thesis?
- If you have a question in your mind - write it down
- Look at your table of contents once per week to see where you need to be making more progress (or revising your plans)
- Write complete references as you go - do **not** attempt to put them in later (you will have forgotten where you read/learned what!)

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Scientific method & System building

- What is the problem?

- What is your **goal**?

Are you going to test a hypothesis?

- If so what is it?
- How should you test it?
  - What data do you need?
  - How are you going to get it?
  - How much data do you need?
  - How are you going to analyze it?

Are you going to show how an idea can be realized?

- What are you going to show?
- Will it scale?
- How will you evaluate it?
- …

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Plagiarism

Everything in the thesis is assumed to be your own: work, words, … .

⇒ Give credit where credit is due - cite your sources!

Figures - each figure has its own copyright

⇒ If you want to use a figure from someone else:
- Get the permission of the copyright owner (who may be different from the author)
  – When you get this permission they will say how they wish this to be acknowledged.
- **Best:** Draw your own figure - in the figure caption **cite the source** which inspired you (For example: "Figure 14: Flight of a Bumblebee (Adapted from Figure 87 of [15])"

There are sources which are in the public domain

- you still have to cite your source!

There are souces for which the Creative Commons[1] rules apply:

- you still have to cite your source and
- you have to follow the rules associated with this source

1. See *http://creativecommons.org/*

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Literature Study

Literature study $\subset$ final report:

- ## Title page
  - Title, Author, Date
  - What kind of document is this? {i.e., a "Literature Study Draft"}
  - State where you are doing this work, who is/are you advisor(s), who is the examiner

- ## Abstract
  - Short problem statement
  - Why is this problem worth an masters thesis project? (i.e., Why is the problem both significant and of suitable degree of difficulty to be worth an masters?)
  - What you expect to show.

- ## Introduction
  - Longer problem statement
  - General introduction to the area

- ## Background
  - What have others already done?
  - What does a reader (another x student -- where x is your study line) need to know to understand your report?

- ## References

See: Erik Ehrlund's *http://web.it.kth.se/~maguire/Erik_Ehrlund_Literature_Study_report_v1.2.pdf*

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Title & Abstract

You start with a working title - it can be changed all the way up to the final version that the examiner approves!

Most readers are going to **only** read the title and abstract

- The title & abstract should make it clear to a {member of parliament, the general public, …) - what you did, why it was important, what you showed, and why was it worth a masters thesis

Fewer readers will also read the conclusions and future work

Very few readers will read the entire thesis

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Background

What have others already done?

You should be aware of who has already done related work.

- What are the good and bad aspects of this earlier work?
- What has not been done?

What does a reader (another x student -- where x is your study line) need to know to understand your report?

- Keep in mind that most of your readers will not have just spent 5 months studying this topic!

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Who are your readers?

- You boss
- Your academic advisor
- Your examiner
- Your opponent
- Other students
- People working in other companies
- Someone working in government
- Anyone!

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Who are your readers?
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References

- What makes a good reference?
  - Wikipedia and other web sources?
  - Journals: Transactions on xxx?
  - Conferences?
  - Widely used textbooks?
  - Directly from an expert?
- What makes a bad reference?
  - Wikipedia and other web sources?
  - I heard this from a friend (where the friend is **not** an expert)?

Issues: Who is an authoritaive source? Why? For how long will this source be available? Can someone else find your source? Can you find your source?

- Can you have too few references?
- Can you have too many references?

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References
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Where to find previous work

- Your favorite search engine

- Google scholar (*http://scholar.google.se/*)

- CiteSeer^x (*http://citeseerx.ist.psu.edu/*)

- KTH library (*http://www.lib.kth.se/main/* and *http://www.lib.kth.se/main/eng/*) with access to
  - INSPEC (IEEE & IEE) and other databases
  - e-books, e-journal, …
  - library catelogs
  - …

- Earlier theses and dissertations

- On-line lecture notes and courses

- Textbooks and books

- Wikipedia (*http://en.wikipedia.org/*)

Thesis outline

- Title page
- Abstract
- [Acknowledgements]
- Table of Contents/Figures/Tables; and list of Acronyms & abbreviations
- Introduction
- Background
- Method
  - What are your goals? (What should you be able to do as a result of your solution - which couldn't be done well before you started?)
  - What you are going to do? Why?
- Analysis
  - How you are going to evaluate what you have done?
  - Analysis of your data and proposed solution
  - Does this meet the goals which you had when you started?
- Conclusions and Future work
  - Conclusion
    - Did you meet your goals?
    - What insights have you gained?

