Operating Systems, Spring 2022, Written exercise 1 (Lectures 1-2)

Submit your solutions to Moodle by the deadline (January 25, 2022, 23:59). Afterwards, remember to self-evaluate your solutions in Moodle.

1. **Background** (recap Computer Organization I, see, e.g., Chapter 1 [Stallings]):

   (a) The main structural elements of a computer are (i) processor, (ii) I/O modules, (iii) system bus and (iv) main memory. Describe briefly their roles (i.e., what are they used for) in a computer. (4p, 1p for each element)

   (b) The machine instructions can be caterogized as (i) processor-memory instructions, (ii) processor-I/O instructions, (iii) data processing instructions, and (iv) control instructions. Describe briefly what types of actions the machine instructions in each category perform. You can, e.g., use examples. (4p, 1p for each type)

   (c) What is the difference between a multiprocessor and a multicore system? (2p)

2. **OS, basic concepts:**

   (a) What is the difference between an operating system (OS) and an OS kernel? Give some examples of parts of OS that are not part of OS kernel. (2p)

   (b) There are alternative design approaches to operating systems. Describe briefly a monolithic kernel and a microkernel approach. What are their main differences? (2p)

   (c) Describe what is an I/O-bound program and a processor-bound program. What is the difference between them? (2p)

The points listed in the exercises are exercise points, which will be eventually converted into course points, in a similar fashion to the weekly exercises (80% of the maximum number of points for the written exercises will be mapped to 6 course points).

Further instructions for self-evaluation will be provided along the model solutions. It is assumed that you answer each part in your own words using a couple of sentences (full sentences, no bullet point lists).