Spring 2024, MIS 102 – COMPUTER PROGRAMMING

Quiz 5

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1. [60 pts]

1. Pointers are variables that contain __________ as their values.

a) strings
b) null values
c) directions
d) memory addresses

ANS: (d)

2. Suppose we have an integer array:
int array[8] = { 2, 3, 5, 8, 9, 11, 14, 15 };
The first element is located at 0x0100 in main memory, and an integer requires 4 bytes to store.
array[3] = ________
array[3] + 3 = ________
array + 3 = ________
&*(array + 3) = ________

(a) 8, 0x0112, 11, 11 .
(b) 0x0012, 0x0124, 8, 8.
(c) 8, 11, 0x0112, 0x0112.
(d) 0x0012, 11, 0x0024, 11.

Ans: (c)

3. const int *ptr;
The above code means data value is _________ and address is ___________.

(a) modifiable, modifiable
(b) not modifiable, modifiable
(c) modifiable, not modifiable
(d) not modifiable, not modifiable

Ans: (b)

4. Let’s say there is a float array, **float f[5]**, in main memory. Its first element is at location 3000. A pointer **vPtr** has been initialized to point to **f[0]**. The value of **vPtr += 4** is ________, and when **vPtr** points to **f[5]**, we can use ________ to point back to f[2].

(a) 3008, vPtr -= 3
(b) 3008, vPtr -= 6
(c) 3016, vPtr -= 6
(d) 3016, vPtr -= 3

Ans: (d)

5. Which of the following is equivalent to the two statements below?
char *p;
p = (char*) malloc(100);

(a) char p=*malloc(100);
(b) char *p=(char)malloc(100);
(c) char *p=(char*)malloc(100);
(d) char *p = (char *)(malloc*)(100);

ANS: (c)

6. A pointer is

(a) A keyword used to create variables
(b) A variable that stores address of an instruction
(c) A variable that stores address of other variable
(d) All of the above

Ans: (c)

7. The operator used to get value at address stored in a pointer variable is

(a) &
(b) *
(c) &&
(d) ||

Ans: (b)

8. What is (void*)0 in C programming?

(a) Representation of NULL pointer
(b) Representation of void pointer
(c) Error
(d) None of above

Ans: (a)

9. The statement
int* a, b, *c;

(a) creates pointer variables a and c that point to objects of type integer.
(b) creates two pointer variables, a and b.
(c) is a syntax error.
(d) creates 3 integer variables.

Ans: (a)

10. In C programming, what does the address-of operator (&) return when applied to a variable?

(a) The value stored in the variable
(b) The memory address of the variable
(c) The size of the variable in bytes
(d) The data type of the variable

Ans: (b)

11. What is the primary benefit of using pointers in C programming?

(a) Simplifying syntax
(b) Enhancing code readability
(c) Allowing direct memory manipulation
(d) Enabling automatic memory management

Ans: (c)

12. In C programming, how are arguments passed to functions by default?

(a) Pass-by-value
(b) Pass-by-reference
(c) Pass-by-pointer
(d) Pass-by-constant

Ans: (a)

13. When does a pointer in C simulate pass-by-reference behavior for function arguments?

(a) When the pointer is declared as a global variable
(b) When the pointer is passed to a function as an argument
(c) When the pointer is used to access array elements
(d) When the pointer is assigned a constant value

Ans: (b)

14. In C programming, what is one of the purpose of using arrays of pointers?

(a) To store multiple arrays in a single variable
(b) To simplify array manipulation operations
(c) To create a dynamic list of pointers
(d) To restrict access to array elements

Ans: (c)

15. What does the dereferencing operator (*) do in C?

(a) Returns the memory address of a variable
(b) Increments the value of a variable
(c) Returns the value stored at a memory address
(d) Compares two memory addresses

Ans: (c)

2. [40 pts]

Q1 (20 pts): Write a C function concat(str1, str2, out) that concatenates two given strings, str1 and str2, and store the result into the new variable out. For example,

```
concat(“foo”, “bar”, out);
```

would replace the variable out with “foobar”. Please **try NOT to use any string manipulation functions in C Standard Library.** (hint: use C pointer or array)

```
void concat(char *str1, char *str2, char out[]) {

   int iterator = 0;

   while(*str1 != '\0'){
      out[iterator++] = *str1++;
   }
   while(*str2 != '\0'){
      out[iterator++] = *str2++;
   }
}
```

Q2 (20 pts): Write a C program that allows the user to input two strings. The program should then use pointers to compare these two strings for equality. If the strings are identical, the program should output "**The strings are identical.**" If the strings are not identical, the program should output "**The strings are not identical.**" Please **use C pointers** to solve the problem.

Here is some example of the program output:
—--
Example 1

```
Enter the first string: Hello, World!
Enter the second string: Hello, World!
The strings are identical.
```

—--
Example 2

```
Enter the first string: Hello, World!
Enter the second string: Goodbye, World!
The strings are not identical.
```

```c
#include <stdio.h>
#include <string.h>

const char* compareString(const char* str1, const char* str2) {

    // Loop through both strings until reaching the end of either
    while (*str1 && *str2) {
        if (*str1 != *str2) {
            return "The strings are not identical.";
        }

        str1++;
        str2++;
    }

    // Check if both strings have reached their end simultaneously
    if (*str1 == *str2) {
        return "The strings are identical.";
    } else {
        return "The strings are not identical.";
    }
}

int main() {

    // Declare two character arrays to store the input strings
    char str1[100], str2[100];

    printf("Enter the first string: ");
    fgets(str1, sizeof(str1), stdin);
    str1[strcspn(str1, "\n")] = 0; // Remove newline character

    printf("Enter the second string: ");
    fgets(str2, sizeof(str2), stdin);
    str2[strcspn(str2, "\n")] = 0; // Remove newline character

    // Compare the two strings and store the result
    const char* result = compareString(str1, str2);

    // Output the result
    printf("%s\n", result);

    return 0;
}
```