



# Übung Echtzeitsysteme WS 2014 / 2015 PThreads

## Philipp Heise

#### Exercise 0 PThreads

1. (PThreads) Read the documentation for pthread\_create and pthread\_join. Write a program that starts two threads and waits for each thread. Each thread should be passed an id as an argument that is used for printing a message on the command line. The third parameter of pthread\_create is the name of a function that returns a void pointer and also has one void pointer as parameter.

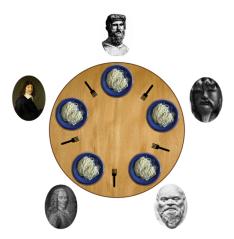
## Exercise 1 A bank account and pthread mutex

In the *pthreadmutex.c* file a simple multi-threaded program is given. The program creates two threads and each thread generates a random number that is added to a shared global variable.

- Why does this program not always work? What do you need to do to solve the problem?
- Read the documentation for pthread\_mutex\_init, pthread\_mutex\_lock and pthread\_mutex\_unlock.
- Fix the problem with one global pthread mutex.

### Exercise 2 Dining philosophers

In the lecture we already got to know the famous problem of the dining philosophers. You can download a code skeleton from our homepage. In the provided code the code to pickup the left and right fork is missing.



- 1. (Semaphore functions) Find out what the functions sem\_init, sem\_destroy, sem\_post and sem\_wait are for.
- 2. (Solve the problem) Use the semaphores to solve the problem. Explain the deadlock issue and find a way to avoid it.