Structure Chart

Modules

Function
Returns A Value

Procedure
Does Not Returns A Value

Difference Between By Value And By Reference Parameter

By Value : The Copy of the variable is passed
By Reference : Variable Itself is passed

By Value (Photocopy Method)

- Imagine you have an important document (your variable).
- Someone asks for it, but instead of giving them the original, you make a photocopy and hand it over.
- Now, they can edit, write, or even tear up the photocopy, but your original document remains unchanged.
- This is how pass-by-value works: a copy of the variable is passed, and any changes made do not affect the original.

By Reference (Original Document Method)

- Now, imagine you give someone the original document instead of a photocopy.
- If they make any changes—highlighting, erasing, or writing on it—your original document is directly affected.
- This is how pass-by-reference works: you pass the actual variable, and changes affect the original value.

Structure Chart

Structure Chart helps to understand the complex program and helps to identify the relation between modules

| Symbol	Explanation
○──→	Value passed between modules
●──→	Boolean value passed between modules
◇	Selection statement
↻↺	Repetition
←─○─→	By reference (value changed)
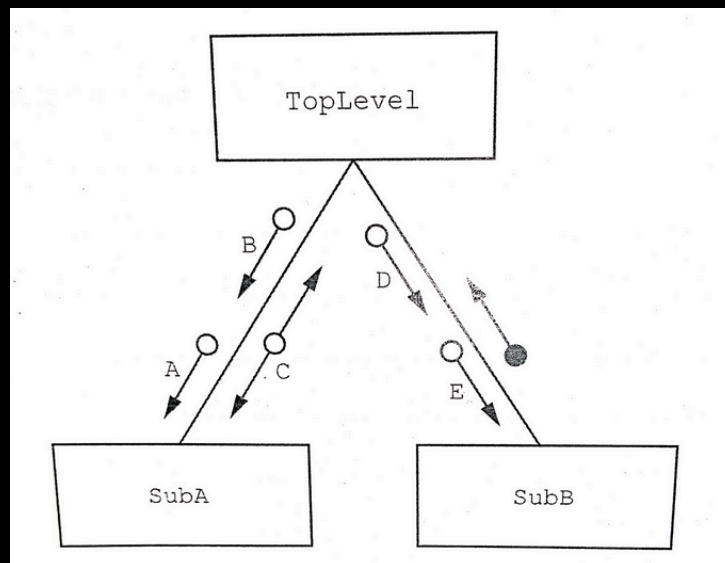
2 (a) Three modules form part of a program for a car rental company. A description of the relationship between the modules is summarised as follows:

Module name	Description
RentCar()	A customer will pay for each car rental either by bank card or by using their account with the rental company.
PayByCard()	Called with parameter HireCost, representing the cost of the rental. Returns a BOOLEAN value to indicate whether or not the card payment was successful.
PayByAccount()	Called with parameters HireCost, AccountNumber, CurrentBalance and AccountLimit. • Checks whether HireCost plus the CurrentBalance would exceed the AccountLimit. If so, then the rental is not authorised. • If the rental is authorised, then the CurrentBalance is updated. • Returns a BOOLEAN value to indicate whether or not the rental was authorised.

Draw a structure chart to show the relationship between the **three** modules and the parameters passed between them.