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- – What suggestions can you give to others working in this area?
- – If you had it to do again, what would you have done differently?
- Future work
  - – What you have left undone?
  - – What are the next obvious things to be done?
  - – What hints can you give to the next person who is going to followup upon your work?

- References

- Appendix/Appendices (Optional) - one of which might be a list of abbreviations or terms which you use in your report.

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Opposition & Opposition report

Goals:

- Help improve the thesis of someone else
- Help improve your own thesis - by thinking about how someone else will understand it

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Opposition & Opposition report
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Exjobb opposition report

- Reviewer name:
- Date of review:
- Title:
- Author:
- Section I. Evaluation
  - Category:
    - Relevance of content: 1 to 5 (5 excellent)
    - Disposition: 1 to 5 (5 excellent)
    - Evaluation of published results: 1 to 5 (5 excellent)
    - Abstract: 1 to 5 (5 excellent)
    - Conclusion: 1 to 5 (5 excellent)
    - Presentation of related work: 1 to 5 (5 excellent)
    - Language: 1 to 5 (5 excellent)

- Section II. Recommendations
- Section III. Detailed comments for the author

Examples of exjobb opposition reports (each appears here with the permisison of its author):.

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Exjobb opposition report
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example report 1:

Reviewer name: Charlie Westergren

Date of review: 28 Nov. 2006

Title: Network gaming: performance and traffic modeling

(Version: DRAFT, 11 Nov. 2006)

Author: Mattias Åkervik

Section I. Evaluation

Relevance of content: 3

Disposition: 3

Evaluation of published results: 3

Abstract: 4

Conclusion: 4

Presentation of related work: 3

Language: 4

Generally a nice report which could have been made shorter by excluding some parts taking focus from the thesis core topic. The disposition was clear, but at times it was hard to distinguish what category was explained, if it was method, background, results or analysis. The language was good with some minor spelling errors and grammatical errors which made some sentences tricky to get through. Nice figures throughout the report. The references seem recent and relevant. In general, the thesis has a good layout, which makes it easy to read.

Section II. Recommendations

- In the very first section, you say that the genre of game has been carefully chosen, but you don't give any explanation to why it was chosen? I assume that it was because it is the most demanding genre?

- In chapter two, instead of listing all game genres, it would have been sufficient to only list the game categories that are actually mentioned in the thesis. Might have felt more relevant if it was describing what type of information needed to be communicated by each category.

- It is unclear where the definitions of the different types of gamers are taken from. Not sure that the information in this chapter is of as big relevance to give it a chapter of its own. Could have been merged with chapter two into a Background information part where some section of low relevance to the thesis topic could be removed.

- Section 4.2 is another place where it would be of interest to know where these numbers are originating from. Is it something that you have researched for this thesis, or who has come up with them? And why is there a difference between the acceptable RTT requirement in table 2 for FPS games and in section 4.2.1?

- As this kind of reports generally are printed in gray-scaled copies. Make sure that the colours in figures and diagrams generate easily distinguishable gray-scales or markers, if not possible for one type of diagram, consider using another type of diagram or divide the diagram into two separate diagrams. E.g. fig. 1, 36 & 37.

- Try to use a different size or typeface of the explanation to the figures and tables.

Making the type bold makes it look more like head lines.

Section III. Detailed comments for the author

- Internet should be spelled with capital i.

- At some places in the text you have mixed up i.e. and e.g. (e.g. section 4.5.5)

- In the overview you say for example that: "This thesis will be divided into …" which sounds like the report is not completed yet. Might be replaced by: "This thesis is divided… " instead. It occurs in a couple of places in that section, and also in some places in the entire report. One in section 4.5.

- In my version, there is a broken reference in section 4.2.1.

- In figure 1, section 4.4.1; it would be nice to also be presented the percentages.

