Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institut für Technische Informatik
und Kommunikationsnetze
Computer Engineering and Networks Laboratory

Prof. Dr. Lothar Thiele

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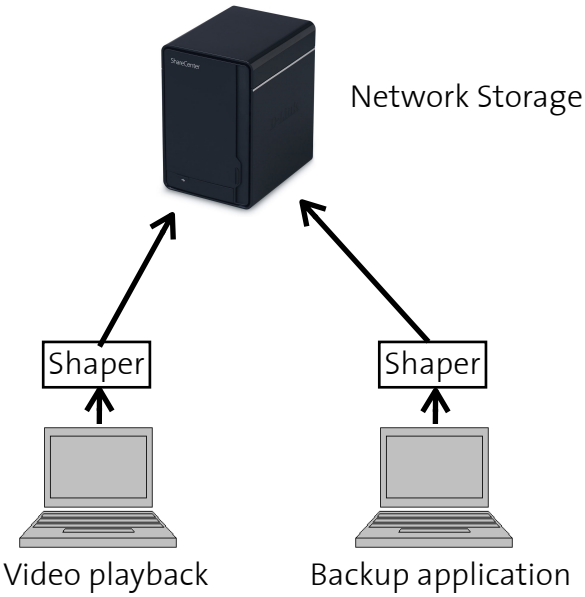
**MASTER/SEMESTER THESIS**

# SHAPING FOR TIMELINESS

## THE PROBLEM

In a computing system, different software tasks share resources. As an example, in the figure, a cluster of PCs share a networked memory device. Such sharing leads to interference across tasks: the timeliness behavior of one task depends on the behavior of other tasks. Unchecked interference can lead to undesirable consequences. In the figure, the video playback can become stuttered when the backup application stresses the memory.




## SHAPERS AS A SOLUTION

One solution is to **enforce bounds** on the resource usage of an application. For instance, the maximum rate of memory accesses for the backup application can be bounded. Enforcing such bounds can be done through the use of **shapers** [1]. They are sufficiently general to express different kinds of bounds and have efficient implementations. In combination with a scheduling policy, shapers can be used to implement **servers** [2] to enable isolation on computing resources.

## YOUR THESIS

### Tasks

1. Propose and implement a framework for supporting shapers over POSIX threads on a UNIX environment
2. Demonstrate the utility of the shapers on a cluster of PCs with a network disk drive
3. Propose a theoretical framework to dimension and analyze the shapers
4. (Optional) Extend results to multicore processors

### Existing Infrastructure

As part of the EURETILE [3] project, we have an implementation of our Distributed Application Layer (DAL) [4] supporting a cluster of PCs, which can enable support of shapers.

### Requirements

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

**ADVISERS** Lars Schor, ETZ G78.1, lschor@tik.ee.ethz.ch | Pratyush Kumar, ETZ G76, kumarpr@tik.ee.ethz.ch

**PROFESSOR** Prof. Dr. Lothar Thiele, ETZ G87, thiele@tik.ee.ethz.ch

## REFERENCES

[1] Le Boudec and Thiran, *"Network Calculus: A theory of deterministic queueing systems for the internet"*, Spring-Verlag Berlin.
[2] P. Kumar and L. Thiele, *"Generalized Resource Reservation: Demand Bound Servers"*, in Proc. of EMSOFT 2011
[3] EURETILE: EUropean Referenced TILed architecture Experiment. http://euretile.roma1.infn.it/
[4] DAL: Distributed Application Layer http://www.tik.ee.ethz.ch/~euretile/dal.php