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The title of your thesis

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Budapest, 2017

Abstract

This page contains the text of your abstract.

Contents

Chapter 1

Introduction

The opening text of the Introduction chapter.

1.1 A section of the Introduction chapter

The opening text of this section.

1.1.1 A subsection of the Introduction chapter

The text of this subsection.

1.2 Commonly used LaTeX features

This section includes a few examples of LaTeX components you can reuse in your thesis. See the `example.tex` file for the source code of this section.

1.2.1 Citations and references

Citations are imporant part of scientific papers and theses. In LaTeX you first have to label and list the works you want to cite in the bibliography section (see `biblio.tex`), and then you can refer to them anywhere in the document by using this label, like this [1]. If you want to cite more than one work, you can cite them like this [2, 3].

A different type of label definition can also be used to refer to certain parts of the documents, like figures (see Section 1.2.3.), and chapters, sections, subsections. Chapter labels can also be utilized to refer to an appendix (like Appendix A).

1.2.2 Mathematics

Representing mathematical formulas is one of the strongest suits of LaTeX.

Inline formula: $x^2 + y^2 = z^2$. This is also useful to write single mathematical symbols, like α or $\Longrightarrow$ or $\leftarrow$.

Standalone formula:

$$x^2 + y^2 = z^2$$

Numbered formulas:

$$x^2 + y^2 = z^2 \tag{1.1}$$

$$\binom{n}{k} = \frac{n!}{k!(n-k)!} \tag{1.2}$$

Aligned formulas:

$$x^2 + y^2 = z^2 \tag{1.3}$$

$$\binom{n}{k} = \frac{n!}{k!(n-k)!} \tag{1.4}$$

Aligned unnumbered formulas:

$$\begin{aligned} x^2 + y^2 &= z^2 \\ \binom{n}{k} &= \frac{n!}{k!(n-k)!} \end{aligned}$$

Definition 1. *A graph is an ordered pair $G = (V, E)$ comprising a set V of vertices, nodes or points together with a set E of edges, arcs or lines, which are 2-element subsets of V (i.e., an edge is associated with two vertices, and the association takes the form of the unordered pair of the vertices).*

Example 1. *Let V and E be the sets*

$$\begin{aligned} V &= \{1, 2, 3, 4, 5, 6\} \\ E &= \{\{1, 2\}, \{1, 5\}, \{2, 3\}, \{2, 5\}, \{3, 4\}, \{4, 5\}, \{4, 6\}\} \end{aligned}$$

Then (V, E) is a graph.

1.2.3 Figures

You can include, resize, and position figures using the figure environment and the `includegraphics` directive. This environment makes it possible to add captions to a figure, and to add a custom label by which you can refer to this figure anywhere in the document. See the Latex source of Figure 1.1 in `examples.tex`. To include big figures, you can rotate the image with the `sidewaysfigure` environment, as in the case of Figure 1.2.

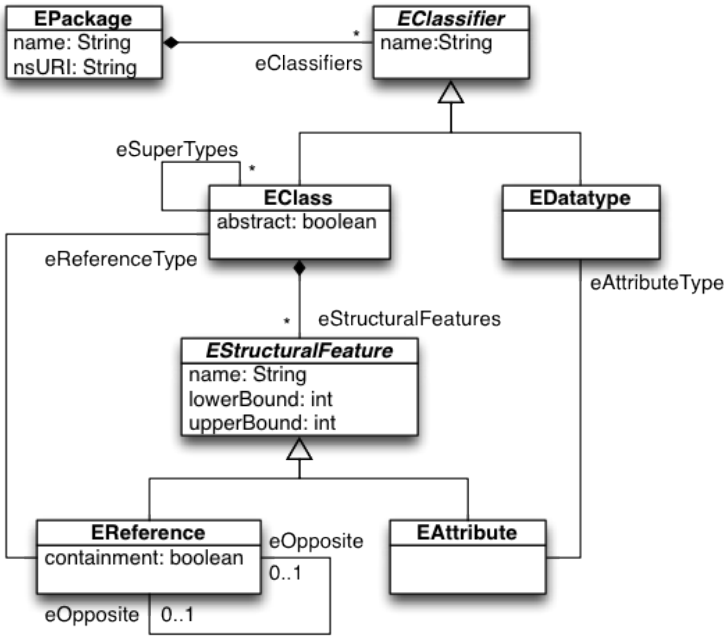

Figure 1.1: A small image, centered horizontally [4].

