

Data File Caching Proxy Demonstrator

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Areas of Investigation

- ROOT Optimizations for WAN
- File Caching
- Site Proxy Server

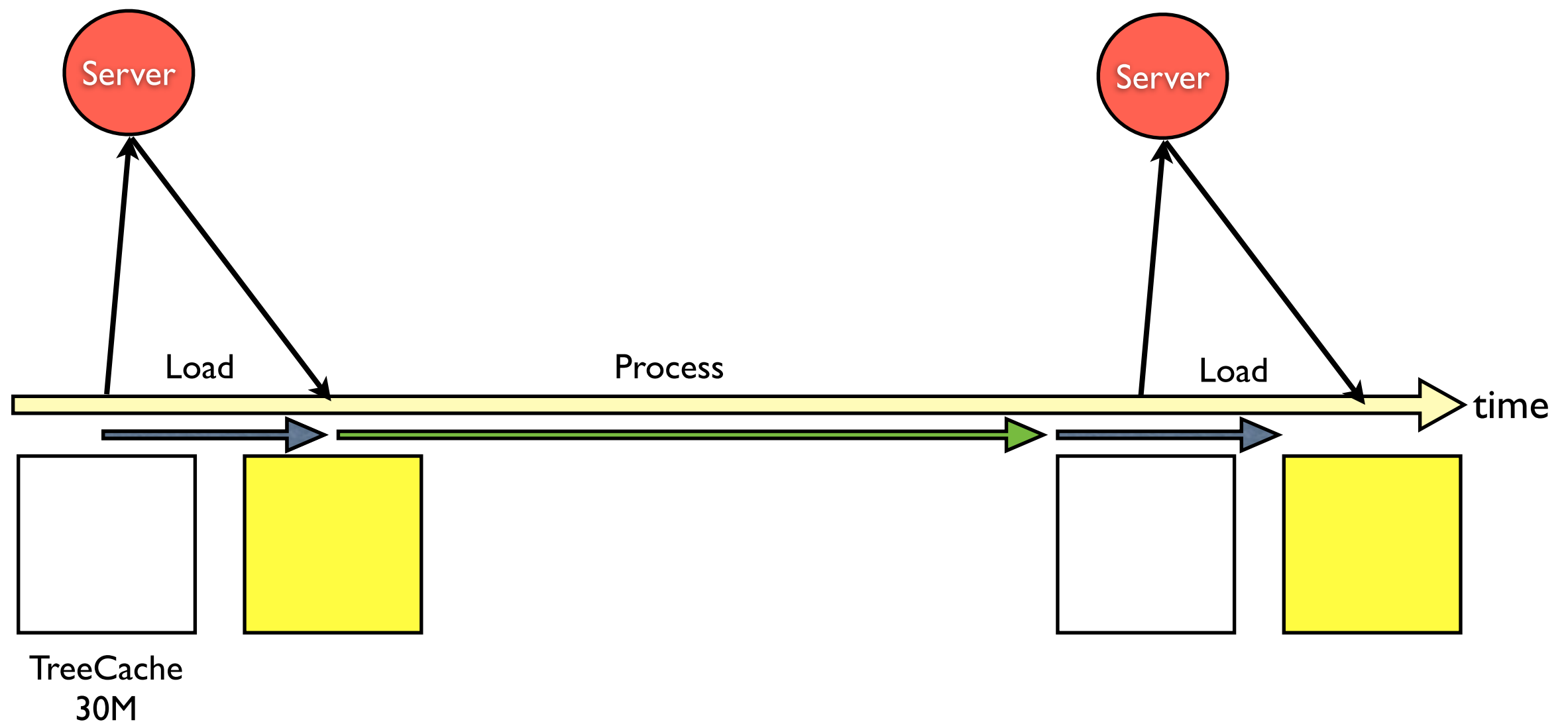
Demonstrator Goals

- Analyze/Improve efficient WAN transfer for xroot and other root protocols
- **Prove** expected **benefits** of proxy/cache approach **for analysis use case**
 - better use of T2/T3 disk space and network bandwidth for popular data
 - low site management effort
 - transparent on-demand caching, cache hierarchies

