UNIVERSITI SAINS MALAYSIA

First Semester Examination
2004/2005 Academic Session
October 2004

External Degree Programme
Bachelor of Computer Science (Hons.)

CPT211 - Programming Language Concepts and Paradigms

Duration : 2 hours

INSTRUCTIONS TO CANDIDATES:

- Please ensure that this examination paper contains **FOUR** questions in **SEVEN** printed pages before you start the examination.

- Answer **ALL** questions.

- On each page, write *only your Index Number.*

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1. (a) "A language that has a large number of basic components is more difficult to learn compare to the one with a small number of basic components."

    Discuss the above problem in terms of writeability by a programmer and program verification.

    (6 marks)

    (b) (i) Give **two (2)** reasons why coercion is required in a programming language.

         (ii) Explain the disadvantages of dynamic type checking in terms of programs that are difficult to debug and the utilisation of storage.

         (8 marks)

    (c) A possible additional language design principle is learnability, that is, the ability of programmers to learn to use the language quickly and effectively.

         (i) Describe a situation in which learnability is an important requirement for a programming language.

         (ii) Describe **two (2)** ways in which language designer can improve learnability of the language.

         (6 marks)

    (d) In LISP, the following unparenthesized prefix expression is ambiguous:

         + 5 * 4 5 6

         (i) State the reasons why the above expression is ambiguous.

         (ii) Give **two (2)** possible parenthesized interpretations of the above expression.

         (5 marks)

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2. (a) Given the following program segment:

```
switch (afundi) {
    case 1:  cout << "Linda Menang" << endl;
    case 2: count << "Zahid Menang" << endl;
    case 3:
    case 4: count << "Siapa Ya..." << endl;
    case 5: count << "Mas!! Berusaha bersungguh" << endl;
    default: cout << "Selamat Berjaya.....".<<end;
}
```

Explain the problem that exists in the above program segment. Give a solution to the problem.

(4 marks)

(b) Describe **two (2)** problems of unconditional branching.

(2 marks)

(c) Give BNF rules/grammar for accepting the following expressions:

```
z
(x)
[(x)],y]
[(x),[y,x]]
```

(7 marks)

(d) (i) Describe with example the functional side effect on parameters and global variables.

(ii) Given the following program:

```
int x;
int tiger (int *i,int *j)
   {
   *i = *i * 5;
   *i = *i  + *j ;
   return (x);
   }

void fish()
   {
   int y = 10;
   x = tiger(&x,&y)+ bird(&y);
   }
```

```
int bird(int *k)
{
    return (x - *k);
}

main()
{
  x = 3;
  int y = 4;
  fish() ;
  x = x + y ;
  cout << x << endl;
}
```

Give a value of x in main() and explain how you arrive at the answer if:

• tiger function is evaluated first

• bird function is evaluated first

(8 marks)

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(e) Briefly explain **two (2)** advantages of the scripting language Javascript in terms of:

- Immediate response and interactivity improvement

- Server workload reduction

(4 marks)

3. (a) Give **two (2)** differences between dynamic scoping and static scoping with respect to program performance and program reliability.

(4 marks)

(b) (i) Briefly explain how parameter passing by reference is better than parameter passing by value in terms of utilisation of storage.

(ii) Given the following Pascal program:

```
program epal;
var i:integer;
    a: array [1..2] of integer;

procedure lime(x,y: integer;);
begin
    x := x +1;
    i := i + 1;
    y := y + 1;
end;

begin
    a[1]  := 1;
    a[2]  := 1;
    i := 1;
    lime (a[i],a[i]);
    writeln(a[1]);
    writeln(a[2]);
end.
```

Give the value in the array a[1] and in the array a[2] if the following parameter passing methods are used:

- by reference

- by name

- by value

- by value result

(8 marks)

...5/-

(c) (i) Briefly explain with a diagram the following computer architectures:

- MISD

- MIMD

(ii) State **two (2)** usages of precedence graph for developing a parallel algorithm.

