A Quick Introduction to the Lout Document Formatting System

Ludovic Courtès[*]
based on material by Jeffrey H. Kingston[†]

[*] *Inria Bordeaux Sud-Ouest*

[†] *Basser Dept. of Computer Science*
The University of Sydney

25 September 2012

about Lout

- free software, GPLv3+
- first released in 1991
- functionally similar to TeX + LaTeX (+ PGF/Tikz + …)
- purely functional
- small: ≈7 MiB installed
- research project by Jeff Kingston, University of Sydney
- may have a successor, *Nonpareil*

document authoring

A simple input file

```
@SysInclude { doc }
@Doc @Text @Begin
Hello, world
@End @Text
```

How to format it

```
lout filename > out.ps
gv out.ps
lpr out.ps
```

Hello, world

Headings and paragraphs

```
@SysInclude { doc }
@Doc @Text @Begin
@Heading { Introduction }
@PP
The design of the Lout formatting
system was undertaken with the
needs of the @I { ordinary user }
very much in mind.
@End @Text
```

Introduction

The design of the Lout formatting system was undertaken with the needs of the *ordinary user* very much in mind.

Lists

```
@Heading { Operating Instructions }
@NumberedList
@ListItem { Press small green lever. }
@ListItem { Wait approximately 10 seconds
until red light flashes. }
@ListItem { If smoke emerges from rear of unit,
call Service Department. }
@EndList
```

Operating Instructions

1. Press small green lever.
2. Wait approximately 10 seconds until red light flashes.
3. If smoke emerges from rear of unit, call Service Department.

Technical reports

```
@SysInclude { report }
@Report
    @Title { ... }
    @Author { ... }
    @Institution { ... }
    @DateLine { ... }
//
@Abstract { ... }
@Section { ... }
@Section { ... }
@Section { ... }
@Appendix { ... }
@Appendix { ... }
```

Sections

```
@Section
    @Tag { dfs }
    @Title { Depth-first search }
@Begin
@PP
We turn now to our first algorithm
on general graphs ...
@End @Section
```

10.6. Depth-first search

We turn now to our first algorithm on general graphs …

Cross references

For further information, consult Section @NumberOf dfs on page @PageOf { dfs }.

For further information, consult Section 10.6 on page 245.

References

@Database @Reference { myrefs }

...

For the details, consult the User's Guide @Cite { $kingston1995lout.user }.

For the details, consult the User's Guide [1].

…

References

1. Jeffrey H. Kingston. *A User's Guide to the Lout Document Formatting System (Version 3).* Basser Department of Computer Science, University of Sydney, 1995.

Database file myrefs.ld

```
{ @Reference
    @Tag { kingston1995lout.user }
    @Type { Book }
    @Author { Jeffrey H. Kingston }
    @Title { A User's Guide to the Lout
Document Formatting System (Version 3) }
    @Institution { Basser Department of
Computer Science }
    @Address { University of Sydney
2006, Australia }
    @Year { 1994 }
}
```

Books (and theses)

- Title page, preface, introduction
- Automatic table of contents
- Prefatory pages numbered in Roman numerals
- Chapters, sections, subsections, appendices
- References at end of chapters or book
- Running page headers
- Odd-even page formats
- Sorted index

Equation formatting

```
@SysInclude { math }
...
Since @M { T(n-i) = T(0) = 0 } we have
@IndentedDisplay @Math {
T(n) = big sum from i=0 to n-1 2 sup i = 2 sup n - 1
}
for the number of disk moves made by the Towers
algorithm, given @M { n } disks.  An @I { in-line } formulæ
would instead look like @M { big sum from { i=0 } to { n-1 }
2 sup i }.
```

Since $T(n-i) = T(0) = 0$ we have

$$T(n) = \sum_{i=0}^{n-1} 2^i = 2^n - 1$$

for the number of disk moves made by the Towers of Hanoi algorithm, given n disks. An *in-line* formulæ would instead look like $\sum_{i=0}^{n-1} 2^i$.