ROOT Optimiazations for WAN

Prototype Work of Elvin Alin Sindrilaru (fellow IT-DSS)

ROOT Tree processing is synchronous

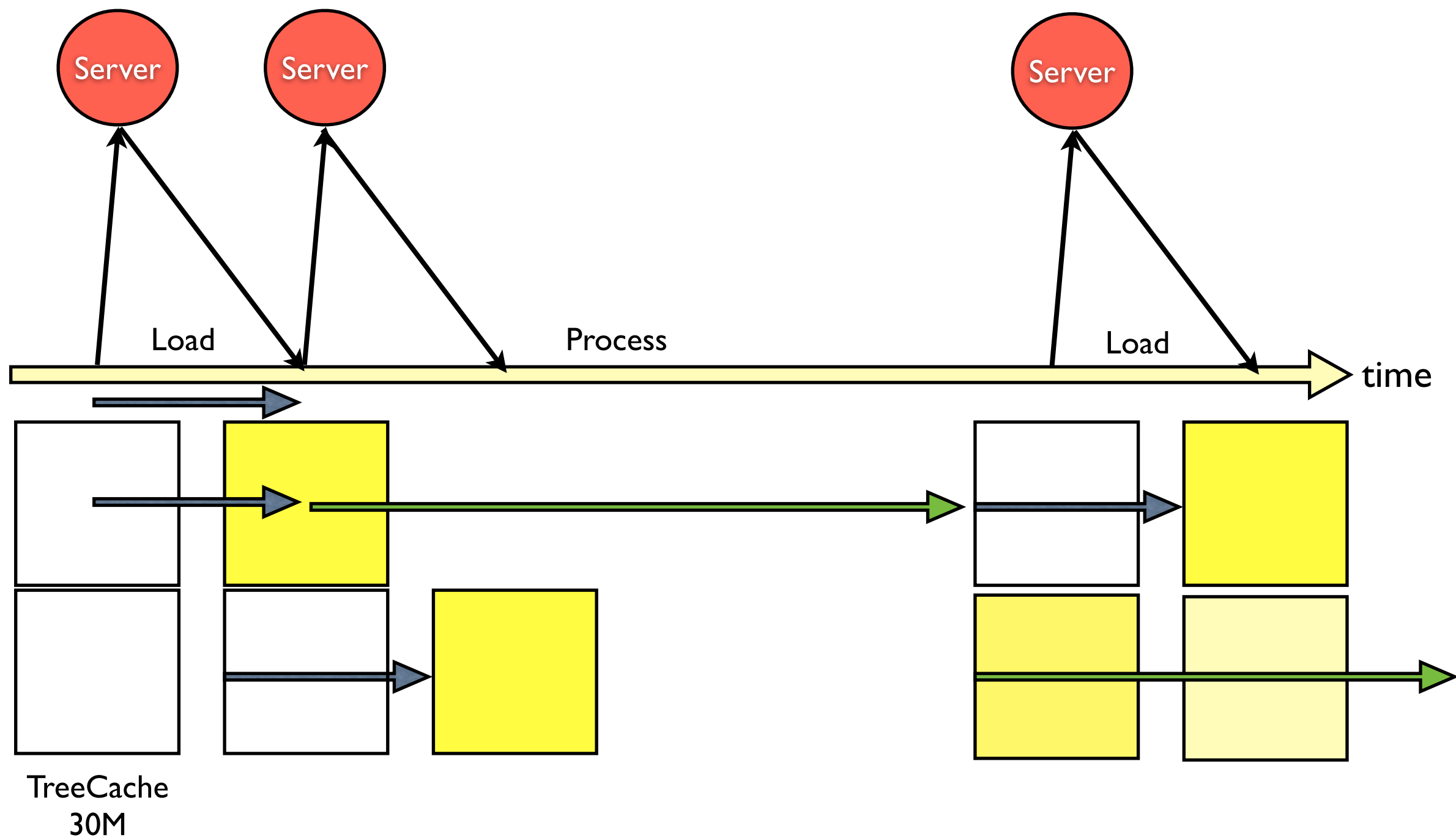


ROOT Optimiazations for WAN

