

PlanetLab - P2P Testing in the Wild

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Abstract

PlanetLab is a seasoned Internet testbed for distributed applications consisting of donated nodes located at more than 350 remote locations spread across the globe. It is particularly appropriate for peer-to-peer application research due its large-scale, distributed operation, and the availability of nodes with edge characteristics. This talk describes the basic testbed offering and suggests appropriate use-cases.

Keywords

Test facilities; Distributed algorithms

I. INTRODUCTION

PlanetLab [1] is a large-scale distributed testbed for algorithms and networking research. It has been in operation since 2002 and currently includes more than 1000 registered nodes in more than 350 remote locations. In this talk, we will cover the basic PlanetLab infrastructure and review a number of use-cases that highlight the unique characteristics of the testbed.

II. FACILITIES

PlanetLab nodes are time-shared computers running a modified version of Fedora Core Linux. Each node instantiates one or more slices; jailed, isolated environments where the users can have root access, without affecting or jeopardizing the other users of that node. Access to each slice is restricted to SSH connections using public/private key authentication. The PlanetLab Central sites [3], [2] provide administration and management for users, nodes and slices.

Each PlanetLab node is connected to the Internet without an intervening firewall or Network Address Translator (NAT). Security is built into the PlanetLab system, through auditing, monitoring, and access restrictions. The PlanetFlow Central service [5] provides netflow like tracking of communication sessions into and out of each PlanetLab node.

III. USE CASES

It is helpful to review use-cases for PlanetLab as a method of highlighting specific characteristics of the testbed.

A. Content Distribution Networks - CoDeeN

One of the first research projects to use PlanetLab was the CoDeeN [4] project. In CoDeeN, the researchers developed a large-scale distributed content distribution system consisting of high-performance proxy servers deployed on PlanetLab nodes. These servers behave as both request redirectors and server surrogates. The value of the PlanetLab testbed is the ability to operate these servers in a real-world Internet environment, physically distributed in many locations. The interactive behavior of the remote servers was both a challenge and an opportunity for the CoDeeN researchers. This project spawned a number of sub-projects as specific issues arose and were addressed. CoDeeN is a long running PlanetLab service, having been operational since 2003.

B. Distributed Internet Measurements - DIMES

The DIMES [8] project attempts to map the Internet using versions of the traceroute protocol. The system leverages the PlanetLab facility by placing active sensors on each PlanetLab node. Since the nodes are remote from each other, the resulting traces expose multiple routes through the Internet's core. DIMES became operational in 2009, and is expected to be a long running PlanetLab service.

C. Distributed Hash Tables - OpenDHT

OpenDHT [6] is a publicly accessible distributed hash table (DHT) service. In contrast to the usual DHT model, clients of OpenDHT do not need to run a DHT node in order to use the service. Instead, they can issue “put” and “get” operations to any DHT node, which processes the operations on their behalf. No credentials or accounts are required to use the service, and the available storage is fairly shared across all active clients. OpenDHT was developed and deployed on PlanetLab. The specific characteristics of PlanetLab nodes led to enhancements of the algorithms [7] for non-optimal network latencies as observed in the real-world Internet.

IV. PARTICIPATION

PlanetLab is open to research and commercial users through the PlanetLab Consortium. Academic researchers may join the consortium without cost. Members are required to donate two recent computers to the system, to maintain these computers, and to provide unrestricted access between these computers and the public Internet. PlanetLab has built-in management and auditing services that enable these nodes to be managed remotely by the consortium administrators located in Princeton, NJ, Paris, France, and elsewhere around the globe.

V. CONCLUSION

PlanetLab is an appropriate testbed for distributed algorithms that are expected to live and survive near the edge of the Internet. It provides a safe and secure environment for testing and operating peer-to-peer algorithms and monitoring their activities.

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