



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

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Petrozavodsk State University

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DaCoPAn

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

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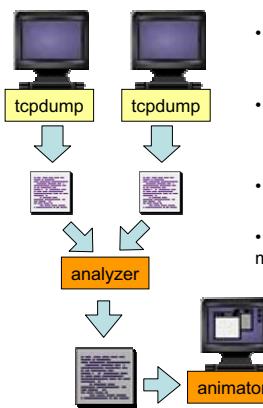
DaCoPAn

Traditional methods for teaching protocols

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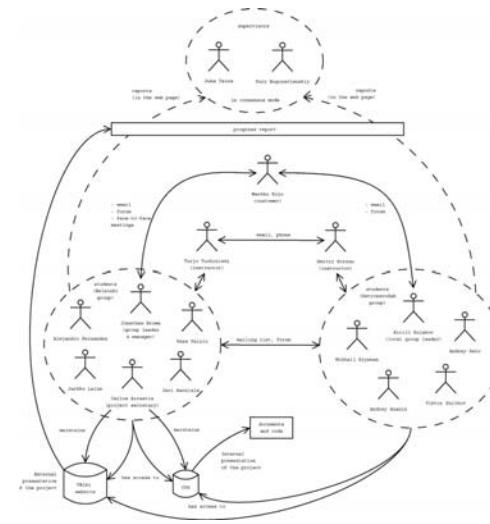
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Description of the solution



- 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

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Communication

Team Wiki website

The screenshot shows a web interface for the DaCoPAn Team Wiki. At the top, there's a navigation bar with links like Home, Overview, Members, Documentation, Resources, Links, and Forum. Below the navigation, there's a sidebar with sections for 'Documents related to the project' and 'Meeting Minutes'. The main content area lists various documents with their file names and sizes, such as 'Project plan' (236 KB), 'Requirements document' (144 KB), and 'Design document: Animator' (261 KB). Under 'Meeting Minutes', it shows a list of internal meetings from April 2004 to March 2004.

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

Communication

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

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Communication

Forum

The screenshot shows a forum thread titled 'Re: Requirement specification'. It contains three posts by users 'Jonathanbrown', 'Kirill', and 'JarkkoLaine'. The first post by Jonathanbrown links to an external article about requirements specification. The second post by Kirill asks for more detail on scenarios. The third post by JarkkoLaine responds that the document is brief but detailed enough for their needs.

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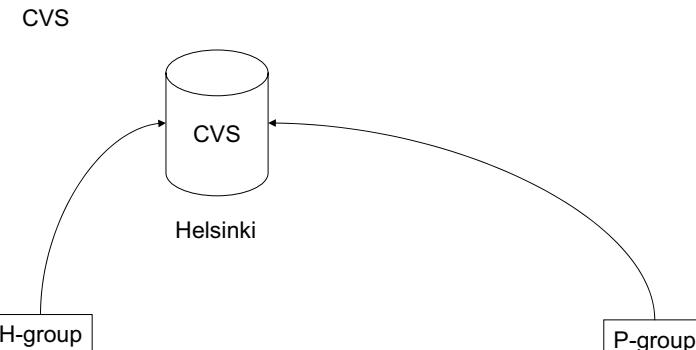
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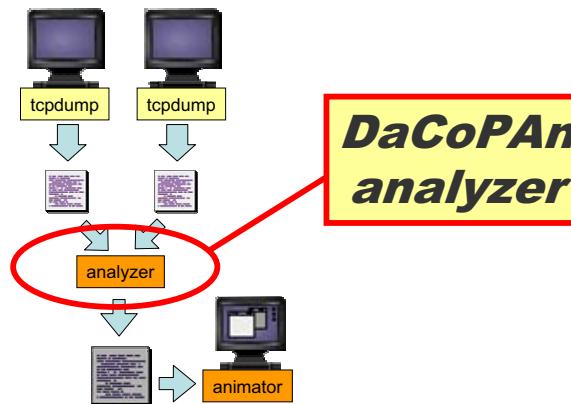
Communication

