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**COAL Assignment 4**

**-----------------------------------------------------**

**Q1:**

**Code:**

INCLUDE Irvine32.inc

.data

array2D BYTE 1,2,3,4,5,6,7,8,9,10

rowSize = ($ - array2D)

BYTE 2,3,6,1,7,9,3,6,8,3

BYTE 5,6,7,6,5,7,8,3,6,7

BYTE 10,20,30,40,50,60,70,80,90,100

BYTE 2,4,6,8,9,7,1,3,5,3

BYTE 1,1,1,1,1,1,1,1,1,1

BYTE 7,8,7,8,7,8,6,5,6,5

BYTE 6,5,4,3,2,1,2,3,4,5

BYTE 9,8,7,6,5,6,7,8,9,0

BYTE 2,3,4,4,3,2,3,4,5,6

rowsSum DWORD 10 DUP (0)

colsSum DWORD 10 DUP (0)

RowsAvg DWORD 10 DUP (0)

colsAvg DWORD 10 DUP (0)

RowsMax DWORD 10 DUP (0)

ColsMax DWORD 10 DUP (0)

RowsMin DWORD 10 DUP (0)

ColsMin DWORD 10 DUP (0)

tableSum DWORD 0

tableAvg DWORD ?

tableMax DWORD 0

max DWORD 0

min DWORD 0

Sum DWORD 0

msg1 BYTE "Rows Sum Respectively: ",0

msg2 BYTE "Colomns Sum Respectively: ",0

msg3 BYTE "Rows Average Respectively: ",0

msg4 BYTE "Colomns Average Respectively: ",0

msg5 BYTE "Rows Max. Respectively: ",0

msg6 BYTE "Colomns Max. Respectively: ",0

msg7 BYTE "Rows Min. Respectively: ",0

msg8 BYTE "Colomns Min. Respectively: ",0

msg9 BYTE "Table Sum: ",0

msg10 BYTE "Table Max: ",0

msg11 BYTE "Table Average: ",0

.code

main PROC

mov eax, 0

mov ebx, 0

mov esi, 0

mov edi, 0

mov ecx, rowSize

l1:

PUSH ecx

mov ecx, rowSize

l2:

movzx eax, array2D[esi\*TYPE array2D]

INC esi

add sum, eax

add tableSum, eax

mov tableMax, eax

Loop l2

POP ecx

mov eax, sum

mov rowsSum[edi], eax

mov sum, 0

add edi, 4

Loop l1

;------------------------------------------------- tableMax

mov esi, 0

mov ecx, rowSize

l5:

PUSH ecx

mov ecx, rowSize

l6:

movzx eax, array2D[esi\*TYPE array2D]

INC esi

cmp eax, tableMax

ja nt

jna yes

nt:

mov tableMax, eax

yes:

Loop l6

POP ecx

loop l5

;-----------------------------------------------Table Avg

mov edx, 0

mov eax, rowSize

mov ebx, rowSize

mul ebx

mov ebx, eax

mov eax, tableSum

div ebx

mov tableAvg, eax

;-----------------------------------------------Rows Max

mov esi, 0

mov edi, 0

mov ecx, rowSize

l7:

PUSH ecx

mov ecx, rowSize

l8:

movzx eax, array2D[esi\*TYPE array2D]

cmp eax, max

ja gr

jmp dne

gr:

mov max, eax

dne:

INC esi

Loop l8

POP ecx

mov eax, max

mov rowsMax[edi], eax

add edi, 4

mov max, 0

mov eax, 0

Loop l7

;--------------------------------------------Rows Min

mov edi, 0

mov esi, 0

mov ecx, rowSize

l:

PUSH ecx

mov ecx, rowSize

li:

movzx eax, array2D[esi\*TYPE array2D]

cmp eax, Min

jna ls

jmp de

ls:

mov min, eax

de:

