

Study of P2P Systems for Video Live Streaming

Contact: Frédéric Giroire.

Email: frederic.giroire@cnr.fr

The goal of this internship is to study and propose models to describe P2P systems. These systems are cheap to operate and scale well, but their highly distributed nature raises questions about reliability, durability, availability, confidentiality, and routing of the data. In particular, the focus of this internship will be on streaming in peer to peer networks. In such system peers are relaying packets or video frames, and the goal is to play the video the nodes ask for. This is possible only if some delay in the playback is allowed, and there exist trade-offs between the number of customers nodes and the delay that the systems can support. Moreover some scheduling protocols must decide which packets are exchanged and who send them in order to achieve the best possible behavior. The analysis of P2P systems involves a wide range of techniques between practice and theory, from mathematical analysis to simulations and deployment of experiments. This will allow us to adapt the orientation of the project to the taste of the interested student.

Objective: During the internship, we will study and simulate a live streaming system for video. We will study its efficiency when there are frequent arrivals and departures of peers. The metric considered will be the delay and bandwidth usage.

The internship can be followed by a Ph.D.

- [1] M. Castro, P. Druschel, A. Kermarrec, A. Nandi, A. Rowstron, and A. Singh, "SplitStream: high-bandwidth multicast in cooperative environments," in Proceedings of the nineteenth ACM symposium on Operating systems principles. ACM, 2003, p. 313.
- [2] X. Zhang, J. Liu, B. Li, and T. Yum, "CoolStreaming/DONet: A data-driven overlay network for efficient live media streaming," in proceedings of IEEE Infocom, vol. 3. Citeseer, 2005, pp. 13–17.
- [3] X. Hei, C. Liang, J. Liang et al., "Insights into PPLive: A Measurement Study of a Large-Scale P2P IPTV System," in International Word Wide Web Conference. IPTV Workshop, 2006.
- [4] L. Massoulié and A. Twigg, "Rate-optimal schemes for Peer-to-Peer live streaming," Performance Evaluation, vol. 65, no. 11-12, pp. 804–822, 2008.
- [5] T. Bonald, L. Massoulié, F. Mathieu, D. Perino, and A. Twigg, "Epidemic live streaming: optimal performance trade-offs," in Proceedings of the 2008 ACM SIGMETRICS international conference
- [6] Giroire, F., Modrzejewski, R., Nisse, N., and Pérennes, S. (2013). "Maintaining Balanced Trees For Structured Distributed Streaming Systems". In Structural Information and Communication Complexity (pp. 177-188). Springer International Publishing.