

Past Papers Questions:

3.5 Programming Paradigms

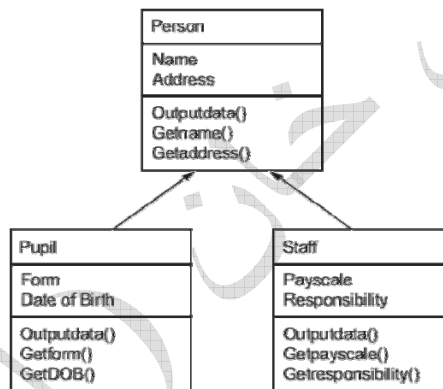
May/June 2003

- 5 (a) Describe three characteristics of an object-orientated approach to problem solving. [6]
(b) In object-orientated programming, state what is meant by [3]
(i) class,
(ii) subclass,
(iii) superclass.

October / November 2003

- 4 (a) Explain the importance of storing return addresses when procedures are called by a program. [2]
(b) (i) State a suitable data structure for storing return addresses. [1]
(ii) State why your suggested data structure is a sensible choice. [3]
(iii) Describe other data that it would be necessary for the stack to hold. [2]

8 In a particular object oriented programming language, the following classes are defined.



With reference to the diagram explain the terms:

- (i) Data encapsulation
(ii) Inheritance [4]

May/June 2004

7 VARIABLE NAME is defined in a particular language as an alphabetic character which may be followed by two digits or another alphabetic character.

Given that, in Backus-Naur Form (BNF), an alphabetic character is called an ALPHA and is defined as

$\langle \text{ALPHA} \rangle ::= \text{A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z}$
and a digit is defined as
 $\langle \text{DIGIT} \rangle ::= \text{0|1|2|3|4|5|6|7|8|9}$

(a) Use BNF and the above definitions (that do not need to be written out again), to define $\langle \text{VARIABLE NAME} \rangle$ [4]

(b) The definition of a variable name is altered.

A variable name is now defined as either

- an alpha followed by two digits, where the first digit must not be zero,
- OR
- an unlimited set of alpha characters.

Write new rules in BNF that will define the new $\langle \text{VARIABLE NAME} \rangle$. [4]



October/November 2004

7 (a) Explain what is meant by the following terms

- (i) local variables;
- (ii) global variables;
- (iii) parameters.

[3]

(b) Explain the difference between passing a parameter by value and by reference.

[5]

(c) Explain how a stack is used to control the following example.

A main program is run.

The instruction at address 100 calls a procedure with a parameter of value 6.

Within this procedure, at address 300, there is a call to another procedure. This second procedure is called with two parameters, 2 and 3.

(You are advised to use diagrams of a stack to illustrate your answer).

[6]

May/June 2005

8 Sto, Dis, May, David, Minah, John are all members of one family.

The following facts apply:

- female(sto).
- female(may).
- female(minah).
- male(john).
- male(dis).
- male(david).
- parent(john,dis).
- parent(john,may).
- parent(dis,sto).
- parent(dis,david).
- parent(minah,dis).
- parent(minah,may).

where male(X).states that X is male

female(X).states that X is female

parent(X,Y).states that X is a parent of Y

mother(X,Y):-parent(X,Y),female(X).states that X is mother of Y if X is parent of Y and X is female.

(a) By using examples from the facts given, explain what is meant by

- (i) instantiation.
- (ii) a goal.
- (iii) backtracking.

[6]

(b) A new rule states

grandparent (X,Y):-parent(X,Z),parent(Z,Y).

(i) Write down a rule to define grandmother.

[2]

(ii) Explain how this new rule is used to find the grandmother of david.

[2]

October/November 2005

- 2 (a) Explain what is meant by each of the following types of addressing of memory.
- (i) Indirect addressing. [3]
 - (ii) Indexed addressing. [3]
- (b) Explain under what circumstances
- (i) indirect addressing,
 - (ii) indexed addressing
- are useful in low level language processing. [4]

May/June 2006

- 6 (a) Describe each of the following programming paradigms
- (i) Object-oriented, [2]
 - (ii) Declarative. [2]
- (b) Explain the meaning of the following types of addressing
- (i) Indirect,
 - (ii) Indexed.
- Give a reason why each may need to be used. [6]

October/November 2006

- 10 (a) Explain how the use of procedures and functions can assist a programming team when a piece of software is being developed. [4]
- (b) State what is meant by each of the following:
- (i) a local variable;
 - (ii) a global variable;
 - (iii) a parameter passed by value;
 - (iv) a parameter passed by reference. [4]
- (c) Explain how a stack is used to handle procedure calling and parameter passing. [4]

May/June 2007

- 6 A name is passed as a parameter to a function.
The function uses a loop structure to search for the name in an array.
It returns the details found to the calling program.
- (a) The name to be searched can be passed either
- (i) by value, or
 - (ii) by reference.
- Using this example, explain what is meant by a parameter being passed by value and by reference. [2]
- (b) Using examples from this function, explain what is meant by a
- (i) local variable,
 - (ii) global variable. [4]
- 10 A variable name is defined in a particular system as:
- one or two letters, followed by
 - any number of digits(including zero) followed by either a
 - o \$ sign if there are no digits,
 - o & sign if there are any digits.
- Draw a syntax diagram which describes a variable name. [6]



October/November 2007

- 11 (a) Describe the characteristics of
- (i) a procedural programming language, [2]
 - (ii) a declarative programming language. [2]
- (b) Explain what is meant by the following terms when referring to object-oriented languages:
- (i) Data encapsulation, [2]
 - (ii) Inheritance. [2]

May/June 2008

10 The following fish are all part of the same food chain
guppy, herring, roach, salmon, shrimp.

The following facts apply:

- fresh(guppy)
- fresh(roach)
- salt(shrimp)
- salt(herring)
- salt(salmon)
- eats(herring, shrimp)
- eats(salmon, herring)
- eats(guppy, roach)
- eats(salmon, roach)

Where fresh(x) states that x is a fresh water fish
salt(x) states that x is a salt water fish
eats(x, y) states that x eats y

By using examples from the facts given, explain what is meant by

- (i) instantiation, [2]
- (ii) a goal, [2]
- (iii) backtracking. [4]