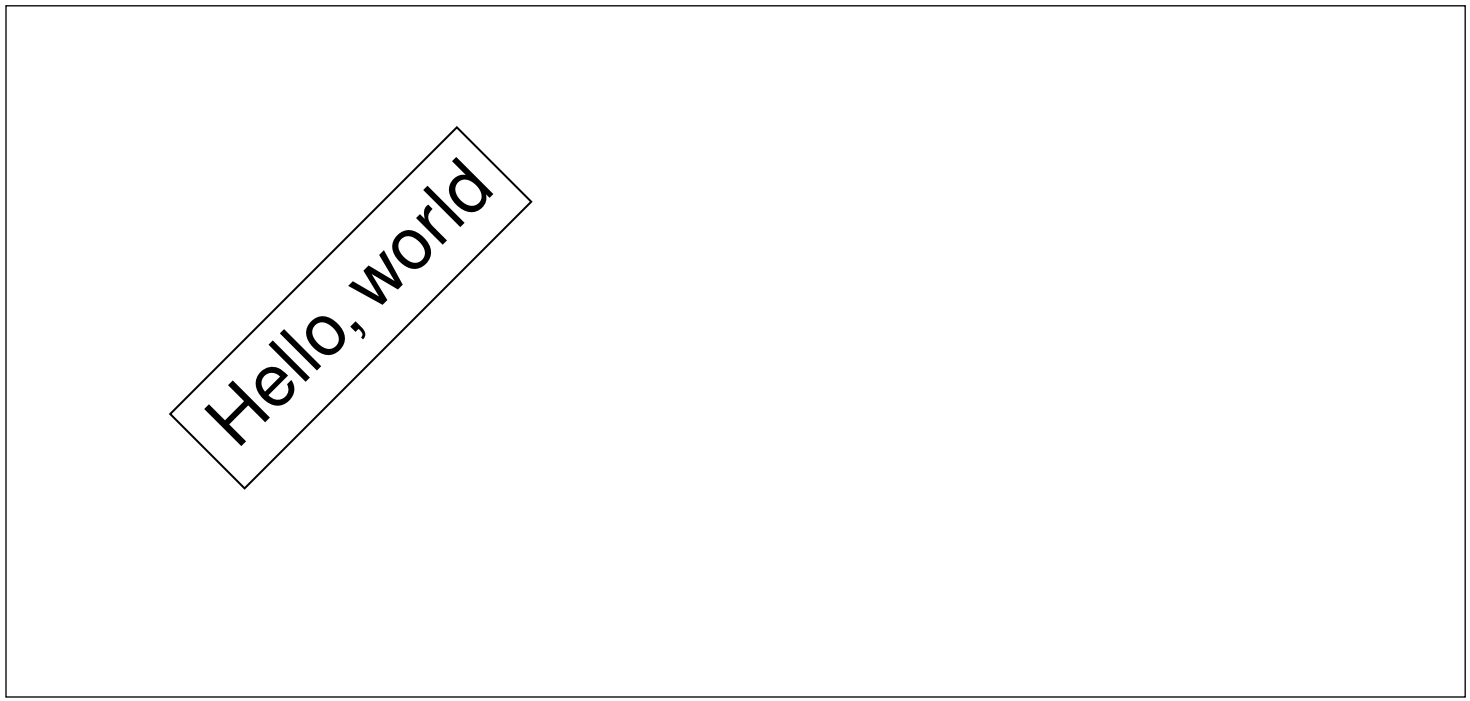
Tables

```
@Tab
   side { single }
   @Fmta { @Col @B @CC X @Over A,B,C }
   @Fmtb { @Col @I A ! @Col B !! @Col C }
{
@Rowa  above { single }
   X { Value of mathematical ... dollars) }

@Rowb  above { double }
   A { Quadratic formula }
   B { @Math { x ^= { ... } over 2a } }
   C { 3^.5 }

@Rowb  below { single }
   A { Binomial theorem }
   B { @Math { ( a + b ) sup n ^= ... b sup n-k } }
   C { 12^ }
}
```

Value of mathematical formulæ (millions of dollars)		
Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	3.5
Binomial theorem	$(a+b)^n = \sum_{k=0}^{\infty} \binom{n}{k} a^k b^n - k$	12

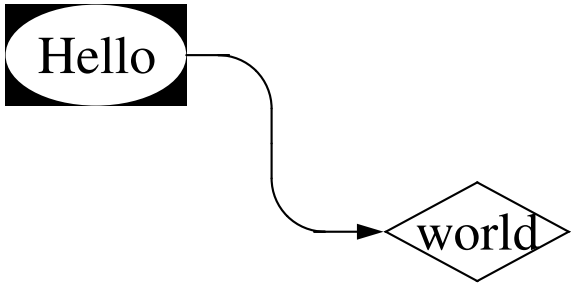
Basic graphics

```
45d @Rotate 1.5 @Scale @Box {
    Hello, world
}
```


