DELIS
Dynamically Evolving, Large-scale Information Systems

Deliverable D6.2.4

Improved prototype of the 3nuts peer-to-peer network
Start date of the project: January 2004
Duration: 50 months
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Due date of deliverable: December 2007
Actual submission date: December 2007
Dissemination level: PU – public

Work Package 6.2: Self-organizing Semantic Overlay Networks
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1 Main Contributions

3nuts is a peer-to-peer network combining the benefits of reliable random graphs and semantic search trees. One of the major goals of 3nuts is to overcome the restricted query languages induced by the use of distributed hash tables. In most of the currently used peer-to-peer networks these distributed hash tables do not support the efficient exploration of the semantic neighborhood of a data entry. In 3nuts, semantic relationships of data are preserved, because peers are assigned to the data and not vice versa. 3nuts allows nontrivial lookups, like prefix search for example. All network operations in 3nuts are local and distributed, i.e. simple handshake operations maintain the network structure. Besides this, 3nuts provides fair load balancing, fast data access and guaranteed robustness, proved by rigorous analysis.

The present deliverable D6.2.4 extends D6.2.3 in the following ways:

- The network has been extended to support prefix search.
- Reduced routing latency. The link structure of the 3nuts overlay network now adapts to the physical network underneath (i.e. the Internet) and thus reduces latency times in the routing process.
- The code has been extend to allow measurement of important network parameters, e.g. hop distances during lookup, monitor message utilization, etc.
- We improved stability, robustness, load-balancing, and reduced the overall network load.
- With storenuts, we provide an application running on top of 3nuts which allows to store metadata in a 3nuts network (e.g. link information of data files or term/document lists of a search engine, such as Minerva developed at MPII). The storenuts application provides an extremely simple API which will turn out to be useful when 3nuts will be integrated into other projects, since storenuts makes the tree-based structure, load-balancing, etc. transparent to the application running on top of 3nuts and thus makes it as easy to use as a DHT-based peer-to-peer network.

To the best of our knowledge 3nuts is the first peer-to-peer network providing network locality (reduced routing latency) as well as data locality (enhanced queries like prefix search). The software and a user guide is available for download under:

http://3nuts.upb.de