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Department 6.2 - Computer Science
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Computer Architecture I - WS 07/08

Exercise Sheet 9

Excercise 1: (warm up)

1. What are interrupts and why do we need them?
2. Ensure that you can define the signal $JISR$ (and all signals used in the definition, of course).

Excercise 2: (interrupt level computation)
In class you have seen the definition of the interrupt level $il(c, eev)$ as

$$il(c, eev) = min\{j | mca(c, eev)[j] = 1\}$$

with $j \in \{0, \ldots, 31\}$. In this exercise you have to construct a circuit that computes this interrupt level. Hence,

1. Construct a circuit with $mca[31:0]$ as input and output $il[5:0]$ such that $il[5:0] = il(c, eev)$.
2. Compute the delay and cost of your construction as a closed formula.
3. Prove the correctness of your construction.

Excercise 3: (majority voter)
Let o be the function, which computes the number of ones in a bitvector, e.g. $o(0010101110) = 5$. Let z be the analogous function for zeros. Construct a majority voter circuit which computes the function $mv : \mathbb{B}^n \to \mathbb{B},\ mv(a) = (o(a) > z(a))$ for odd n. Compute its delay and costs as a closed formula. Prove its correctness.