DaCoPAn

Петрозаводский государственный университет

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UNIVERSITY OF HELSINKI

DaCoPAn Distributed Software Engineering Project
-
Проект DaCoPAn

Presentation produced by the DaCoPAn team (see below)

Description of the problem

Motivation

- Internet protocols form the basis of data communication education
- Internet protocols are actively studied by researchers.
- There are almost no tools available for studying the behaviour of real network protocols
- Provide a tool that students can use at home, teachers can use in the classroom, and researchers can use in the laboratory
- Features: easy to use, powerful for visualizing, and extensible for future projects

Uses for DaCoPAn

Teaching

- Teachers can use scenarios to show the most important ideas.
- Save time preparing lectures.
- Can use the tool to assign exercises to the students.

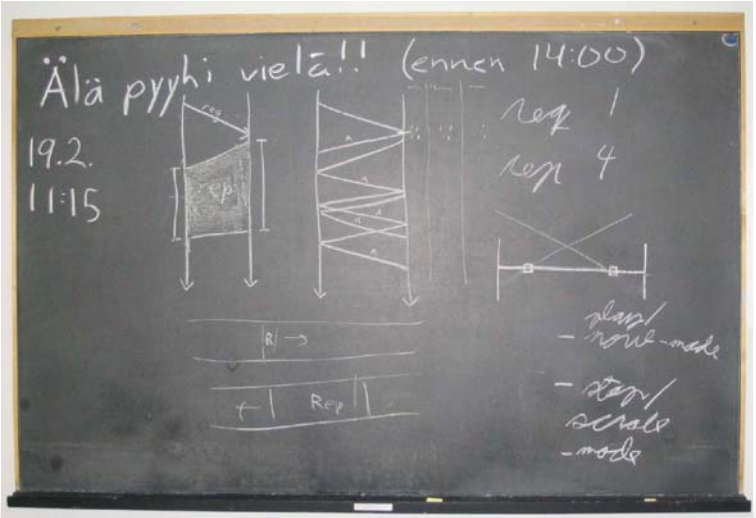
Students

- Can download DaCoPAn for home use.
- Used as personal e-learning tool.

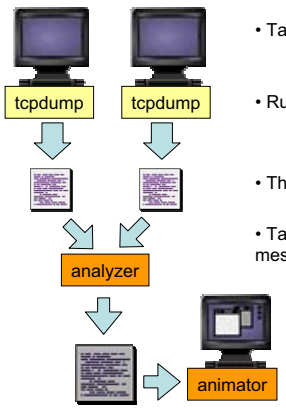
Researchers

- Can use real data to see complex situations in a network
- Useful for performance analysis

Traditional methods for teaching protocols

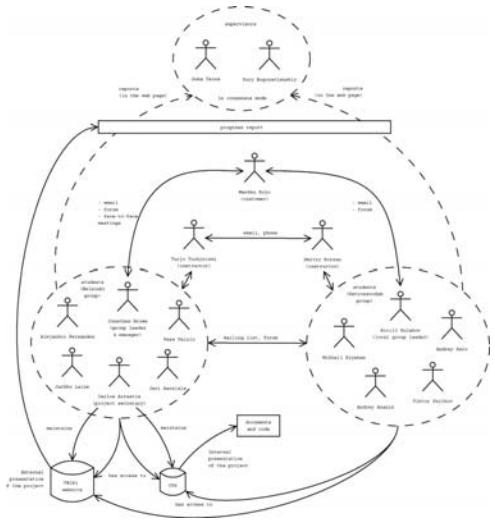


Description of the solution



- Take a network with two computers
- Run a program called "tcpdump"
- This program saves the network traffic into two files
- Take these files, and analyze them, to see what messages happen between the two computers
- A file is output from the analyzer
- This file acts as input for the animator.

