Technische Universität München
Chair for Network Architectures and Services
Prof. Dr. Georg Carle

15.01.2010

Student assistant jobs

# Internet Exploration and Cartography

Motivation

Due to unregulated Internet growth, global information on its infrastructure are not available anymore. As the ISP scenery and especially its interrelations are highly intransparent and most often of confidential matter, technical means for exploring and mapping the Internet became highly valuable just like detailed real-world maps. Generating such maps is a complex area of research leaving enough space for individual contribution.

Topics

Traceroute re-development

New Internet technologies like load balancing or firewalling lead to severe traceroute anomalies. Sophisticated approaches can correct some of its deficiencies, but for an exhaustive cartography attempt, the traceroute concept has to be reinvented. Distributed approaches with two or more measuring points should be considered as well.
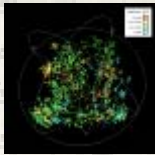
Measurement of link characteristics

Tools for measuring link characteristics are far from reliable. While there are basic approaches for media type, capacity and bandwidth, distance metering has still to be considered as green-field. Innovative development as well as improving current procedures are part of this topic.

Internet infrastructure analysis

Backbone-routers, their geographical location as well as their belonging to autonomous systems (ASs) are the building blocks of every cartography attempt. Link information on top of these structures are essential as well. Obtaining and organizing this data is based on massive tracerouting and a challenging task.

Internet infrastructure visualization

Automated processing of infrastructure data is another highly important step towards intuitive Internet maps. Accessing current graph drawing technologies as well as Google Maps, an interactive and layered real-world visualization including exposure of AS- and router-level topology is the objective.

Dynamic routing analysis

Routing information augmented on static Internet maps is the last stage of expansion. Obtaining this data on AS- and router-level as well as drawing interactive graphs combined with infrastructure information from earlier stages represent the result of the cartography efforts.

Requirements

• Explorative nature
• Programming skills (e.g. C/C++ or Python)
• Advanced knowledge on computer networks

Keywords

Network measurements, network topology, Internet routing, graph drawing

Further information and detailed topic descriptions:
http://www.net.in.tum.de/en/theses

Contacts:
schlamp@net.in.tum.de | haage@net.in.tum.de