- In the same section (4.4.1), you introduce two types of delays that it would be good to give a short explanation to (FEC and interleaving delay).

- In section 4.5.1 you declare that Latency and delay are often used as synonyms, it feels like a statement that should be followed by something telling the reader if

- this is a correct synonym or not.In section 4.5.2, the second paragraph is kind of tricky to get through and extract the meaning of.

- In the same section (4.5.2) you refer to Tcpdump without explaining what it is or what it dumps. A similar thing goes for the following section where you say that network traces are analyzed. What is a network trace, and how do they specify inter-arrival times?
- Consider moving figure 2 in section 4.6.1, now it breaks the text in a way that feels unnatural.
- In the beginning of chapter 5, you refer to three main parts as (in this order) the first part, next part and the second part. Using terms as the next or the following while listing references can be ambiguous since its not sure whether you are aiming at the actual following section or the following with respect to the last sentences reference.
- Table 4 (section 5.1.1) is unreferenced in the text.
- In section 5.4 you refer to probe traffic but give just a vague explanation to the term.
- Page 41, in figure 9 and 9 in figure 9 and 10?
- In section 5.9 you write to prepare for the discussion in chapter 5, it is rather unclear to see which discussion you're aiming at.

- In section 5.11 you use the abbreviation PSTN but there is no explanation of that abbreviation.
- In section 6.3.2.1 you say that GPRS is close to the level that Quake 4 requires, but according to the figures, the uplink capacity is less then 50% of the required bandwidth which is not so close according to me.
- Section 6.3.2.2 UNTS UMTS?
- In section 6.2.3.4, you write about different simultaneous game sessions and I would assume this meaning several games running at the same time. Whereas in figure 33 and 34 you put number of players on the x-axis. Should this be number of game sessions too, or am I confused?
- In section 6.5 you suggest that operators should prioritize game traffic to have stable low latencies. At what cost would this be? How would the other traffic be affected by this? Could it happen that the gaming traffic rule out other traffic, such as voice calls?
- In the same section (6.5) you state that Mr Claypool says that Sony PSP generates traffic around 300 Kbps or less, but in your experiment, you tried FIFA 2007 which, according to table 11, on average just

generated 12 & 13 Kbps which is much less than 300 Kbps, do you know why FIFA 2007 generates much less traffic? Did you have access to any other games that could have generated more traffic? It would have been interesting to see how a game, actually generating on average 300 Kbps, would behave in the same situation

example report 2: *http://www.it.kth.se/~maguire/example-Xjobb_opposition_guan_wang.pdf*

Openness

Keep in mind:

- the final report is a public document
- your oral presentation and examination are open to the public

If you are working in a company then communication with your advisor during the thesis is confidential as this concerns a working document.

Put any confidential material in an appendix and make sure that you follow the company's procedures for getting your document cleared for external publication:

- for example, filing patent applications, removing confidential material, …

Note: Only the material which is the thesis is part of your academic thesis project and only this activity counts in the minimum 20 weeks of the project.

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Where to find additional information

General information: *http://www.it.kth.se/~maguire/maguire-exjobbs.html*

Some earlier reports: *http://www.it.kth.se/~maguire/DEGREE-PROJECT-REPORTS/index.html*

For those writing in English excellent resources are:

[1]   Chicago Editorial Staff, The Chicago Manual of Style. 14th edition, University Of Chicago Press, 923 p., 1993, ISBN 0-226-10389-7 or # 973 pages

[2]   Staff of the University of Chicago Press, The Chicago Manual of Style. 15th edition , University Of Chicago Press, August 1, 2003, 984 pages, ISBN-10: 0226104036, ISBN-13: 978-0226104034

[3]   Staff of the University of Chicago Press, The Chicago Manual of Style. 15th edition (CD-ROM), University Of Chicago Press, September 15, 2006, ISBN-10: 0226104044, ISBN-13: 978-0226104041 (there is also a Windows CD-ROM edition)

[4]   The University of Chicago. The Chicago Manual of Style Online, Fifteenth Edition, The University of Chicago Press, *http://www.chicagomanualofstyle.org/home.html*, Sunday January 18, 2009 03:29:30 PM

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Where to find additional information
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Questions?

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