Organizational division



Project team

Idea

Timo Alanko

Yury Bogoyavlensky

Customer

Markku Kojo

Supervisors

Juha Taina

Yury Bogoyavlensky

Instructors

Turjo Tuohiniemi

Dmitry Korzun

Project team

H-group

- Jonathan Brown, manager
- Alejandro Fernández
- Carlos Arrastia
- Jari Aarniala
- Jarkko Laine
- Vesa Vainio

P-group

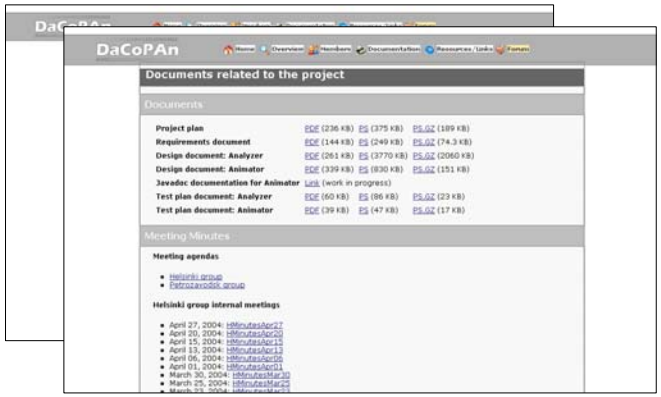
- Kirill Kulakov, group leader
- Andrew Salo
- Andrew Ananin
- Mikhail Kryshen
- Viktor Surikov

Communication

- Team Wiki website
- Forum
- CVS
- E-mail

Communication

Team Wiki website



http://db.cs.helsinki.fi/~tkt_daco/twiki/bin/view/Main/DaCoPAn

Communication

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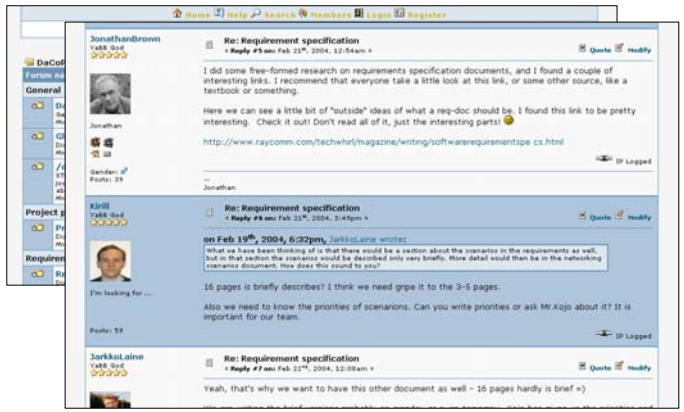
- E-mail

Communication

Forum



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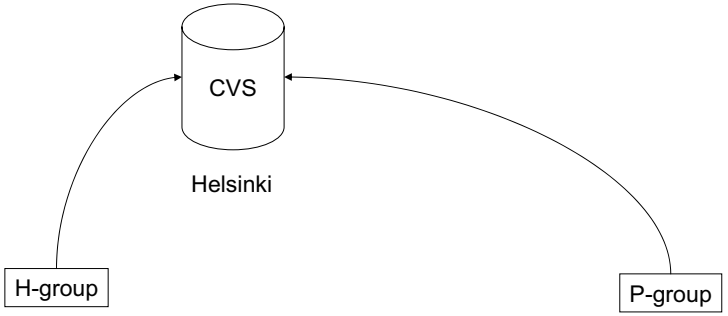
Communication

CVS



Communication

- Team Wiki website
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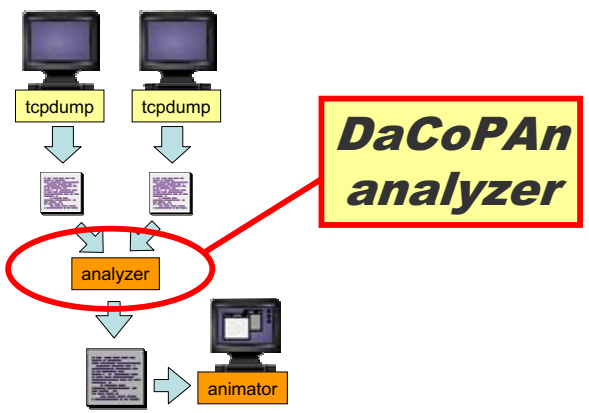
- CVS
- E-mail

