LaTeX and Friends
Branching

http://csweb.ucc.ie/~dongen/LAF/LAF.html

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LaTeX Counters

```
\newcounter{⟨name⟩}
\setcounter{⟨name⟩}{⟨value⟩}
\stepcounter{⟨name⟩}
\addtocounter{⟨name⟩}{⟨increment⟩}
\the⟨name⟩
\newcounter{⟨slave⟩}[⟨master⟩]
```

LaTeX Counters

LaTeX Input

```
\newcounter{ans}
\setcounter{ans}{9}
\addtocounter{ans}{11}
\stepcounter{ans}
\addtocounter{ans}{\theans}
The answer to the ultimate
 question of life, the universe,
 and everything is \theans.
```

LaTeX Output

The answer to the ultimate question of life, the universe, and everything is 42.

Decision Making

- LaTeX does not support decision making.
- To make decisions you need TeX or package such as `ifthen`.

Switches

```
\newif\if⟨switch⟩
\⟨switch⟩true
\⟨switch⟩false
\if⟨switch⟩⟨then clause⟩\fi
\if⟨switch⟩⟨then clause⟩\else⟨else clause⟩\fi
```

Example

LaTeX Usage

```
\newif\ifnotes
\notestrue

\begin{document}
\section{\ifnotes Lecture Notes%
         \else Presentation%
         \fi}
...
\end{document}
```

Lengths

Unit	Name	Equivalent
pt	point	
pc	pica	1 pc = 12 pt
in	inch	1 in = 72.27 pt
bp	big point	72 bp = 1 in
cm	centimetre	2.54 cm = 1 in
mm	millimetre	10 mm = 1 cm
dd	didôt point	1157 dd = 1238 pt
cc	cicero	1 cc = 12 dd
sp	scaled point	65536 sp = 1 pt

Lengths

- Each length unit represents its own length.
- When LaTeX expects a length, writing `1⟨unit⟩` results in the length of the unit `⟨unit⟩`.
  - For example `1mm` gives you the length of one millimetre.
- Write `⟨constant⟩⟨unit⟩` to multiply `⟨unit⟩` and `⟨constant⟩`.
  - For example, `101in` is equivalent to `256.54cm`.

Length Variables

- Length variables hold length values.
- You write them just as control sequences.
- Given variable ⟨len⟩, 2⟨len⟩ gives you twice its current value.
- There are two kinds of lengths: *rigid* and *rubber*.

  rigid A rigid length always has the same size.

  rubber A rubber length is a combination of natural length and elasticity.
  - Values may stretch or shrink depending on the situation.
  - Useful for stretching/shrinking inter-word space and so on.
  - Multiplying a rubber length makes it rigid.

Existing Length Commands

```
\parindent
\textwidth
\textheight
\parskip
\baselineskip
```

Length-related Commands

```
\newlength{⟨command⟩}
\setlength{⟨command⟩}{⟨length⟩}
\addtolength{⟨command⟩}{⟨length⟩}
\settowidth{⟨command⟩}{⟨stuff⟩}
\settoheight{⟨command⟩}{⟨stuff⟩}
\settodepth{⟨command⟩}{⟨stuff⟩}
```

The ifthen Package

`\newboolean{⟨bool⟩}`	Define variable. May fail.
`\provideboolean{⟨bool⟩}`	Define variable. Can't fail.
`\setboolean{⟨bool⟩}{⟨value⟩}`	Assign ⟨value⟩.

Decision Making

`\ifthenelse{⟨test⟩}{⟨then clause⟩}{⟨else clause⟩}`

- Two-way branching statement.

Valid Conditions

⟨boolean⟩

⟨number$_1$⟩⟨op⟩⟨number$_2$⟩

\lengthtest{⟨dimen$_1$⟩⟨op⟩⟨dimen$_2$⟩}

\isodd{⟨number⟩}

\isundefined{⟨command⟩}

\equal{⟨string$_1$⟩}{⟨string$_2$⟩}

\boolean{⟨bool⟩}

⟨test$_1$⟩⟨command⟩⟨test$_2$⟩

⟨negation⟩⟨test⟩

\(⟨test⟩\)

The \ifthenelse Command

LaTeX Input

```
\begin{document}
    \ifthenelse
        {\isodd{\value{page}}}
        {Odd page.}
        {Even page.}
\end{document}
```

LaTeX Output

Odd page.

The \whiledo Command

\whiledo{⟨test⟩}{⟨statement⟩}
Implements while statement.

LaTeX Input

```
\newcounter{count}
\setcounter{count}{3}
$\thecount = 0
 \whiledo
   {\not\(\thecount=0\)}%
   {+ 1 \addtocounter{count}{-1}}$.
```

LaTeX Output

3 = 0 + 1 + 1 + 1.

The calc Package

- The calc package extends TEX and LATEX's arithmetic.
- Makes counter/length commands accept infix expressions.
- Also provides additional useful commands.

Loop Commands

Comma-separated Version

\@for \var:=⟨list⟩\do \command

LaTeX Input

```
\@for \var:=1,two\do{%
    (\var)%
}
```

LaTeX Output

(1)(two)

More Loop Commands

Token Sequence Version

`\@tfor\var :=⟨list⟩\do \command`

LaTeX Input

```
\newcommand*\swop[2]{#2#1}
\@tfor\var:=1\swop\do{%
    \var23%
}
```

LaTeX Output

12332

More Looping

`while` Loop With Condition Based on Switch

`\@whilesw⟨switch⟩\fi{⟨statements⟩}`

LaTeX Input

```
\newif\iffirst\firsttrue
\newif\ifsecond\secondfalse
\@whilesw\iffirst\fi{%
  X\ifsecond\firstfalse%
   \else\secondtrue\fi%
}
```

LaTeX Output

XX

Tail Recursion

LaTeX Usage

```
\def\apply#1{%
   \def\Apply##1{%
      \ifx##1\endApply%
         \breakApply% terminate recursion
      \fi%
      #1{##1}% Apply command to next item.
      \Apply%  Tail recursive call.
   }%
   \Apply%
}
\def\breakApply#1\Apply{\fi}%
\def\twice#1{#1#1}

\apply\twice a{bc}d\endApply
```

Bibliography

Acronyms and Abbreviations

AMS	American Mathematical Society
API	Application Programming Interface
APL	A Programming Language
CTAN	Comprehensive TEX Archive Network
CD	Compact Disk
FAQ	Frequently Asked Question
GUI	Graphical User Interface
IDE	Integrated Development Environment
ISBN	International Standard Book Number
OS	Operating System
SI	Système International d'Unités/International System of Units
TUG	TEX Users Group
URL	Uniform Resource Locator
WYSIWYG	What You See Is What You Get

About this Document

- This document was created with `pdflatex`.
- The LaTeX document class is `beamer`.