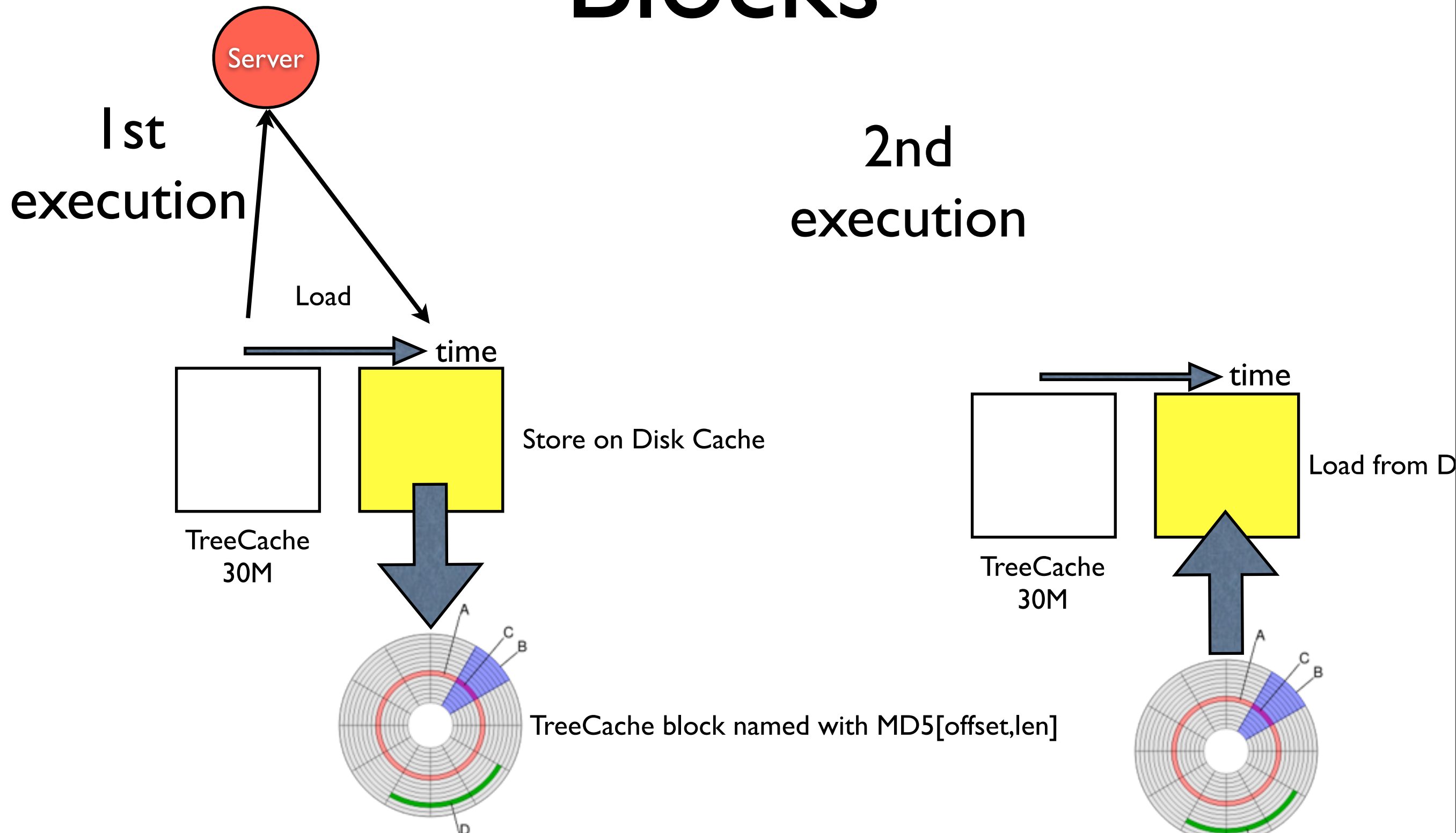
- load phase (where data is fetched from an SE into the TreeCache) is
 - short for LAN transfers
 - significant for WAN transfers (RTT,bandwidth)

