ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

(Department of Computer Science)

WARNING

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.**
2. **SUBMITTING ASSIGNMENTS BORROWED OR STOLEN FROM OTHER(S) AS ONE'S OWN WILL BE PENALIZED AS DEFINED IN "AIOU PLAGIARISM POLICY".**

Course: Computer Organization and Assembly Language (3453)
Level: BS (CS) **Semester: Spring, 2013**
Total Marks: 100

ASSIGNMENT No. 1

Note: All questions carry equal marks

Q. 1 a) In which kind of problem domains, assembly language can be readily applied? Give arguments to support your answer.
b) Describe the major differences between Machine and Assembly Language instructions? Give two examples.

Q. 2 a) Explain the working of Segment resisters of the CPU?
b) Convert the following segment-offset addressed to absolute addresses:
0800:0100 h
07F2:101E h
0040:0049 h
03ED:FFFF h

Q. 3 a) What is the role of FLAG register during the execution of program?
b) Describe the typical arrangement of elements found in IBM PC in first 1 Mega Byte.

Q. 4 a) Define an array of 100 elements of type and initialize with the maximum value an element can store.
b) Initialize two string arrays with your name and father's name respectively.
c) Consider the double word 12347856H? How this double word will be stored in memory. What data type should be selected to store this value?

Q. 5 a) Write down the basic structure of an assembly program that include data and code segments.
b) How a program is loaded into memory and then executed? Write all steps in sequence.

ASSIGNMENT No. 2

Q. 1 Explain all the addressing modes of 80x86 based microprocessor that deal with memory. Memory may be referenced using named or un-named methods. Give proper examples to explain each.

Q. 2 Explain the use of arithmetic instructions including ADD, SUB, INC, DEC, CMP, MUL and DIV. Also tell how these instructions affect FLAGS register?

Q. 3 Give examples of all variations of loop instructions. LOOP, LOOPE and LOOPNE. Choose different examples to explain the working and structure of the variations. Examples should also include arrays.

Q. 4 How do we implement the following CASE structure in assembly language? Consider grade as a character and four cases are based on it.
Case (grade)
'A': Display "Excellent"
'B': Display "Very Good"
'C': Display "Well"
'F': Display "Poor"

Q. 5 Write a program in Assembly Language to add all the elements of an array of 16 elements. If the result of addition is equal to or greater than 100 then display the following message:
"Result is great than 99"
Otherwise display the result of sum of all elements by writing a display procedure.

3453 Computer Organization and Assembly Credit Hours: 4(3, 1)

Recommended Book:
Assembly Language for Intel-Based Computers, by Kip R. Irvine

Course Outlines:

Unit-1 Introduction

a) Context of Assembly Language (Introduction to assembly language, Assembly Language Applications)
b) Data representation (Binary numbers, Converting Binary to Decimal, Hexadecimal Number, Signed Numbers, Character Storage)
c) Introducing Assembly Language (Language Instructions, A Sample Debug Program, Debug Commands)

Unit-2 Hardware and Software Architecture

a) 16-BIT Intel Processor Architecture (Central Processing Unit, Registers, Status and Control Registers, Flags; Instruction Execution Cycle, Intel Microprocessor Family)
b) 32-BIT Intel Processor Architecture (Improved Execution Cycle, 32-bit Register Set)
c) Operating System and Memory (Memory Architecture, Video display, Absolute Address Calculation-Video Adapter, Memory (RAM), Video RAM)

Unit-3 Assembly Language Fundamentals

a) Basic Elements (Constants and Expressions, Statements, Names, Sample Hello Program)
b) Assembling Linking and Debugging (Microsoft Assembler (MASM))
c) Data Allocation Directive (Define Byte (DB), Define Word (DW), Define Doubleword (DD))
d) Symbolic Constants (Equal-Sign Directive, EQU Directive, TEXTEQU Directive)

Unit-4 Instructions

a) MOV Instruction (Operands with Displacements, XCHG Instruction)
b) Arithmetic Instructions (INC and DEC Instructions, ADD Instruction, SUB Instruction, 1 lags Affected by ADD and SUB)
c) Basic Operand Types (Register Operands, Immediate Operands, Direct Operands, Direct Offset Operands)
d) Extended Addition and Subtraction (ADC Instruction, SBB Instruction)
e) Multiplication and Division (MUL Instruction, IMUL Instruction, DIV Instruction, IDIV Instruction, CBW, CWD, CDQ, and CWDE Instructions, Preventing Divide Overflow)

Unit-5 Using the Assembler

a) More About the Assembler and Linker (Source Listing File, Map File, Assembling and Linking with MS-DOS Batch Files, Memory Models, Target Processor Directives)
b) Operators and Expressions (Arithmetic Operators, OFFSET, SEG, PTR, LABEL, AND EVEN)
c) IMP and LOOP Instructions (JMP Instructions, LOOP Instruction LOOP, LOOPW, LOOPD Instructions)
d) Indirect Addressing (Indirect Operands, Base an Indexed Operands, Base-Index with Displacement)

Unit-6 Conditional Processing

a) Boolean and Comparison Instructions (The Flags Register, AND Instruction, OR Instruction, XOR Instruction," NOT Instruction, NEG Instruction, TEST Instruction, CMP Instruction, CMPXCHG Instruction)

b) Integer Arithmetic (Shift and Rotate Instructions, SHL Instruction, SHLD/SHRD Instructions, SHR Instruction, SAL and SAR Instructions, ROL Instruction, ROR Instruction, RCL and RCR Instructions)
c) Sample Applications (Shifting Multiple Bytes on the 8086, Fast Multiplication and Division)

Unit-7 Conditional Jumps

a) Code Generation for Conditional Jumps, Conditional Jump Examples
b) Conditional Loops (LOOPZ and LOOPE Instructions, LOOPNZ and LOOPNE Instructions)
c) High-Level Logic Structures (Simple IF Statement, Compound IF Statement, WHILE Structure-, REPEAT-UNTIL Structure, CASE Structure, Table of Procedure Offsets.)

Unit-8 Software Interrupts

a) INT Instruction, Redirecting Input-Output
b) MS-Dos Function Calls, Output Functions, Input Functions, Date/Time Functions
c) BIOS-Level Keyboard Input (INT16H)
d) BIOS-Level Video Control (INT 10H)
e) Disk Storage Fundamentals
f) Drive and Directory Manipulation

Unit-9 Procedures and Interrupts,

a) Stack Operations
b) Procedures,
c) Procedure Parameters
d) Structures
e) Macros (Macros with Parameters, Defining a Macro, Example: mDisplayiStr, Macro, mGotoRowCol macro)

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