TARTU ÜLIKOOL
Arvutiteaduse instituut
Informaatika õppekava

Siim Pragi

Pealkiri eesti keeles

Bakalaureusetöö (9 EAP)

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Pealkiri eesti keeles

Lühikokkuvõte:

Eestikeelne lühikokkuvõte

Võtmesõnad:

fuu, baar, bääz

Eestikeelsed võtmesõnad

CERCS:

CERCS kood ja nimetus: `https://www.etis.ee/Portal/Classifiers/Details/d3717f7b-bec8-4cd9-8ea4-c89cd56ca46e`

Title in English

Abstract:

Abstract in English

Keywords:

foo, bar, baz

English keywords

CERCS:

CERCS code and name: `https://www.etis.ee/Portal/Classifiers/Details/d3717f7b-bec8-4cd9-8ea4-c89cd56ca46e`

Sisukord

1 Sissejuhatus

What is it in simple terms (title)?

Why should anyone care?

What was my contribution?

What you are doing in each section (a sentence or two per section)

Tip: if it's hard for you to start writing, then try to split it to smaller parts, e.g. if the title is "Type Inference for a Cryptographic Protocol Prover Tool" then the "What is it" can be divided into "what is type inference", "what is cryptographic protocol" and "what is the prover tool". These three can also be split to smaller parts etc.

2 Title of Section 2

Short description of what this section is about

2.1 Title of Subsection 1

Some text...

2.1.1 Title of Subsubsection 1

Some text...

2.1.2 Title of Subsubsection 2

Some text...

2.2 Title of Subsection 2

Rule: If you divide the text into subsections (or subsubsections) then there has to be at least two of them, otherwise do not create any.

Tip: You can also use paragraphs, e.g.

Type rules for integers. Some text ...

Type rules for rational numbers. Some text here too...

2.3 How to use references

Cross-references to figures, tables and other document elements. LaTeX internally numbers all kind of objects that have sequence numbers:

- chapters, sections, subsections;
- figures, tables, algorithms;
- equations, equation arrays.

To reference them automatically, you have to generate a label using `\label{some-name}` just after the object that has the number inside. Usually, labels of different objects are split into different namespaces by adding dedicated prefix, such as `sec:`, `fig:`. To use the corresponding reference, you must use command `\ref` or `\eqref`. For instance, we can reference this subsection by calling Section 2.3. Note that there should be a

nonbreakable space ~ between the name of the object and the reference so that they would not appear on different lines (does not work in Estonian).

Citations. Usually, you also want to reference articles, webpages, tools or programs or books. For that you should use citations and references. The system is similar to the cross-referencing system in LaTeX. For each reference you must assign a unique label. Again, there are many naming schemes for labels. However, as you have a short document anything works. To reference to a particular source you must use `\cite{label}` or `\cite[page]{label}`.

References themselves can be part of a LaTeX source file. For that you need to define a bibliography section. However, this approach is really uncommon. It is much more easier to use BibTeX to synthesise the right reference form for you. For that you must use two commands in the LaTeX source

- \bibliographystyle{alpha} or \bibliographystyle{plain}
- \bibliography{file-name}

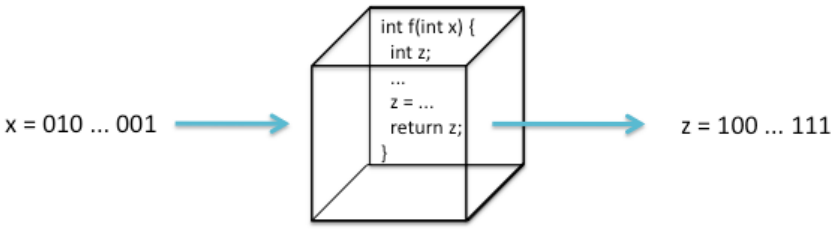
The first command determines whether the references are numbered by letter-number combinations or by cryptic numbers. It is more common to use `alpha` style. The second command determines the file containing the bibliographic entries. The file should end with `bib` extension. Each reference there is in specific form. The simplest way to avoid all technicalities is to use graphical frontend Jabref (`http://jabref.sourceforge.net/`) to manage references. Another alternative is to use DBLP database of references and copy BibTeX entries directly form there.