1.2.4 Diagrams

It's also possible to draw diagrams *inside* LaTeX code.

$$\begin{array}{ccc} L = & (L^S \xleftarrow[s_L]{} L^C \xrightarrow{t_L} L^T) \\ \downarrow tr & \downarrow tr^S \quad \downarrow tr^C \quad \downarrow tr^T \\ R = & (R^S \xleftarrow[s_R]{} R^C \xrightarrow{t_R} R^T) \end{array}$$

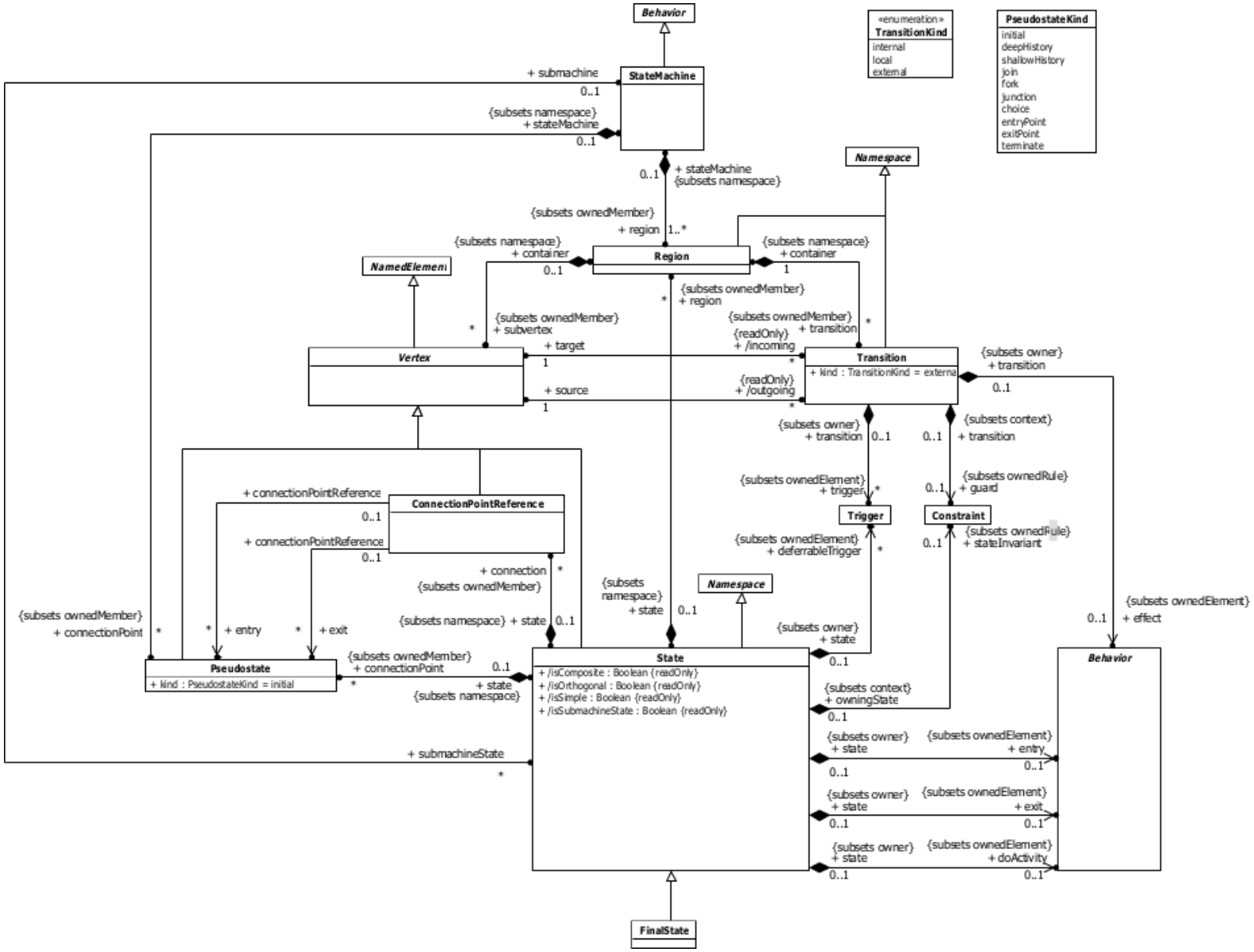

Figure 1.2: A wholepage image, rotated sideways [5].

1.2.5 Lists

List for unordered things:

- Apple is a deciduous tree in the rose family best known for its sweet, pomaceous fruit, the apple.
- Orange is the fruit of the citrus species Citrus × sinensis in the family Rutaceae. The fruit of the Citrus × sinensis is considered a sweet orange, whereas the fruit of the Citrus × aurantium is considered a bitter orange.
- Pomegranate is a fruit-bearing deciduous shrub or small tree in the family Lythraceae that grows between 5 and 8 m tall.

