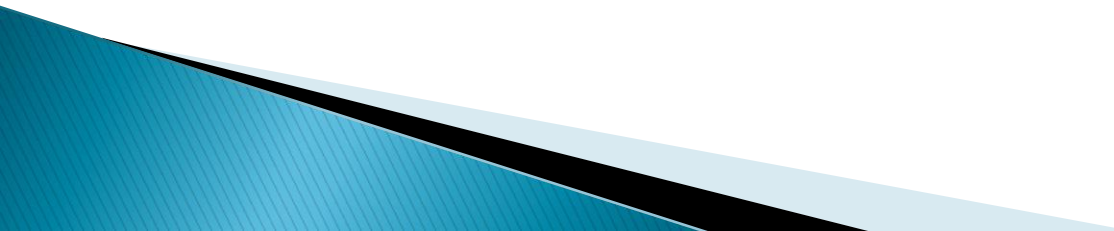
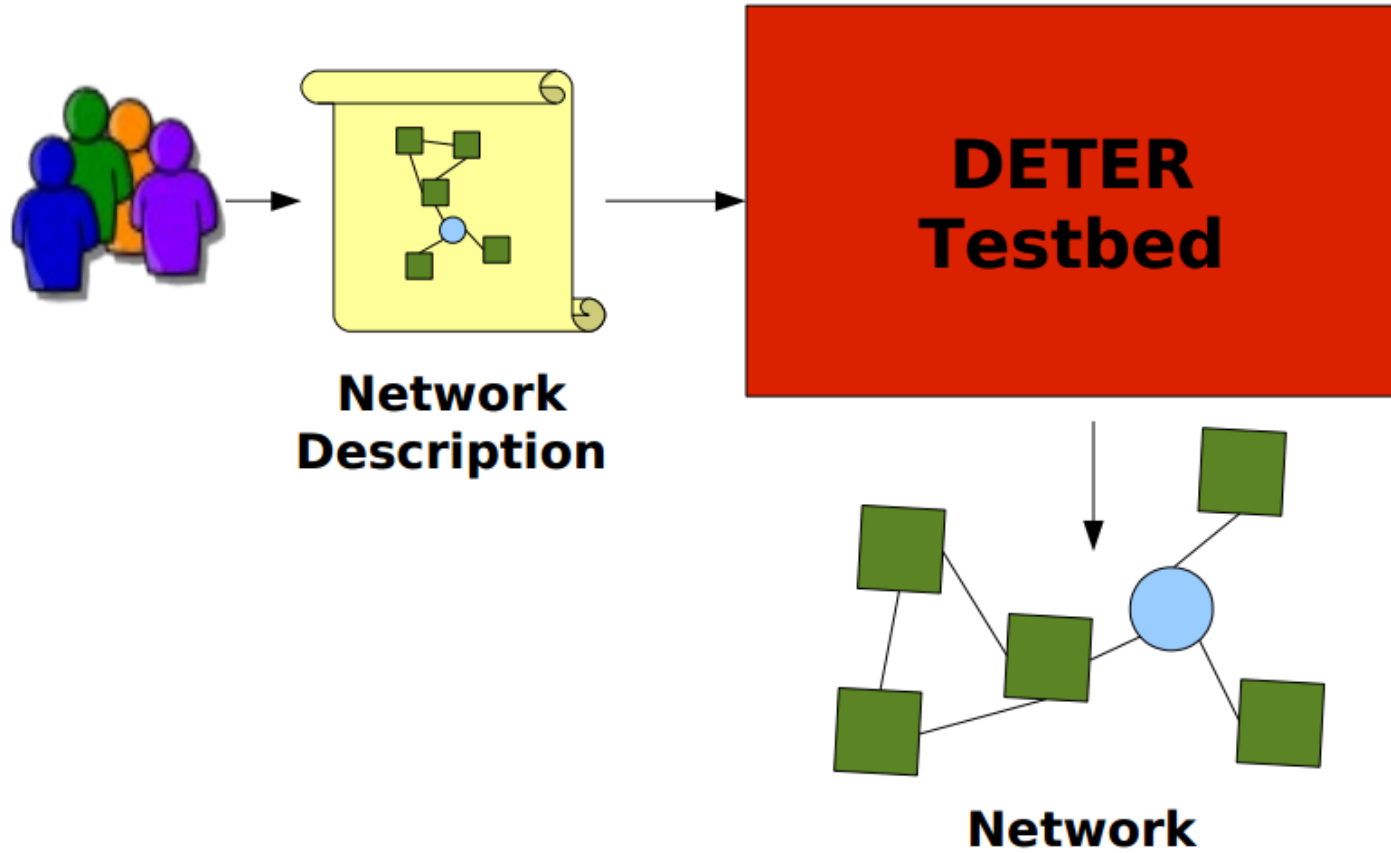


DETER

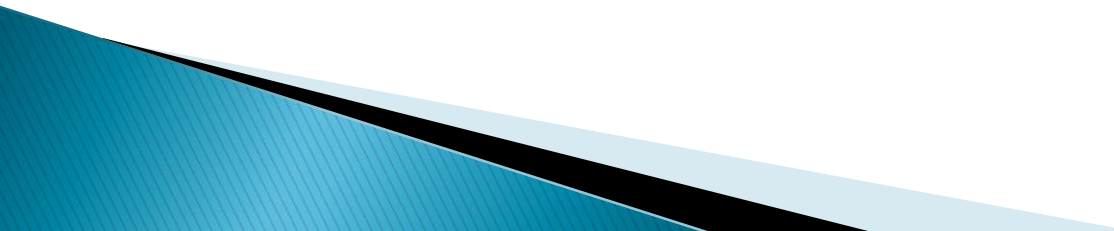
Introduction

- ▶ DETER is a network testbed environment for deploying and analyzing distributed applications
 - ▶ DETER is the research project and operator of [DeterLab](#), the primary shared facility for scientists engaged in research, discovery, development, experimentation, and testing of new cyber–security technology
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Workflow



Workflow(contd..)

