**Lab 05: ‘Assembly’ Application Programs**

**OBJECTIVE**

To learn to write the following application codes:

1. Password protected application, used to sign-in to a computer.
2. Count the capital characters in a defined string.
3. Search and Replace a character in a string.
4. Count the ‘Even’ numbers in an entered string.

**1. Code 01: ‘Password protected application’, used to sign-in to a computer.**

Hints:

* Initialize a 4-digit password e.g. ‘NUML$’ in a db. (.data)
* Use function # 8, to hide password input on run time.
* Use function # 2, to display ‘\*’ or ‘.’ In place of password.
* Take a string at input and ‘cmp’ both strings location by location.
* Two ways of termination when a wrong password is entered.

i) Any key mismatch (terminate). ii) At the end of string input

Code:

.model small

.stack 100h

.data

prompt db 'Enter Password$'

correct db 'Correct Password$'

wrong db 'Wrong Password$'

password db 'Asim$'

entered db '?'

.code

main proc

mov ax,@data

mov ds,ax

lea si,password

lea di,entered

mov cx,4 ;limit cx=4 character password only

mov ah,9

LEA dx, prompt

int 21h

mov ah,2 ; new line

mov dl,0ah

int 21h

mov dl,0dh

int 21h

input:

mov ah,8 ;Function # 8 hides character input at run time

int 21h

cmp al,[si]

jne finish

mov [di],al

mov ah,2

mov dl,'\*' ;display \* in case of password

int 21h

inc si

inc di

loop input

mov ah,2 ; new line code

mov dl,0dh

int 21h

mov dl,0ah

int 21h

mov ah,9

LEA dx, correct

int 21h

jmp terminate

finish:

mov ah,2

mov dl,’\*’

int 21h

mov dl,0dh ; new line code

int 21h

mov dl,0ah

int 21h

mov ah,9

LEA dx, wrong

int 21h

terminate:

mov ah,4ch

int 21h

main endp

end main

**2. Code 02: ‘Password Updated Code’, used to sign-in to a computer.**

.model small

.stack 100h

.data

prompt1 db 'Enter New Password$'

updated db 'Password Updated$'

password db 'aqib$'

.code

main proc

mov ax,@data

mov ds,ax

lea si,password

mov cx,4 ;limit cx=4 character password only

mov ah,9

mov dx,offset prompt1

int 21h

mov ah,2 ; new line

mov dl,0ah

int 21h

mov dl,0dh

int 21h

input:

mov ah,8 ;Function # 8 hides character input at run time

int 21h

mov [si],al

mov ah,2

mov dl,'\*' ;Display \* in case of password

int 21h

inc si

loop input

mov ah,2 ; new line code

mov dl,0dh

int 21h

mov dl,0ah

int 21h

mov ah,9

mov dx,offset updated

int 21h

mov ah,2 ; new line code

mov dl,0dh

int 21h

mov dl,0ah

int 21h

mov ah,9

mov dx,offset password

int 21h

main endp

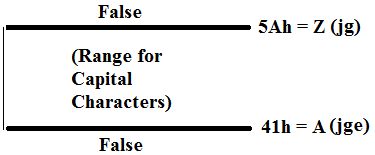
end main

**3. Code 02: Count the ‘Capital characters’ in a defined string.**

Hints: (see flowchart below)

* E.g. the string ‘BDEFg$’
* ‘cmp’ to check if a letter falls in range of capital letters
* From A to Z (true) if ‘A = 41h to Z = 5Ah’.
* Use ‘Jge’ & ‘Jle’ if in range.

**Flowchart for Code-2:**

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**True**

Code:

.model small

.stack 100h

.data

**msg** db 'BDEFg$'

.code

main proc

mov ax,@data

mov ds,ax

lea si,**msg**

mov cx,5 ;length of string except $

mov bl,0 ;set character count to zero

inrange: ;check if character falls in-ragne

mov al,[si]

inc si ;next character in string

cmp al,41h ;code for 'A'

jl inrange ;if character is < 41h

cmp al,5ah ;value for 'Z'

jg end ;end if value is greater than Z, no increment

inc bl ;both conditions Ok the increment count

end:

loop inrange

mov ah,2 ;new line

mov dl,bl

add dl,30h

int 21h

mov ah,4ch

int 21h

main endp

end main

**See ‘String Search’ Code in Lab-4.**

**4. Code 03: Search and Replace the characters in a string.**

Program Flow: Read and compare each character in string with Input value.

If the value to be changed is found in string. Ask for new value. Display it.

Code:

.model small

.data

string db 'house$' ;we want to replace 'u' with 'r'

msg1 db 'Enter value to be searched: $'

msg2 db 'Enter its new value: $'

msg3 db 'Updated Sring is: $'

.code

main proc

mov ax,@data

mov ds,ax

lea si,string

mov cx,5

mov ah,9

lea dx,msg1

int 21h

mov ah,1 ;enter value to be searched in a string

int 21h

label1:

cmp [si],al ;search for the entered value

je update ;if found go to label to update it

inc si ;otherwise increment SI and keep on searching

loop label1

update:

mov ah,9

lea dx,msg2

int 21h

mov ah,1 ;user will enter the new value to update it

int 21h

mov [si],al ;value updated

mov ah,9

lea dx,msg3

int 21h

mov ah,9

mov dx,offset string

int 21h

main endp

end main

1. **Code 05: Count the ‘Even’ numbers in an array.**

.model small

.data

array db 23h, 78h, 89h, 94h, 12h

.code

main proc

mov ax,@data

mov ds,ax

lea si,array

mov bl,2

mov ax,0

mov bh,0 ;counter

mov cx,5 ;elements

label:

mov al,[si]

div bl

inc si

cmp ah,0 ;remainder is checked

je label1

jmp lab

label1:

inc bh ;count even no

lab:

loop label

exit:

mov ah,2

mov dl,bh

add dl,30h

int 21h

main endp

end main

**Code 06: Count the ‘Even’ numbers in an entered string.**

Program Flow: User will enter digits till Enter key is pressed.

Each digit will be divided by 2 to find if remainder is zero. Display count.

Code:

.model small

.stack 100h

.code

main proc

mov cl,0 ;initialize even digits count to zero

mov bl,2 ;dividing a number by 2 reveals if its even or not

even:

mov ah,1 ;user will enter the digits

int 21h

cmp al,0dh ;enter key compare

je display

div bl

cmp ah,00h ;check remainder if it is zero, hence even number

je counter

jmp even

counter:

inc cl ;increment even digits counter value

jmp even

display:

mov ah,2 ; new line code

mov dl,0ah

int 21h

mov dl,0dh

int 21h

mov ah,2

mov dl,cl ;display the value of the count

add dl,30h

int 21h

main endp

end main

**< The End >**