ns-2 Tutorial

Haobo Yu, Nader Salehi
USC/ISI
{haoboy,salehi}@isi.edu

Overview

- Project goals and status
- What is ns
- History and status

- Seminar schedule

Goals

- VINT: Virtual InterNet Testbed
- A collaborative simulation platform
  - Provide common reference → promote sharing
  - Test suites → increase confidence in results
- Intended audience
  - Researchers
  - Developers
  - Educators

What is NS

- Discrete event simulator
- Packet-level
- Link layer and up
- Wired and wireless

History and Status

- Columbia NEST
- UCB REAL
- ns-1
- ns-2
  - 100K lines of C++
  - 70K lines of OTcl
  - 30K lines of test suite
  - 20K lines of documentation

Platforms

- Most UNIX and UNIX-like systems
  - ✓ FreeBSD or *BSD
  - ✓ Linux
  - ✓ Sun Solaris
  - ? HP, SGI
- Window 95/98/NT
  - Some work, some does not
- (Emulation only for FreeBSD for now)

Related Research

- intserv/diffserv
- Multicast
  - Routing
  - Reliable multicast
- Transport
  - TCP
  - Congestion control
- Application
  - Web caching
  - Multimedia

Installation

- Getting the pieces
  - Tcl/TK 8.x (8.0.5 preferred): http://dev.scriptics.com
  - OTcl, TclCL, ns-2, nam-1: http://www.isi.edu/nsnam/dist
- Other utilities
  - http://www.isi.edu/nsnam/ns/ns-build.html
  - Tcl-debug, GT-ITM, xgraph, …

Getting Help

- ns-2 build questions
  - http://www.isi.edu/nsnam/ns/ns-build.html
- ns-users@isi.edu (previously ns-users@mash.cs.berkeley.edu)
  - ns-users-request@isi.edu
  - "subscribe ns-users" in body
  - Archive: http://www.isi.edu/nsnam/ns

Resources

- Tcl (Tool Command Language)
  - http://dev.scriptics.com/scripting
- OTcl (MIT Object Tcl)
  - ~otcl/doc/tutorial.html (in distribution)
- ns manual
  - Included in distribution: ~ns/doc
  - http://www.isi.edu/~salehi/ns_doc.ps.gz

Cautions

- People tried best to validate ns with regression tests
- However: abstraction of the real world is necessary for a simulator
- ☛ You must justify the usage of this simulator based on your research goals

Workshop Goals

- Capability of the simulator
  - Design and implementation
  - Complete examples of its usage
- We try to avoid:
  - Detailed research results

Workshop Schedule

- Day 1: OTcl-based simulations
  - Fundamentals: wired and wireless worlds
  - Supporting tools
  - Lab
- Day 2: C++ and ns
  - ns internal
  - Extending ns
  - Lab

History and Status

- Users from approximately
  - 600 institutes
  - 50 countries
- Releases
  - Periodic releases (currently 2.1b6, Jan 2000)
  - Nightly snapshots (probably compiles and works, but “unstable”)
  - Available from: USC/ISI, UC Berkeley, UK mirror

Functionality of ns

- Wired world
  - Point-to-point link, LAN
  - Unicast/multicast routing
  - Transport
  - Application layer
- Wireless
  - Mobile IP
  - Ad hoc routing
- Tracing, visualization, various utilities