- | | |
|---|--|
| <p>E-mail</p> <ul style="list-style-type: none">• Personal e-mail• Group e-mail list• Project e-mail list | <p>kulakov@cs.karelia.ru
kulakov@cs.helsinki.fi</p> <p>dacopan-ru@cs.karelia.ru
ohtuk04-dacopan-petrozavodsk@cs.helsinki.fi</p> <p>dacopan-all@cs.karelia.ru
ohtuk04-dacopan-global@cs.helsinki.fi</p> |
|---|--|

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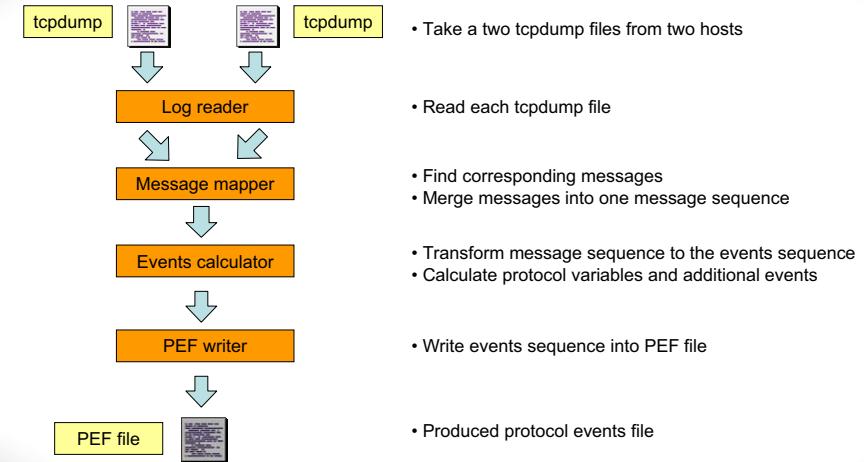
High level architecture



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Analyzer



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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 iota.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

