Execution Times

Function	Assembly [µs]	C [µs]
Generate unique number	2	7
Generate checksum	6	13.5
Validate checksum	4.25	7.5
Bubble sort	24	113
Toggle LED Assembly - 0.65 (this should technically be subtracted from all results)		
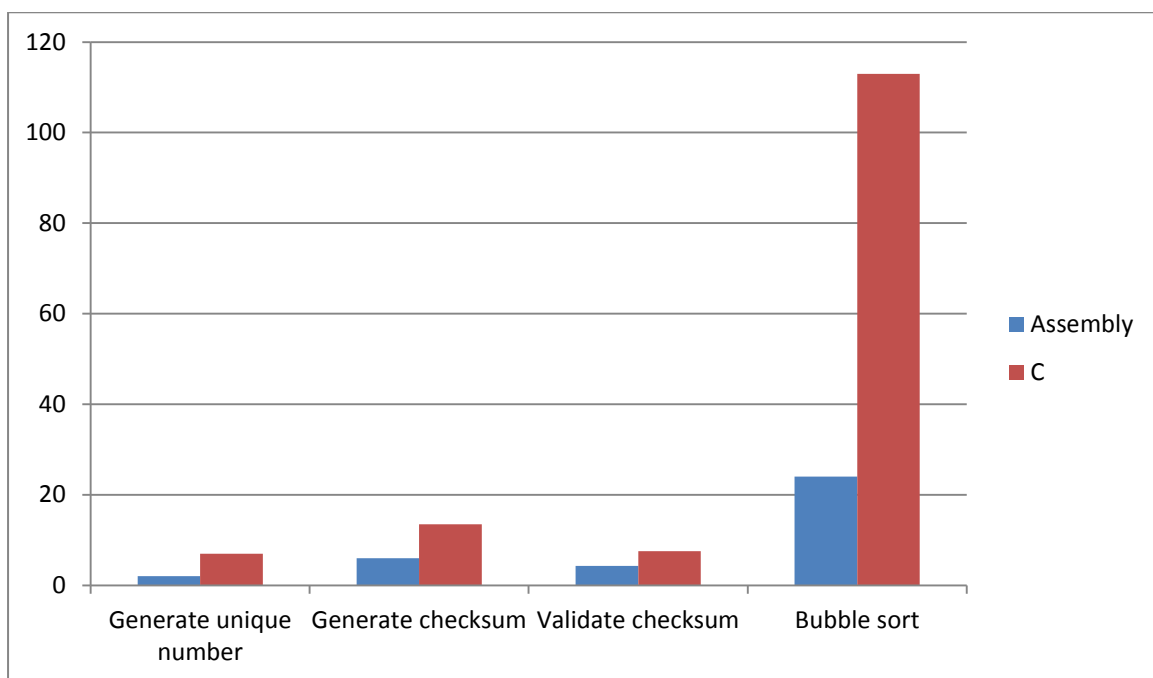

```
int calculate_unique_number_in_c(int a, int b, int c, int d, int e, int f, int g, int h)
{
        //TODO: write your code here
        int smallTot = 0, bigTot = 0, Tot = 0;
        char num[] = {a, b, c, d, e, f, g, h};
        bubble_sort_in_c(num);

        smallTot = num[0] + num[1] + num[2] + num[3];
        bigTot = num[4] + num[5] + num[6] + num[7];

        Tot = bigTot * smallTot;
        return Tot;
}

int generate_checksum_in_c(char* studentNumber)
{
        //TODO: write your code here
        int i;
        int N = 8;
        int tot = 0;
        int tempNum = 0;

        for(i = 0; i < N; i++)
```

```c
        {
                tempNum = studentNumber[i] - 48;
                tot += tempNum * (8 - i);
        }

        return tot;
}

int validate_checksum_in_c(int checksum)
{
        //TODO: write your code here
        return (checksum % 11)? 0 : 1;
}

void bubble_sort_in_c(char* studentNumber)
{
        //TODO: write your code here
        int i;
        int j;
        int N = 8;

        for(i = 0; i < N; i++)
        {
                for(j = 0; j < N; j++)
                {
                        if(studentNumber[i] > studentNumber[j])
                                swap(i, j, studentNumber);
                }
        }
}

void swap(int first, int second, char* array)
{
        char temp = array[first];
        array[first] = array[second];
        array[second] = temp;
}
```

The times vary fairly drastically between the C and assembly code as the compiler that translates the C into assembly writes far more lines than is necessary for the actual assembly code. Thus as I wrote the assembly myself and know that is as essentially as close to the most efficient that it can be, it is much faster than the C code.

I would rather code in C for the convenience and speed at which you can write the few lines of code.

I would rather code in Assembly when I need to do many calculations and simulations as it is much more efficient than C (or other high level programing languages for that matter). Even though it takes long to write the code and it is many lines and difficult to read interpret and debug, it is much more efficient.