Queasy/KetPsi

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Abstract

The Abstract of the report should be written here, it should provide a short summary of the work encompassing no more than 300 words (roughly). THE ABSTRACT.TEX FILE IS INSIDE THE INTRO FOLDER

Acknowledgements

The Acknowledgements section may be used to thank your supervisor, family, research funding bodies, or any other applicable individuals or institutions.

Declaration

I confirm that the work contained in this BTech project report has been composed solely by myself and has not been accepted in any previous application for a degree. All sources of information have been specifically acknowledged and all verbatim extracts are distinguished by quotation marks.

Signed ....   Date ....

       Maharshi Kadeval

Rajiv Chitale

Rishit D

Vedant Bhandare

Contents

List of Tables

List of Figures

List of Algorithms

Listings

Chapter 1

Introduction

A short paragraph introducing the topic the chapter examines.

1.1   Background

A number of pages about the background of the project.

1.2   About this Thesis

This is the thesis of *Insert Full Name Here*, submitted as part of the requirements for the degree of MSc Computing: Software Technology at the School of Computing, Robert Gordon University, Scotland.

A number of paragraphs detailing the main expectations of this body of work.

1.3   Chapter List

Provide a list of all the chapters within the thesis and a brief summary of the content.

Chapter 2 Background Research. This chapter deals with . . ..

Chapter 3 Design. This chapter deals with . . ..

Chapter 4 Implementation. This chapter deals with . . ..

Chapter 5 Evaluation & Testing. This chapter deals with . . ..

Chapter 6 Conclusion. The conclusions of the thesis are presented.

Chapter 7 Using LaTeX. This chapter deals with how to use the LaTeX system. ERASE THIS LINE ONCE YOU ARE DONE!

1.4   Conclusion

A short conclusion summarising the chapter.

Chapter 2

Background Research

This chapter provides some background research on the project and examines some previous work.

2.1 Conclusions

The main conclusions for this chapter.

Chapter 3

Design

This chapter examines the design of the project.

3.1 Conclusions

The main conclusions for this chapter.

Chapter 4

Implementation

This chapter examines the implementation of the project.

4.1 Conclusions

The main conclusions for this chapter.

Chapter 5

Evaluation & Testing

This chapter evaluates the overall project and provides results of tests carried out.

5.1 Conclusions

The main conclusions for this chapter.

Chapter 6

Conclusion

This chapter summarises the main outcomes and conclusions resulting from this body of work.

6.1 Conclusions

The main conclusions that may be drawn from the body of work.

6.2 Future Work

Further development that could be carried out in the future.

Chapter 7

Using LaTeX

There are several reasons why one should prefer LaTeX to a WYSIWYG word processor like Microsoft Word: *portability*, *lightness*, *security* are just a few of them (not to mention that LaTeX is free). There is still a further reason that should definitely convince you to abandon MS Word for the development of a dissertation: you will never be able to produce professionally typeset and well-structured documents using most standard WYSIWYG tools.

LaTeX is a free typesetting system that allows you to focus on content without bothering about the layout: the software takes care of the actual typesetting, structuring and page formatting, producing documents of astonishing elegance.

7.1 Structure of this Template

The file thesis.tex in the root of the directory (ThesisTemplate) is the main file of this template. This is the file that must be compiled to create the document. The thesis.tex document contains a lot of configuration settings. The only elements that require editing are details such as the title of the report, authors name and so forth. The only further addition to the file is to use the $\backslash include$ statement to include additional chapters into the report. One may also comment out the $\backslash include$ statements using the percentage sign (%) to develop the report on a chapter by chapter basis. The BibTeX database thesis.bib is also included within the root. All the actual content of the report is divided up into directories each with a .tex file containing the chapter content.

7.2 Using Figures

One can insert graphic elements using LATEX in a number of ways. Vector based imagery such as diagrams saved to the pdf format may use the \includegraphics command with the optional *viewport* attribute to specify a precise area of the graphic to be included. Figures should also include a Caption and a Label for referencing.

