

LaTeX Tutorial

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Outline

- 1 Introduction
 - Eclipse LaTeX Plugins
 - CVS and Eclipse
- 2 LaTeX Document
 - Document Layout
 - Document Formatting
- 3 Resources

TeXlipse: <http://texlipse.sourceforge.net/>

The screenshot shows the Eclipse IDE with the TeXlipse plugin. The main editor window displays the following LaTeX code and text:

```

\section{Introduction}

This project was done for the SoberIT laboratory. The general purpose of this
project was to create a \LaTeX plugin (later referred to as TeXlipse) for the
popular Eclipse IDE. The purpose of TeXlipse is to provide a powerful editing
environment that is integrated into Eclipse for creating \LaTeX -documents.
There are existing free plugins for this, e.g. the ecleTeX -project, but they
are lacking in features, contain many bugs and do not offer the possibilities
permitted by the Eclipse-platform or desired by a power user. TeXlipse is aimed
to provide many powerful editing features for the power user, featuring eg.
automatic building, document outline viewing, syntax highlighting, templates
and error annotations.

The customer's objective of this project was to have a freely distributable and
powerful, yet easy to use environment for document creation on multiple
platforms.

The project organization was stable during the whole project. The figure
below describes all project stakeholders. Each stakeholders' role is described
in more detail in the {\em(Project Plan)} document.

\includegraphics[height=3in]{communications.pdf}

Figure 1. Communications chart.
    
```

The left sidebar shows the file navigator with the following structure:

- finalreport
 - tmp
 - .project
 - appendixA.tex
 - appendixB.tex
 - FReport.dvi
 - FReport.tex
 - refs.bib
- javatest
- latextest

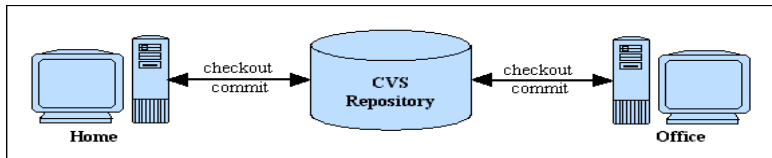
The bottom panel shows the console with the following error messages:

```

8 errors, 7 warnings, 0 infos
    
```

Description	Resource	In Folder	Location
Cannot determine size of graphic in communications.pdf (nc	FReport.tex	finalreport	
Cannot determine size of graphic in workload_distribution.pc	FReport.tex	finalreport	
Cannot determine size of graphic in workloadtype_distribution.px	FReport.tex	finalreport	
File 'communications.pdf' not found.	FReport.tex	finalreport	line 96
File 'workload_distribution.pdf' not found.	FReport.tex	finalreport	line 579

Configuration Management with CVS



Setup

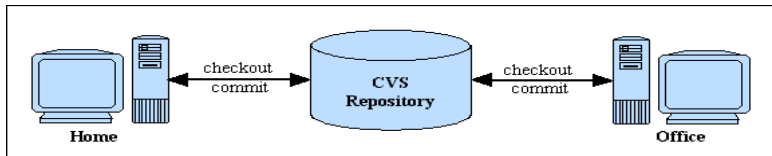
- 1 Set CVSROOT environment variable

```
CVSROOT=/csd/thesis/rbahati/DiGS
export CVSROOT
```
- 2 Create repository

```
cvs init
```
- 3 Initialize the project

```
cvs import -m "LaTeX" LaTeX-2009 rbahati start
```

Configuration Management with CVS



Setup

- 1 Set CVSROOT environment variable
`CVSROOT=/csd/thesis/rbahati/DiGS`
`export CVSROOT`
- 2 Create repository
`cvs init`
- 3 Initialize the project
`cvs import -m "LaTeX" LaTeX-2009 rbahati start`