Enumerated list for ordered things:

1. Open door.
2. Enter room.
3. Close door.

Named list for dictionary-like descriptions:

Apple A deciduous tree in the rose family best known for its sweet, pomaceous fruit, the apple.

Orange The fruit of the citrus species Citrus × sinensis in the family Rutaceae. The fruit of the Citrus × sinensis is considered a sweet orange, whereas the fruit of the Citrus × aurantium is considered a bitter orange.

Pomegranate A fruit-bearing deciduous shrub or small tree in the family Lythraceae that grows between 5 and 8 m tall.

1.2.6 Text formatting

The usual text formatting options (**bold**, *italic*, `fix-width`) are also available in LaTeX.

```
The verbatim environment can be used to
present multiline text with fix-width font.
```

1.2.7 Algorithm

Below is an example usage of the algorithm environment. You can use this environment to include pseudocode in your thesis, usually to describe programs and algorithms you invented.

Algorithm 1 $discoverGenFsm(modulName)$

$spgModel \leftarrow newSpgModel()$
$root \leftarrow newRoot()$
$spgModel.setRoot(root)$
$modul \leftarrow newModul(modulName)$
$root.addChild('mod', modul)$
for $f \in initFuns$ **do**
    $modul.addChild('func', erlNode2ModelNode(f))$
end for
$visited \leftarrow newSet(initFuns)$
$stack \leftarrow newStack(initFuns)$
$Visited \leftarrow Init$
$S \leftarrow stack(V)$
while $stack \neq \varnothing$ **do**
    $node \leftarrow stack.pop()$
    if $v \notin visited$ **then**
        $visited.add(node)$
        $modelNode \leftarrow erlNode2ModelNode(node)$
        $neighbours \leftarrow nextNode(node)$
        for $(e, n) \in neighbours$ **do**
            $stack.add(n)$
            $modelNode.addChild(e, erlNode2ModelNode(node))$
        end for
    end if
end while
    return $spgModel$

1.2.8 Source code

Below is an example usage of the listings environment. You can use this environment to include source code in your thesis, usually to show source code examples.

```
1  -module(hello).
2  -export([hello_world/0]).
3
4  %% Outputs "hello world\n" on the standard output.
5  hello_world(ok) ->
6      X = "hello␣world\n",
7      io:fwrite(X);
8
9  hello_world(_) ->
10     ok.
```

Figure 1.3: A "Hello world" program in the Erlang language. Syntax highlighting is provided by the listings environment.

1.2.9 Tables

Table 1.1: Runtime test results

Module	**Line no.**	**Average (ms)**
Ejabberd		
ejabberd_c2s	3128	31614.7
ejabberd_service	404	17991.3
eldap	1196	27353.0
mod_proxy65_stream	291	14975.9
Riak		
riak_kv_2i_aae	695	11688.4
riak_kv_get_fsm	787	5521.9
Erlang OTP		
ssh_connection_handler	1721	67467.6
tls_connection	975	56788.5

Chapter 2

A main chapter

Chapter 3

Another main chapter

Chapter 4

Related work

Chapter 5

Conclusions

The opening text of the Conclusions chapter.

You can use this chapter to present your work from a result-oriented standpoint, to describe the testing and evaluation results of your implementation, to delineate future work, development direction and possible advancements, and to conclude your thesis.

Bibliography

[1] Ericsson AB. Erlang Programming Language. `http://www.erlang.org`. [Accessed: 2017.02.07].

[2] M. Tóth and I. Bozó. Static analysis of complex software systems implemented in erlang. Central European Functional Programming Summer School – Fourth Summer School, CEFP 2011, Revisited Selected Lectures, Lecture Notes in Computer Science (LNCS), Vol. 7241, pp. 451-514, Springer-Verlag, ISSN: 0302-9743, 2012.

[3] I. Bozó, D. Horpácsi, Z. Horváth, R. Kitlei, J. Köszegi, Tejfel. M., and M Tóth. Refactorerl - source code analysis and refactoring in erlang. In *Proceedings of the 12th Symposium on Programming Languages and Software Tools, ISBN 978-9949-23-178-2*, pages 138–148, Tallin, Estonia, October 2011.

[4] Eclipse Foundation. Xtext Documentation. Az EMF Ecore meta-metamodell sematikus ábrája. `https://eclipse.org/Xtext/documentation/308_emf_integration.html`. [Accessed: 2017.02.07].

[5] Object Management Group. OMG Unified Modeling Language Superstructure. `www.omg.org/spec/UML/`. [Accessed: 2017.02.07].

Appendix A

Chapter in the appendices

The text of this appendix.

You can refer to this appendix by using the label defined after the chapter directive (see `appendix.tex`).

Appendix B

Another appendix

The text of this appendix.