(8 marks)

(d) Briefly explain the Beowulf computer cluster. Give **two (2)** software that are used for message passing.

(5 marks)

4. (a) (i) Briefly describe PERL scripting language with regards to the type of declaration, type of scoping, and type of language implementation (interpretation, hybrid interpretation, compilation). Give examples to support your answer.

(ii) Briefly explain the disadvantages of PERL scripting language implementation compared to C++ programming language.

(7 marks)

(b) (i) The following statements are PERL scripting language:

- /cat\s*tiger/

- /^\d+$/

- /[\d\s]{2,3}/

What does each of the above statements do?

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(ii) Given the following program segment of PERL scripting language:

```
#/!usr/bin/Perl

$in = ' ' ;
@sent = ();
$words = 0;
@misteri=90;

print ' Masukan ayat: ';
chomp ($in = <STDIN>);
print 'Jawapan 1:   ';
print length $in;

@sent = split(' ', $in);
$words = @sent;
print "\n Jawapan 2: $words\n";

@misteri = reverse @sent;
print " Jawapan 3 :   \n";
print "@misteri\n";
```
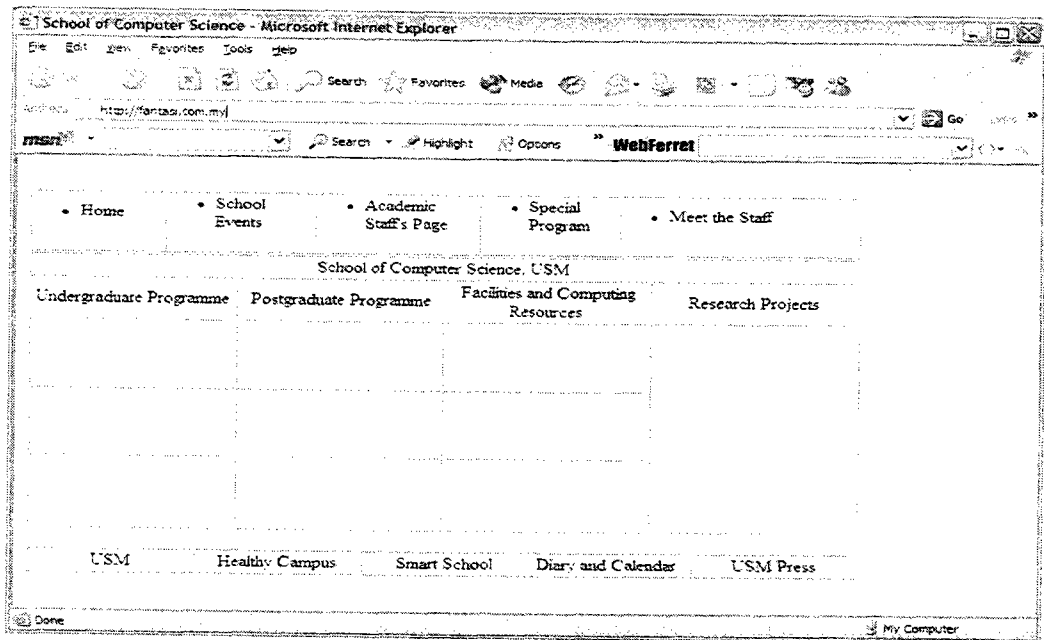
Briefly explain what the above program segment does.

(7 marks)

(c) (i) The average amount of information stored in protein database is doubling every 15 months. This large amount of data present many challenges in biology and also computing in storing and analysing of data. Describe the use of XML for a database in terms of data exchange format and the availability of accessing data compared to another database system such as Oracle and SQL.

(ii) State **two (2)** important reasons of using DTD for storing data so that data can be shared by many applications in a network.

(6 marks)

(d) Write html codes to display the output as shown in the diagram below:

(5 marks)

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