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Vrije Universiteit of Amsterdam and CAIDA UC San Diego

Proposal for the Research Exchange Program

Maarten van Steen, June 2000

Overview

We propose an exchange between Wilfred Dittmer, a master's student and future scientific programmer in the Computer Systems Group at the Vrije Universiteit of Amsterdam, and CAIDA in San Diego.

Wilfred would work with KC Claffy on the Skitter project for 6 months starting in September 2000. Work concentrates on enhancing and developing tools for measuring Internet traffic in order to obtain better insight in the physical orgainzation of the network.

Description of the Sending Institute

The Computer Systems Group at the Vrije Universiteit Amsterdam is headed by Andrew Tanenbaum. The group is working on wide-area distributed systems in the Globe project. They are now in a phase in which experiments across the Internet can be set up. At present, approximately 13 people, including staff, researchers, grad students, and programmers, are involved in Globe.

The Computer Systems group is actively cooperating with the Intelligent Interactive Distributed Systems group headed by Frances Brazier. The main field of cooperation currently lies in designing a worldwide scalable architecture for supporting agent-based application development. We aim to integrate this agent architecture and Globe into a single system.

Description of the Receiving Institute

The Cooperative Association for Internet Data Analysis (CAIDA) is a collaborative undertaking among different organizations aimed at promoting greater cooperation in the engineering and maintenance of the Internet. One of the goals of CAIDA that is particularly relevant for this proposal, is creating Internet traffic metrics, and actually measuring various performance issues related to the Internet.

CAIDA is located at the San Diego Supercomputing Center (SDSC), which is an extension of the University of California at San Diego (UCSD). It was founded by dr KC Claffy.

Description of the Student

Wilfred Dittmer is currently a master's student in the Computer Systems group. He is finishing his thesis on using the Globe wide-area location service for building a secure, scalable Instant Messaging service. The main distinction with existing messaging services, is the inherently distributed and scalable nature of the location database, as well as facilities for secure tracking and communication of peers.

Wilfred has followed the Computer Systems track of courses, which includes courses in operating systems, computer networks, parallel programming, and distributed systems. He has done a considerable amout of practical work in the form of various assignments, most of which comprise 3-6 weeks fulltime design and implementation. He has shown to be a strong and practical student, aimed at making something that is useful for others.

We have offered Wilfred a job as a scientific programmer in the Globe project. His task will be to do detailed design and implementation of various Globe components, starting with work in the field of security.

Research Exchange Plan

Wilfred is interested in designing and implementing components for complex distributed systems. One of his drives is develop programs that are actually used by end users, and not to just build programs for the mere fun of programming.

This aspect also brings us to one of the problems in wide-area research: to make distributed systems that are actually uselful, it is necessary to do various experiments to see how components actually behave. To that end, having access to wide-area data, and being able to analyze data by means of appropriate tools is a must. Such data and tools are currently missing in the Computer Systems group. In addition, equally leveling the expertise at CAIDA concerning Internet metrics and measurements, is not practically feasible. In other words, the work and expertise at CAIDA supplements that present in our own group.

Wilfred will be working on the skitter project at CAIDA (see also http://www.caida.org/tools/measurement/skitter/). Skitter essentially lets a host on the Internet build up a spanning tree to numerous other hosts and

subsequently aggregates various performance measurements from polling the nodes in the tree.

The current set of tools for analyzing performance can be improved. For example, results from multiple hosts (each with its own spanning tree) should be aggregated and visualized at different granularities (i.e. IP versus AS level). Also, the current set of tools do not reflect the delays at intermediate nodes. Another example is to visualize the placement of hosts based on the actual location of routers and not to just use IP addresses.

Exactly which tools will be expanded is to be decided after an introduction period during which the student can familiarize himself with skitter. Depending on mutual interests, a selection will then be made.

Deliverables

Following an earlier exchange proposal, we propose to let the student submit a brief email report at the end of the first month and milestone reports at 3 month intervals thereafter. A final report is due a month after the exchange is over. These reports do not need to be long but should include status reports of the research project. CAIDA should submit a status report midway through the exchange and also a final report after the exchange is completed. Also, CAIDA should report any problems or failures to meet expectations as they occur.

Futures

One of the benefits of this exchange for the VU is getting more insight in system's behavior in a wide-area setting. Data are generally rare when it comes to wide-area systems. CAIDA has significant experience in gathering data and statistics, and we hope to learn from them. Having a programmer in our group who knows about wide-area performance measurements is going to be of great help.

Time Frame

Wilfred would like to come to CAIDA in September 2000 and stay for a period of six months. A couple weeks off around Christmas to return to the Netherlands is part of the plan. Based on previous experience, we believe that a 6-month stay at CAIDA is the minumum to produce results that are worthwhile.

Budget

The estimated costs for Wilfred's stay at CAIDA are as follows:

round trip airfare	2 * $750
housing	$550/month, during 6 months
food	$300/month, during 6 months
books, supplies	$400
local transportation	$75/month during 6 months
spending money	$100/month during 6 months
conference talks, etc.	$1500

This totals to about $1600 per month. If the budget turns out to be wrong (in either direction), it will be revisited at one of the 3 month reviews.

In addition, Maarten van Steen will be visiting San Diego once in January for about a week.

round trip airfare	$750
hotel/food/	$150 * 7 days

The total estimated budget is therefore $13350.