NAMAL Institute Mianwali

CS-222L : Computer Organization and Assembly Laboratory

**Final Assessment Tasks**

**Problem Scenario:**

You are working at Namal Institute Agritech Research Laboratories. The field scientist need to determine the soil temperature over a vast field spanning an area of 10 sq.km. It is decided to divide the field into smaller squares, and a temperature sensor be placed in the center of each square. Mr. Salah (the scientist) asks your help. He wants you to determine the number of smaller squares that would fit in the whole field for a given length and width.

He provides you with two computers, namely, Alpha and Delta, whose specifications are stated in Table 1. Alpha is deployed in the field, where you have to write the program on its pre-configured programming environment i.e. assembly only. Whereas, Delta is placed at NAMAL premises, and can be programmed in C and assembly.

Mr. Salah is adamant that he should be able to give input on a console to ALPHA, in the form of length and width, and the result be displayed on screen. Whereas, for DELTA, a program should read a file (comma separated file containing several lengths and widths), and generate the result in a separate file, as well as input data on console.

|  | ALPHA | DELTA |
| --- | --- | --- |
| Micro Processor : Intel | 8086 | P-IV |
| RAM | 64 M Bytes | 4 G Bytes |
| Harddisk | 1 G Bytes | 1 T Bytes |
| Operating System | DOS v7 (16 bit) | MS Windows 7 (32/64 bit) |
| I/O Peripherals | SCSI, Parallel Port, Serial Port | USB, PCI, eSATA |
| Programming Environment | MASM | Visual C/C++, MASM |

Table 1: Hardware Specifications for Alpha and Delta desktop computers.

Furthermore, Mr. Amjad, software development team lead wants you to write the programs in the form of sub-procedures written specifically for the supported architecture (16, 32,or 64 bit). He wants you to test your code for the given inputs stated in Table 2. Write check codes for wrong input.

Mr. Amjad suggests to use inline assembly for the Delta computer by writing the code in C/C++, for file access, whereas, calling external assembly codes using external definitions. But first he suggests to get the functionality tested by writing completely in C, and then using inline assembly and lastly try to call assembly procedures using extern.

Further more, Mr. Amjad suggests to confirm the supported architecture by each of the computer specified.

|  |  |  |
| --- | --- | --- |
| **Data Type** | **Width** | **Height** |
| 16-bit | A, -1, 0, 3, 65536 | -1, 0, 5, 65536 |
| 32-bit | A, -1, 0, 3, 4.29e9 | -1, 0,5,4.29e9 |
| 64-bit | A, -1, 0, 3, 1.8447e19 | -1, 0,5, 1.8447e19 |
| Floating Point | A, -1, 3.13, | B, -5.0, 5.0, |

Table 2: Test Inputs for checking code

**Submission Requirements:**

Submit your program files and assignment document file on Namal LMS before 15 Dec 2019, 2359 hrs.

No assignment will be checked, submitted after due date, no matter what factors affected it and zero marks will be assigned for it.

Viva will be held from Monday, 16 Dec, 2019 office timings.

You may be asked to write some portion of program / code or usage of different code snippets on paper, so do it yourself and try your best efforts to gain maximum appreciation.