→ gain in WAN by asynchronous (double buffering) technique for ALL protocols

Asynchronous Pre-Fetching

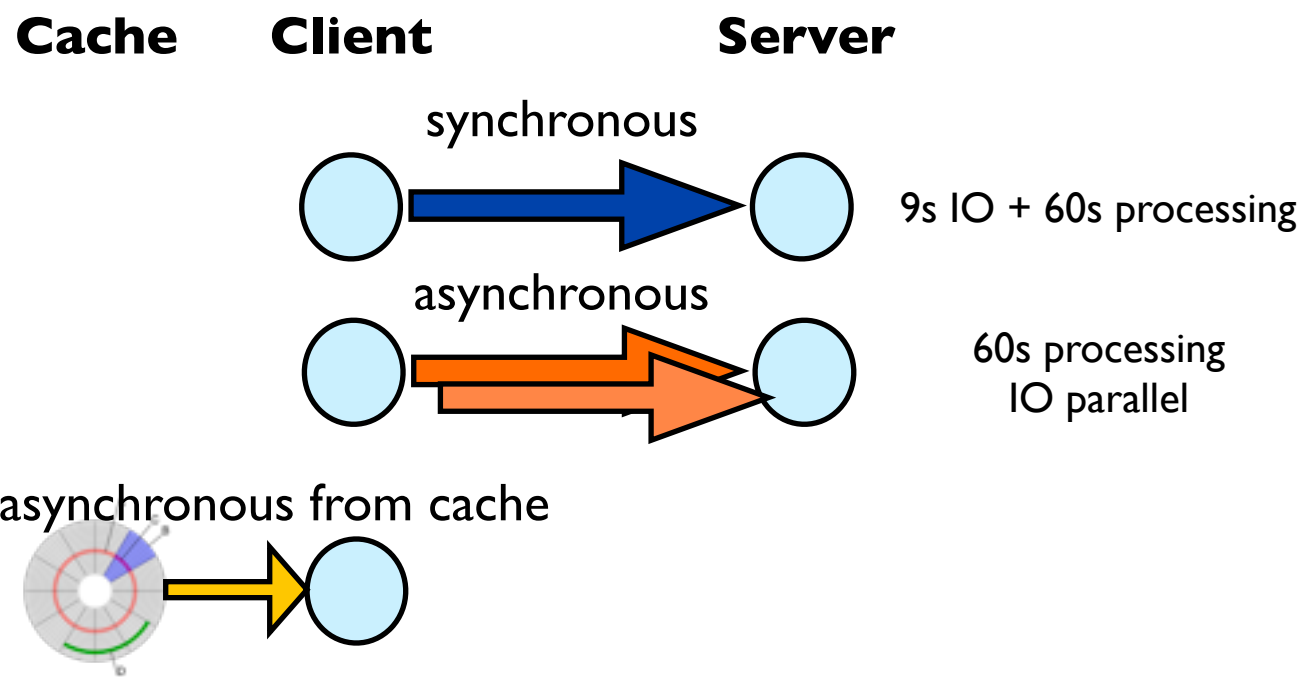


