Exercise sheet 1x – Basic setup and first steps

Goals:

- Definition of computer architecture vs. computer organisation
- Computability
- Recap „IT-Systeme“ lecture
- Check your own computer

Exercise 1x.1: What does computer architecture mean?

(a) Describe in your own words the meaning of computer architecture.

(b) Describe in your own words the meaning of computer organisation.

Exercise 1x.2: Computability (recapitulation semester 1–3)

(a) Can you make a statement as to whether a calculation is computable on a particular computer architecture (e.g. Intel), but not on an other (e.g. PowerPC)?

Proposal for solution: If you can simulate a Turing Machine, you can compute everything. But in real life there are some differences, eg:

- performance
- price
- memory
- programming comfort

Exercise 1x.3: Compatibility

(a) State some examples for compatibility (also from everyday life).

Proposal for solution:

- Intel Pentium compatible to Intel 8086 (in real/virtual mode)
- IBM Mainframe Computer compatible to its counterpart from the 60s
- Schuko plug:
  - Italy/France: mechanically incompatible
  - USA: electrically incompatible

(b) Does every change to an HSI cause incompatibility?

Proposal for solution: No, not necessarily. If you wrap the old HSI into the new one, you are still compatible

Exercise 1x.4: C and assembler knowledge

(a) Recap your „IT-Systeme“ knowledge:

- Assembler coding
- Registers
- Digital components

(b) Recap your „programming“ knowledge:

- C, data types, arrays, character arrays (strings)
- Pointers
- Structs, unions

Exercise 1x.5: Check your own computer

(a) Which CPU do you have (vendor, type, frequency, number of cores)?

(b) How many transistors has your CPU?

(c) How much RAM and which type of RAM do you have?

(d) Which GPU do you have?

(e) Which data storage (hard disc/SSD) do you have (vendor, type, capacity, speed)?