COURSE: UCS1502 - MICROPROCESSORS AND INTERFACING

Instruction set of 8086 – (Branch, flag manipulation and machine control instruction)

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This presentation covers

• Instruction set of 8086 (Branch , flag related and machine control instructions)

Learning Outcome of this module

• To understand branch ,flag related and machine control instructions of 8086

Contents

- Different types of branch, flag manipulation and machine control instructions of 8086
- Explanation of all branch, flag manipulation and machine control instructions of 8086

Types of instructions in 8086

1. Data transfer instructions
2. Arithmetic and logical instructions
3. Branch instructions
4. Loop instructions
5. Machine control instructions
6. Flag manipulation instructions
7. Shift and rotate instructions
8. String manipulation instructions

Branch instructions

2 classifications

Unconditional branch instructions
Conditional branch instructions

<u>Unconditional branch instructions</u>

CALL - To call a procedure and save their return address to the stack.

RET - To return from the procedure to the main program.
JMP - To jump to the provided address to proceed to the next instruction.

Branch instructions

INT N - To interrupt the program during execution and calling a service specified.

- Total 256 software interrupts (N can be from 00 to FFH)
- Eg:
- INT 00 – divided by zero
- INT 01 – single step
- INT 02 – NMI ..

INTO - Interrupt on overflow (same as INT 04)

IRET – To return from ISR.
It pops flags also.
RET instruction will not pop back flags

Branch instructions

LOOP - Used to loop a group of instructions until CX =0

```
        MOV CX, 0005H
L1:     <INST 1>
        <INST 2>
        ------
        ------
        LOOP L1
```

- Decrement CX
- If CX≠0 jump to label

LOOPE / LOOPZ
Loop if ZF=1 and CX≠0

LOOPNE / LOOPNZ
Loop if ZF=0 and CX≠0

Branch instructions

Conditional branch instructions

JA/JNBE − jump if above/not below or equal
JAE/JNB /**JNC**− jump if above or equal /not below / no carry
JBE/JNA − jump if below or equal/ not above
JC − jump if carry flag CF = 1
JE/JZ − jump if equal/zero flag ZF = 1
JG/JNLE − jump if greater/not less than or equal
JGE/JNL − jump if greater than or equal/not less than
JL/JNGE − jump if less than/not greater than or equal

Branch instructions

JLE/JNG − jump if less than/equal/if not greater than
JNE/JNZ − jump if not equal/zero flag ZF = 0
JNO − jump if no overflow flag OF = 0
JNP/JPO − jump if not parity/parity odd PF = 0
JNS − jump if not sign SF = 0
JO − jump if overflow flag OF = 1
JP/JPE − jump if parity/parity even PF = 1
JS − jump if sign flag SF = 1

Flag manipulation instructions

STC − set carry flag
CLC − clear/reset carry flag
CMC − complement carry flag
STD − set the direction flag
CLD − clear/reset the direction flag
STI − set the interrupt enable flag
CLI − clear the interrupt enable flag

Machine control instructions

WAIT − Wait till $\overline{TEST}$ pin = 0
HLT − Halt the program
NOP − No operation
ESC − Used to pass instruction to 8087
LOCK −Used as prefix instruction to prevent another processor from taking the control over the bus while executing an instruction (it will make $\overline{LOCK}$ pin to 0)

References

- Doughlas V. Hall, “Microprocessors and Interfacing, Programming and Hardware”, Second Edition, TMH.

Thank you