

INFOMOV 2018 EXAM - November 6, 17.00 - 19.00 - BEATRIX 7th FLOOR

Answer these questions as elaborate as necessary. Don't be too elaborate; incorrect statements in your answer reduce your score. Negative scores for a question are not possible however. This exam consists of 9 questions on 1 page. Your grade is calculated as $(pts * 9.f / max_pts) + 1$.

1. Explain the following concepts in 30 words or less. 3x5 pts
 - a) False sharing
 - b) Prefetching
 - c) Out-of-order execution
2. Your code contains the following snippet:

```
float a = table[20];
a += b; a += c;
a += d; a += e;
a += f; a += g;
table[20] = a;
```

How would you modify this code to make it execute faster on a modern CPU? 10 pts
3. NVidia's Pascal GPU architecture uses a cache line width of 128 bytes.
 - a) Why is it, you think, that it uses a wider cache line than a CPU? 10 pts
 - b) Why, you think, is the cache line not even wider on the GPU? 10 pts
4. "A fully associative cache does not suffer from collisions and under-utilization and is, for a given size, the most efficient caching scheme."
 - a) Is this statement true? Motivate your answer. 10 pts
 - b) What is, in the context of caching, a 'collision'? 5 pts
 - c) What is, in the context of caching, 'under-utilization'? 5 pts
5. List three reasons for using fixed point math on a modern CPU. 10 pts
6. "Object Oriented Programming, when used correctly, makes poor use of modern CPU architectures." Why? 10 pts
7. 64-bit code typically runs somewhat faster than 32-bit code.
 - a) Why? 10 pts
 - b) Describe a situation where a 64-bit build would be slower. 10 pts
8. One difference between debug and release mode compilation is that in debug builds, the compiler does not reorder instructions.
 - a) Why does the compiler reorder instructions in release builds? 10 pts
 - b) Name one other important difference between debug and release compilation. 5 pts
9. Identify the creature in the picture. 0 pts

May the Light be with you.