Solution
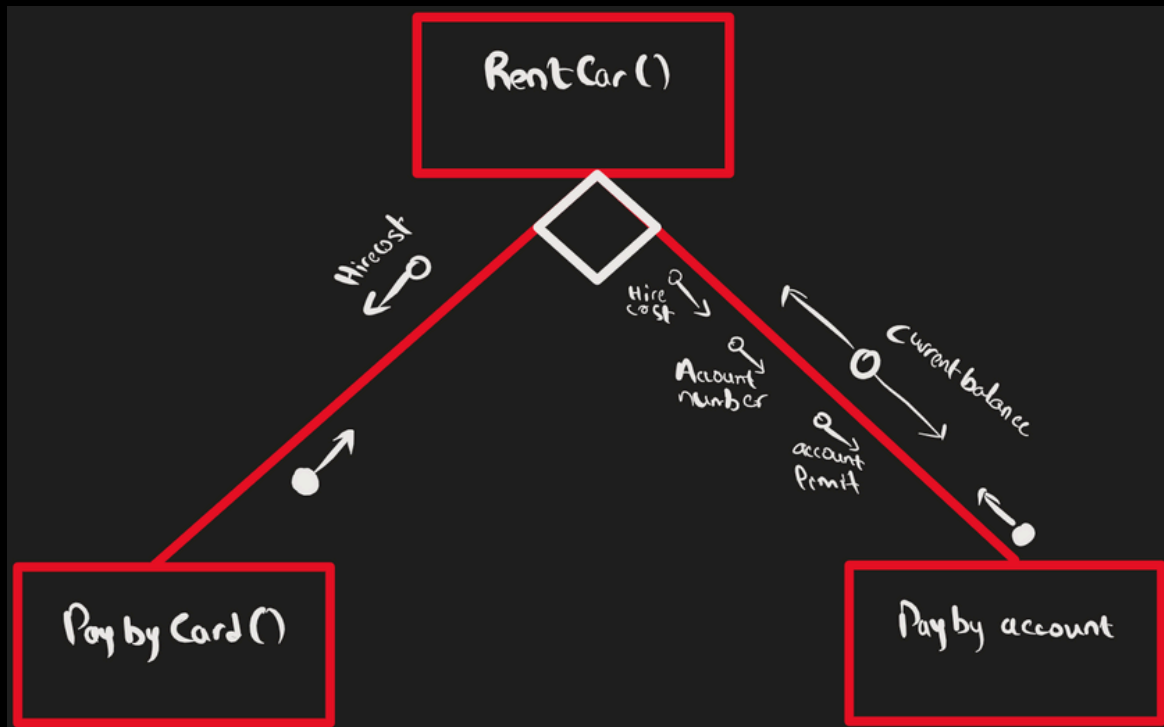
Practice Question

**5** The module headers for three modules in a program are defined in pseudocode as follows:

Pseudocode module header
PROCEDURE Lookup(P4 : INTEGER, BYREF M4 : STRING)
FUNCTION Update(T4 : INTEGER) RETURNS INTEGER
FUNCTION Validate(S2 : INTEGER, P3 : STRING) RETURNS BOOLEAN

A fourth module, `Renew()`, calls the three modules in the following sequence.
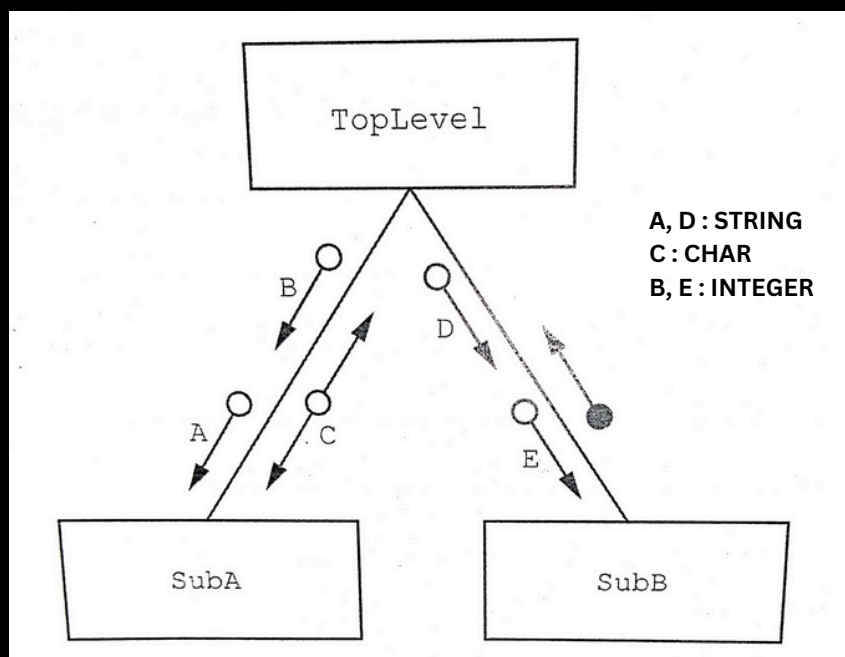
```
Validate()
Lookup()
Update()
```

Draw a structure chart to show the relationship between the four modules and the parameters passed between them.

Writing Modules Header
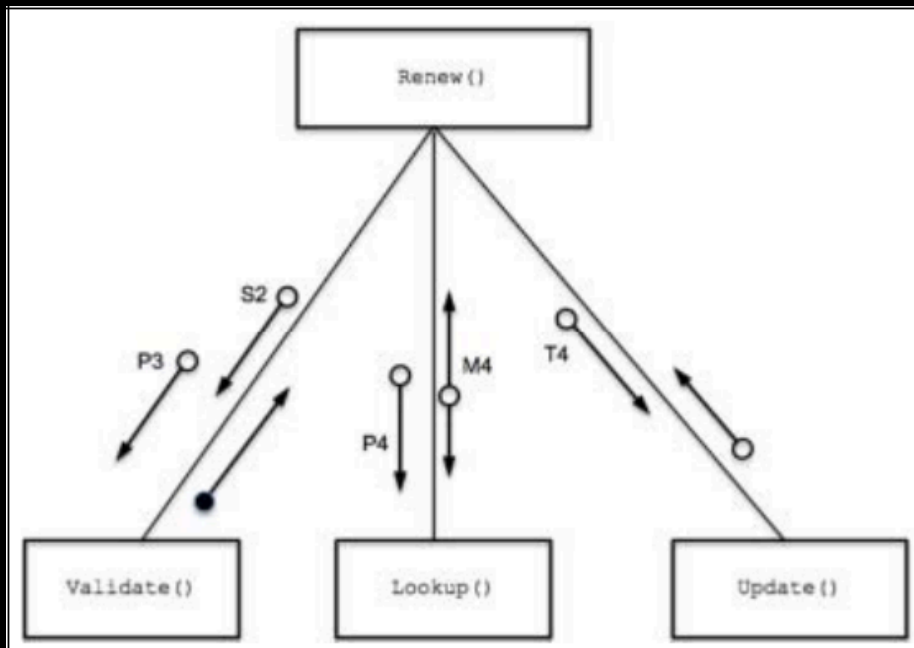
A, D : STRING
C : CHAR
B, E : INTEGER

FUNCTION SubB (D : STRING , E : INTEGRER) RETURNS BOOLEAN

PROCEDURE SubA (A : STRING , B : INTEGER, BY REF C : CHAR)

Features of Structure Chart

- **Hierarchy Of Module**
- **Iteration**
- **Selection**
- **The Parameter that are passed between modules**