The following paragraph shows how references can be used. Game-based proving is a way to analyse security of a cryptographic protocol [BR04, Sho04]. There are automatic provers, such as CertiCrypt [BGZ09] and ProVerif [Bla].

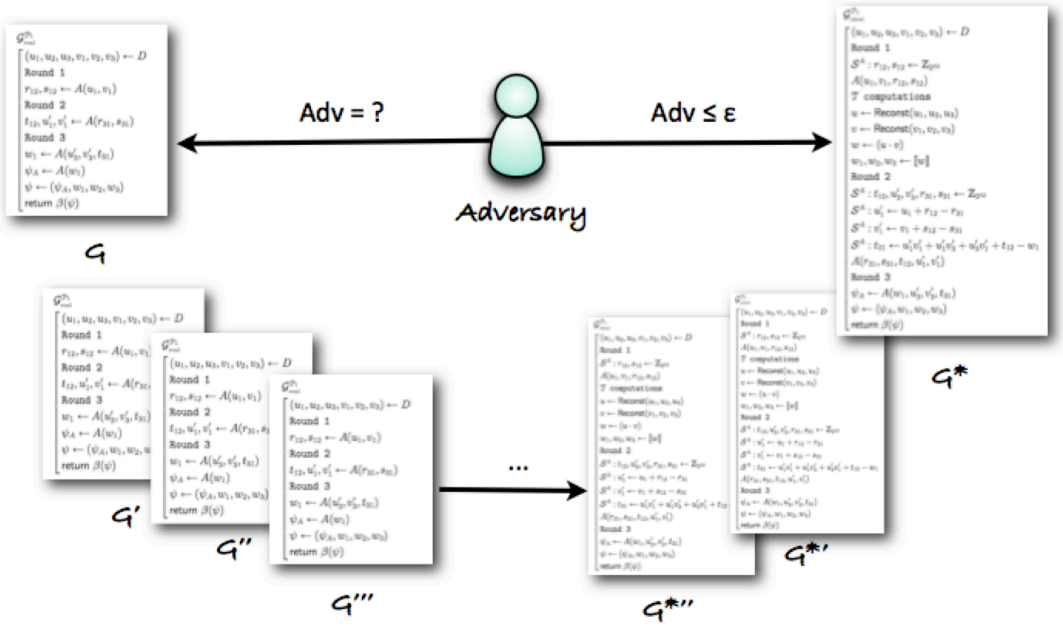
3 How to add figures and pictures to your thesis

Here are a few examples of how to add figures or pictures to your thesis (see Figures 1, 2, 3).

Rule: All the figures, tables and extras in the thesis have to be referred to somewhere in the text.