When inserting a Figure (Figure 7.1) one uses the \begin{figure} and \end{figure} commands. The image presented is a vector graphic in the form of a pdf file. When working with such files it is usually necessary to include the optional *viewport* attribute to designate the specific area in which to focus. The first pair of coordinates (x & y) designate the pixel location of the lower left corner. The second pair identify the upper right hand corner. Modification of these coordinates allows one to focus in upon a particular area of interest within the vector image. The optional attribute [H] when beginning a Figure inserts the graphic element at the specified location. Other options such as [htb] (here, top, bottom) will place the graphic in the most suitable place that LATEX can find. This however can have a negative impact on memory allocation if a large number of images are to be found within the document.
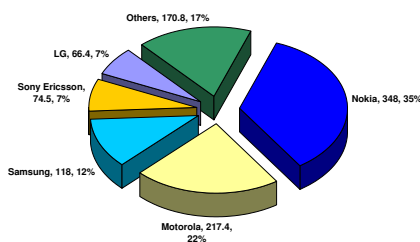
Figure 7.1: Mobile Phone Suppliers, Market Share 2006 (Millions of Units Shipped)

One may use the *minipage* command when inserting two figures to span across the page. This allows for the subdividing of the page into a number of columns of specified width. Note the pie-charts presented here (Figure 7.2 & 7.3) are a bit small for viewing as printed matter. Zoom in on them using a pdf reader to see the advantage of printing diagrams (vector graphics) in pdf format.

Figure 7.2: Caption for Figure

Figure 7.3: Caption for Figure

The example below (Figure 7.4) demonstrates the insertion of a bitmap image. One can see that the extension for the image file isn't specified, as this template is setup to automatically search for .jpg, .png, .gif and .pdf images. The size of the displayed image within the document can be varied by adjusting the height and wid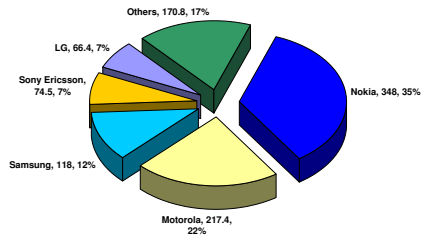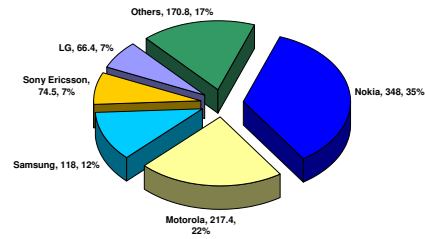th attributes. To rotate an image 90 degrees an optional attribute can be added, for example [width=.4\linewidth, angle=90].
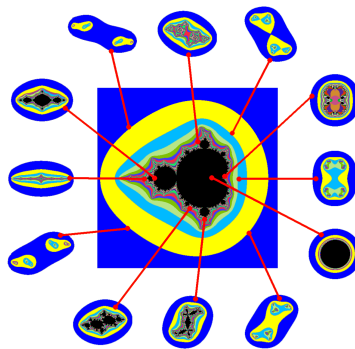
Figure 7.4: Caption for Bitmap Image Example

7.3 Referencing

To refer to another part of the document one must use a combination of the \ref and \label commands. The label is a unique identifier, therefore when working with large documents it helps to give references meaningful names. Examples of this includes prefixing Table references with *tab:*, figures with *fig:*, chapters with *ch:*. In very large documents in may also be useful to add an additional level of prefixing to represent the chapter the label is in. In this example chapter the tables and figures have the additional prefix of *using* to represent the *usingLatex* chapter. The tilde (∼) is used to ensure that a reference remains as a single object. All instances of \ref should be preceded with the tilde.

7.4 Citing Bibliographic References

Bibliographic references are stored in a database (.bib file extension), this contains a list of articles, proceedings, books, thesis and so forth. Each type of publication has a number of required fields such as a unique identifier, author and title. To cite a references within the main body text one must use the $\backslash cite$ command as in the following examples. **book:einsteinBrownianMovement** for example is well known for his work on Brownian Movement. The SETI@Home project **web:berkeleyBOINC** is an example of a webpage citation. One can also work with articles **art:Moller2003HWRastArch**, MSc Thesis **msc:Edberg2007FluxgateMagnetometer**, PhD Thesis **phd:Grace2004MiddlewareMobile** or articles within conference proceedings **proc:Park2006UIMgtRmtRobots**. Several other types of article exist, but they are used to a lesser degree.

7.4.1 The Harvard Bibliography Style

The bibliographic references are laid out using the Harvard style. Further information about this style may be found at the following link (https://library.rgu.ac.uk/RGUHarvard). If you want parenthesis to enclose the reference, use *parencite* or *autocite* instead of *cite*. This would change the citation style in the previous paragraph to:

(**book:einsteinBrownianMovement**) for example is well known for his work on Brownian Movement.

