Computer Architecture 16/06/2012

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1. Explain what an ISA instruction is, and what a microinstruction is. What is the difference between the two, and how are they related?

2. Branch instructions. How many types of such instructions are possible? What is the influence of branch instructions on the program flow on pipelined computers? Are there solutions to deal with this influence? Describe them.

3. Addressing modes for ISA instructions. Give a brief description of each mode. Which kind of addressing modes appear in RISC designs? Which kind do not?

4. What is a programmable logic array (PLA)? Describe the implementation of a ternary minority boolean function by an appropriate PLA.

5. Consider the following number in radix 4: 321123221.2330012. What is the representation of the same number in radix 8? Describe the method you apply and illustrate the transformation steps in the example provided.

6. Caching. Cache principles. Direct mapped caches vs. set associative caches. Advantages, disadvantages.

7. Describe the IEEE 754 standard, single precision. Represent -3.75 in the standard (give the result in hexadecimal representation).

8. Consider the Mic-1 microarchitecture (see Figure 1). Describe the role of each register. Describe the memory model of the IJVM. What does the following sequence of microinstructions do? (Explain what happens in the data path for each clock cycle.)

```
i1    MAR = SP-1; rd
i2    H = TOS;
i3    MDR = TOS = MDR - H; wr
i4    MAR = SP; wr; goto Main1
```