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 iota.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]
  
```

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Analyzer

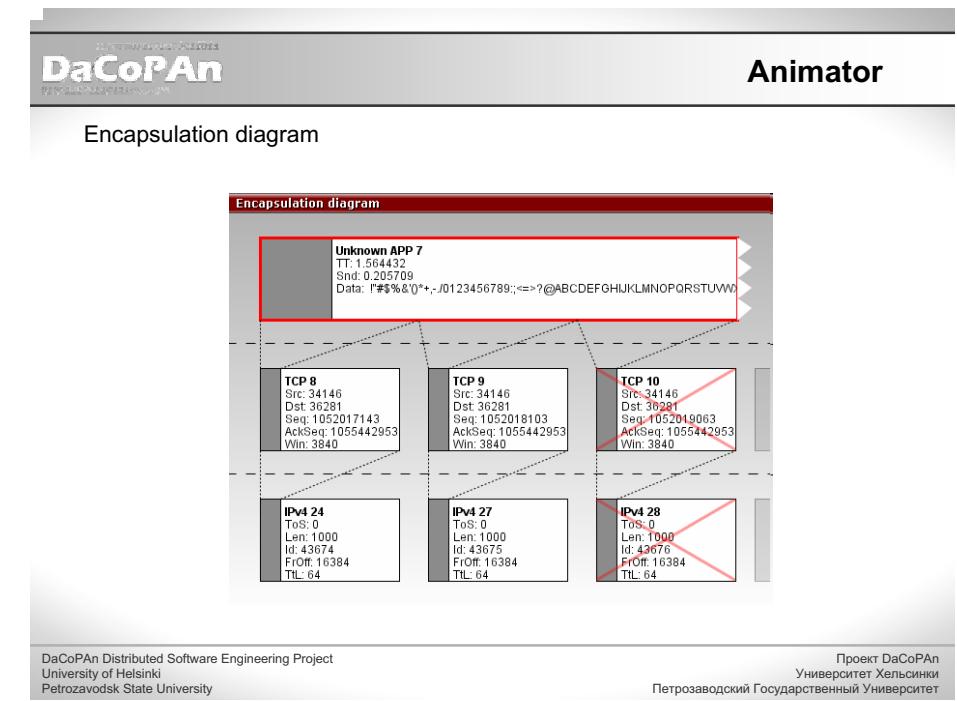
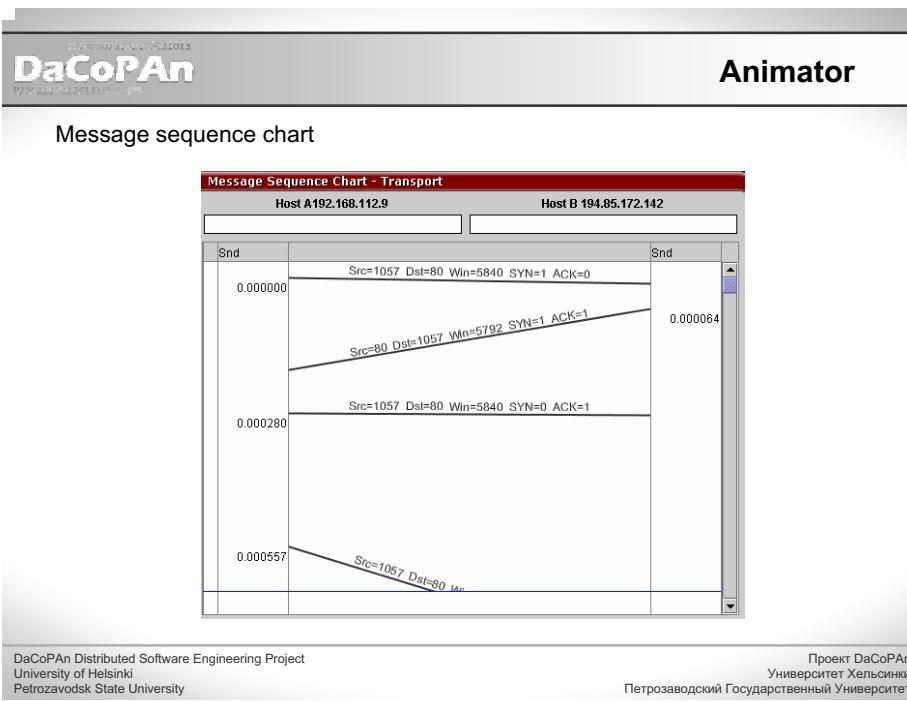
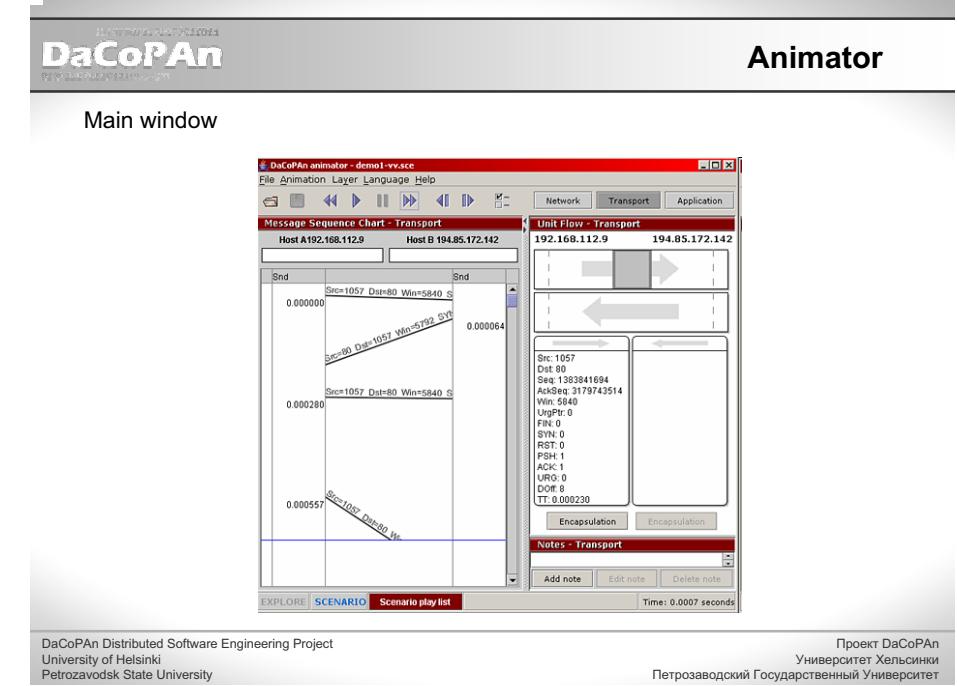
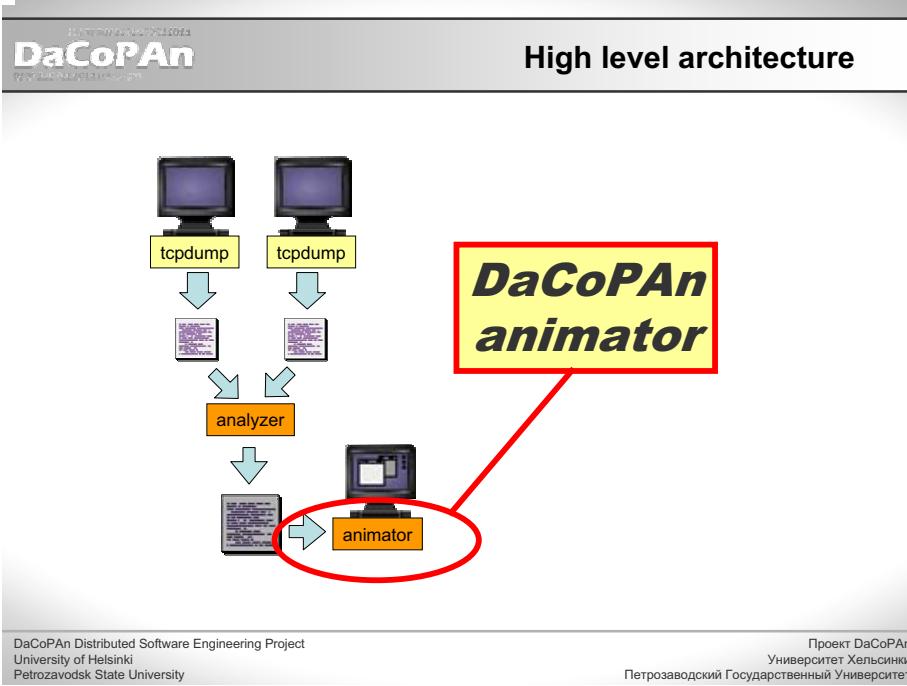
Protocol Events File