Small Document

```
\documentclass[journal]{IEEEtran}
\usepackage{algorithm}
\usepackage{algorithmic}
\usepackage{listings}
\usepackage{epsfig}

\begin{document}
\title{Document Title}
\author{Document Author}
\maketitle

\section{First Section}
\subsection{First Subsection}
\subsubsection{First Subsubsection}
\subsubsection{Second Subsubsection}

\section{Second Section}
\subsection{Second First Subsection}
\subsection{Second Second Subsection}

\bibliographystyle{IEEEtran}
\bibliography{bib-file}
\end{document}
```

Large Document

```
\documentclass[11pt,leqno]{report}
\usepackage{amsmath,amssymb,amsfonts}
\usepackage{listings}
\usepackage{epsfig}

\begin{document}
\title{Document Tittle}
\author{Document Author}
\maketitle

\pagestyle{plain}
\addcontentsline{toc}{chapter}{Contents}
\pagenumbering{roman}
\tableofcontents

\include{ch-introduction}
\include{ch-modelling-RL}

\bibliographystyle{IEEEtran}
\bibliography{raphael-PhDDISSERTATION}
\appendix
\include{appendix-policies}
\include{appendix-cycle}
\end{document}
```

Chapter: ch-modelling-RL

```
\chapter{Modelling Reinforcement Learning}
\label{ch:modelling-RL}

\section{State-Transition Model}
\label{sec:state-transition-model}
\subsection{System States}
\label{sec:system-states}
\subsection{System Transitions}
\label{sec:system-transitions}
\section{Reward Function}
\label{sec:reward-function}

\section{Exploration/Exploitation}
\label{sec:exploration-exploitation}
\subsection{Exploration Strategy}
\label{sec:exploration-strategy}
\subsection{Exploitation Strategy}
\label{sec:exploitation-strategy}

\section{Learning by Reinforcement}
\label{sec:learning-by-reinforcement}

\section{Discussion}
\label{sec:modelling-RL-discussion}
```


Document Classes and Packages

`documentstyle[options]{class}`

- 1 **{article}**: 11pt, 12pt, twoside, twocolumn, draft, fleqn, leqno, acm
- 2 **{report}**: 11pt, 12pt, twoside, twocolumn, draft, fleqn, leqno, acm
- 3 **{letter}**: 11pt, 12pt, fleqn, leqno, acm
- 4 **{book}**: 11pt, 12pt, twoside, twocolumn, draft, fleqn, leqno

`usepackage{package}`

- **{amsmath,amssymb,amsfonts}**: Mathematics
- **{epsfig}**: Figures (.jpeg, .png)
- **{subfigure}**: SubFigures
- **{listings}**: Codes
- **{algorithm, algorithmic}**: Algorithms
- **{multirow}**: Table formatting

Bibliography

@INPROCEEDINGS; @TECHREPORT; @ELECTRONIC; @INBOOK;
@PHDTHESIS; @MASTERSTHESIS;

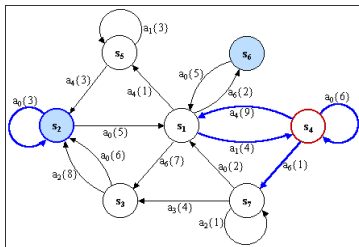
```
@INPROCEEDINGS{REF502,  
  TITLE="{Reinforcement Learning in Policy-driven Autonomic  
  Management}",  
  YEAR="2008",  
  PAGES="899--902",  
  MONTH="April",  
  BOOKTITLE="Network Operations \& Management Symposium  
  (NOMS'08)",  
  ADDRESS="Salvador, Bahia, Brazil",  
  FILE="raphael-NOMS2008.pdf",  
  AUTHOR="Raphael M. Bahati and Michael A. Bauer"  
}
```

Reference

- 1 R. M. Bahati and M. A. Bauer, "Reinforcement Learning in Policy-driven Autonomic Management," in *Network Operations & Management Symposium (NOMS'08)*, Salvador, Bahia, Brazil, April 2008, pp. 899–902.