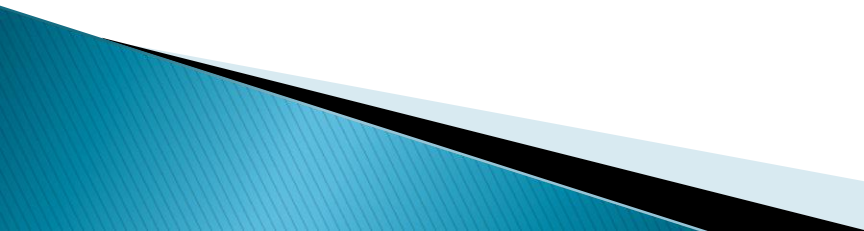
- ▶ Describe the physical system on which your distributed system runs
 - ▶ Submit that system description to the DETER web interface. DETER will then create and deploy that system for you within the DETER cluster
 - ▶ Deploy your software in the environment created by deter
 - ▶ Analyze your software and/or collect metrics
- 

System Description

At a minimum, the description of the physical system involves the following:

- ▶ Machines together with their operating systems
- ▶ Physical links between machines together with their characteristics or LAN groups of machine

Creating Experiment in Deter

- Designing a Network Topology
 - DETER uses the "NS" ("Network Simulator") format to describe network topologies
 - Network simulator (ns) language, is an embedded language in the general purpose TCL programming language. DETER has extended ns with commands that are specific to testbed features
- 

Sample NS File

```
set ns [new Simulator]
source tb_compat.tcl
set nodeA [$ns node]
set nodeB [$ns node]
set nodeC [$ns node]
set nodeD [$ns node]
set link0 [$ns duplex-link $nodeB $nodeA 30Mb 50ms DropTail]
tb-set-link-loss $link0 0.01
set lan0 [$ns make-lan "$nodeD $nodeC $nodeB " 100Mb 0ms]
# Set the OS on a couple.
tb-set-node-os $nodeA FreeBSD7-STD
tb-set-node-os $nodeC Ubuntu1004-STD
$ns rtproto Static
# Go!
$ns run
```

- **Beginning the Experiment**
- Log into DETER with your account
- Under the "Experimentation" menu at the top of the page, click "Begin an Experiment"
- Select your Class Project name from the "Select Project" dropdown.
- Leave the "Group" dropdown set to Default unless otherwise instructed
- In the "Name" field, enter a name of the format *username-exercisename*
- Enter a brief description in the "Description" field
- In the "Your NS File" section, browse and upload the NS file
- Set the "Idle Swap" field to 1 hour. Leave the rest of the settings for "Swapping," "Linktest Option," and "BatchMode" alone (unless otherwise instructed).
- If you would like to start your lab experiment, check the "Swap In Immediately" box and confirm
- Click "Submit"!

Accessing The Experiment

- Experiment nodes are firewalled
- To access the experimental nodes, you'll need to first ssh to `users.deterlab.net`
- Once you log in to `users`, you'll need to ssh again to your actual experimental nodes
- Since your nodes addresses may change every time you swap them in, it's best to ssh to the permanent network names of the nodes
- File systems are imported to experiments. Nodes have local disk to avoid overhead

How to work on experiments?

- Log into DETERLab with your DETERLab account
- Click on the "My DETERlab" link on the left hand menu
- In the "Current Experiments" table, click on the name of the experiment you want
- Under the "Experiment Options" menu on the left margin, click "Swap Experiment In", then click "Confirm"
- The swap in process will take 5 to 10 minutes. While you're waiting, you can watch the swap in process displayed in your web browser. Or, you can watch your email box for a message letting you know that it has finished swapping in

Experiment States

- **Swapped**

Internal representation exists. No resources allocated

- **Active**

Resources allocated, configured, in use

- **Changing State**

Swapping in/Swapping out

LinkTest

- ▶ On the IP infrastructure level, to check if DETER has set up the network as requested, we can use the LinkTest option
- ▶ Linktest is an end-to-end validation test for DETERLab experiments. It verifies that experiment nodes are up, that they are reachable by static routes, and that traffic shaping on delay nodes matches the experiment NS script
- ▶ There are four test levels:
 - Level 0 – Do not run Linktest
 - Level 1 – Connectivity and Latency
 - Level 2 – Static Routing
 - Level 3 – Loss
 - Level 4 – Bandwidth

The Project Filesystems

- ▶ **Under /proj/project**
 - ▶ Custom disk images
 - ▶ Software (rpms, tar files)
 - ▶ Per-experiment data
 - ▶ **Under /proj/project/exp/experiment**
 - ▶ Log files (loghole)
 - ▶ Shared experiment data
- 

Getting Outside

- **Talking to the Internet**
- Risky Experiment Services
- Controlled permeability of the deter isolation
- Requires Administrative coordination
- **Talking to other testbeds**
- DETER federation system
- Incorporate other testbed nodes – PlanetLab, Emulab, ProtoGENI..
- **<http://fedd.isi.deterlab.net>**