CS 382
Fall 2024

Computer Architecture
and Organization

Lab 2

1 Task: An Array of Nibbles

In this lab, we're going to create an array of nibbles. Say we have an integer array: `int arr[2] = {0xEFF2, 0x9812}` we can use bit-wise operations and shifting to create an array like this: `unsigned char nibs[16] = {0,0,0,0,0xE,0xF,0xF,0x2,0,0,0,0,0x9,0x8,0x1,0x2}`. Note how many `0` are there in `nibs`: each integer takes four bytes which is **eight** nibbles, so you need to make sure leading zeros are also considered in the array. Since there's no data type that contains only four bits, we use `unsigned char` as a substitute.

The function you are going to implement is declared as follows:

```
void int_to_nibble(int[] intarr, int nint, char[] nibarr, int nnibs)
```

where `intarr` is the integer array, `nint` the number of integers in that array, `nibarr` the array of nibbles that you're going to fill in, and `nnibs` the size of that array.

You can assume both `nint` and `nnibs` are correct.

We have provided a start code for you:

```
#include <stdio.h>
#include <stdlib.h>

void int_to_nibble(int intarr[], int nint, unsigned char nibarr[], int nnibs) {

    /* Your code here */

}

int main(int argc, char const *argv[]) {
    int arr[3] = {0x12BFDA09, 0x9089CDBA, 0x56788910};
    unsigned char nibs[24] = {0}; // Initialize all elements to 0;
    int_to_nibble(arr, 3, nibs, 24);
    for (int i = 0; i < 24; i ++) printf("%1hhX ", nibs[i]); // Print each nibble in hex
    return 0;
}
```

The output from the code above should look like:

```
1 2 B F D A 0 9 9 0 8 9 C D B A 5 6 7 8 8 9 1 0
```

Requirements

- Your code must be able to compile successfully and executed without segmentation fault or any other type errors;
- Write your name (and your partner's name if you have one) and honor code pledge at the top of your code as comments;
- You must not change the function declaration of `int_to_nibble()`.

2 Grading

The lab will be graded based on a total of 10 points.

- **-10:** the code does not compile, or executes with run-time error;
- **-5:** included other header files, and/or the starter code was changed (except `main()`);
- **-5:** the result is incorrect;
- **-3:** leading zeros in the integer numbers are not stored as nibbles;
- **-1:** no pledge and/or name(s) in C file.

Earlybird Extra Credit: 2% of extra credit will be given if the lab is finished by Wednesday 11:59PM EST (1 day before the lab deadline). For specific policy, see syllabus.

Attendance: check off at the end of the lab to get attendance credit.

Deliverable

Submit a single `.c` file on Canvas.