

A Practical Introduction to the Lout Document Formatting System

Jeffrey H. Kingston

*Basser Dept. of Computer Science
The University of Sydney*

A simple input file

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

How to format it

```
lout filename > out.ps  
ghostview out.ps  
mpr 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.

Displays

You certainly don't want to return to his office and report:

```
@IndentedDisplay @I {  
  'I can't find an efficient algorithm, I  
  guess I'm just too dumb.'  
}
```

To avoid serious damage to your position in the company, it would be better if ...

You certainly don't want to return to his office and report:

'I can't find an efficient algorithm, I guess I'm just too dumb.'

To avoid serious damage to your position in the company, it would be better if ...

Paragraph breaking styles

You certainly don't want to return to his office and report:

```
@ID { ragged nohyphen } @Break @I {  
'I can't find an efficient algorithm, I  
guess I'm just too dumb.'  
}
```

To avoid serious damage to your position in the company, it would be better if ...

You certainly don't want to return to his office and report:

'I can't find an efficient algorithm, I guess I'm just too dumb.'

To avoid serious damage to your position in the company, it would be better if ...

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.
2. ...

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

Making a sorted index

@PP

There are several possible ways to implement the

@I Partition procedure,

partition @Index { @I Partition (in {@I Quicksort}) }

but the following seems to be the best. Starting ...

Index

...

partial order, 227

Partition (in *Quicksort*), 189

postorder traversal

 of binary tree, 19

 topological ordering, 229

...

Equation formatting

`@SysInclude { eq }`

...

Since `@Eq {  $T(n-i) = T(0) = 0$  }` we have

`@IndentedDisplay @Eq {`

$T(n) = \text{big sum from } i=0 \text{ to } n-1 \ 2^{\sup i} = 2^{\sup n - 1}$
`}`

for the number of disk moves made by the Towers of Hanoi algorithm, given `@Eq {  $n$  }` disks.

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.

Another equation

```
@CenteredDisplay @Eq {  
big int supp 1 on 0 '  
dx over sqrt { 1 - x sup 2 }  
= pi over 2  
}
```

$$\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{\pi}{2}$$

Tables

```
@SysInclude { tab }  
...  
@Tab  
  @Fmta { @Col @I A ! @Col B }  
{  
  @Rowa  
    A { Fortran }  
    B { The first ... language }  
  @Rowa  
    A { Algol-60 }  
    B { Said to be ... successors }  
  @Rowa  
    A { Pascal }  
    B { The famous ... successors }  
}
```

<i>Fortran</i>	The first high-level programming language
<i>Algol-60</i>	Said to be a better language than most of its successors
<i>Pascal</i>	The most famous of Algol-60's successors

Another table

@Tab

hmargin { 0.4c }

vmargin { 0.3v }

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 { @Eq { $x = \{ \dots \} \text{ over } 2a$ } }

C { $3^{.5}$ }

@Rowb below { single }

A { Binomial theorem }

B { @Eq { $(a + b)^n = \dots b^{n-k}$ } }

C { $12^{\wedge}$ }

}

Value of mathematical formulae (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

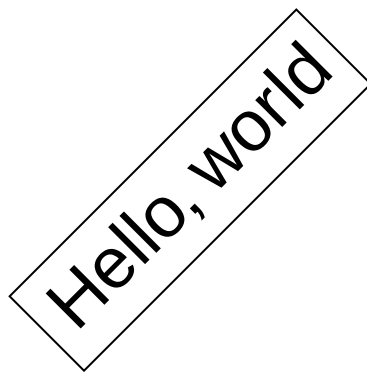
Pascal programs

```
@SysInclude { pas }  
...  
@ID @Pas {  
  procedure DoPriAbstract(root: PriEntry);  
  begin  
    if root^.leftchild <> nil then begin  
      DoPriAbstract(root^.leftchild);  
      write(', ');  
    end;  
    PriKeyAbstract(root^.key);  
    write(':');  
    PriValueAbstract(root^.value);  
    if root^.rightchild <> nil then begin  
      write(', ');  
      DoPriAbstract(root^.rightchild);  
    end;  
  end;  
end;  
}
```