INC esi

Loop li

POP ecx

mov eax, min

mov rowsMin[edi], eax

add edi, 4

mov eax,0

mov min, 100

Loop l

;------------------------------------------RowsAvg

mov ecx, rowSize

mov edi, 0

mov esi, 0

l10:

mov edx, 0

mov eax, rowsSum[esi\*TYPE rowsSum]

mov ebx, rowSize

div ebx

mov RowsAvg[edi], eax

INC esi

add edi, 4

Loop l10

;-----------------------------------------ColsSum and ColsMax

mov esi, 0

mov edi, 0

mov sum, 0

mov ecx, rowSize

one:

PUSH ecx

PUSH esi

mov ecx, rowSize

two:

movzx eax, array2D[esi\*TYPE array2D]

add sum, eax

cmp eax, max

ja ab

jmp d

ab:

mov max, eax

d:

add esi, 10

Loop two

POP esi

POP ecx

INC esi

mov eax, sum

mov colsSum[edi], eax

mov eax, max

mov colsMax[edi], eax

mov eax, 0

mov sum, 0

mov max, 0

add edi, 4

Loop one

;----------------------------------------cols Min

mov esi, 0

mov edi, 0

mov min, 100

mov ecx, rowSize

four:

PUSH ecx

PUSH esi

mov ecx, rowSize

five:

movzx eax, array2D[esi\*TYPE array2D]

cmp eax, min

mov min, eax

k:

add esi, 10

Loop five

POP esi

POP ecx

INC esi

mov eax, min

mov ColsMin[edi], eax

mov eax, 0

mov min, 200

add edi, 4

Loop four

;------------------------------------------cols avg

mov ecx, rowSize

mov esi, 0

mov edi, 0

six:

mov edx, 0

mov eax, colsSum[esi\*TYPE colsSum]

mov ebx, rowSize

div ebx

mov colsAvg[edi], eax

INC esi

add edi, 4

Loop Six

;---------------------------------------------Printing

mov edx, OFFSET msg1

call WriteString

mov ecx, rowSize

mov esi, 0

m1:

mov eax, rowsSum[esi\*TYPE rowsSum]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m1

call crlf

mov edx, OFFSET msg2

call WriteString

mov ecx, rowSize

mov esi, 0

m2:

mov eax, ColsSum[esi\*TYPE ColsSum]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m2

call crlf

mov edx, OFFSET msg3

call WriteString

mov ecx, rowSize

mov esi, 0

m3:

mov eax, rowsAvg[esi\*TYPE rowsAvg]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m3

call crlf

mov edx, OFFSET msg4

call WriteString

mov ecx, rowSize

mov esi, 0

m4:

mov eax, ColsAvg[esi\*TYPE ColsAvg]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m4

call crlf

mov edx, OFFSET msg5

call WriteString

mov ecx, rowSize

mov esi, 0

m5:

mov eax, RowsMax[esi\*TYPE RowsMax]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m5

call crlf

mov edx, OFFSET msg6

call WriteString

mov ecx, rowSize

mov esi, 0

m6:

mov eax, ColsMax[esi\*TYPE ColsMax]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m6

call crlf

mov edx, OFFSET msg7

call WriteString

mov ecx, rowSize

mov esi, 0

m7:

mov eax, RowsMin[esi\*TYPE RowsMin]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m7

call crlf

mov edx, OFFSET msg8

call WriteString

mov ecx, rowSize

mov esi, 0

m8:

mov eax, ColsMin[esi\*TYPE ColsMin]

call WriteDec

mov eax, ' '

call WriteChar

INC esi

Loop m8

call crlf

mov edx, OFFSET msg9

call WriteString

mov eax, TableSum

call WriteDec

call crlf

mov edx, OFFSET msg10

call WriteString

mov eax, TableMax

call WriteDec

call crlf

mov edx, OFFSET msg11

call WriteString

mov eax, TableAvg

call WriteDec

call crlf

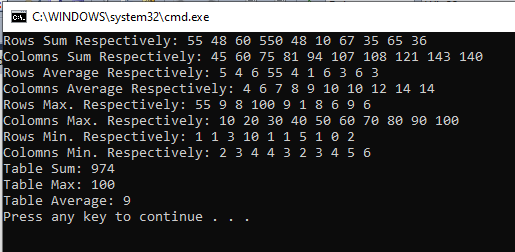
;---------------------------------------- -------end

exit

main ENDP

END main

**Screenshot:**



**Q2:**

