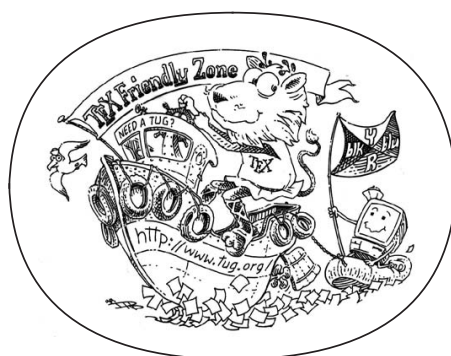


ANDRÉ MIEDE
A CLASSIC THESIS STYLE

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An Homage to The Elements of Typographic Style

September 2015 – version 4.2

André Miede: *A Classic Thesis Style*, An Homage to The Elements of Typographic Style, © September 2015

Ohana means family.
Family means nobody gets left behind, or forgotten.
— Lilo & Stitch

Dedicated to the loving memory of Rudolf Miede.
1939–2005

ABSTRACT

Short summary of the contents in English. . . a great guide by Kent Beck how to write good abstracts can be found here:

<https://plg.uwaterloo.ca/~migod/research/beck00PSLA.html>

ZUSAMMENFASSUNG

Kurze Zusammenfassung des Inhaltes in deutscher Sprache. . .

PUBLICATIONS

This might come in handy for PhD theses: some ideas and figures have appeared previously in the following publications:

*This is just an early
– and currently
ugly – test!*

- [1] Tobias Isenberg, André Miede, and Sheelagh Carpendale. “A Buffer Framework for Supporting Responsive Interaction in Information Visualization Interfaces.” In: *Proceedings of the Fourth International Conference on Creating, Connecting, and Collaborating through Computing (C⁵ 2006)*. IEEE, 2006, pp. 262–269. ISBN: 978-0-7695-2563-1.
- [2] Ulrich Lampe, Markus Kieselmann, André Miede, Sebastian Zöller, and Ralf Steinmetz. “A Tale of Millis and Nanos: On the Accuracy of Time Measurements in Virtual Machines.” In: *Proceedings of the Second European Conference on Service-Oriented and Cloud Computing (ESOCC 2013)*. Springer, 2013, pp. 172–179. ISBN: 978-3-642-40650-8.
- [3] Ulrich Lampe, Qiong Wu, Ronny Hans, André Miede, and Ralf Steinmetz. “To Frag Or To Be Fragged – An Empirical Assessment of Latency in Cloud Gaming.” In: *Proceedings of the Third International Conference on Cloud Computing and Services Science (CLOSER 2013)*. 2013, pp. 5–12. ISBN: 978-898-8565-52-5.
- [4] André Miede. “Theses and other Beautiful Documents with classicthesis.” In: *TUGboat – The Communications of the T_EX Users Group* 31.1 (2010), pp. 18–20. ISSN: 0896-3207.
- [5] André Miede, Gökhan Şimşek, Stefan Schulte, Daniel F. Abawi, Julian Eckert, and Ralf Steinmetz. “Revealing Business Relationships – Eavesdropping Cross-organizational Collaboration in the Internet of Services.” In: *Proceedings of the Tenth International Conference Wirtschaftsinformatik (WI 2011)*. Vol. 2. 2011, pp. 1083–1092. ISBN: 978-1-4467-9236-0.
- [6] Hsin-Yi Tsai, Melanie Siebenhaar, André Miede, Yu-Lun Huang, and Ralf Steinmetz. “Threat as a Service? Virtualization’s Impact on Cloud Security.” In: *IEEE IT Professional* 14.1 (2012), pp. 32–37. ISSN: 1520-9202.

Attention: This requires a separate run of bibtex for your refsection, e.g., `ClassicThesis1-b1x` for this file. You might also use biber as the backend for biblatex. See also <http://tex.stackexchange.com/questions/128196/problem-with-refsection>.

