

Please write clearly. Voit myös vastata suomeksi.

Mark your project completion year / Merkitse harjoitustyön suorittamisvuosi

- Explain the meaning of an Instruction Set Architecture (3p)
 - Explain the concept of pipelining. (3p)
 - Explain the concept of program threads. (2p)
 - Why are threads important in GPU systems. (2p)
- Consider a 4-kilobyte direct-mapped cache with a block size of 2 words. Indicate below how many bits of a 32-bit address form the tag, how many form the cache index, and how many form the byte offset (the position in the block). (3p)
 - Consider now an 8-word direct-mapped cache with 2-word blocks, and suppose that the following sequence of memory accesses is made (e.g. with a sequence of loads) with an initially empty cache. For each access, show where in the cache the access points, and identify which accesses are hits, which are misses that fill in a block, and which are misses that cause a block to be replaced. (7p)
Hex byte address: 4512, 4514, 4504, 4501, 4508, 4584, 4518, 4501
- For each MIPS addressing mode, explain in detail where the operand is and how its location is indicated. (6p)
 - Explain how virtual memory functions. (4p)
- Explain the three MIPS instruction formats. (3p)
 - Below is the single-cycle MIPS datapath presented during lecture. Your job is to modify the diagram for multicycle operation (5p)
 - Also explain how the control changes with multi-cycle operation (2p)

