JAIST Repository
https://dspace.jaist.ac.jp/

Title	大規模実証環境の実現と実験支援によるネットワークサービスの検証技術
Author(s)	宮地，利幸
Citation	
Issue Date	2007-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/3570
Rights	
Description	Supervisor:篠田　陽一，情報科学研究科，博士

JAIST
JAPAN
ADVANCED INSTITUTE OF
SCIENCE AND TECHNOLOGY

Japan Advanced Institute of Science and Technology

On Verification Techniques for Network Services on Large Scale Testbeds Using an Experiment-Support Environment

Toshiyuki Miyachi
School of Information Science
Japan Advanced Institute of Science and Technology

March, 2007

Abstract

New technologies must be evaluated to prevent negative influences on the real environments before introducing them to fields such as automobiles or medical systems.

The Internet has become the most versatile and most widely spread communication infrastructure that covers the entire world, with so many critical services running on it. In the past, the Internet had two aspects, experimental and practical; hence new technologies could be evaluated using the Internet itself. However, we cannot evaluate newly developed distributed software directly on the current Internet because it may severely impact the existing crucial services. Now we can use Internet-like environments to avoid these problems. The existing evaluation techniques for network services are not enough, because we deal with a relatively new environment. Therefore, in this paper, I discuss novel evaluating techniques for network services.

First, I classify purposes and phases of network experiments, and characteristics of techniques for making experiments, such as software simulators and testbeds based on actual nodes. Generally, an experiment has 3 steps: deciding the detail of the experiment, executing the experiment, and analyzing the resulting data. Next, I discuss in detail the 2nd step, which is the most fundamental one. General software simulators help to perform experiments through simulation, however, testbeds based on actual nodes are currently not sufficiently deployed. In order to solve this problem, StarBED, which is a testbed based on lots of actual nodes, is proposed and implemented, for building a large-scale, complex and realistic environment for experiments. As it is difficult to manage and control such a large number of nodes, SpringOS, which is a support software for making experiments on StarBED, is also designed and implemented. SpringOS creates the experiment topology, and drives the experiment scenario automatically, according to user configurations.

General software simulators and StarBED/SpringOS will help researcher make network experiments in an easy manner. However, if the details of experiments are not correct, the result will also be incorrect. In my thesis I discuss methods to decide techniques for making environments and topology for experiment to help researchers in planning network experiments.

Key Words: **Network Experiments, Evaluation, Large-scale Testbed, StarBED, Supporting Software for Network Experiments**