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Computer Science

CSC 342

Quiz No. 3

CSC or CPE

May 1ˢᵗ, 2024   Quiz time: 2:00 – 3:15 PM

Question #1

You are given the following source in CPP with inline assembly. The student who wrote this code did not have time to complete it, and in addition he erased the array initialization in the source code. Luckily, he kept the disassembly window and some memory, register windows printouts. Can you help him to reconstruct the source code?

Q1.1

Please complete array initialization lines 33 and 34 in the source code. Please replace question marks ??? with correct values. In lines 41, 42, 43, 44 Please write the value or the address of the variable. Replace ?? with correct value.

static float a[N] = {1.0, 2.0, 1.0, 2.0, 1.0, 2.0, 1.0, 2.0}

static float b[N] = {2.0, 1.0, 2.0, 1.0, 2.0, 1.0, 2.0, 1.0}

pxor xmm0, xmm0 ; initialize xmm0 to 0, xmm0 stores 00000000000000000000000000000000

mov eax, dword ptr[aPointer] ; eax stores 00AC7000

mov ebx, dword ptr[bPointer] ; ebx stores 00AC7020

mov ecx, N ; ecx stores 00000008

The following information is gathered from the screenshot containing "register" and "memory 2" tabs.

Q1.2

Please replace ?? with correct values in the code and comments; lines 47, 48, 49, 50.

movups xmm1, [eax] ; loads 4 values of a in xmm1

movups, xmm2, [ebx] ; loads 4 values of b in xmm2

mulps xmm1, xmm2 ; multiplies the elements of a and b

addps xmm0, xmm1 ; adds the result to xmm0

Q1.3

Please complete lines 50, 51, 52, 53. (replace ???? with correct code)

add eax, 10h ; increment eax by 16

add ebx, 10h ; increment ebx by 16

sub ecx, 4 ; loop – 4

The following is found in the disassembly code on lines 95-97.

Q1.4

Based on the debug windows shown on the next page, please determine the address in memory where vectors a & b are stored.

Address of a = 00AC7000

Address of b = 00AC7020

The following information is gathered from the screenshot containing "register" and "memory 2" tabs.

Q1.5

What is the vector size in bits stored in Register XMM2?

The vector size in bits stored in XMM2 is 128 and contains 4 single-precision floating point numbers.

4 * 32 = 128 bits.

Q1.6

What are the types of variables stored in XMM2? And how many of these variables are stored in XMM2?

The types of variables stored in XMM2 are single-precision floating point numbers and there are 4 of these variables stored in XMM2.

128 bits / 32 bit length floating point values = 4 variables.