Hello, world

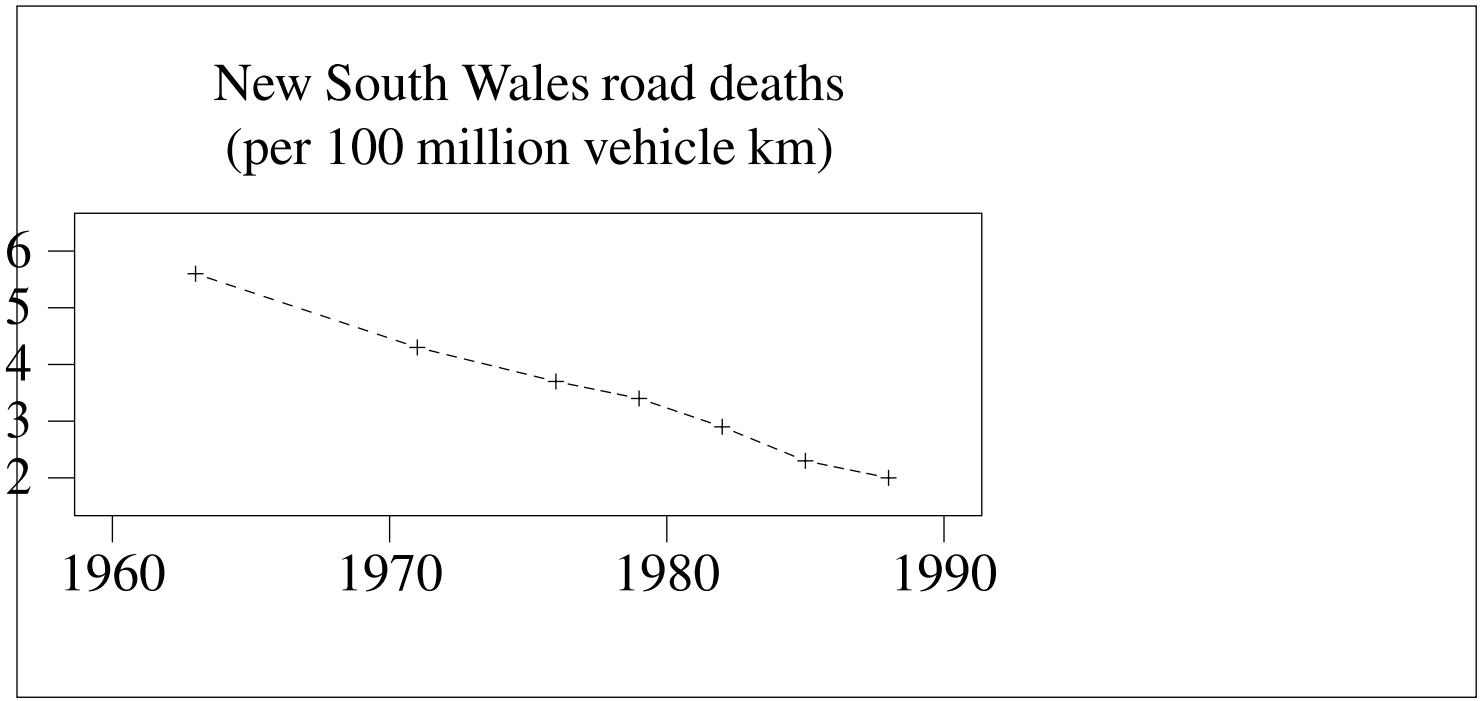
Advanced graphics!

```
@Diag {
A:: @Box margin { 0c } paint { black }
@Ellipse outlinestyle { noline } paint { white }
       { Hello }
//1c |5c
B:: @Diamond { world }

//
@Link arrow { yes } path { hvhcurve }
  from { A } to { B }
}
```


Hello
world

Graphs

```
@Graph
    abovecaption { New South Wales road deaths
(per 100 million vehicle km) }
{
    @Data  points { plus }  pairs { dashed }
    { 1963 5.6  1971 4.3  1976 3.7  1979 3.4
    1982 2.9  1985 2.3  1988 2.0 }
}
```


New South Wales road deaths
(per 100 million vehicle km)
6
5
4
3
2
1960
1970
1980
1990


