SkipNet: A Scalable Overlay Network with Practical Locality Properties

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1 Paper Summary

Many scalable overlay networks have been introduced as a flexible infrastructure to support large peer-to-peer systems. This paper proposes *SkipNet*, a scalable overlay network which provides controlled data placement and guaranteed routing locality by organizing data by string names. It outperforms existing distributed hash tables where local traffic dominates. Plus, it is resilient to organizational network partitions.

2 Problem Definition

Q: What are the major problem(s) or issue(s) addressed by the paper? Are they important and/or interesting? Why?
A: This paper suggest a new distributed hash table technique (DHT). The main purpose of DHTs is to partition ownership of a set of keys among participating nodes, and to efficiently route messages to the unique owner of any given key. It should scale up and handle continual node arrivals and failures.

In addition to that, this paper tries to incorporate locality properties to the system. It is reasonable to solve this problem because data locality and path locality make it possible to manage the system efficiently, to perform better, and to protect against security issues.

3 Main Results

Q: What are the main results of this paper? Are they useful or significant? Will anyone benefit from it? Will it be used by others in their research? Does it open up new areas or resolve an important open issue?
A: The main result of this paper is to introduce a new data structure called *SkipNet*. In their method, a given data can be placed in a pre-determined node. In addition, the routing can be made within a single administrative domain.

This technique can be used by a large-scale company, where the orgainization nodes are spread over the Internet. The company can place the contents close to clients, and maintain the contents efficiently.

4 Approach/Methodology

Q: What is the approach/methodology in this paper? Comment on its degree of novelty, creativity, and technical depth. How would you use them for other studies?
A: *SkipNet* structure is a generalization of skip list data structure. With this new structure, we can skip over 2^k nodes in both numeric and name ID space with logarithmic operation costs for routing and insertion. The main idea is to have a hierarchical ring to efficiently maintain the nodes. The concept of hierarchy is being extensively used in every studies.

5 Strength and Weakness

Q: What are the major strengths of the paper?
A: Following the motivation of this paper, the proposed system supports both content and path locality. Various good properties are being proved by the experiments.

Q: What are the major flaws of the paper?
A: As mentioned in the paper, the system has potential security issues. First, comparing to *CHORD*, fewer nodes are need to compromised to intercept the interdomain traffics.

Plus, the system uses DNS as an access control mechanism, which prevents an arbitrary nodes to create global DNS names containing the suffix of a registered organization without its permission. The problem here is that a potential DNS security issue can make trouble to *SkipNet*.

6 Assumptions and Future Work

Q: What are the the inherent assumptions or the models used in the paper (if any)? Are they still valid today? What are the avenues for future work or follow-up studies? If you are asked to work on the same problem today, how would you do differently?
A: I think the underlying assumption of all this DHT scheme is that every node in the overlay network are likely to cooperate each other. The routing operations are achieved by the messages, and the messages should be relably transferred. Apart from the security issue, there should be some incentives from each overlay node to operate its duty. In addition, the operation overhead should be fairly distributed across the overlay network.