As one grows in the art of computer programming, one constructs programs in a sequence of refinement steps. At each step the programmer breaks his task into a number of subtasks, thereby defining a number of partial programs. Although it is possible to camouflage this structure, this is undesirable. The concept of the procedure (or subroutine) allows the display of the subtasks as explicit subprograms.

A. Procedures

The procedure declaration serves to define a program part and to associate it with an identifier, so that it can be activated by a procedure statement. The declaration has the same form as a program, except it is introduced by a procedure heading instead of a program heading.

Recall the program part that found the minimum and maximum values in a list of integers. As an extension, say that increments of \( j_1 \ldots j_n \) are added to \( a[1]\ldots a[n] \), then min and max are again computed. The resulting program, which employs a procedure to determine min and max, follows.
program minmax2(input,output);

const n = 20;
var a : array[1..n] of integer;
i,j : integer;

procedure minmax:
var i : 1..n; u,v,min,max :integer;
begin
  min := a[1]; max := min; i := 2;
  while i<n do
    begin
      u := a[i]; v := a[i+1];
      if u>v then
        begin
          if u>max then max := u;
          if v<min then min := v
        end else
        begin
          if v>max then max := v;
          if u<min then min := u
        end;
      i := i+2
    end;
  if i=n then
    begin
      if a[n]>max then max := a[n]
      else if a[n]<min then min := a[n];
      writeln(min,max);
    end;
end;

begin [read array]
  for i := 1 to n do
    begin
      read(a[i]); write(a[i]:3)
    end;
end;

Although simple, this program illustrates many points:

1. The simplest form of the PROCEDURE HEADING, namely:

  procedure <identifier>;