

## **CSC2231 – Internet Systems and Services**

### **Paper Review #4 – Development of the Domain Name System**

**Name:** Alex Wun

**Date:** Oct. 2nd, 05

The Domain Name System is a decentralized name serving system for the Internet (DARPA Internet at the time of the paper). It was designed to be a highly scalable system for replacing the use of a centralized “hostname” file. The DNS namespace is organized hierarchically into dot-separated zones. Each zone is considered to be the responsibility of an organization or sub-division of a parent organization. The architecture of DNS is hierarchal as well consisting of domain and sub-domain resolvers and root DNS servers at the top. Extensive caching on the resolvers limits the amount of traffic that goes to the root servers.

Mockapetris and Dunlap do an excellent job of outlining both the advantages and disadvantages of the DNS. The successes include extensive use of caching to reduce overall network traffic and use of datagrams (as opposed to TCP) to improve performance. Additionally, the highly flexible, variable-depth structured naming system is entirely appropriate for the organizational characteristics of the Internet. Since this paper is not an initial proposal, but written after adoption, it is also an excellent case study on the adoption of new large-scale protocols in the Internet. The widespread adoption of DNS was hampered primarily not by technological deficiencies but (unsurprisingly) the human element, which often failed to “do things properly”. The authors should be commended for recognizing this fact and choosing (as an initial design point) to omit advanced functionalities. Instead, they opted for only the most necessary features, leading to a lean and easily adoptable design.

DNS is not without its shortcomings and the authors outline several of these. The most significant shortcoming of the DNS is that more responsibility is put onto the administrators of individual zones or domains. These administrators are disparate and are not necessarily able to manage their local name servers at desired levels of efficiency or compliance. From a technical perspective, DNS is unable to guarantee consistency or correctness of name resolutions due to its use of caching and long timeouts. Additionally, their use of datagrams creates a great deal of redundant traffic that would have been avoided with TCP.

Although DNS is not an ideal or perfect naming service it is clearly very successful due to its widespread use today. Its success can be attributed to the designer’s care in addressing the concrete requirements of such a system in practice.