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Reg. ID: SP21-BCS-052

# Display Mode

# Question 1:

Write a string (your name) horizontally and scroll it continuously towards the left. Each letter that disappears from the left end should reappear in the same row from right end. (You might want to use first or last row to ensure that row remains the same)

# Answer:

|  |
| --- |
| ORG 100h |
|  |
| .DATA |
|  |
| STR1    *DB*  'MAIZ NADEEM$' |
| SIZE    *DW*  11 |
|  |
| .CODE |
|  |
| MAIN PROC |
| MOV AH, 0 |
| MOV AL, 3 |
| INT 10h |
|  |
| MOV AX, 0xB800 |
| MOV ES, AX |
| MOV SI, (13-1)\*160 + (5-1)\*2 |
|  |
| MOV CX, SIZE |
| MOV AH, 0x07 |
| XOR BX, BX |
|  |
| NAMEPRINT:  MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT |
|  |
| PROCCALL:   CALL LEFT |
| JMP PROCCALL |
|  |
| RET |
| MAIN ENDP |
|  |
|  |
| LEFT PROC |
|  |
| MOV CX, SIZE |
|  |
| ERASE:      CMP SI, 1920 |
| JLE ERASE2 |
| SUB SI, 2 |
| MOV ES:SI, 0X0720 |
| LOOP ERASE |
| JMP AFTER |
|  |
| ERASE2:     MOV SI, 2078 |
| MOV ES:SI, 0X0720 |
| JMP ERASE |
|  |
| AFTER:      MOV CX, SIZE |
| MOV BX, 0 |
| SUB SI, 2 |
| MOV DX, 1920 |
|  |
| CMP SI, 1918 |
| JNE  NAMEPRINT2 |
| MOV SI, 2078 |
|  |
| NAMEPRINT2: CMP SI, 2080 |
| JGE NAMEPRINT3 |
| MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT2 |
| RET |
|  |
| NAMEPRINT3: MOV SI, DX |
| SUB DX, 2 |
| JMP NAMEPRINT2 |
|  |
| RET |
| LEFT ENDP |

# Keyboard Interrupt

# Question 2:

Connect KB interrupt such that on each release of 'P' the movement of the string toggles.

# Answer:

|  |
| --- |
| ORG 100h |
|  |
| .DATA |
|  |
| STR1    *DB*  'MAIZ NADEEM$' |
| SIZE    *DW*  11 |
| KFLAG   *DB*  0 |
| FLAG    *DB*  0 |
|  |
| .CODE |
|  |
| MAIN PROC |
|  |
| MOV BX, 0 |
| MOV ES, BX |
|  |
| CLI |
| MOV ES:[0x9\*4], OFFSET [KBISR] |
| MOV ES:[0x9\*4+2], CS |
| STI |
|  |
|  |
| MOV AH, 0 |
| MOV AL, 3 |
| INT 10h |
|  |
| MOV AX, 0xB800 |
| MOV ES, AX |
| MOV SI, (13-1)\*160 + (5-1)\*2 |
|  |
| MOV CX, SIZE |
| MOV AH, 0x07 |
| XOR BX, BX |
|  |
| NAMEPRINT:  MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT |
|  |
| PROCCALL:   CMP FLAG, 1 |
| JNE  SKIP |
| CALL LEFT |
| SKIP:   JMP PROCCALL |
|  |
| RET |
| MAIN ENDP |
|  |
| KBISR:  PUSH AX |
| IN  AL, 0x60 |
| CMP AL, 0x19 |
| JNE KNEXTCOMP |
| MOV KFLAG, 1 |
|  |
| KNEXTCOMP:  CMP KFLAG, 1 |
| JNE KEXIT |
| CMP AL, 0x99 |
| JNE KEXIT |
| MOV KFLAG, 0 |
| CMP FLAG, 1 |
| JE  CHECK2 |
| MOV FLAG, 1 |
| JMP KEXIT |
|  |
| CHECK2:  MOV FLAG, 0 |
|  |
| KEXIT:  MOV AL, 0x20 |
| OUT 0x20, AL |
| POP AX |
| IRET |
|  |
|  |
| LEFT PROC |
|  |
| MOV CX, SIZE |
|  |
| ERASE:      CMP SI, 1920 |
| JLE ERASE2 |
| SUB SI, 2 |
| MOV ES:SI, 0X0720 |
| LOOP ERASE |
| JMP AFTER |
|  |
| ERASE2:     MOV SI, 2078 |
| MOV ES:SI, 0X0720 |
| JMP ERASE |
|  |
| AFTER:      MOV CX, SIZE |
| MOV BX, 0 |
| SUB SI, 2 |
| MOV DX, 1920 |
|  |
| CMP SI, 1918 |
| JNE  NAMEPRINT2 |
| MOV SI, 2078 |
|  |
| NAMEPRINT2: CMP SI, 2080 |
| JGE NAMEPRINT3 |
| MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT2 |
| RET |
|  |
| NAMEPRINT3: MOV SI, DX |
| SUB DX, 2 |
| JMP NAMEPRINT2 |
|  |
| RET |
| LEFT ENDP |