```

<unit_sent id="U1" source="H1" destination="H2" protocol="P3" time="0.000000">
  <children>U2</children>
  <flow>F1</flow>
  <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_push">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>
</unit_sent>
  
```

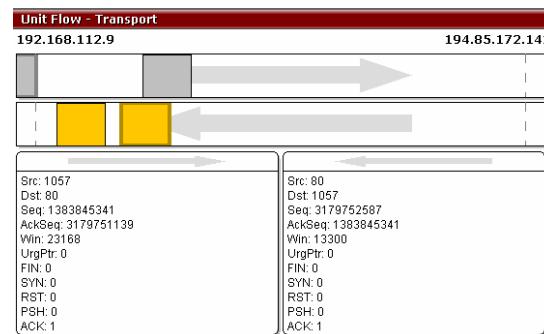
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Animator

Unit flow diagram



Animator

Additional features

Notes

Notes - Transport

THREE-WAY HANDSHAKE
PHASE 1
Computer on right sends a synchronization request

Add note | Edit note | Delete note

Scenarios

Scenario play list

MSC 0.0000->0.4639 [Transport] {1/10}
ENC [TransferUnit { U100.412202-0.463859/P3H2->I
Pause
MSC 0.4639->0.7251 [Transport] {1/10} AutoPlay
MSC 0.7251->2.0061 [Transport] {1/10}
(end)

Recording mode	Next item
Insert Encapsulation	Edit item
Record start	Delete item
Record end	Insert pause

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

