Your Name and Titles

Title of the Thesis

MASTER'S THESIS
to achieve the university degree of
Diplom-Ingenieur

submitted to
Graz University of Technology

Supervisor
Your Supervisors name and Titles
Institute of Technical Informatics
Embedded Architectures & Systems Group

Graz, July 2026

Some fancy quote you want to present – Whoever said that

Affidavit

I declare that I have authored this thesis independently, that I have not used other than the declared sources/resources, and that I have explicitly indicated all material that has been quoted either literally or by content from the sources used. The text document uploaded to TUGRAZonline is identical to the present thesis.

Important Note

Not necessary for Bachelor's theses. Optional for Master's and Doctoral theses.

Date

Signature

Acknowledgements

The Acknowledgements section of a thesis is where you express gratitude to the people and institutions that contributed to the completion of your research. It is a personal section, and while it doesn't follow strict academic rules. The tone of the acknowledgements is more personal and informal than the rest of the thesis.

Important Note

Not necessary/optional for Bachelor's theses.

Graz, July 2026
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Abstract

The abstract provides a concise summary of the entire research. It allows readers to quickly understand the main contributions, approach, and results without reading the entire document. Give a brief overview of the key aspects of the thesis. It should allow the reader to understand the core problem, your approach to solving it, and the significance of the results.

Typical structure:

- introduction to the problem/context
- research objectives and/or questions
- methodology/approach (novelty!)
- results and key findings
- conclusion and significance of your work

Please make sure to avoid using abbreviations. If they are really needed, use the `\ac{...}` package here as well, but re-introduce every abbreviation at the first usage in the main text!

Some tips:

- Your abstract should be short an concise.
- Every sentence should contribute to the overall summary.
- It should represent the research objectively, without going into unnecessary detail but providing enough context to understand the significance.
- Stand-alone! The abstract should make sense even if the reader doesn't have access to the rest of the thesis.

Kurzfassung

Optional: Deutsche Fassung des Abstracts.

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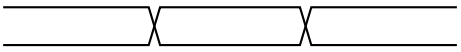
CHAPTER 1

Introduction

The introduction chapter serves as the foundation for the thesis. It sets the stage for the reader, outlining the problem, the motivation for the research, and the structure of the thesis. In the following, an example for a structure of an Introduction chapter is given with common subsections that are typically found in most academic theses.



Put a generalized Introduction here that gives a broad entry to your topic. Also tease towards some motivation i.e. why is this all relevant. State some early problem sources.

For a Bachelor's thesis, this chapter is often broader and less complex, focusing on defining a specific, manageable problem. For Master's and Doctoral theses, this chapter goes deeper into the intricacies of the problem, offering more technical or scientific motivation.

1.1 Motivation

Explicitly state why this problem is significant -— whether due to technological, environmental, economic, or social reasons. You should try to answer the question "Why is my work important?".

1.2 Research Questions and Contributions

This is a critical section where you define the research questions or hypotheses that your work will address. It also highlights the contributions your research makes to the field. Typical Content:

- Research Questions (RQs): These are clear, focused questions that your thesis aims to answer. They help guide the direction of your research and are often derived from the problem statement.

- Contributions: After defining the research questions, you list the key contributions of your work. This could include new methodologies, frameworks, algorithms, systems, or experiments. Contributions should address the gaps or limitations identified in the "Related Work" section.

Research Question RQ 1

You can emphasize your research questions with boxes like this.

1.3 Thesis Structure and Organization

Could look something like this:

The remainder of the thesis is structured as follows:

Chapter 2: Background and Terminology[p3] starts with some general background information ...

The subsequent **Chapter 3: Related Work**[p5] gives an overview ...

...

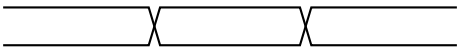
CHAPTER 2

Background and Terminology

Important Note

Not necessary for Bachelor's theses. Optional for Master's theses.

The goal of this chapter is to provide foundational knowledge that readers need to understand the research and its context. It introduces key concepts, definitions, and technologies that are central to the thesis.



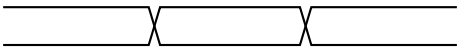
Typical Content:

- Introduction to Key Concepts: Explain the fundamental ideas, theories, and technical concepts that underpin your research. This can include things like embedded systems, hardware/software architecture, or algorithms.
- Terminology and Definitions: Define specific terms or jargon that will be frequently used throughout the thesis. This helps readers who might not be familiar with the niche field understand your work.
- Technology Overview: Briefly introduce the technologies, tools, or frameworks used, or specific software tools.
- Context of the Study: Provide the larger context of where your research fits into the field. For example, in a dissertation on embedded systems, you would explain how embedded systems are used across different industries.
- Architecture or System Overview (if applicable): If your work involves a specific hardware/software system, this section can provide a high-level overview of how these systems are structured.

