

COE 205 : Computer Organization & Assembly Language

Quiz 3 Solution – Monday, December 13, 2004

Write a macro *mult10* that multiplies *src* operand by 10 and stores the result in *dest* operand.

`mult10 dest, src` which performs `dest = src * 10`

You should use only shift and add instructions to perform the multiplication. Your macro should work properly when the *src* and *dest* are registers and/or memory locations. The registers used in this macro and the *src* operand should also be preserved. The *src* and *dest* should be word operands. Otherwise, an error message should be displayed.

Solution:

```
mult10 MACRO dest, src
    IF (TYPE dest NE 2) AND (TYPE src NE 2)
        %OUT dest and src in mult10 macro should be word operands
    ENDM
    IFDIFI <dest> , <AX>
        push AX          ; preserve AX
        mov AX, src      ; copy src into AX
        shl AX, 1        ; AX = src * 2
        mov dest, AX     ; dest = src * 2
        shl AX, 2        ; AX = src * 2 * 4 = src * 8
        add dest, AX     ; dest = src * 10
        pop AX           ; restore AX
    ELSE
        ; dest is AX
        push BX          ; preserve BX
        mov BX, src
        shl BX, 1        ; BX = src * 2
        mov AX, BX       ; AX = src * 2
        shl BX, 2        ; BX = src * 2 * 4 = src * 8
        add AX, BX       ; AX = src * 10
        pop BX           ; restore BX
    ENDM
ENDM
```