Communication

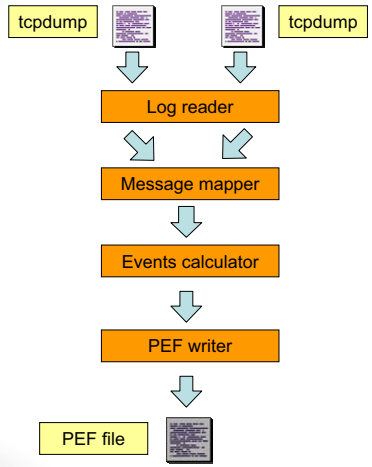
E-mail

- Personal e-mail: kulakov@cs.karelia.ru, kulakov@cs.helsinki.fi
- Group e-mail list: dacopan-ru@cs.karelia.ru, ohtuk04-dacopan-petrozavodsk@cs.helsinki.fi
- Project e-mail list: dacopan-all@cs.karelia.ru, ohtuk04-dacopan-global@cs.helsinki.fi

High level architecture



Analyzer



- Take a two tcpdump files from two hosts
- Read each tcpdump file
- Find corresponding messages
- Merge messages into one message sequence
- Transform message sequence to the events sequence
- Calculate protocol variables and additional events
- Write events sequence into PEF file
- Produced protocol events file

Analyzer

tcpdump log 1

```
17:13:45.955758 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF)
17:13:45.955933 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:45.956007 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF)
17:13:45.981674 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 51 (DF)
17:13:45.981817 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
17:13:47.524336 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 14 (DF) [tos 0x10]
17:13:47.524497 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:47.524648 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 34 (DF)
17:13:47.524675 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
17:13:50.956903 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 15 (DF) [tos 0x10]
17:13:50.996908 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:51.032471 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 33 (DF)
17:13:51.032499 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
```

tcpdump log 2

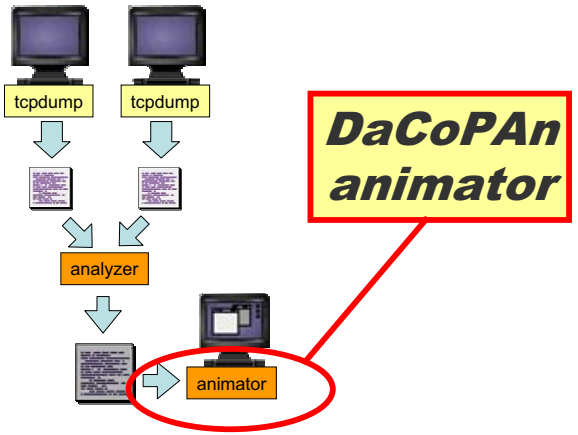
```
17:13:45.938659 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF)
17:13:45.938700 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:45.938902 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF)
17:13:45.964420 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 51 (DF)
17:13:45.964717 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
17:13:47.507242 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 14 (DF) [tos 0x10]
17:13:47.507264 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:47.507409 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 34 (DF)
17:13:47.507572 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
17:13:50.939818 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 15 (DF) [tos 0x10]
17:13:50.979665 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 0 (DF)
17:13:51.015232 zeta.cs.karelia.ru.ftp > iota.cs.prv.dcs: tcp 33 (DF)
17:13:51.015397 iota.cs.prv.dcs > zeta.cs.karelia.ru.ftp: tcp 0 (DF) [tos 0x10]
```


