SCHOOL OF COMPUTER SCIENCES
UNIVERSITI SAINS MALAYSIA
Semester I Session 2024/2025

CPT111 – Principles of Programming
Week 14 Tutorial
Pointers (Part I)

Learning Outcomes:

- Describe pointer variables
- Explain pointers in arrays
- Demonstrate pointer arithmetic
- Demonstrate pointers as function parameters

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1. Describe in C++ statement that displays the address of the variable `count`.

2. Describe in C++ the definition statement for a variable `fltPtr`. The variable should be a pointer to a `float`.

3. Given the following code.

```
int x = 7;
int *iptr = &x;
```

   Show what will be displayed if you send the expression `*iptr` to `cout`.
   Explain what happens if you send the expression `ptr` to `cout`.

4. Explain how indirection operator * works using pointer variable `ptr` and integer variable `x`.

5. Show the output of the following code.

```
int x = 50, y = 60, z = 70;
int *ptr = nullptr;
cout << x << " " << y << " " << z << endl;
ptr = &x;
*ptr *= 10;
ptr = &y;
*ptr *= 5;
ptr = &z;
*ptr *= 2;
cout << x << " " << y << " " << z << endl;
```

6. Modify the following loop so it uses pointer notation (with the indirection operator) instead of subscript notation.

```
for (int x = 0; x < 100; x++)
      cout << arr[x] << endl;
```

7. Assume `ptr` is a pointer to an `int` and holds the address 1000. On a system with 4-byte integers, state the address that will be in `ptr` after the following statement.

```
ptr += 10;
```

8. Assume `pint` is a pointer variable. State whether each of the following statements valid or invalid. If any is invalid, explain the reason.

```
A) pint++;
B) --pint;
C) pint /= 2;
D) pint *= 4;
E) pint += x; // Assume x is an int.
```

9. State whether each of the following definitions is valid or invalid. If any of them are invalid, explain the reason.

A)
```
int ivar;
int *iptr = &ivar;
```
B)
```
int ivar, *iptr = &ivar;
```
C)
```
float fvar; int *iptr = &fvar;
```
D)
```
int nums[50], *iptr = nums;
```
E)
```
int *iptr = &ivar;
int ivar;
```

10. Given the following array definition.

```
int numbers[] = {2, 4, 6, 8, 10};
```

Show what the following statement will display.

```
cout << *(numbers + 3) << endl;
```

11. The following function uses reference variables as parameters. Modify the function so that it uses pointers instead of reference variable, then demonstrate the function in a complete program.

```
// The doSomething function
int doSomething(int &x, int &y)
{
   int temp = x;
   x = y * 10;
   y = temp * 10;
   return x + y;
}
```

12. What is the output of the following program?

```
#include <iostream>
using namespace std;

int main() {
    int x = 10, y = 20;

    const int* ptr1 = &x;
    *ptr1 = 15;
    ptr1 = &y;
    int* const ptr2 = &x;
    *ptr2 = 15;
    ptr2 = &y;

    cout << "Pointer to constant: " << *ptr1 << endl;
    cout << "Constant pointer: " << *ptr2 << endl;

    return 0;
}
```

13. Fill in the blank to declare a constant pointer to constant data.

```
int a = 5;
____  int* const p = &a;
```