REALLY
COOL

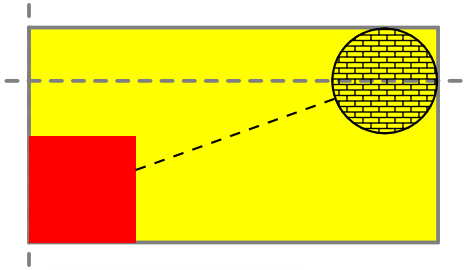
under the hood

objects & marks

$$\frac{x^2+1}{4}$$

A

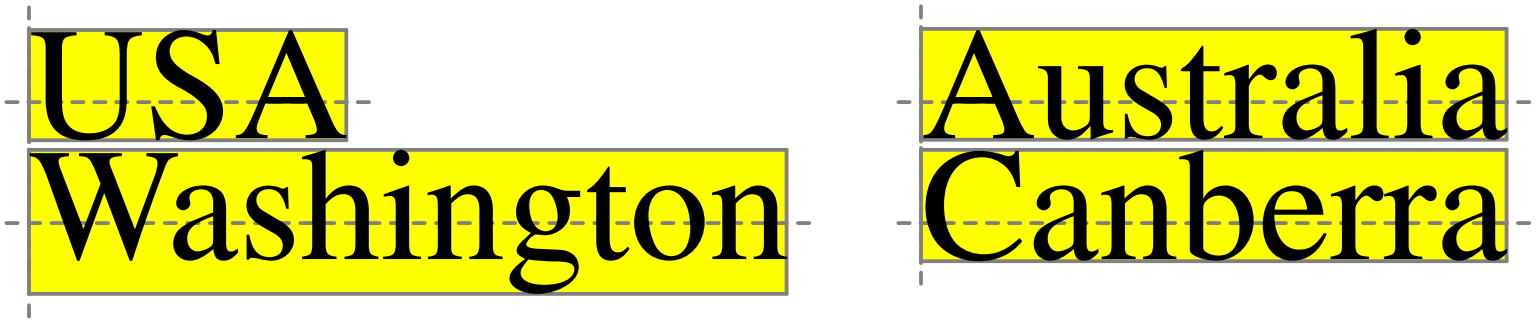
g



A box, a paragraph, and other things, like $\frac{1+\sqrt{5}}{2}$ and  .

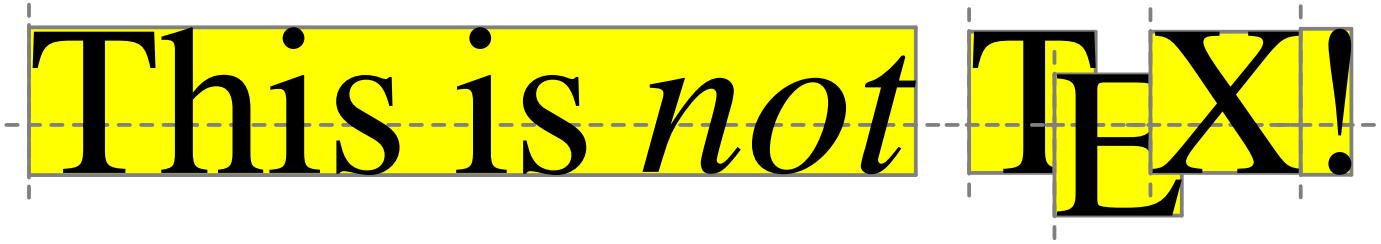
vertical & horizontal object concatenation

```
      { USA          |0.2i Australia  }
/0.1i{ Washington    |      Canberra  }
```



shifting marks

```
This is @I { not }
@OneCol { T |0.4fo {-0.2f @VShift E} |0.45fo X }
```



context-sensitive attributes

```
10c @Wide {
  { Times Base 15p } @Font
    { adjust hyphen } @Break {
Lout also provides…
  }
}
```

Lout also provides @Break and @Space symbols for controlling the paragraph breaking and space styles mentioned above. These work in the same way, returning their right parameters in the style of their left. The implementation is very simple: one merely broadcasts the style information down into the parse tree of the right parameter. A font, for example, is converted to an 8-bit internal name and stored in each leaf, while a breaking style is stored in the root node of each paragraph.

functions & laziness

def @Leaders { .. @Leaders }

…

10c @Wide { Chapter 7 @Leaders 42 }

Chapter 7 42

there’d be so much more to say…

ludovic.courtes@inria.fr

http://savannah.gnu.org/projects/lout/