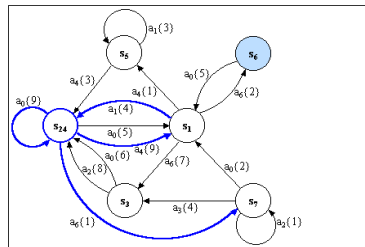
Figures: `usepackage{epsfig, subfigure}`

```
\begin{figure}[htb]
\begin{center}
\subfigure [Original model]{\label{fig:change7}
\epsfig{file=figures/change7,height=1.3in,width=1.9in}}
\subfigure [New model]{\label{fig:modification7}
\epsfig{file=figures/modification7,height=1.3in,width=1.9in}}
\caption{Sample Table.}
\end{center}
\end{figure}
```



(a) Original model

$\xrightarrow{\Psi[G_1^*]}$



(b) New model

Figure: Sample Figure.

Tables: `usepackage{multirow}`

```
\begin{table}[htb]
\begin{center}
\begin{small}
\begin{tabular}{|c|c|c|c|c|p{2.2in}|}
\hline
State &  $R_{m_j}^k$  &  $f(R_{m_j}^k)$  & \multicolumn{2}{c|}
      { $A(s_i)$ } \\
\hline
 $s_i$  &  $R_{m_1}^k$  &  $f(R_{m_1}^k)$  &  $s_1$  & State action \\
\hline
\multirow{4}{*}{ $s_1$ } &  $R_{m_1}^3$  &  $f(R_{m_1}^3)$  & \multirow{4}{*}{ $R_{m_1}^0$ } &  $s_0$  &  $\gamma s$ -action \\
\cline{4-5} & &  $s_1$  & \texttt{AdjustMaxClients(+25)} \\
\cline{4-5} & &  $s_2$  & \texttt{AdjustMaxKAResources(-30)} \\
\cline{4-5} & &  $s_3$  & \texttt{AdjustMaxBandwidth(-128)} \\
\hline
\end{tabular}
\end{small}
\end{center}
\caption{Sample Table.}
\label{tab:system-states}
\end{table}
```

Tables

State	$R_{m_j}^k$	$f(R_{m_j}^k)$	$A(s_i)$	
s_i	$R_{m_1}^k$	$f(R_{m_1}^k)$	a_l	State action
s_1	$R_{m_1}^3$	0	a_0	γ -action
			a_1	AdjustMaxClients(+25)
			a_2	AdjustMaxKRequests(-30)
			a_3	AdjustMaxBandwidth(-128)

Table: Sample Table.

Equations

```
\begin{equation}
Q_{0}(s, a)=\frac{\sum\limits_{p_{j}\in[P_{v}]_{a}}\tanh[S(p_{j})]\times W_{a}(p_{j})}{\| [P_{v}]_{a} \|}
\label{equ:action-strength}
\end{equation}
```

Eguation

$$Q_0(s, a) = \frac{\sum_{p_j \in [P_v]_a} \tanh[S(p_j)] \times W_a(p_j)}{\| [P_v]_a \|} \quad (1)$$

Equations

```
\begin{align}
S(p_{-1}) &= \sum\limits_{c_{-i}\in p_{-1}} c_{-i}.\omega \\
&\quad \times V(c_{-i}) \\
&= \{\frac{1}{6} \times 0.0588\} + \{\frac{1}{6}\} \\
&\quad \times 1.0000 \\
&= 0.0098 + 0.1667 \\
&= 0.1765
\end{align}
```

Equation

$$S(p_1) = \sum_{c_i \in p_1} c_i \cdot \omega \times V(c_i) \quad (2)$$

$$= \left\{ \frac{1}{6} \times 0.0588 \right\} + \left\{ \frac{1}{6} \times 1.0000 \right\} \quad (3)$$

$$= 0.0098 + 0.1667 \quad (4)$$

$$= 0.1765 \quad (5)$$

Listings: `usepackage{listings}`

```
\begin{figure}[htb]
\begin{center}
\lstset{language=C++, numbers=left, basicstyle=\tiny}
\lstinputlisting{listings/listing.cpp}
\label{lis:listing-cpp}
\end{center}
\end{figure}
```

```
1 status_t ActionTestList::getValidActionTest (ActionTestInfo **entry)
2 {
3     register int count;
4     if (lock() == NOTOK)
5         return NOTOK;
6     for (count = 0; count < numItems; count++)
7     {
8         if ( actionList[count].type != INVALID_TEST )
9             {
10                *entry = &actionList[count];
11                break;
12            }
13     }
14     if (unlock() == NOTOK)
15         return NOTOK;
16     return OK;
17 }
```