Caching of TreeCache Blocks

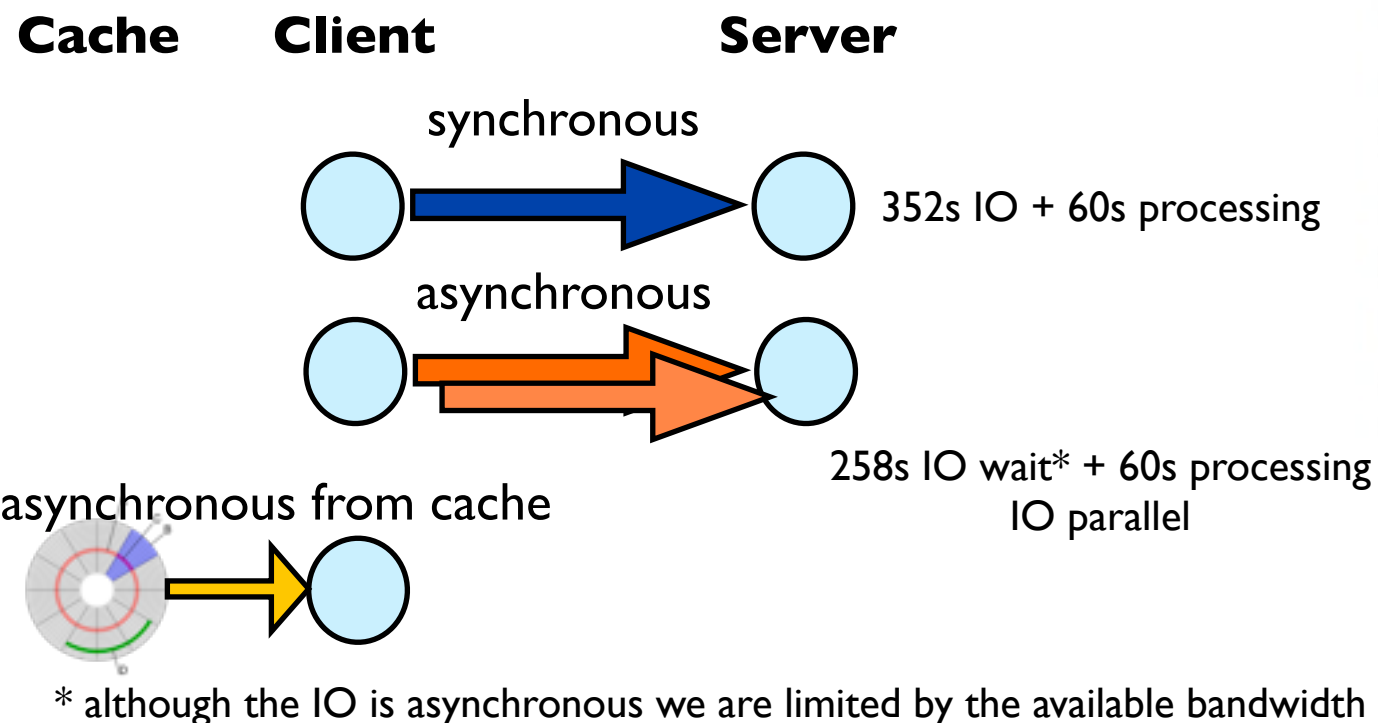
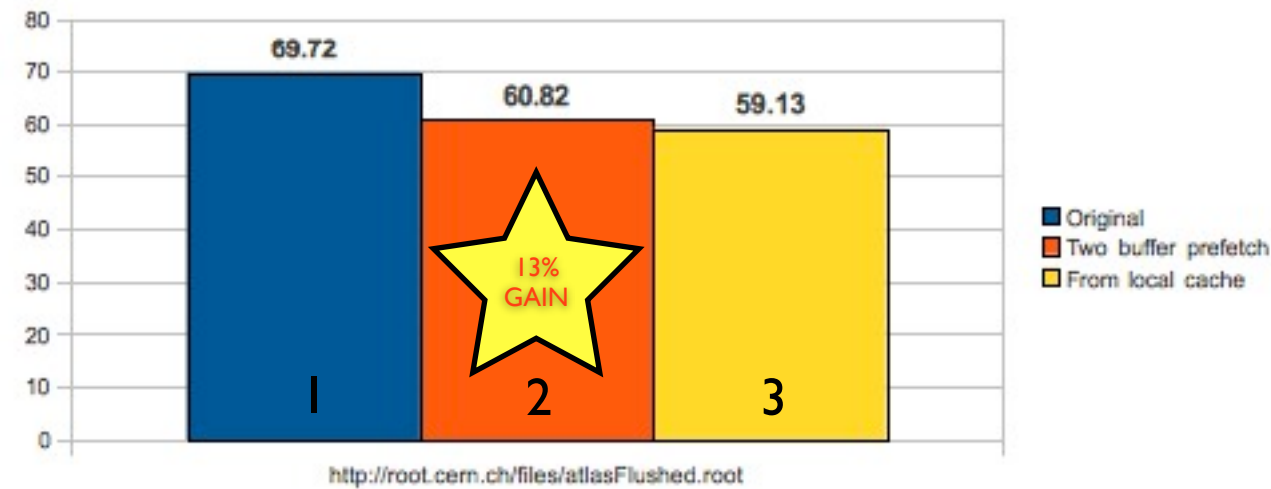