```
procedure DoPriAbstract(root: PriEntry);  
begin  
  if root↑.leftchild ≠ nil then begin  
    DoPriAbstract(root↑.leftchild);  
    write(' ', ' ');  
  end;  
  PriKeyAbstract(root↑.key);  
  write(':');  
  PriValueAbstract(root↑.value);  
  if root↑.rightchild ≠ nil then begin  
    write(' ', ' ');  
    DoPriAbstract(root↑.rightchild);  
  end;  
end;
```

Basic graphics

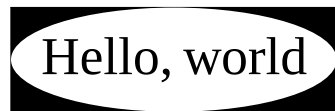
```
45d @Rotate 1.5 @Scale @Box {  
    Hello, world  
}
```



Hello, world

Advanced graphics

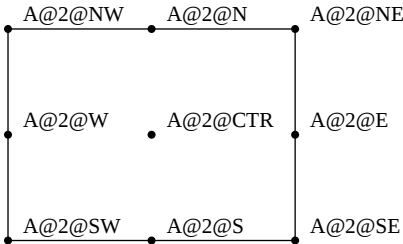
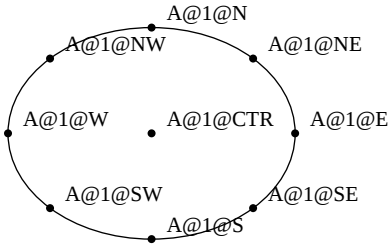
```
@SysInclude { fig }  
...  
@Fig {  
  @Box  
    margin { 0c }  
    paint { black }  
  @Ellipse  
    linestyle { noline }  
    paint { white }  
  { Hello, world }  
}
```



Hello, world

Point labelling

```
@Fig {  
A::  
{  
  1:: @Ellipse { 3c @Wide 2c @High }  
  //3c  
  2:: @Box { 3c @Wide 2c @High }  
}  
@ShowLabels  
}
```



Graphs

@Graph

abovecaption { New South Wales road deaths
(per 100 million vehicle km) }

{

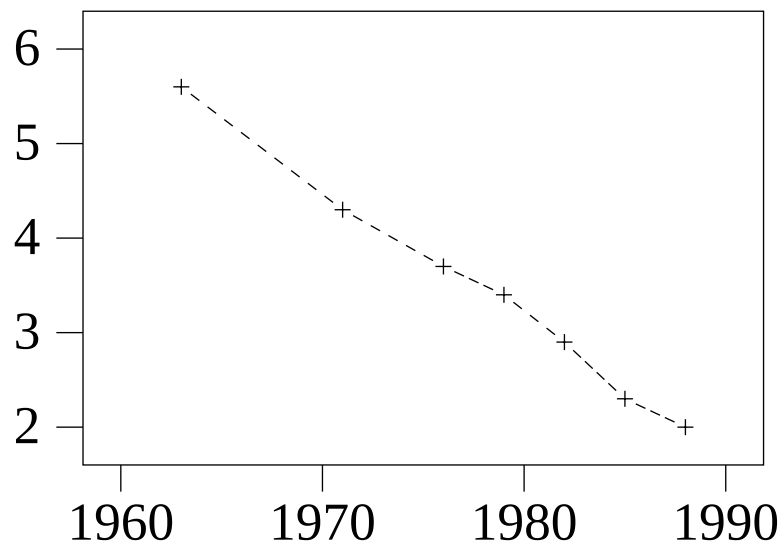
@Data points { plus } pairs { dashed }

{ 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)



```

-2p @Font @Graph
  style { axes }
  xorigin { 0 } yorigin { 0 }
  xticks { 10@ 50@ 100@ 200@ 500@ }
  objects { @NE at { 300 2 } @I { Exponential }
    @SE at { ... } @I { Uniform } }
  belowcaption { @I n }
{
  @Data points { filledcircle } { ... }
  @Data points { filledcircle } { ... }

  @Data pairs { dashed }
  { 10 2 500 2 }

  @Data pairs { dashed }
  {
    xloop from { 10 } to { 500 } by { 20 } do
    {
      x sqrt { pi*x / 4 } + 1
    }
  }
}

```