*We have seen that computer programming is an art,
because it applies accumulated knowledge to the world,
because it requires skill and ingenuity, and especially
because it produces objects of beauty.*

— Donald E. Knuth [5]

ACKNOWLEDGMENTS

Put your acknowledgments here.

Many thanks to everybody who already sent me a postcard!

Regarding the typography and other help, many thanks go to Marco Kuhlmann, Philipp Lehman, Lothar Schlesier, Jim Young, Lorenzo Pantieri and Enrico Gregorio¹, Jörg Sommer, Joachim Köstler, Daniel Gottschlag, Denis Aydin, Paride Legovini, Steffen Prochnow, Nicolas Repp, Hinrich Harms, Roland Winkler, Jörg Weber, Henri Menke, Claus Lahiri, Clemens Niederberger, Stefano Bragaglia, Jörn Hees, and the whole L^AT_EX-community for support, ideas and some great software.

Regarding L_YX: The L_YX port was initially done by *Nicholas Mariette* in March 2009 and continued by *Ivo Pletikosić* in 2011. Thank you very much for your work and for the contributions to the original style.

¹ Members of GuIT (Gruppo Italiano Utilizzatori di T_EX e L^AT_EX)

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ACRONYMS

Part I

SOME KIND OF MANUAL

BACKGROUND

With computer programs melded into almost every aspect of human life, we often not only require their efficiency, but also their correctness. We would like to know for sure that our programs deliver the desired results, and do not run forever. This is called *total correctness*. To know “for sure”, we could verify programs using formal methods that have been developing for decades. One of such methods are *Hoare Triples* [4] proposed by Tony Hoare in 1969. A Hoare Triple contains three parts: a precondition, a program, and a postcondition. They are written as such: $\{F\}C\{G\}$.¹ It states that if the system is in a state that satisfies the precondition, then the state after the execution of the program will satisfy the postcondition, provided that the program terminates. This is called *partial correctness*.

Originally, Hoare Triples only deals with deterministic programs in a top-to-down manner, but nondeterminism can be added in a sensible way [2]. Here, Dijkstra presented the *weakest precondition* transformer (wp): starting with a postcondition, it works backwards and “guesses” what the precondition can be. wp is concerned with total correctness and is related to Hoare Triples by an implication:²

$$\forall G. G \implies wp.C.F : \{G\}C\{F\}$$

This connection not only tells us that

- given $wp.C.F$, any predicate G that implies it can be the precondition of a valid Hoare Triple: $\{G\}C\{F\}$;

it also shows when Hoare Triple will guarantee total correctness:

- given a valid Hoare Triple $\{G\}C\{F\}$, if its precondition G implies $wp.C.F$, then $\{G\}C\{F\}$ is valid for total correctness.

Sometimes, however, we deem nontermination a good behaviour, and proving partial correctness suffices. The *weakest liberal precondition* transformer [3] can be used in such occasions: if the system is in a state satisfying $wlp(C, F)$, then either F is reachable after the termination of C , or C does not terminate. wlp directly relates to Hoare Triples via an implication:

$$\forall G. G \implies wlp(C, F) : \{G\}C\{F\}$$

G is then called the *sufficient liberal precondition*, and finding it means we can prove the absense of errors in the program (if it terminates). In contrast, the

¹ Originally it was written as $F\{C\}G$, but now it is often written with brackets around conditions instead of the program.

² Here $wp.C.F$ is a function written in lambda-calculus style, it can be seen now as a function $wp(C, F)$. This form of writing proves to be simple and elegant in the upcoming sections.

necessary liberal precondition G (where $\text{wlp}(C, F) \implies G$) tells us that the system will not satisfy the postcondition F , once G is violated. Cousot et al. studied the matter from a practical perspective [1], they proposed inference tools and experimented in industrial codes. In this thesis, we aim to research this matter further with a more theoretical view. We would like to propose a proof system and prove its soundness and completeness similar as in [6], but using Dijkstra’s guarded command language (GCL) [2].