CHAPTER 3

Related Work

This chapter reviews existing research, systems, and methodologies that are closely aligned with the topic of the thesis. It shows how your research builds upon or differs from previous efforts.



Typical Content:

- Review of Existing Research: Discuss other research papers, projects, and academic contributions that are directly related to your work. For a doctoral thesis, this review would be more exhaustive, whereas for a Bachelor's or Master's thesis, it would cover the most significant related studies.
- Comparison and Gaps: Highlight the gaps or limitations in existing research that your work intends to address. This is especially important in Master's and Doctoral theses where you need to demonstrate originality.
- Conceptual and Technical Comparisons: Compare various techniques, tools, or methods used by others in the same field and explain how your approach is similar or different.
- Existing Solutions and Their Limitations: If your thesis proposes a new solution, describe how existing solutions work and where they fall short, leading to the need for your research.
- Related Systems or Architectures: If there are existing hardware or software systems similar to yours, describe them and contrast their design with your proposed system.

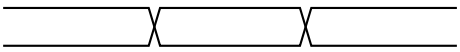
Use the citation package (`\cite{...}`) to provide the bibliography. For every paper work out the distinction to your work.

In the end summarize, how your work plans to improve the state of the art in the related work.

CHAPTER 4

Main Text 1

Main Text Chapters are where you describe the research approach and methods you employed to solve the problem or answer the research questions posed earlier in the thesis. These chapters provides the roadmap for how the research was conducted and should be thorough enough to allow other researchers to replicate or understand your process in detail.



Typical chapter names include “Implementation”, “Design”, “Approach”, “Methodology”, “Evaluation”, etc.

You can either make entire chapters for every needed part, or create sections within your single main chapter. It is important to conclude every Methodology/Implementation chapter/section with a thorough Evaluation of some sort. There, your results must be shown in detail and compared to the state of the art you want to improve. Use graphs, figures, tables etc.

Make sure these main text chapters are written in **active** and **present** tense!

4.1 Best Practices, Common Pitfalls, Tips, and Templates

- Most importantly: Stay consistent throughout your thesis! This applies to pretty much any naming conventions, style, typesetting, and so on.
- Whenever using figures, stick to vector graphics (in PDF, SVG or EPS format preferrably). If pixel graphics are necessary, make sure the resolution is good enough to be printed.
- Text on graphics must be readable in printed format. As a rule of thumb, the smallest text should be as small as the figure caption.
- Consistent capitalization is important! Especially for titles of chapters, sections and subsections.

- Do not mix American and British English throughout your work. American English is generally preferred.
- Make use of packages such as `\ac{...}` for abbreviations (see `3_post\1_abbr.tex`) and `\cite{...}` for citations. This way, abbreviations are only introduced once per text, and the short version is consistently used otherwise (be aware of abstracts – they must not introduce an abbreviation). Here is an example:

  When looking into the RISC-V Instruction Set Architecture (ISA) spec [1], one can see that the ISA ... Field-Programmable Gate Arrays (FPGAs) are quite handy, because an FPGA is like ...
- For your bibliography, use a literature management tool such as JabRef, Meneley, or Zotero.
- When referencing to other chapters, sections, figures, etc. that are numbered in your work, use Capital First Letters; if unnumbered, use small letters:

  See the sections in Chapter 5.
- When referencing, the following rule applies: If the figure caption for your template starts with "Fig.", use "... Fig. 4.1 ..." in your text also; if the caption uses "Figure", also use "... Figure 4.1 ..." in your text. The latter is preferred in general. Same applies to listings, tables, etc.
- When referencing items in your text, or citing bibliography, use "`~`" before the actual command, to make the reference number sticking to the word before:

  `cf. Section~\ref{sec:label}` or `Authors et al.~\cite{bibtexkey}`
- Use referencing of objects/items/passages by making extensive use of the `\label` command; never try doing this manually!
- Also: use consistent labeling prefixes for figures, tables, equations, listings chapters, sections, etc. (e.g., `fig:`, `tab:`, `eq:`, `lst:`, `ch:`, `sec:`). Examples:

  `\label{sec:introduction}` or `\label{fig:blockdiagram}` and their referencing `\ref{sec:introduction}` or `\ref{fig:blockdiagram}`
- Captions are supposed to be full sentences. They end with a full stop (".") always.
- Make sure to have commas (",") before and after the following constellations:
  - ", e.g., " (*exempli gratia*, for example)
  - ", i.e., " (*id est*, in other words)
- Make sure to have full stops (".") after:
  - " cf. " (*confer*, compare)
  - " etc. " (*et cetera*, and so forth)
  - " et al. " (*et alia* , and others)

