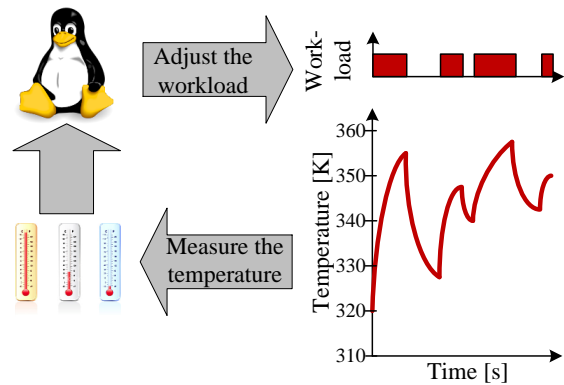


Semester / Master Thesis:

## Cool Linux

**Motivation and Informal Description:** The trend to integrate multiple processing elements into a single die has recently led to high power densities and thus, to high chip temperatures. Modern general-purpose processors like Intel's i3/i5/i7 processors have a critical temperature of about 70° Celsius. Exceeding this temperature can lead to computing failures or even damage the processor. Thus, modern processors typically integrate dynamic frequency management strategies (keyword dynamic voltage and frequency scaling (DVFS)) to prohibit the system to overshoot the critical temperature. However, if time critical workload is processed, an unexpected reduction of the processing power might lead to deadlines being missed.



On the other hand, modern processors have multiple temperature sensors integrated to observe the current temperature of the processing cores. By injecting controlled idle slots, both timing and temperature requirements of modern real-time applications can be guaranteed. Thus, in this thesis, we will design and implement a feedback loop to control the system temperature of a UNIX-based environment.

Besides learning how to use hardware sensors in Linux, you will learn how multi-threading works, and become acquainted with various scheduling mechanisms.

### Your Thesis:

1. Propose and implement a framework for measuring the current temperature and adjusting the execution of multiple tasks implemented as POSIX threads.
2. Compare various scheduling and feedback algorithms with respect to their capability to reduce the maximum temperature.
3. (Optional) Extend the results to consider thermal neighboring effects on a multi-core processor.

**Existing Infrastructure:** As part of a previous master thesis, a framework to schedule and analyze multiple tasks implemented as POSIX threads has been developed. The intent is to extend this framework during the thesis.

**Requirements:** You should be familiar with programming in one of the major languages such as C or Java.

**Interested? Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!**

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