Instead of the usual qualitative reasoning using logical predicates, we would like to study in a quantitative setting using functions that represent quantities such as expectations of program variables. While predicates map program states to true or false, functions map program states to \mathbb{R}_∞ , real numbers extended with (negative) infinity. In this setting, not only are infinities clear indication for nontermination, the transformers can also express more such as flow of quantitative information [7].

Part II

THE SHOWCASE

You can put some informational part preamble text here. Illo principalmente su nos. Non message *occidental* angloromanic da. Debitas effortio simplicate sia se, auxiliar summarios da que, se avantiate publicationes via. Pan in terra summarios, capital interlingua se que. Al via multo esser specimen, campo responder que da. Le usate medical addresses pro, europa origine sanctificate nos se.

Part III

APPENDIX

APPENDIX TEST

Lorem ipsum at nusquam appellantur his, ut eos erant homero concludaturque. Albucius appellantur deterruisset id eam, vivendum partiendo dissentiet ei ius. Vis melius facilisis ea, sea id convenire referrentur, takimata adolescens ex duo. Ei harum argumentum per. Eam vidit exerci appetere ad, ut vel zzril intellegam interpretaris.

More dummy text.

A.1 APPENDIX SECTION TEST

Test: [Table 1](#) (This reference should have a lowercase, small caps A if the option floatperchapter is activated, just as in the table itself → however, this does not work at the moment.)

LABITUR BONORUM PRI NO	QUE VISTA	HUMAN
fastidii ea ius	germano	demonstratea
suscipit instructor	titulo	personas
quaestio philosophia	facto	demonstrated

Table 1: Autem usu id.

A.2 ANOTHER APPENDIX SECTION TEST

Equidem detraxit cu nam, vix eu delenit periculis. Eos ut vero constituto, no vidit propriae complectitur sea. Diceret nonummy in has, no qui eligendi recteque consetetur. Mel eu dictas suscipiantur, et sed placerat oporteat. At ipsum electram mei, ad aequae atomorum mea. There is also a useless Pascal listing below: [Listing 1](#).

Listing 1: A floating example (listings manual)

```
for i:=maxint downto 0 do
begin
{ do nothing }
end;
```

BIBLIOGRAPHY

- [1] Patrick Cousot, Radhia Cousot, Manuel Fähndrich, and Francesco Logozzo. “Automatic inference of necessary preconditions.” In: *International Workshop on Verification, Model Checking, and Abstract Interpretation*. Springer. 2013, pp. 128–148.
- [2] Edsger W Dijkstra. “Guarded commands, nondeterminacy and formal derivation of programs.” In: *Communications of the ACM* 18.8 (1975), pp. 453–457.
- [3] Edsger W. Dijkstra and Carel S. Scholten. “On substitution and replacement.” In: *Predicate Calculus and Program Semantics*. New York, NY: Springer New York, 1990. ISBN: 978-1-4612-3228-5. URL: https://doi.org/10.1007/978-1-4612-3228-5_2.
- [4] Charles Antony Richard Hoare. “An axiomatic basis for computer programming.” In: *Communications of the ACM* 12.10 (1969), pp. 576–580.
- [5] Donald E. Knuth. “Computer Programming as an Art.” In: *Communications of the ACM* 17.12 (1974), pp. 667–673.
- [6] Edsko de Vries and Vasileios Koutavas. “Reverse hoare logic.” In: *International Conference on Software Engineering and Formal Methods*. Springer. 2011, pp. 155–171.
- [7] Linpeng Zhang and Benjamin Kaminski. “Quantitative Strongest Post.” In: *arXiv preprint arXiv:2202.06765* (2022).

DECLARATION

Put your declaration here.

Saarbrücken, September 2015

André Miede

COLOPHON

This document was typeset using the typographical look-and-feel `classicthesis` developed by André Miede. The style was inspired by Robert Bringhurst's seminal book on typography "*The Elements of Typographic Style*". `classicthesis` is available for both \LaTeX and \LyX :

<https://bitbucket.org/amiede/classicthesis/>

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<http://postcards.miede.de/>