STRUCTS REFERENCES

Problem Solving with Computers-I





References in C++

```
int main() {
  int d = 5;
  int &e = d;
}
```

A reference in C++ is an alias for another variable

References in C++

```
int main() {
  int d = 5;
                     How does the diagram change with this code?
  int & e = d;
  int f = 10;
  e = f;
                                  D. Other or error
```

Pointers and references: Draw the diagram for this code

```
int a = 5;
int & b = a;
int* pt1 = &a;
```

Call by reference: Modify to correctly swap a and b

```
void swapValue(int x, int y){
     int tmp = x;
     x = y;
     y = tmp;
int main() {
    int a=30, b=40;
    swapValue(a, b);
    cout<<a<<" "<<b<<endl:
```

Call by reference: Modify to correctly swap a and b

```
void swapValue(int&x, int&y){
     int tmp = x;
    x = y;
     y = tmp;
int main() {
    int a=30, b=40;
    swapValue(a, b);
    cout<<a<<" "<<b<<endl:
```

C++ structures (lab05)

A struct is a data structure composed of simpler data types.

```
struct Point {
    double x; //member variable of Point
    double y; //member variable of Point
};
```

Think of Point as a new data type

C++ structures (lab05)

• A **struct** is a data structure composed of simpler data types.

```
struct Point {
    double x; //member variable of Point
    double y; //member variable of Point
};
```

• Access the member variables of p1 using the dot '.' operator

```
Point p1;
p1.x = 5;
p1.y = 10;
```

Access via a pointer using the -> operator

```
Point* q = &p1;
(*q).x = 5;
(*q).y = 10;
```

Which of the following is/are incorrect statement(s) in C++?

```
struct Box {
 struct Point {
                            Point ul; // upper left cor
    double x;
                           double width;
    double y;
                           double height;
                     };
A.ul.x = 10;
B. Box b1 = \{\{500, 800\}, 10, 20\};
C. Box b1, b2; b1.ul = \{500, 800\};
```

E. None of the above are incorrect

D. A and C

Passing structs to functions

• Write a function that prints the x and y coordinates of a Point

Passing structs to functions by reference

• Write a function that takes a Point as parameter and initializes its x and y coordinates

Pointer Arithmetic Question

How many of the following are invalid?

```
I. pointer + integer (ptr+1)
```

II. integer + pointer (1+ptr)

III. pointer + pointer (ptr + ptr)

IV. pointer – integer (ptr – 1)

V. integer – pointer (1 - ptr)

VI. pointer – pointer (ptr – ptr)

VII. compare pointer to pointer (ptr == ptr)

VIII. compare pointer to integer (1 == ptr)

IX. compare pointer to 0 (ptr == 0)

X. compare pointer to NULL (ptr == NULL)

#invalid

A: 1

B: 2

D. 4

E: 5

Pointer Arithmetic Question

How many of the following are invalid?

```
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```

II. integer + pointer (1+ptr)

III. pointer + pointer (ptr + ptr)

IV. pointer – integer (ptr – 1)

V. integer – pointer (1 – ptr)

VI. pointer – pointer (ptr – ptr)

VII. compare pointer to pointer (ptr == ptr)

VIII. compare pointer to integer (1 == ptr)

IX. compare pointer to 0 (ptr == 0)

X. compare pointer to NULL (ptr == NULL)

#invalid A: 1 B: 2

C: 3 D: 4

E: 5