Implementing the mini-Internet Routing Registry
Semester thesis proposal

The routing project [8] is one of the key projects in our communication networks lecture [5]. For this project, we build a virtual mini-Internet infrastructure composed of hundreds of routers and dozens of Autonomous Systems (ASes), and let the students configure their virtual devices and operate their AS. Our students have to configure various routing protocols to enable Internet-wide connectivity, likewise actual network operators.

One of the interesting features of the mini-Internet is its collaborative aspect: every student group must configure a BGP session with its neighboring ASes, which are operated by other students. As in the real life, this task requires discussions between the different ASes involved to ensure that the correct routing policies and filters are configured. However, in the real life, this task is simplified thanks to the Internet Routing Registries (IRR) [2], a globally distributed routing information database where network operators publicly share their IP prefixes and routing policies.

Network operators can populate the IRR using the Routing Policy Specification Language [6]. Then, anyone can access the IRR data using telnet, a terminal-based client such as whois [7] or using web interfaces such as the RADB query service [4]. The IRR data helps operators to configure their BGP route filters, perform network-wide troubleshooting, or infer a global view of Internet routing. For instance, tools such as bgpq4 [1] typically use the IRR data to automatically generate the BGP filters that deny bogus routes received from neighboring ASes.

In this thesis, the goal is to implement a routing registry service within the mini-Internet platform that users can use to configure and debug their network. More precisely, the student is first expected to implement a routing registry backend using an existing open-source IRR database server implementation such as the IRR deamon [3]. Then, the student is expected to implement a frontend service that can be used to populate and query the database in a user-friendly fashion. We envision that students can read and update the mini-Internet routing registry through a web interface. Finally, the student is expected to showcase how the mini-Internet Routing Registry data helps to automatically generate the BGP filters for our mini-Internet project.

Milestones

- Understand what is the IRR, how it works and the open-source tools used to run the different IRR services;
- Implement a mini-Internet routing registry backend;
- Implement a mini-Internet routing registry frontend for populating and querying the data;
- Illustrate how the mini-Internet routing registry helps our students to tackle the typical BGP-related tasks such as configuring the BGP filters.

Prerequisites

- Being able to program in Bash and Python, good knowledge in UNIX-like systems;
- Communication Networks (227-0120-00L).

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References