Algorithms: `usepackage{algorithm, algorithmic}`

```
\begin{algorithm}
\caption{\texttt{CreateState}($E_{-m}$, $A_{-v}$)}
\label{pro:create-state}
\begin{algorithmic}[1]
\REQUIRE $r_{-m_i}$ \in $M_{-R}^{\{P\}}$
\ENSURE $s = \langle \mu, M(s), A(s) \rangle$
\FOR {each $e$ \in $E_{-m}$}
\FOR {each $r_{-m_i}$ \in $M_{-R}^{\{P\}}$}
\IF {($\alpha_{-m_i}.\texttt{metric} = e.\texttt{metric}$)}
\STATE $s.m_i.\texttt{ID} \leftarrow \alpha_{-m_i}.\texttt{ID}$
\STATE $s.m_i.\omega \leftarrow \alpha_{-m_i}.\omega$
\STATE $s.m_i.\texttt{value} \leftarrow e.\texttt{value}$
\STATE $s.m_i.f(R_{-m_i}^{\{1\}}) \leftarrow$
    \texttt{Region}($e.\texttt{value}, \sigma_{-m_i}$)
\STATE $\mathcal{M}(s) \leftarrow \mathcal{M}(s) \cup s.m_i$
\STATE break;
\ENDIF \label{line-C:create-state}
\ENDFOR
\ENDFOR
\STATE $\mathcal{M}(s) \leftarrow \texttt{Sort}(\mathcal{M}(s), s.m_i.\texttt{ID})$
\STATE $a_{-0} \leftarrow \texttt{\$gamma\$-action}$
\STATE $A(s) \leftarrow A(s) \cup a_{-0}$
\FOR {each $a_{-i}$ \in $A_{-v}$}
\STATE $A(s) \leftarrow A(s) \cup a_{-i}$
\ENDFOR
\RETURN $s$
\end{algorithmic}
\end{algorithm}
```

Algorithm 1 CreateState(E'_m, A_v)

Input: $r_{m_i} \in M_R^P$ **Output:** $s = \langle \mu, M(s), A(s) \rangle$

```
1: for each  $e \in E'_m$  do
2:   for each  $r_{m_i} \in M_R^P$  do
3:     if  $(\alpha_{m_i}.metric = e.metric)$  then
4:        $s.m_i.ID \leftarrow \alpha_{m_i}.ID$ 
5:        $s.m_i.\omega \leftarrow \alpha_{m_i}.\omega$ 
6:        $s.m_i.value \leftarrow e.value$ 
7:        $s.m_i.f(R_{m_i}^l) \leftarrow \text{ComputeRegionValue}(e.value, \sigma_{m_i})$ 
8:        $M(s) \leftarrow M(s) \cup s.m_i$ 
9:       break;
10:    end if
11:  end for
12: end for
13:  $M(s) \leftarrow \text{Sort}(M(s), s.m_i.ID)$ 
14:  $a_0 \leftarrow \gamma\text{-action}$ 
15:  $A(s) \leftarrow A(s) \cup a_0$ 
16: for each  $a_i \in A_v$  do
17:    $A(s) \leftarrow A(s) \cup a_i$ 
18: end for
19: return  $s$ 
```

Resources

- 1 **CVS**: <http://www.csd.uwo.ca/~rbahati/courses/CS212b/resources.html>
- 2 **LaTeX**: <http://frodo.elon.edu/tutorial/tutorial/node1.html>
- 3 **TeXlipse**: <http://texlipse.sourceforge.net/>
- 4 **Beamer**: <http://latex-beamer.sourceforge.net/>