**1. Design and develop an assembly language program to search a key element “X” in a list of ‘n’ 16-bit numbers. Adopt Binary search algorithm in your program for searching.**

**title** “binary search program to search a 16-bit value"

**.model small**

**.data**

array dw 1111h,2222h,3333h,4444h,5555h ;Initialize array of 16-bit values

srchkey dw 3333h ; Initialize element to be searched

n dw 05h ; Initialize length of the array data

msg1 db "Successful Search $" ; Initialize success message to inform element found

msg2 db "Unsuccessful search $" ; Initialize fail message to inform element not found

**.code**

mov ax,@data ;Initialize data segment

mov ds,ax

mov ax,srchkey ;ax=key

mov si,00h ;low=0

mov di,n

dec di ; high=n-1

again: cmp si,di ; check if low>high(have all the data been searched)

ja notfound ; if yes, search is over, go to notfound

mov bx,si ; else find mid,bx=low

add bx,di ; low+high

shr bx,01h ; low+high/2

mov bp,bx

shl bx,01h ; position the pointer(bx) to actual location of mid element

cmp array[bx],ax ; compare key with mid element

je found ; if key=mid, go to found & display successful search

jc right ; else if key>mid go to right half of the array

dec bp ; else key<mid,search the element in the left half of the array

mov di,bp ; high=mid-1

jmp again ; search for the new half to the left array

right: inc bp

mov si,bp ; low=mid+1

jmp again ; search to the right half of the array

; display successful message

found: mov ah,09h ; ‘09h’ DOS sub function to display a string

mov dx, offset msg1 ; point to the start of the message 1

int 21h ; ‘21h’ DOS interrupt function

jmp exit

; display unsuccessful message

notfound: mov ah,09h ; ‘09h’ DOS sub function to display a string

mov dx, offset msg2 ; point to the start of the message 2

int 21h ; ‘21h’ DOS interrupt function

jmp exit

exit: mov ah,4ch ; terminate the program normally

int 21h

**end**

**OUTPUT 1**

* **Edit filename.asm**

**Array Elements are:**

**1111h, 2222h, 3333h, 4444h, 5555h**

**srchKey: 3333h**

* **Masm filename.asm;**
* **Link filename;**
* **Debug filename.exe**

**-- G**

**Successful Search**

**--Q**

**OUTPUT 2**

* **Edit filename.asm**

**Array Elements are:**

**1111h, 2222h, 3333h, 4444h, 5555h**

**srchKey: 2536h**

* **Masm filename.asm;**
* **Link filename;**
* **Debug filename.exe**

**-- G**

**Unsuccessful Search**

**--Q**