OR

(**book:einsteinBrownianMovement**) for example is well known for his work on Brownian Movement.

7.4.2 Compiling a BibTeX Database

Having initially compiled the document using pdfLatex a number of helper files are created that aid in referencing and citations. One then must compile the bibtex database, followed by an additional two compiles using pdfLatex. Citing additional bibliographic references within the body of the document being produced will require the recompile of the bibtex database. In the case that the bibtex reference of a cited article cannot be found one will see a question mark [?] instead of the proper citation.

7.4.3 The Harvard Bibliography Style

The bibliographic references are laid out using the Harvard style. Further information about this style may be found at the following link (https://library.rgu.ac.uk/

`RGUHarvard`). If you want parenthesis to enclose the reference, use *parencite* instead of *cite*.

7.5   Working with Tables

The data in a table (Table 7.1) displays four columns of left-aligned data. The cell contents can be aligned to the left (l), right (r), or center (c). Vertical bars may sometimes be seen in tables but these generally look unprofessional. The Booktabs package **web:Fear2005BookTabs** allows for the creation of professional looking tables as shown in the example. The use of *\toprule*, *\midrule* and *\bottomrule* commands provided by the package allow for rules of varying thickness and spacing. Data elements (cells / columns) within a table are divided up using the ampersand (&). To complete a row one must end with a double backslash (\\). Tables as with figures need a caption and a label.

Heading 1	Heading 2	Heading 3	Heading 4
Cell A1	Cell B2	Cell C3	Cell D4
Cell E1	Cell F2	Cell G3	Cell H4

Table 7.1: Table Caption

One may find the following spreadsheet tool (http://cobweb.ecn.purdue.edu/~zhang97/xls2latex/) to be particularly useful for quickly converting tabular data in a spreadsheet to LaTeX form. A complete list of instructions on how to use the tool are also present. The WinShell editor has an in-built GUI based utility to aid in the creation of the tabular data.

7.6   Inserting an Algorithm

The *algorithm2e* environment may be used to generate algorithms (Algorithm 1). The following document (http://www.tex.ac.uk/ctan/macros/latex/contrib/algorithm2e/algorithm2e.pdf) provides detail of all the commands available within the package. If no algorithms are used within the document then comment out line 70 of the file `thesis.tex` to remove the list of algorithms from the contents area.

7.7   Inserting Program Code Samples

To insert small segments of program code (Listing 7.2) that detail how interesting algorithms and so forth are implemented use the *lstlisting* command. Inclusion of

---
Algorithm 1: A Sample Algorithm
---
while *(RANK < COMPSIZE)* **do**

   if *(RANK == MASTER)* **then**

      generate random value ;

      for *(each item K)* **do**

         get result ;

      end

   end

end

---

program code again requires a Caption and Label. Sample code from external files may also be included (Listing 7.1), again one must supply a Caption and a Label as well as the relative path to the source file. Note a paragraph of text consisting of just a few lines is not a paragraph.

```
1  public void someInterestingMethod( int x ) {
2    try {
3      DataInputStream in = new DataInputStream(req.getInputStream());
4      HttpSession session = req.getSession(true);
5      //Read Input Data
6      in.close();
7    } catch ( Exception err ) { }
8    outputStream.close();
9  }
```

Listing 7.1: The Caption for the Code Listing

```
1  if(rndVal==0){
2      if(opType > 2){
3          //do something
4      }
5  }
```

Listing 7.2: Sample Program Code Listing

7.8 Working with Maths

One can insert mathematical formula directly into a paragraph of text. The mathematical definition of the "Cantor set" is a good example of this in action $\sum_{n=0}^{\infty} \frac{2^n}{3^{n+1}} = \frac{1}{3} + \frac{2}{9} + \frac{4}{27} + \frac{8}{81} + \cdots = \frac{1}{3}\left(\frac{1}{1 - \frac{2}{3}}\right) = 1$. The previous equation demonstrates the use of sigma, fractions, large brackets, power, and dots. The function that defines the MSet is a simpler example of math in use $Z_{n+1} = Z_n^2 + C$. Matrix Multiplication is

typically regarded as an $O(n^3)$ operation. One may use the *equation* environment for more complex mathematical formula that should standout. One may take for example the product C of two matrices $A \in M_{n,m}(R)$ and $B \in M_{m,p}(R)$ to be defined as

$$(A \times B)_{ij} = \sum_{k=0}^{m-1} a_{ik} b_{kj}, \ i = 0, ..., n-1, \ j = 0, ..., p-1. \tag{7.1}$$