Analyzer

Protocol Events File

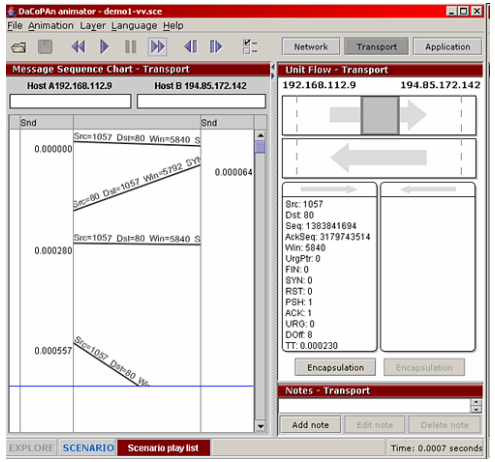
```
...
<unit_sent id="U1" source="H1" destination="H2" protocol="P3" time="0.000000"
          children="U2" flow="F1">
    <value name="sent_time">0.000000</value>
    <value name="trans_time">0.000105</value>
    <value name="source_port">1367</value>
    <value name="dest_port">21</value>
    <value name="seq">900322900</value>
    <value name="ack_seq">0</value>
    <value name="window">5840</value>
    <value name="urg_pointer">0</value>
    <value name="flag_fin">0</value>
    <value name="flag_syn">1</value>
    <value name="flag_rst">0</value>
    <value name="flag_psh">0</value>
    <value name="flag_ack">0</value>
    <value name="flag_urg">0</value>
    <value name="data_offset">10</value>
</unit_sent>
<unit_sent id="U2" source="H1" destination="H2" protocol="P0" time="0.000000">
    <value name="sent_time">0.000000</value>
    <value name="trans_time">0.000105</value>
    <value name="tos">0</value>
...
```

High level architecture



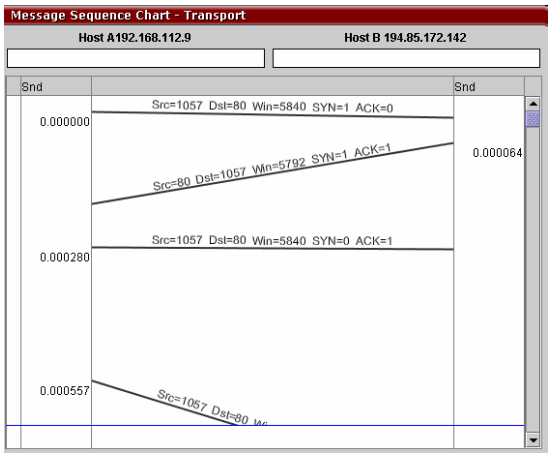
Animator

Main window



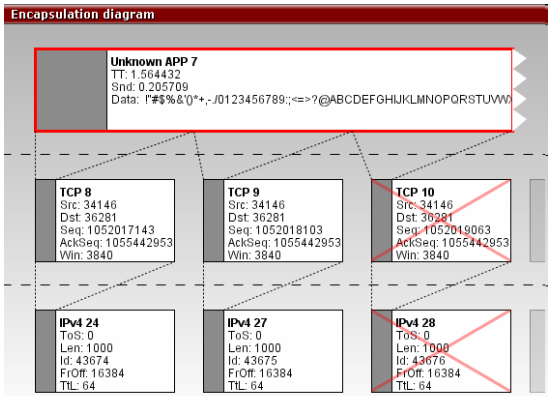
Animator

Message sequence chart



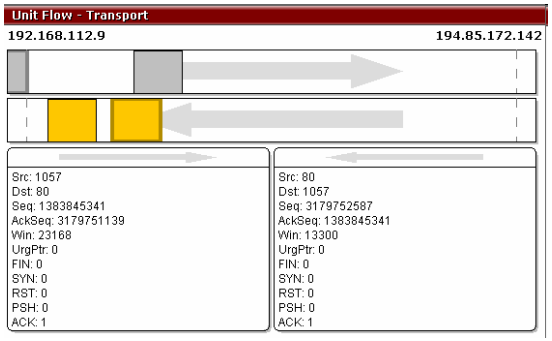
Animator

Encapsulation diagram



Animator

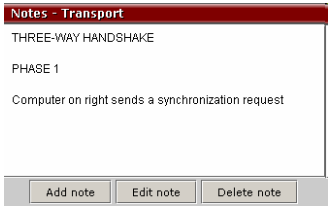
Unit flow diagram



Animator

Additional features

Notes



Scenarios

DaCoPAn Metrics

- Work time – 134 days, 31 day of collaboration work
- Implementation – 12.000 lines of code, 5.500 lines of comment
- Documentation – 15 documents, 346 pages
- E-mails – 650 messages
- Forum – 46 topics, 296 messages
- Test plan – 126 different tests
- Integration testing – 25 errors