# Übung Echtzeitsysteme WS 2015 / 2016
# PThreads

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## Exercise 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 2 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 3 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.