ASSEMBLY LANGUAGE EXAMPLES

Examples of problem solutions using assembly language...

1. Write an HC11 assembly program that will output the following messages:

   NOTICE:
   No class on April 1st (yeah, right)

   Solution:

   ```
   * CET270 assembly example 1
   * Mar 30, 20xx

   * ASCII character definitions
   EOT EQU 4 ;End Of Text
   CR EQU $0D ;Carriage Return

   * BUFFALO monitor routines
   OUTCRLF EQU $FFC4 ;output CR-LF
   OUTSTRG EQU $FFC7 ;string output rtn.
   OUTSTRG0 EQU $FFCA ; ditto w/o leading CR

   * Program constants
   CODE EQU $2000
   ORG CODE
   Start ldx #NoticeMsg
   jsr OUTSTRG
   ldx #Msg1
   jsr OUTSTRG
   jsr OUTCRLF
   swi

   * program output messages
   NoticeMsg FCC "NOTICE:"
   FCB EOT ;BUFFALO’s end-of-string marker
   Msg1 FCB "No class on April 1st",EOT

   END
   ```

Note the use of the “FCC-type string” expression in the Msg1 definition, normally strings would be defined as shown with NoticeMsg. Also note the use of the EOT ASCII character as the string terminator; this is a BUFFALO-specific convention. C programming strings are terminated with the ASCII NULL character (00). For Msg1, note the use of FCB so that the EOT can be placed on the same line. Thus, FCB also understands FCC strings.
2. Write an assembly program sequence that will:
   a. output the greeting message:
      \textbf{Welcome!}
   b. output the prompt message:
      \textbf{Enter a character (ESCape to exit):}
   c. once the user enters a character, output the following message:
      \textbf{The character you entered was: <the character>}
   d. loop back to (b) until the user enters ESC at which time display the following message and
      exit the program:
      \textbf{You’ve been a great sport.}

\textbf{Solution:}

\begin{verbatim}
* CET270 assembly example 2
* Mar 30, 20xx

* ASCII character definitions
EOT EQU 4 ;End Of Text
CR  EQU $0D ;Carriage Return
ESC EQU $1B ;ESCape

* BUFFALO monitor routines
OUTA EQU $FFB8 ;char output rtn.
OUTCRLF EQU $FFC4 ;output CR-LF
OUTSTRG EQU $FFC7 ;string output rtn.
INCHAR EQU $FFCD ;char input rtn.

* Program constants
CODE EQU $2000

ORG CODE
Start ldx #GreetMsg
    jsr OUTSTRG
Loop    jsr OUTCRLF
           ldx #Msg1
           jsr OUTSTRG
           jsr INCHAR  ;character returns in A
cmpa #ESC  ;escape char?
           beq Exit  ;done if so
           psha  ;save user's char
           ldx #Msg2
           jsr OUTSTRG
           pula  ;recall char
           jsr OUTA  ;output user's char
           bra Loop
Exit     ldx #Msg3
           jsr OUTSTRG
           jsr OUTCRLF
           swi

* program output messages
GreetMsg FCB "Welcome!",EOT
Msg1  FCB "Enter a character (ESCape to exit): ",EOT
Msg2  FCB "The character you entered was: ",EOT
Msg3  FCB CR,"You've been a great sport.",EOT
END
\end{verbatim}
3. Although BUFFALO does provide a character input routine, it does not provide a general string input routine; so let us create our own…

Write a subroutine “INSTR” to input a string from the user and save the string in a buffer pointed to by index register X. The input string is terminated by the user with a carriage return character, but is to be terminated in memory with an EOT character. Also write a test program to verify proper operation of the INSTR subroutine.

**Solution:**

* CET270 assembly example 3  
* Mar 30, 20xx  

* ASCII character definitions  
EOT EQU 4 ;End Of Text  
CR EQU $0D ;Carriage Return  

* BUFFALO monitor routines  
OUTCRLF EQU $FFC4 ;output CR-LF  
OUTSTRG EQU $FFC7 ;string output rtn.  
INCHAR EQU $FFCD ;char input rtn.  

* Program constants  
VARS EQU $100 ;where to locate variables  
CODE EQU $2000 ;where to locate code  

StrBuf RMB 80 ;to store user input string  

Start  
ldx #GreetMsg  
jsr OUTSTRG  
jsr OUTCRLF  
ldx #Msg1  
jsr OUTSTRG  
ldx #StrBuf  
jsr INSTR  
ldx #Msg2  
jsr OUTSTRG  
ldx #StrBuf  
jsr OUTSTRG  
jsr OUTCRLF  
swi  

INSTR  
jsr INCHAR ;get 1 input char  
cmpa #CR ;end of input string?  
beq INSexit ;exit if so  
staa 0,X ;store char in string  
inx ;advance X to next char position  
bra INSTR ;continue  

INSexit  
ldaa #EOT  
staa 0,X ;mark end of string with EOT  
rts ;return to caller  

* program output messages  
GreetMsg FCB "Welcome!",EOT  
Msg1 FCB "Enter a string: ",EOT  
Msg2 FCB "The string you entered was: ",EOT  
ByeMsg FCB CR,"End program",EOT  

END