Extending DNS to support geographical coordinates queries

Supervisor(s)

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Description

Domain Name Systems (DNSs) provide a human-friendly translation from computer hostnames into IP addresses and vice-versa. The use of DNS on the Internet has proved to be quite scalable due to its distributed hierarchical naming system. For the most part, DNS stores information about IP addresses and hostnames, but it can also store other types of information, such as mail servers for a given network domain.

Recently, some discussion have been going on in the networking community proposing the extension of DNS in order to cope with queries containing geographical coordinates. This extension has primarily been motivated by the advent of geocast protocols as well as vehicular networks. The former refers to the delivery of information to computer hosts lying within a specific geographical location. Applying this delivery method within the context of vehicular networks, messages could be sent to specific geographical areas in order to warn drivers about a dangerous situation (e.g., icy roads) that might be lying ahead.

If on the one hand, DNS currently enables to express geographic location information for domain names or individual hosts (see RFC 1876), on the other hand it does not support queries containing geographical coordinates. In order to support such queries, DNS servers should be modified (extended). As a result of this extension, applications will be able to issue a set of geographical coordinates and get as a result a set of IP(v6) addresses.

Objective

In this context, the goal of this assignment is the extension of DNS in order to support geographical coordinate queriers. During this assignment the student will be mainly involved with:

- design decisions about how the extension should be done;
- implementation (in C language) of an extended version of DNS;
- experimentation of the extended DNS server.

Deliverables

- Writing of a report & source code documentation;
- Implementation and experimentation of a prototype DNS server that supports queries containing geographical coordinates.

Assignment-specific knowledge

- C programming language
- Background in computer networking (preferably geocast, IPv6, and vehicular networking technologies)