

Department of Computer Science and Engineering

Indian Institute of Technology, Kharagpur

Compiler Laboratory: CS39003
3rd year CSE, 5th Semester

Assignment - 1: Annotating Assembly
Assign Date: August 12, 2021

Marks: 50
Submit Date: 23:55, August 25, 2021

1. Translate the following C program using GCC/Linux to the assembly language program of x86-64 (Intel 64-bit processor) without optimization.

```
cc -Wall -S ass1.c
```

C Program: *ass1.c*

```
/*
 * ass1.c Generate assembly code of x86-64 and comment
 */

#include <stdio.h>
#define MAXSIZE 100

void inst_sort(int num[],int n);
int bsearch(int num[],int n,int item);

int main()
{
    int n, a[MAXSIZE], item, i, loc;

    printf("Enter how many elements you want:\n");
    scanf("%d", &n);

    printf("Enter the %d elements:\n", n);
    for(i = 0; i < n; i++) scanf("%d", &a[i]);

    inst_sort(a,n);

    printf("\nEnter the item to search\n");
    scanf("%d", &item);
    loc=bsearch(a,n,item);
```

```

        if (item == a[loc]) {
            printf("\n%d found in position: %d\n", item, loc + 1);
        } else {
            printf("\nItem is not present in the list.\n");
        }

        return 0;
    }

void inst_sort(int num[],int n)
{
    int i,j,k;

    for(j=1;j<n;j++) {
        k=num[j];
        for(i=j-1;i>=0 && k<num[i];i--) num[i+1]=num[i];
        num[i+1]=k;
    }
}

int bsearch(int a[],int n,int item)
{
    int mid, top, bottom;

    bottom = 1;
    top = n;
    do {
        mid = (bottom + top) / 2;
        if (item < a[mid])
            top = mid - 1;
        else if (item > a[mid])
            bottom = mid + 1;
    } while (item != a[mid] && bottom <= top);
    return mid;
}

```

2. Rename the generated assembly file as *ass1_roll.s* (where *roll* is your roll number). Add comments for each of the assembly language instruction. Your comment should explain the functionality of the instruction and the connection to the original C program. Please make sure that your commented file can be compiled to generate executable file. Upload your file (*ass1_roll.s*) in Moodle server.

Note: *Comments without connection to C program will get partial marks.*