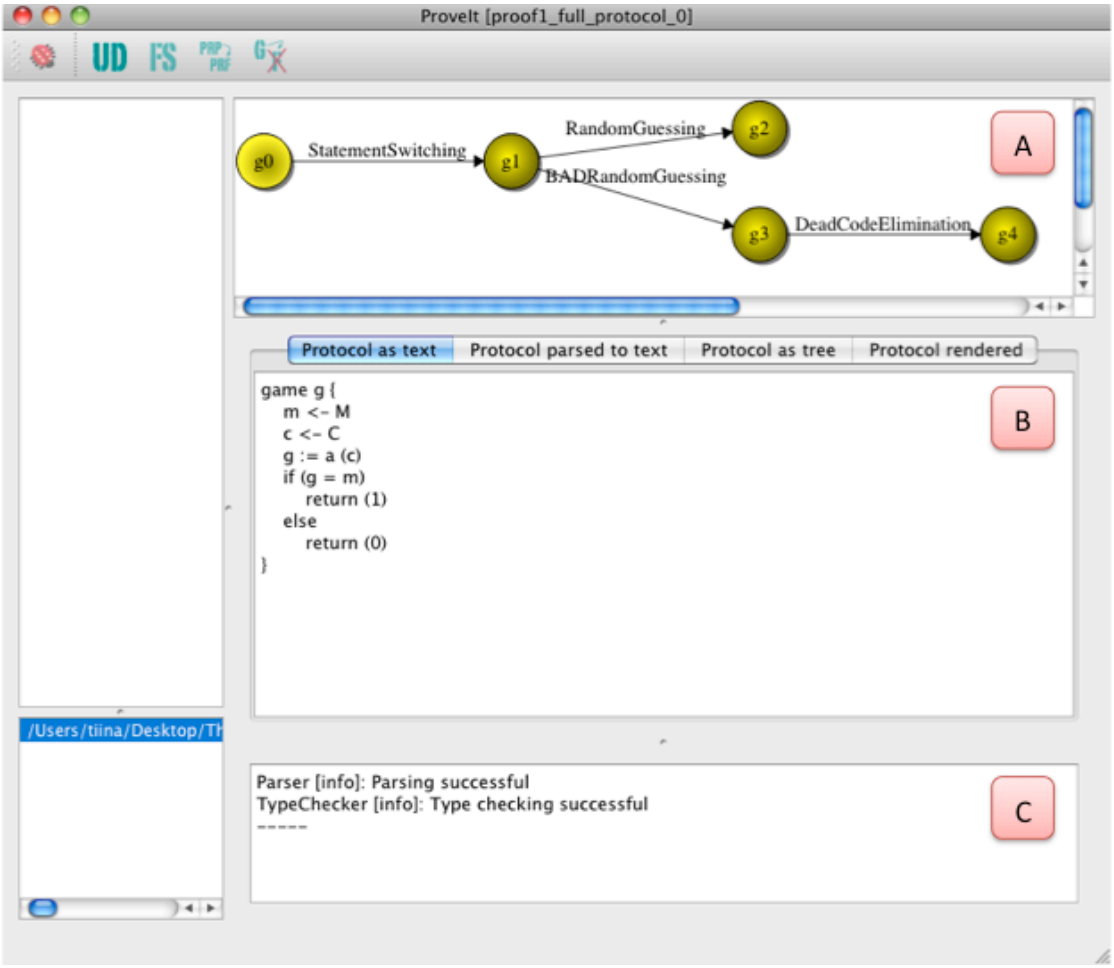


Joonis 1. The title of the Figure.

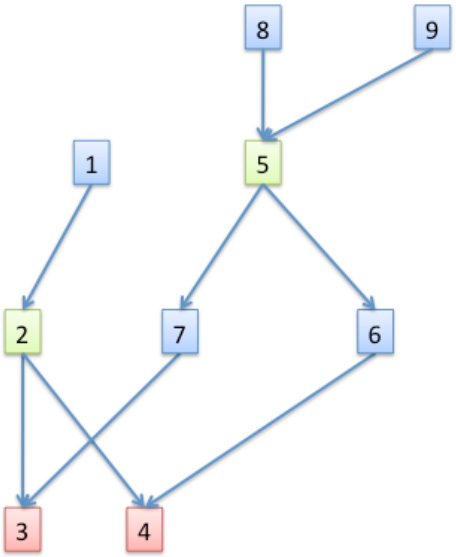


Joonis 2. Refer if the figure is not yours [Kam12].

Tip: If you add a screenshot then labeling the parts might help make the text more understandable (panel C vs bottom left part), e.g.



Joonis 3. Screenshot of ProveIt.



Node	Decendants
1	2, 3, 4
2	3, 4
3	
4	
5	3, 4, 6, 7
6	4
7	3
8	3, 4, 5, 6, 7
9	3, 4, 5, 6, 7

Joonis 4. Example how to put two figures parallel to each other.

