23VLS1401: Microcontroller and Computer architecture

Lecture 5 (U5)

Programming for Microcontroller 8051 based on Real Life problem statements.

A presentation by

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Session objective

To apply the knowledge of programming skills in Microcontroller 8051 to provide the solutions for Industry problems and societal needs.

Problem 1: A system is designed to monitor temperature of a furnace. Ten temperature readings are recorded in 16 bits and stored in memory locations starting at 2501H. High-order bytes are stored first and low-order bytes are stored in next consecutive memory location. High-order bytes of all the temperature readings are constant. Write a program for 8051 Microcontroller, to transfer all low-order temperature readings to internal RAM locations starting at 25H

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#0AH
MOV R1,#25H
L1:  INC DPTR
     MOVX A,@DPTR
    MOV @R1,A
     INC DPTR
DJNZ R0,L1
END
```

Problem 2: In the context of a newly developed library, 100 data bytes are stored from 2501H to represent quality of the books and the data is given in sign magnitude representation. D7 bit is the sign bit, and Logic '1' represents a good quality book. Write a program for 8051 Microcontroller, to transfer the codes of good quality books only, to the internal RAM locations starting at 25H

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#25H
MOV R1,#64H
L1: MOVX A,@DPTR
 RLC A
JNC AHEAD
RRC A
MOV @R0,A
INC R0
AHEAD: INC DPTR
DJNZ R1,L1
END
```

Problem 3: In the context of a newly developed library, 100 data bytes are stored from 2501H to represent quality of the books and the data is given in sign magnitude representation. D7 bit is the sign bit, and Logic '1' represents a good quality book. Write a program for 8051 Microcontroller, to count number of good quality books only and place the count to the internal RAM location 25H

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#0AH
MOV R1,#25H
MOV R2,#00H
L1: MOVX A,@DPTR
    RLC A
    JNC AHEAD
    INC R2
AHEAD: INC DPTR
DJNZ R0,L1
MOV A,R2
MOV @R1,A
END
```

Problem 4: In the receiving department of a manufacturing company, auto parts are placed in sequential order from 2501H-250AH. Write a program for 8051 Microcontroller, to send the waste auto parts represented by the odd data bytes to the bin starting to internal RAM locations starting at 25H.

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#0AH
MOV R1,#25H
L1: MOVX A,@DPTR
    RRC A
    JC AHEAD
    RLC  A
    MOV @R1,A
    INC R1
AHEAD: INC DPTR
DJNZ R0,L1
END
```

Problem 5: 10 data bytes of a grocery list are stored from 2501H and given in sign magnitude representation. Write a program for 8051 Microcontroller, to transfer positive data bytes only to internal RAM locations starting at 25H.

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#0AH
MOV R1,#25H
L1: MOVX A,@DPTR
    RLC A
    JC AHEAD
    RRC  A
    MOV @R1,A
    INC R1
AHEAD: INC DPTR
DJNZ R0,L1
END
```

Problem 6: For a sugar industry, 100 readings for granule size are recorded in 8-bits and are stored from 2501H. Write a program for 8051 Microcontroller to make the most significant '1', i.e. to set D7 bit of all the readings and copy the modified reading to the internal RAM locations starting at 25H

```
ORG 0000H
MOV DPTR,#2501H
MOV R0,#64H
MOV R1,#25H
L1: MOVX A,@DPTR
    ORL A,#80H
    MOV @R1,A
    INC DPTR
    INC R1
DJNZ R0,L1
END
```


Thank
you