NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

PH.D DEFENCE - PUBLIC SEMINAR

Title: **A content caching strategy for named data networking**

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Abstract:

The type of applications that Internet is being used for is completely different from what it was invented for. Whilst resource sharing was the first goal of networking, accessing huge data, such as multimedia files, is the main usage of the Internet now. The nature of multimedia content requires multicasting which is hard to provide in current point-to-point paradigm of TCP/IP protocol. In addition, concepts like mobility, security, efficiency, billing etc were not the first concern of designers of the Internet. That explains the recent movements toward designing a more efficient Internet which matches the current requirements.

Named Data Networking is one of the successful proposals that has received a lot of attention. By giving name to content, NDN enables in-network caching. However, efficiency of in-network caching has been questioned by experts. Therefore, in this thesis we propose a cache policy, CCndnS, which can increase the efficiency of in-network caching. The idea can be generalized to the domain of Content Networking but we analyzed our approach with NDN.

We realize that the source of inefficiency in a network of caches is the dependency between caches. To break the dependency, each cache regardless of its location in the network should receive independent set of requests.
Without such characteristic, only misses of the downstream caches make their way to the upper caches. That filtering effect establishes a hidden dependency between neighboring caches. CCndnS breaks files into smaller segments and spreads them in the path between requesters and publishers. Requests for a segment skip searching intermediate caches to search only the cache with corresponding segment.

We present mathematical equations for cache and network hit rate when CCndnS is applied. We show that how CCndnS can simplify this task. The model can be used for further studies on cache performance or in a real application such as Service Level Agreement application.

Using CCndnS we suggest some techniques to improve the forwarding architecture of an NDN router for a better match with line speed throughput.

Performance of a cache can even be improved more with partitioning scheme. A dynamic partitioning scheme is presented in this thesis. The scheme can be used to enhance other features like fairness as well.

All ideas and proposed techniques are tested with an event-driven simulator that we implemented.