SNS COLLEGE OF TECHNOLOGY

(Autonomous)

COIMBATORE-35

Runtime Environment –Source Language Issues

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- **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 :
- procedure read array; var i : integer;
- 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.

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- **Activation trees:**
- An activation tree is used to depict the way control enters and leaves activations. In an activation tree,
- 1. Each node represents an activation of a procedure.
- 2. The root represents the activation of the main program.
- 3. The node for a is the parent of the node for b if and only if control flows from activation a to b.
- 4. The node for a is to the left of the node for b if and only if the lifetime of a occurs before the lifetime of b.

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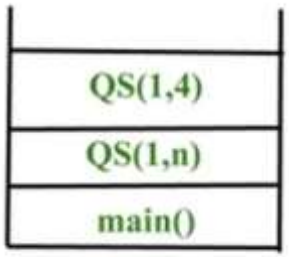
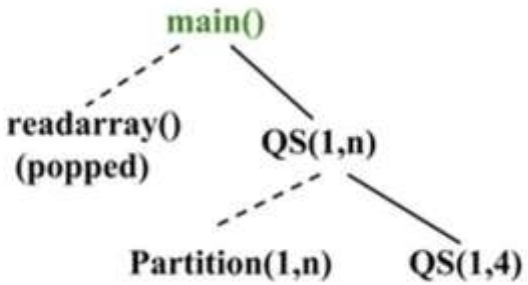
Control stack

- 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.





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- **The Scope of a Declaration:**
- A declaration is a syntactic construct that associates information with a n Declarations may be explicit, such as:
- var i : integer ;
- or they may be implicit. Example, any variable name starting with I is assumed 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.

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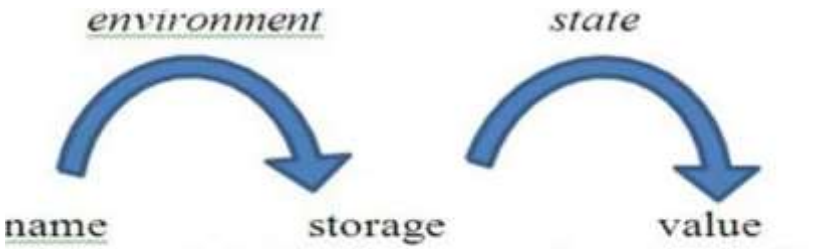
- "Data object" corresponds to a storage location that holds values. The term environment refers to a function that maps a name to a storage location.
- The term state refers to a function that maps a storage location to the value held there. When an environment associates storage location s with a name x, we say that x is bound to s. This association is referred to as a binding of x.



Two-stage mapping from names to values

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Binding Example

C assignment statement

```
count = count + 5;
```

Examples of binding

Binding	Time
Type of `count`	Compile time
Set of possible values of `count`	Compiler design time
Meaning of operator symbol +	Compile time
Internal representation of 5	Compiler design time
Value of `count`	Execution time

Summarization