The sizes of the matrices must satisfy $(n \times m)(m \times p) = (n \times p)$. Matrix multiplication is an associative process thereby $a \cdot (b \cdot c) = (a \cdot b) \cdot c$. Essentially to find the value of a particular cell $C_{i,j}$ it is necessary to multiply row i of the matrix A with column j of matrix B summing all the multiplications.

7.9   Required Software

The implementation of LaTeX typically used is MikTeX (http://miktex.org/). It is best to install the complete MiKTeX system. Initially a small installer application must be downloaded and executed. This in-turn downloads the most recent implementation of the MikTeX system. The complete system is circa 500MB in size. Run the installer again and select the directory of the downloaded package.

To allow one to work with postscript documents a system called Ghostscript in required (http://pages.cs.wisc.edu/~ghost/). To be able to view these documents download and install GhostView (http://pages.cs.wisc.edu/~ghost/gsview/index.htm). The last element that is necessary is an editor. TeXnicCenter is a free download available at (http://sourceforge.net/projects/texniccenter/). An alternative is WinEdt a shareware ASCII editor (http://www.winedt.com/). WinEdt can be freely used for a 30 day period, after which one will periodically receive reminders to register the product. To demonstrate the use of an enumerated list, the software should be installed in the order detailed below. One final option for Windows users is WinShell (http://www.winshell.de/). An advantage of WinShell is its in-built BibTeX GUI editor. It also features a useful Table Wizard.

1. MikTeX

2. Ghostscript

3. Ghostview

4. Editor

7.10 Working with Quotes

To surround a piece of text with double quotes one must place two single quotes on either side of the text. The double quote on the left is created using two left quotes (') this is located just above the *tab* key on the keyboard. The right hand double quote is created using two right hand quotes via (') located just above and to the left of the right shift key. A properly formatted quotation should look like "This is a quotation". Notice how the direction of the quotes are opposite to one another.

7.11 Further Information

The Not so Short Introduction to LaTeX (http://tobi.oetiker.ch/lshort/lshort.pdf) is one useful source of further information on how to work with this system.

7.12 Conclusion

A short conclusion providing a summary of the chapter.

Appendix A

Project Specification

Summary of the project outline.

A.1 Functional Requirements

some text here

A.2 Non-Functional Requirements

some text here

Appendix B

Project Management

Discussion on how the project was managed. What things impacted the success of the project. How does the continually revised versions of the project plan compare to the initial draft developed at the start of the project. Did everything run according the schedule. Did elements such as exams & coursework have any impact.

Appendix C

Another Appendix

This appendix makes use of the *rotating* package to rotate both figures and tables ninety degrees allowing for large datasets and illustrations to be represented.

Heading 1	Heading 2	Heading 3	Heading 4	Heading 5	Heading 6	Heading 7	Heading 8	Heading 9	Heading 10
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj
aaaa	bbbb	cccc	dddd	eeee	ffff	gggg	hhhh	iiii	jjjj

Table C.1: A much longer caption that will not be listed in the list of tables page.

Figure C.1: A much longer caption that will not be listed in the list of figures page.

Appendix D

Presentation Slides

The slides from the formal presentation should be provided here in not more than two pages.

Appendix E

Project Log

The following is a weekly summary of the work carried during the development of this body of work. It covers tasks that were completed, tutorials that were worked through, articles that were read and reviews of discussions / meetings held with the project supervisor and other third parties.

Week Beginning: Monday 27/09/2010

First week working on the project. Had a meeting with supervisor and discussed some of the issues related to the project. The first deliverable is due for the end of next week (project outline & ethics form).

- Downloaded and Installed LaTeX (MikTeX full install), Ghostscript, Ghostview & Winshell.

- Started to get to grips with the LaTeX system by making simple modifications to the template and editing the project log.

- Developed a Mind Map to clarify understanding of project elements.

- Prepared an initial draft of project plan in the form of a Gantt chart.

- Prepared and revised 1 page draft of project summary & filled in ethics form.