# Zad 7.

poniedziałek, 24 kwietnia 2023    16:17

$$\begin{array}{cc} P & f \\ \text{rdi} & \text{Xmm0} \end{array}$$

**Zadanie 7.** Poniżej widnieje kod procedury o sygnaturze «float puzzle7(struct P *, float)». Wyznacz definicję typu «struct P». Przetłumacz tę procedurę na język C i wyjaśnij jednym zdaniem co robi.

```
 1 puzzle7:                                 9      vfmadd231ss (%rcx,%rax,4), %xmm2, %xmm1
 2     movq    (%rdi), %rdx                10      incq    %rax
 3     leaq    8(%rdi), %rcx               11      vmulss  %xmm0, %xmm2, %xmm2
 4     xorl    %eax, %eax                  12      jmp     .L2
 5     vxorps  %xmm1, %xmm1, %xmm1         13 .L5: vmovaps %xmm1, %xmm0
 6     vmovss  .LC1(%rip), %xmm2           14      ret
 7 .L2: cmpq   %rdx, %rax                  15
 8     jge     .L5                         16 .LC1: .long   0x3f800000
```

- → rax = 0, xmm1 = 0
- → xmm2 = 0x3F800000 = $\underbrace{0011111111}_{7}\underbrace{0000...0_2}_{32-9=23}$ = $+1 \cdot 2^0 = 1$
- → rdx = pierwsze pole P (prawdopodobnie long)
  rcx = drugie pole P
- → pętla i=0 to rdx

VFMADD231SS: Multiplies the low single-precision floating-point value from the second source operand to the low single-precision floating-point value in the third source operand, adds the infinite precision intermediate result to the low single-precision floating-point value in the first source operand, performs rounding and stores the resulting single-precision floating-point value to the destination operand (first source operand).

vfmadd231ss    tab[i]    wykładnik    xmm1

$$xmm1 = xmm1 + tab[i] \cdot \underset{(f^k)}{wykładnik}$$

Multiplies the low single-precision floating-point value from the second source operand by the low single-precision floating-point value in the first source operand, and stores the single-precision floating-point result in the destination operand. The second source operand can be an XMM register or a 32-bit memory location. The first source operand and the destination operands are XMM registers.

$$xmm2 = xmm2 \cdot xmm0$$
kolejne potęgi f'a

Moves 4, 8 or 16 single-precision floating-point values from the source operand (second operand) to the destination operand (first operand). This instruction can be used to load an XMM, YMM or ZMM register from an 128-bit, 256-bit or 512-bit memory location, to store the contents of an XMM, YMM or ZMM register into a 128-bit, 256-bit or 512-bit memory location, or to move data between two XMM, two YMM or two ZMM registers.

return xmm1 → suma

```
struct P {
  long n;  (int n)
  float* tab;
}
```
nie da się wywnioskować dokładnie

definicja P =

kod w C ↘

```
11  struct P {
12      int n; // moze byc tez Long
13      float* tab;
14  };
15
16  float puzzle7(struct P* p, float f) {
17      float result = 0.0;
```

dla ciągu floatów $\{g_i\}_{i=0}^{n}$
zwraca $\sum_{i=0}^{n} g_i \cdot f^i$

(?)

```
14  };
15
16  float puzzle7(struct P* p, float f) {
17      float result = 0.0;
18      float exponent = 1.0;
19      for (int i = 0; i <= p->n; i++) {
20          result = result + (p->tab)[i] * exponent;
21          exponent *= f;
22      }
23      return result;
24  }
```

$$\sum_{i=0} \cdots$$

$$(\,?\,)$$