Federated Service-Oriented File Transfer Framework

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Thesis Description

Network topology is not always static – *allow for a dynamic topology by implementing as collaborating federated services.*

The network is not always reliable – *develop support for file redundancies and backups using multiple replicated sources.*

Transport cost can be high for single-source downloads – *peer-to-peer networking can distribute transport costs among peer clients.*

Use of a single connection for control and data communication limits performance – *develop support for concurrent RMI based control protocol and smart-proxy socket based data streaming.*

Transport of large whole files using a single stream has a high cost to retransmit if transport is erroneous – *develop a reliable and efficient data transfer method using multiple streams that is better suited for sending large files.*

Bandwidth is limited – *cache most used files on a local byte-store service to reduce the need for excessive bandwidth.*

Objective/Approach

Objective
Develop a framework-based federated file transfer (FFT) protocol and service-oriented storage system with reliable and efficient upload and download capabilities.

Approach
1. Research current technologies related to the FFT framework
2. Conduct a feasibility study to find best technologies to use
3. Refactor or enhance the current SORCER byte-store service implementation as cooperating services
4. Develop support for concurrent control protocol and data streaming
5. Develop support for connections to multiple byte-store peers
6. Develop a method to effectively and efficiently distribute files and file fragments among multiple byte-store services
7. Validate the FFT framework in the SORCER environment

Schedule

2005.11.14 – Literature review of main research trends and current relevant technologies
2005.11.21 – Completed feasibility study
2005.12.02 – Completed initial design of the FFT framework
2005.12.05 – Refactored and enhanced a byte-store provider for the FFT framework
2005.12.12 – Thesis proposal presentation
2005.12.16 – Refined the FFT framework design
2006.01.09 – Developed control/data protocols to multiple peers
2005.02.20 – Deployment, integration, testing of file sharing between peers with its validation in SGrid
2006.03.06 – Thesis defense

Benefits

- Increased scalability and performance achieved by using federated file storage services

- Increased reliability and a dynamic configuration realized by using byte-store providers with smart proxies

- Reduced network costs, improved distribution speeds, and higher reliability provided by using a peer-to-peer system with replicas across multiple byte-store providers