

# Typesetting algorithms in L<sup>A</sup>T<sub>E</sub>X

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László Babai

I don't use any packages for typesetting pseudocode. The “tabbing” environment seems perfectly adequate for the type of simple pseudocodes that we need in this class. (This is just my personal preference, please use whatever works best for you.)

As an illustration, here is the “first algorithm” from the “Binary Search” handout.

BinarySearch( $A, a, b, x$ )

INPUT:  $a, b$  integers,  $A[a..b]$  array of real numbers,  $x$  real number.

```
00  if  $b < a$  then return NIL, exit    (list empty)
01   $\ell := a, u := b$  (initializing lower and upper limits of current range)
02  while  $\ell < u$ 
03       $p := \lfloor (\ell + u)/2 \rfloor$     (pivot)
04      if  $x \leq A[p]$  then  $u := p$ 
05          else  $\ell := p + 1$ 
06  end(while)
07  if  $x = A[\ell]$  then return  $\ell$ , exit    (item found)
08  return NIL, exit    (item not found)
```

On the next page I give the L<sup>A</sup>T<sub>E</sub>X source code that produces this output. No packages other than *amsmath* and *amssymb* are used. The code uses boldface instructions like **if**, **while**, etc. These are defined as macros in the preamble.

```

\documentclass[12pt]{article}
\usepackage{amsmath,amssymb}

\begin{document}
%% begin macros

\def\bfor{\textbf{for}}
\def\bdo{\textbf{do}}
\def\bwhile{\textbf{while}}
\def\bend{\textbf{end}}
\def\bif{\textbf{if}}
\def\bthen{\textbf{then}}
\def\belse{\textbf{else}}
\def\breturn{\textbf{return}}
\def\bexit{\textbf{exit}}
\def\bprint{\textbf{print}}

%% end macros
%% begin pseudocode

\begin{tabbing}
mmm\= mm\= mm\= mm\= mm\= \kill
00 \> \bif\ $b<a$ \bthen\ \breturn\ NIL, \bexit\ \quad (list empty) \\
01 \> $\ell:=a,$ $u:=b$ (initializing lower and upper limits of
      current range) \\
02 \> \bwhile\ $\ell<u$ \\
03 \> \> $p:=\lfloor (\ell+u)/2\rceil$ (pivot) \\
04 \> \> \bif\ $x\le A[p]$ \bthen\ $u:=p$ \\
05 \> \> \> \belse\ $\ell:=p+1$ \\
06 \> \bend(\bwhile) \\
07 \> \bif\ $x=A[\ell]$ \bthen\ \breturn\ $\ell$, \bexit\ \quad
      (item found) \\
08 \> \breturn\ NIL, \bexit\ \quad (item not found) \\
\end{tabbing}

%% end pseudocode
\end{document}

```