Open Source in Aeronautics and Space Research

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DLR: German Aerospace Center

6500 employees across 29 research institutes and facilities at
- 13 sites.

DLR: German Aerospace Center

Research in:

- Aircrafts
- Satellites
- Ground facilities
DLR: Meaning of Software

- DLR is largest German research institution
- Software is more and more required for day-to-day research
- >1000 DLR employees develop software
SimBrowser: Preprocessing of Aerodynamic Simulations
- Describe and visualize complex motions of physical objects

Motivation
- Validation of input files for high performance calculations

Used Open Source Software: Qt and Open Inventor
- http://www.dlr.de/opensource
SimBrowser
Preprocessing of Aerodynamic Simulations
SimBrowser
Preprocessing of Aerodynamic Simulations
Open Source Software from DLR: SUMO

- SUMO: Simulation of Urban MObility
- Road traffic simulation software

- GNU General Public License (GPL)
- [http://sumo.sourceforge.net](http://sumo.sourceforge.net)
SUMO
Road Traffic Simulation Software

Motivation for DLR: Evaluation of existing and design of new concepts
SUMO
Road Traffic Simulation Software
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Road Traffic Simulation Software

One example scenario: World Cup 2006 in Germany
- Traffic forecast 30 minutes in future via SUMO (in Cologne)
Open Source Software from DLR: TIGLViewer

- TIGLViewer
  - Direct visualization of new aircraft configurations

- Motivation for DLR:
  - Easy and fast graphical visualization of complex geometric functions

- Used Open Source Software: OpenCASCADE
  - [http://www.dlr.de/opensource](http://www.dlr.de/opensource)
TIGLViewer
Open Source Software from DLR: RCE

- RCE: Remote Component Environment
- Software Integration Platform

- Eclipse Public License (EPL) V1.0
- [http://rcenvironment.sourceforge.net](http://rcenvironment.sourceforge.net)
RCE
Software Integration Platform

Motivation for DLR

- One platform containing many specific applications
RCE
Software Integration Platform
Built on Top of RCE: SESIS
Ship Design and Simulation System

- Simulation environment for the early design of ships
SESIS
Ship Design and Simulation System
Built on Top of RCE: VirSat
Virtual Satellite

- Simulation environment for the early design of spacecrafts
VirSat
Virtual Satellite
Built on Top of RCE: Chameleon
Multidisciplinary Integration Environment

- A simulation environment for the early design of new aircraft configurations

- Chameleon should enable engineers to
  - Integrate any simulation tool
  - Communicate data between simulation tools
Chameleon
Multidisciplinary Integration Environment

- Build up simulation processes and workflow
- Optimizing aircraft configurations
Chameleon
Multidisciplinary Integration Environment

Creating experimental aircraft configurations
Chameleon
Multidisciplinary Integration Environment

Simulating climate impacts
Chameleon
Multidisciplinary Integration Environment

Simulating the air transport system
Chameleon
Multidisciplinary Integration Environment
Chameleon
Multidisciplinary Integration Environment
Open Source Software from DLR: RepoGuard

- Content validation framework for version control systems

- Apache License V2.0
- http://repoguard.tigris.org/
RepoGuard
Validation Framework for VCS’s

Motivation for DLR

- Scientists develop software, but are not software developer
- Essential: tool support to ensure a good code base and the compliance with code conventions
RepoGuard
Validation Framework for VCS’s
RepoGuard
Validation Framework for VCS’s
Open Source Software from DLR:
DataFinder

- DataFinder: Scientific Data Management

- BSD License
- http://sourceforge.net/projects/datafinder/
DataFinder
Motivation

DataFinder User Client

- Meta Data Server
- FTP Server
- GridFTP Server
- Tivoli Storage Manager
- WebDAV Server
- File System
- Storage Resource Broker
- External Medias (CD, DVD,...)
DataFinder
Graphical User Client

DataFinder - Server: http://192.168.211.126/datafinder/data/trace/

- File System View
- Name:
  - MTU-12
  - FGR_1
  - ...
- Size:
  - 75 B
  - 130 B
  - ...

- Attributes View
- Name:
  - MTU_12
  - FGR_1
  - ...
- Value:
  - 3.3 K
  - 500 M
  - ...

- Log:
  - 16:33:35 INFO: Search results for [Data Type = Run]
Open Source Software from DLR: Catacomb

- Catacomb: WebDAV Server Module for Apache

- Apache License V2.0
- http://catacomb.tigris.org
Catacomb
A WebDAV Server Module for Apache
Catacomb
DLR – NASA cooperation

- DLR contributes, but different others fork

- NASA Ames:
  - Early contributor
  - Fork later

- Problem of code property
  - Solved through opening the code
Open Source in Aeronautics and Space Research

Conclusion

- We make our software more and more available as open source
  - Enables contribution
  - Supports cooperation

- We use more and more open source
  - Profiting by stability of open source code
  - Writing less code
Questions?