

Semester Thesis:

“To Be or Not to Be a BitThief”

This document describes the subject and the general time schedule of Mathias Karlsson’s semester thesis in the fall term 2009. Adaptations or changes can be agreed upon by the advisers.

Subject

BitTorrent is a widely popular protocol for content dissemination based on the peer-to-peer (p2p) paradigm. The peers interested in the same content form so-called “swarms” in which blocks of the content are exchanged. As peers favor other peers from which they have already received several data blocks and consequently upload to those peers first, it has long been believed that the BitTorrent protocol offers sufficient incentives for each individual peer to actively upload and thereby help to keep the entire swarm alive.

We showed that this assumption is not true by building a simple BitTorrent client called *BitThief*¹ that refuses to upload a single bit and yet achieves good download rates. This implies that there are no real incentives for peers to upload, and any peer that does not want to upload, e.g., because its upload capacity is small and it wants to use this capacity for other purposes, can decide not to help out other peers while still being served by them.

As in the long term we would like to have a p2p file sharing protocol that completely discourages freeloading, we designed two protocols *CycleT4T* and *T4T with source coding*² that are much more robust to selfish participants. In order for two BitThief clients to actually use these protocols they need to disclose one another as BitThief clients while meeting up in a BitTorrent swarm. This seems easy since a client could just announce itself as BitThief during the BitTorrent handshake. However, by doing so a thief reveals itself and its thievish intentions also to other BitTorrent clients. The latter would thus not share content with the thief anymore and BitThief would not be able to steal anything. Therefore, the BitThieves must find ways to recognize each other without revealing their identities to other BitTorrent clients.

The goal of this thesis is to come up with, design, and implement such a revealing mechanism into BitThief.

¹See <http://dcg.ethz.ch/projects/bitthief/>.

²T. Locher et al., “Rescuing Tit-for-Tat with Source Coding”. *P2P 2007*.

Outline of Work Plan

- Reading related work and studying the BitTorrent protocol and the implementation of the BitThief client.
- Formalize the problem and compare different approaches of solving it.
- Implementing the best solution into the existing BitThief client.
- Writing the report and preparing the final presentation.

Duties of the Student

- Regular meetings with the advisers. Ideally, there will be a meeting every week, but the frequency of meetings can be adapted.
- There will be one presentation given by the student in front of the research group at the end of the thesis.
- The student will have to write a short summary of his progress at the end of each month (“Monthly Report”).
- Finally, the student has to write a report (20 to 30 pages, English or German), presenting his work and results. This report should also include a critical review of the work.

General

- Independent working is expected.
- A possibility to work in our building (ETZ) is provided. It is also possible to work at home.

Contacts/Advisers

Raphael Eidenbenz eidenbenz@tik.ee.ethz.ch
Thomas Locher lochert@tik.ee.ethz.ch
Roger Wattenhofer wattenhofer@tik.ee.ethz.ch