x86 Assembly Programming Part 2

EECE416 Microcomputer

Charles Kim Howard University

Resources:

Intel 80386 Programmers Reference Manual Essentials of 80x86 Assembly Language Introduction to 80x86 Assembly Language Programming

WWW.MWFTR.COM/uC.html

1 Sample Code and Run in Visual Studio – Open Project Solution **Microsoft Visual Studio** _ 7 🛛 File Edit View Debug Team Data Tools Test Window Help - 20 New . - 🔍 🕾 🖬 🖬 💥 🔝 🚆 Open . Droject/Solution... Ctrl+Shift+O Solution Explorer Close 🏂 Web Site... Shift+Alt+O Close Solution Team Project... 😂 File... Save Selected Items Ctrl+S Ctrl+O Save Selected Items As... Convert... Save All Ctrl+Shift+S Export Template... Source Control . Page Setup... 🖨 Print... Ctrl+P **Recent Files** • **Recent Projects and Solutions** . Alt+F4 Exit Error List * 4 X O Errors A 0 Warnings 0 Messages Column Project File Description Line Solution... Team E... Ready 4 06800 EN 🔍 💁 🏷 🖉 🕬 🦻 🔗 9:43 AM Microsoft Visu... 📲 start

2 Sample Code and Run in Visual Studio – Select Project.sln



3.Sample Code and Run in Visual Studio – Addsub.asm

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4 Sample Code and Run in Visual Studio – Build Solution/Compile



5. Sample Code and Run in Visual Studio – Build Success



6 Sample Code and Run in Visual Studio --- Run/Debug (F10 key)



7. Sample Code and Run in Visual Studio --- LIST file open

Project - Microsoft Visual Studio

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8 Sample Code and Run in Visual Studio --- .LST file

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9 Sample Code and Run in Visual Studio --- .lst





11 Sample Code and Run in Visual Studio – When a new code is tested

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12 Sample Code and Run in Visual Studio --- Read in the new code



13 Sample Code and Run in Visual Studio --- New code

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14.LST File and The Memory Contents of Code



Arduino Project 2

- Base: Arduino + ShiftBrite
- Project 1 --- Base + (PIR, Distance, Gas, Touch, Joystick, Temperature, etc)
- Project 2 --- Base + (Project 1 components) + (Project 2 Component)
 - Multiple Teams Can build a big system
 - Will be graded
- Project 2 Presentation + Demo (with a plausible scenario)
 - Tuesday November 10 Class
 - Presentation:
 - ~ 10 slides of explaining the scenario
 - Code section explanation ---- "What this code line is for"
 - Video Clip Attachment of operation {Recommended}
 - Demonstration





Registers for x86



Figure 2-1. Intel386™ DX Base Architecture Registers



Basic Data Types



Instruction Format

Opcode: mov eax, source specifies the operation performed by the instruction. dest, eax mov Register specifier eax, source+4 mov an instruction may specify one or two register operands. Addressing-mode specifier dest+4, eax when present, specifies whether an operand mov is a register or memory location. eax, source+8 mov Displacement ۲ dest+8, eax mov - when the addressing-mode specifier eax, source+12 mov indicates that a displacement will be used to compute the address of an operand, the dest+12, eax mov displacement is encoded in the instruction. Immediate operand - when present, directly provides the value of an operand of the instruction. Immediate operands may be 8, 16, or 32 bits wide. mov eax, U

Register Size and Data

 Assuming that the content of eax is [01FF01FF], what would be the content of eax after each instruction?

mov	al,	155	eax:[
mov	ax,	155	eax:[
mov	eax,	155	eax:[

- Further Example
- Before EAX: [01010101] mov al -10; EAX:[mov ax, -10; EAX:[mov eax, -10; EAX:[

Exercise of Register Size and Data – Do it by hand or by Coding

• Example:

BeforeInstructionAfterEAX: 01 1F F1 23 \rightarrow mov AX, -1 \rightarrow EAX: 01 1F FF FF

	Before	Instruc	tion	After
(a)	EBX: 00 00 FF 75			-
	ECX: 00 00 01 A2	mov	ebx, ecx	EBX, ECX
(b)	EAX: 00 00 01 A2	mov	eax, 100	EAX
(c)	EDX: FF 75 4C 2E			
	dValue: DWORD -1	mov	edx, dValue	EDX, dValue
(d)	AX: 01 4B	mov	ah, 0	AX
(e)	AL: 64	mov	al, -1	AL
(f)	EBX: 00 00 3A 4C			
	dValue: DWORD ?	mov	dValue, ebx	EBX, dValue
(g)	ECX: 00 00 00 00	mov	ecx, 128	ECX