Test Results

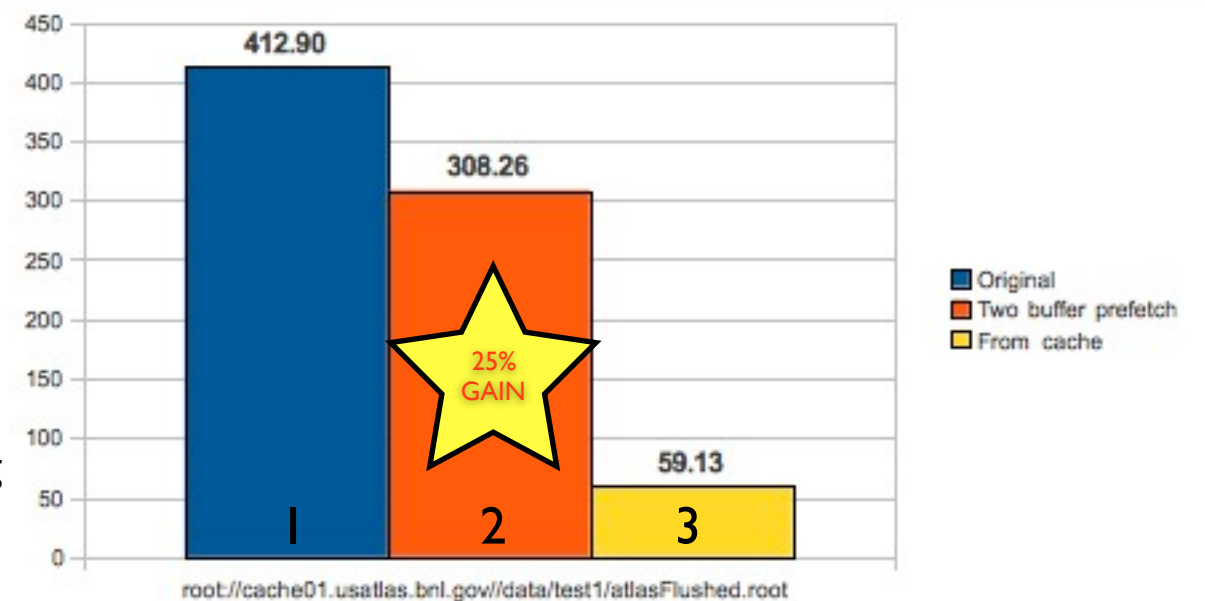
reading an 1.0 GB ATLAS AOD file over http



Server@CERN LAN



Server@BNL WAN



File Caching & Proxy Server

- work has started with promising results for some access patterns (reported during last GDB)
- further studies require real remote access (instead of full file copies) to exploit full benefit of local cache copies
 - this functionality is now available in recent ATLAS and CMS releases

Summary

- The concept of asynchronous pre-fetching has been demonstrated as a very efficient way to **improve** the **cpu/realtime efficiency** of analysis type applications
 - allows to use every synchronous protocol in asynchronous mode
 - allows to evaluate caching of TreeCache blocks on any ROOT supported file storage
 - TreeCache transforms sparse/random access into sequential local access
 - The integration into ROOT needs to take into account the complex IO buffer management
 - good occasion to restructure IO classes before integration of a generic asynchronous mechanism
- Study of file caching can now continue with latest experiment frameworks