- Also use the constellations shown before! Try not to write them out or use other stuff like "For example, ...".
- Floating objects (figures, tables, listings, etc.) shall be on top (`[t]`) or at the bottom (`[b]`) of the page to avoid small text areas floating around them, as this breaks the reading flow.
- Use the \SI package for units and their proper spacing: 150 MHz, 1024 bits/s
- Avoid line feeds within abbreviations, labels, etc.
- Avoid double bracketing as in “this is my work (which I did lately (on December 12th))”.
- Try to resolve warnings and errors, as things usually get worse!
- When you’re done writing, check for double words such as “the the”, “and and”, “of of”, “for for”, “in in”, “to to”, “at at”, “is is”, “that that”, “with with”, etc. in your text; you might be surprised how many you find.
- Use a spell and grammar checker!

Figure 4.1: We created a figure command for you. See `tex\cmd.tex` for more commands. Captions always end with a full stop (".")!! Please make sure to do so. For all captions. Also use vector graphics (ideally included as PDF) whenever possible.

For figures, tables, and listings, stick to these templates. Try to position all figures, tables, and listings either on top or on the bottom of the page.

```
10  void cinsi_emu( uint32_t instr ) {
11    // [... code for emulating the cinsi functionality ...]
12  }
13
14  OS_TASKENTRY(task1) {
15    // [...]
16    addEmulInstr(0x1B, cinsi_emu, CINSI_ID);
17    // [...]
18    while(1) {
19      // [...]
20      asm(".insn i 0x1B, 0, t3, t4, 10");
21      // [...]
22    }
23  }
```

Listing 4.1: Example C code. Also ended with a fullstop.

Table 4.1: Template Table. Caption on top and also ended with a full stop.

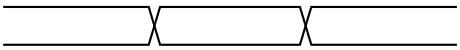
#	**Implementation Option**	t_{exec}	**cycle #**
	profiling (cycle-accurate measurements)		
0	traditional software	≈5.46 µs[a]	273
1	instruction emulation	≈6.12 µs[a]	306
2	instruction in hardware	≈20 ns[a]	1
	Simulation[b]		
3		5.46 µs	273
4		6.12 µs	306
5		20 ns	1
	Oscilloscope measurements[c]		
6		5.461 µs	≈273[a]
7		6.122 µs	≈306[a]
8		21.667 ns	≈1[a]

[a] calculated values using $f_{clk} = 50\,\text{MHz}$ and $T_{clk} = 20\,\text{ns}$.
[b] Tool 1.
[c] Tool 2 2.5 GHz measurement.

CHAPTER 5

Main Text 2

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.



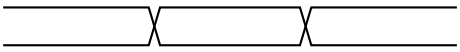
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

CHAPTER 6

Conclusion and Future Work

The conclusion chapter of a thesis serves to summarize the key aspects of the research, restating the primary objectives and reflecting on whether they were achieved. It begins by revisiting the research questions or objectives outlined at the start of the thesis, providing a clear statement about how these were addressed throughout the study. This allows the reader to see how the research aligns with the original goals, giving a sense of closure and accomplishment. The future work section concludes by reflecting on the broader potential of the research. This is where the researcher outlines the long-term implications of their findings and suggests how future developments could significantly advance the field. It's a forward-looking section, designed to inspire further research and highlight the possibilities that lie ahead.

Make sure to use the proper tenses! Past tense and future.

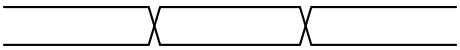


Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

CHAPTER 7

Publications

This chapter summarizes and shows all publications that belong to your thesis. Include them as PDFs to your thesis.



Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Important Note

Not necessary for Bachelor's and Master's theses. Mandatory for Doctoral theses.

Bibliography

[1] RISC-V Foundation, *The RISC-V Instruction Set Manual, Volume I: User-Level ISA, Document Version 2.2*, 5 2017. → [p8]

List of Figures

4.1 We created a figure command for you. See **tex\cmd.tex** for more commands. Captions always end with a full stop (".")!! Please make sure to do so. For all captions. Also use vector graphics (ideally included as PDF) whenever possible. 10

List of Tables

4.1 Template Table. Caption on top and also ended with a full stop. 11

List of Listings

4.1 Example C code. Also ended with a fullstop. 11

List of Abbreviations

FPGA Field-Programmable Gate Array

ISA Instruction Set Architecture

Some ending quote you like.

– Whoever said this