Example: A screenshot of ProveIt can be seen on Figure 3. The user first enters the pseudocode of the initial game in panel B. ProveIt also keeps track of all the previous games showing the progress on a graph seen in panel A.

There are two figures side by side on Figure 4.

4 Other Ways to Represent Data

4.1 Tables

Tabel 1. Statements in the ProveIt language.

Statement	**Typeset Example**
assignment	$a := 5 + b$
uniform choice	$m \leftarrow M$
function signature	$f : K \times M \rightarrow L$

4.2 Lists

Numbered list example:

1. item one;
2. item two;
3. item three.

4.3 Math mode

Example:

$$a + b = c + d \tag{1}$$

Aligning:

$$\begin{aligned} a &= 5 \\ b + c &= a \\ a - 2 * 3 &= 5/4 \end{aligned}$$

Hint: Variables or equations in text are separated with $ sign, e.g. a, $x - y$.

Inference Rules

$$\text{addition}\frac{\Gamma \vdash x : T \qquad \Gamma \vdash y : T}{\Gamma \vdash x + y : T}$$

Bigger example:

$$\text{assign}\frac{\Gamma \vdash c := a + b \qquad \text{addG}\ \dfrac{\Gamma \vdash a : \mathsf{Rat} \qquad \text{var}\ \dfrac{\Gamma \vdash b : \mathsf{Int} \qquad \Gamma \vdash \mathsf{Int} \subseteq \mathsf{Rat}}{\Gamma \vdash b : \mathsf{Rat}}}{\Gamma \vdash a + b : \mathsf{Rat}}}{\Gamma \vdash c : \mathsf{Rat}}$$

4.4 algorithm2e

Algorithm 1: typeChecking

Input: Abstract syntax tree

Result: Type checking result; In addition, type table $\text{type}_{\text{type\_G}}$ for global variables, $\text{type}_{\text{game}}$ for the main game and type_{fun} for each $fun \in F$

```
1 while something changed in last cycle do
2     foreach global statement s do parseStatement(s, type_type_G);
3     ;
4     foreach function fun do
5         foreach statement s in fun do parseStatement(s, type_fun);
6         ;
7     foreach statement s in game do parseStatement(s, type_game);
8     ;
```

4.5 Pseudocode

```
expression
  : NUMBER
  | VARIABLE
  | '+' expression
  | expression '+' expression
  | expression '*' expression
  | function_name '(' parameters ')'
  | '(' expression ')'
```

Joonis 5. Grammar of arithmetic expressions.

4.6 Frame Around Information

Tip: We can use minipage to create a frame around some important information.

1. integer division (\div) – only usable between Int types
2. remainder (%) – only usable between Int types

Joonis 6. Arithmetic operations in ProveIt revisited.

5 Kokkuvõte

what did you do?

What are the results?

future work?

Viidatud kirjandus

[BGZ09] Gilles Barthe, Benjamin Grégoire, and Santiago Zanella Béguelin. Formal certification of code-based cryptographic proofs. In *36th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2009*, pages 90–101. ACM, 2009.

[Bla] Bruno Blanchet. Proverif: Cryptographic protocol verifier in the formal model. `http://www.proverif.ens.fr/`.

[BR04] Mihir Bellare and Phillip Rogaway. Code-based game-playing proofs and the security of triple encryption. Cryptology ePrint Archive, Report 2004/331, 2004. `http://eprint.iacr.org/`.

[Kam12] Liina Kamm. ProveIt – How to make proving cryptographic protocols less tedious. Talk at the 21st Estonian Computer Science Theory Days at Kubija, January 2012.

[Sho04] Victor Shoup. Sequences of games: a tool for taming complexity in security proofs. Cryptology ePrint Archive, Report 2004/332, 2004. `http://eprint.iacr.org/`.

Lisad

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Siim Pragi
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