RUN-TIME ENVIRONMENTS - SOURCE LANGUAGE ISSUES

Procedures:

A procedure definition is a declaration that associates an identifier with a statement. The identifier is the procedure name, and the statement is the procedure body. For example, the following is the definition of procedure named read array:

```
1. procedure read array; vari : integer;
2. begin
                for i : = 1 to 9 do read(a[i])
        end;
```

When a procedure name appears within an executable statement, the procedure is said to be called at that point.

Activation trees:

An activation tree is used to depict the way control enters and leaves activations. In an activation tree,

3. Each node represents an activation of aprocedure.
4. The root represents the activation of themain program.
5. The node for a is the parent of the node for b if and only if control flows from activation a to b.
6. The node for a is to the left of the node for b if and only if the lifetime of aoccurs before the lifetime ofb.

Control stack:

A control stack is used to keep track of live procedure activations. The idea is to push the node for an activation onto the control stack as the activation begins and to pop the node when the activation ends. The contents of the control stack are related to paths to the root of the activation tree. When node n is at the top of control stack, the

stack contains the nodes along the path from n to the root.

The Scope of a Declaration:

A declaration is a syntactic construct that associates information with a n Declarations may be explicit, such as:

vari : integer ;

or they may be implicit. Example, any variable name starting with I is as summed to denote an integer. The portion of the program to which a declaration applies is called the scope of that declaration.

Binding of names:

Even if each name is declared once in a program, the same name may denote different data objects at run time. “Data object” corresponds to a storage location that holds values. The term environment refers to a function that maps a name to a storage location. The term state refers to a function that maps a storage location to the value held there. When an environment associates storage location s with a name x, we say that x is bound to s. This association is referred to as a binding of x.

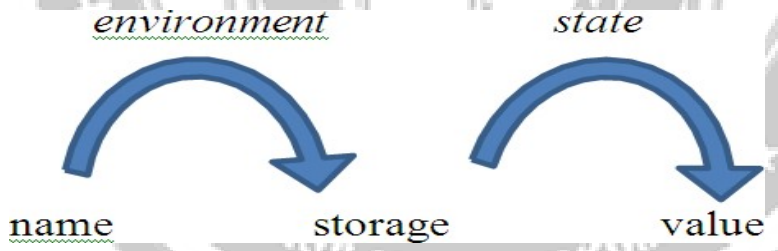

Fig. 2.8 Two-stage mapping from names to values