CEN 214 Microprocessors Lab
Assignment 6

New Instructions:

MUL

Description: Performs an unsigned multiplication of the first operand (destination operand) and the second operand (source operand) and stores the result in the destination operand. The result is stored in register AX or register pair DX: AX (depending on the operand size), with the high-order bits of the product contained in register AH or DX, respectively.

Algorithm : when operand is a byte:
AX = AL * operand.
when operand is a word:
(DX : AX) = AX * operand.

IMUL

Description: Performs a signed multiplication of two operand. When an immediate value is used as an operand, it is sign-extended to the length of the destination operand format. The CF and OF flags are set when the signed integer value of the intermediate product differs from the sign extended operand-size-truncated product, otherwise the CF and OF flags are cleared.

Algorithm : when operand is a byte:
AX = AL * operand.
when operand is a word:
(DX : AX) = AX * operand.

DIV

Description: Divides unsigned the value in the AX or DX:AX registers (dividend) by the source operand (divisor) and stores the result in the AX (AH:AL) or DX:AX, registers. The action of this instruction depends on the operand size (dividend/divisor).

Algorithm: when operand is a byte:
AL = AX / operand
AH = remainder (modulus)
when operand is a word:
AX = (DX AX) / operand
DX = remainder (modulus)

IDIV

Description: Divides the (signed) value in the AX or DX:AX by the source operand (divisor) and stores the result in the AX (AH:AL) or DX:AX registers.

Algorithm: when operand is a byte:
AL = AX / operand
AH = remainder (modulus)
when operand is a word:
AX = (DX AX) / operand
DX = remainder (modulus)

Examples:

1. Write a program that multiply unsigned values FEh (254d) and 10h (16d) and saves the result to the memory address 0100:0400h.

2. Write a program that multiply signed values FEh (-2d) and 10h (16d) and saves the result to the memory address 0100:0400h.

3. Write a program to divide unsigned value ABh (171d)) by 0Ah (10d). Then save the quotient to the memory address 0100:0500h, and remainder to the memory address 0100:0502h.

4. Write a program to divide signed value ABh (-85d) by 0Ah (10d). Then save the quotient to the memory address 0100:0500h, and remainder to the memory address 0100:0502h.