

APCS 程式設計觀念題

C Subset 語言

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前言

大學程式設計先修檢測（簡稱 APCS）分兩部分測驗，其中「程式設計觀念題」以測驗程式運作過程或結果為主，因此必須選定一種程式設計語言為基礎進行命題。考量到參加測驗考生所熟悉程式語言不盡相同，測驗題目若須提供程式片段，將以本文件所提及之 C subset 語法及程式結構呈現。進一步的語法及結構說明可參考：

<http://www.tutorialspoint.com/cprogramming/>
<http://www.cprogramming.com/tutorial/c-tutorial.html>

Basic Data Types

```
char, int, long, float, double,  
string (via 1-D char array)
```

Complex Data Types/Structures arrays

```
type arrayName [ arraySize ];
```

structures

```
struct [structure tag] {  
    member definition;  
    ...  
    member definition;  
} [one or more structure variables];
```

pointers

```
type *var-name;
```

Operators

Logical Operators

Op.	Description	Example
!	The result is the opposite of the operand	!(x <= y)
&&	True if both operands are True	(x > 7) && (y < 12)
	False if both operands are False	(x != y) (y == 10)

Arithmetic Operators

Assume x is 2 in the following examples.

Operator	Description	Example	Example Result
()	Brackets		
-	Negation	y = -x	(-2) is -2
*	Multiplication	y = x * 3	(2 * 3) is 6
/	Division	y = 7 / x	(7 / 2) is 3
+	Addition	y = x + 3	(2 + 3) is 5
-	Subtraction	y = x - 3	(2 - 3) is -1
%	modulo	(x+x) % 3	(2+2) % 3 is 1
trunc	truncation	trunc(x/4)	trunc(2/4) is 0
rint	round	rint(x/4)	rint(2/4) is 1
floor	round down	floor(x/4)	floor(3/4) is 0
ceil	round up	ceil(x/4)	ceiling(1/5) is 1
pow	power	pow(2.0, 3.0)	2 ³ is 8

Comparison Operators

Assume x is 2 and y is 3 in the following examples.

Operator	Description	Example	Example Result
==	Equal	x == y	(2 == 3) is False
!=	Not Equal	x != y	(2 ≠ 3) is True
<	Less Than	x < y	(2 < 3) is True
<=	Less Than or Equal To	x <= y	(2 ≤ 3) is True
>	Greater Than	x > y	(2 > 3) is False
>=	Greater Than or Equal To	x >= y	(2 ≥ 3) is False

Precedence Rule

1	()	
2	-, !	negation, logical NOT
3	*, /, %, trunc, rint, floor, ceil, pow	
4	+, -	addition, subtraction
5	<, <=, >, >=	
6	!=, ==	
7	&&	logical AND
8		logical OR

Sequential Statements

Assignment

Format

```
variable = expression ;
```

Input

Format

```
scanf ( ... );
```

Type specifier

c, d, f, o, s, u, x

Display

Format

```
printf ( ... );
```

Type specifier

c, d, f, o, s, u, x

Selection Statements

Format

```
if (boolean_expression) {  
    statement(s);  
}
```

```
if (boolean_expression) {  
    statement(s);  
}  
else {
```

```
    statement(s);  
}
```

```
if (boolean_expression) {  
    statement(s);  
}  
else if {  
    statement(s);  
}  
. . .  
/* can have any number of else-if */  
else if {  
    statement(s);  
}  
else {  
    statement(s);  
}
```

Note: the Else part is optional. Use only when necessary.

```
switch(expression) {  
    case constant-expression :  
        statement(s);  
        break; /* optional */  
    case constant-expression :  
        statement(s);  
        break; /* optional */  
    . . .  
    /* can have any number of case statements */  
    default : /* Optional */  
        statement(s);  
}
```

Iteration (Repetition) Statements

Format

```
for ( init; condition; increment ) {  
    statement(s);  
}
```

```
while (condition) {  
    statement(s);  
}
```

```
do {  
    statement(s);  
} while ( condition );
```

Subprograms

Format - subroutine calls

```
return_type function_name ( parameter list ) {  
    body of the function  
}
```

Commenting

```
/* Anything in between */  
// Anything behind "///" on a single line
```

Miscellaneous

```
#define alias_name value/expression
```

Used to define aliases for various data types or values

```
typedef
```

Used to give a data type a new name.

C online references

1. <http://www.tutorialspoint.com/cprogramming/>
2. <http://www.cprogramming.com/tutorial/c-tutorial.html>
3. <http://www.learn-c.org>

Ver. 1.1 February 2, 2017