Review of *Development of the Domain Name System*

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1 Key Insights and Contributions

The primary contribution of this paper was its discussion of a replacement for the increasingly cumbersome hosts.txt name resolution system. Before DNS, the mapping between host names and addresses was maintained on a single, central server. Clients would periodically download a complete list, called hosts.txt, from this server.

The scalability limitations of this scheme are obvious, which is why the DNS was developed. DNS replaces the centralized system discussed above with a hierarchy of servers. This hierarchy, consisting of a small set of root servers and a much larger set of localized "resolver" and "name" servers, allows for much greater scalability than the original system since clients often receive the necessary information from a local server and, therefore, do not have to contact any root server. Other key ideas include caching local copies of data to reduce load on the root servers, interoperability with the existing hosts.txt name resolution mechanism, and a split between "resolvers" and "name servers" to reduce workload on the client machines.

2 Areas for Improvement

Although DNS is a clear step up from its predecessor, it still suffers from some shortcomings. For example, DNS is vulnerable to denial of service attacks against the root servers. In one incident several years back, a malicious individual comandeered thousands of PCs and proceeded to flood the root servers with useless traffic. The resulting torrent knocked many, but not all, of the root servers offline. Had the individual succeeded in taking them all down, the Internet would have become effectively useless until service was restored. Clearly, as distributed as DNS is, it still suffers because of the root servers' importance.

3 Implications for the Future

DNS has wide-ranging implications with respect to the Internet's usability. Clearly, had we not implemented a system for translating host names to IP addresses, the Internet would be much less user-friendly. The scalability and reliability of DNS is also central to the operation of today's Internet. The fact that we continue to use DNS almost 20 years after this paper was published suggests that DNS is able to handle modern workloads well.

Future DNS implementations could make use of the valuable lessons learned since DNS's implementation. For example, a future DNS should be better distributed, to avoid the security problems inherent in a system with several root servers, as in the current implementation.