CMPSC 122 Lab 3 Report (revised Mar 30, 2014)

Code

// Programmer: Yizhou Wang

// Section: 2

// Lab: 3

// Date: Jan 29, 2014

// Description: A program of pointer exercise

#include <iostream>

using namespace std;

int main ()

{

//DATA DICTIONARY

double x; //a double varialbe named x

double y; //a double varialbe name y

double \*p1; //a pointer named p1

double \*p2; //a pointer named p2

//STEP 1

p1 = &x; //the first pointer points to the first

// double variable x

\*p1 = 1.25; //the pointee x is initialized

// to the value of 1.25

cout << "step 1" << "\n";

cout << "value of p1 is " << p1 << "\n";

cout << "value of p1's pointee is " << \*p1 << "\n";

cout << "x is "<< x << "\n\n";

//STEP 2

y = 2.5; //initialize second double variable y to 2.5

p1 = &y; //the first pointer points to the variable

// 2 now

cout << "step 2" << "\n";

cout << "value of p1 after is " << p1 << "\n";

cout << "value of p1's pointee is " << \*p1 << "\n";

cout << "y is "<< y << "\n\n";

//STEP 3

p2 = new double; //make the second pointer point to a

// different unnamed location in memory

\*p2 = 10; //make the value of the second pointer's

// pointee 10

cout << "step 3" << "\n";

cout << "value of p2 after is " << p2 << "\n";

cout << "value of p1's pointee is " << \*p2 << "\n";

cout << "x is "<< x << "\n";

cout << "y is "<< y << "\n\n";

//STEP 4

delete p2; //delete p2's pointee

p2 = new double; //make the second pointer point to another

// different unamed location in memory

\*p2 = 2 \* (\*p1); //make the pointee of the second pointer to

// the value twice of the pointee of the

// first pointer

cout << "step 4" << "\n";

cout << "value of p2 is " << p2 << "\n";

cout << "value of p2's pointee is " << \*p2 << "\n";

cout << "x is " << x << "\n";

cout << "y is " << y << "\n\n";

//STEP 5

cout << "product of p1 and p2 is " << (\*p1) \* (\*p2) << "\n";

return 0;

}

Sample Runs

step 1

value of p1 is 0x28fed0

value of p1's pointee is 1.25

x is 1.25

step 2

value of p1 after is 0x28fec8

value of p1's pointee is 2.5

y is 2.5

step 3

value of p2 after is 0x5b2eb0

value of p1's pointee is 10

x is 1.25

y is 2.5

step 4

value of p2 is 0x5b2eb0

value of p2's pointee is 5

x is 1.25

y is 2.5

product of p1 and p2 is 12.5

Discussion

Pointer is a way to manipulate data by its location in the memory. It stores the pointee’s address.

By using “\*”, the pointer can reference to the pointee’s value. By using “&”, the pointee can dereference the pointer’s value, which is the address of the pointee.

If we delete a pointer, the pointee that it points to will be destroyed and the location of memory is recycled. But if we point the pointer to somewhere else, then the previous memory location can no longer be accessed. In step 4, we point p2 to a new location in memory. Thus, the previous location stored by p2 is lost, and this pointee 10 in step 3 can never be accessed. This is memory leak.

It is good manner to delete a pointer to prevent memory leak.