# Timer Interrupt

# Question 3:

Connect Timer interrupt such that the each shift in string occurs after 2 seconds.

# Answer:

|  |
| --- |
| ORG 100h |
|  |
| .DATA |
|  |
| STR1    *DB*  'MAIZ NADEEM$' |
| SIZE    *DW*  11 |
| KFLAG   *DB*  0 |
| TFLAG   *DB*  0 |
| FLAG    *DB*  0 |
| COUNT   *DB*  0 |
|  |
| .CODE |
|  |
| MAIN PROC |
|  |
| MOV BX, 0 |
| MOV ES, BX |
|  |
| CLI |
| MOV ES:[0x8\*4], OFFSET [TISR] |
| MOV ES:[0x8\*4+2], CS |
| MOV ES:[0x9\*4], OFFSET [KBISR] |
| MOV ES:[0x9\*4+2], CS |
| STI |
|  |
|  |
| MOV AH, 0 |
| MOV AL, 3 |
| INT 10h |
|  |
| MOV AX, 0xB800 |
| MOV ES, AX |
| MOV SI, (13-1)\*160 + (5-1)\*2 |
|  |
| MOV CX, SIZE |
| MOV AH, 0x07 |
| XOR BX, BX |
|  |
| NAMEPRINT:  MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT |
|  |
| PROCCALL:   CMP TFLAG, 1 |
| JNE NEXTCOMP |
| MOV TFLAG, 0 |
| CALL LEFT |
|  |
| NEXTCOMP:   CMP FLAG, 1 |
| JNE SKIP |
| CALL LEFT |
|  |
| SKIP:       JMP PROCCALL |
|  |
| RET |
| MAIN ENDP |
|  |
| KBISR:      PUSH AX |
| IN  AL, 0x60 |
| CMP AL, 0x19 |
| JNE KNEXTCOMP |
| MOV KFLAG, 1 |
|  |
| KNEXTCOMP:  CMP KFLAG, 1 |
| JNE KEXIT |
| CMP AL, 0x99 |
| JNE KEXIT |
| MOV KFLAG, 0 |
| CMP FLAG, 1 |
| JE  CHECK2 |
| MOV FLAG, 1 |
| JMP KEXIT |
|  |
| CHECK2:     MOV FLAG, 0 |
|  |
| KEXIT:      MOV AL, 0x20 |
| OUT 0x20, AL |
| POP AX |
| IRET |
|  |
|  |
| TISR:       PUSH AX |
| INC COUNT |
| CMP COUNT, 36 |
| JNE EXIT |
| MOV TFLAG, 1 |
| MOV COUNT, 0 |
|  |
|  |
| EXIT:       MOV AL, 0x020 |
| OUT 0x20, AL |
| POP AX |
| IRET |
|  |
|  |
| LEFT PROC |
|  |
| MOV CX, SIZE |
|  |
| ERASE:      CMP SI, 1920 |
| JLE ERASE2 |
| SUB SI, 2 |
| MOV ES:SI, 0X0720 |
| LOOP ERASE |
| JMP AFTER |
|  |
| ERASE2:     MOV SI, 2078 |
| MOV ES:SI, 0X0720 |
| JMP ERASE |
|  |
| AFTER:      MOV CX, SIZE |
| MOV BX, 0 |
| SUB SI, 2 |
| MOV DX, 1920 |
|  |
| CMP SI, 1918 |
| JNE  NAMEPRINT2 |
| MOV SI, 2078 |
|  |
| NAMEPRINT2: CMP SI, 2080 |
| JGE NAMEPRINT3 |
| MOV AL, [STR1 + BX] |
| MOV ES:SI, AX |
| ADD SI, 2 |
| INC BX |
| LOOP NAMEPRINT2 |
| RET |
|  |
| NAMEPRINT3: MOV SI, DX |
| SUB DX, 2 |
| JMP NAMEPRINT2 |
|  |
| RET |
| LEFT ENDP |