An Open Source Software Directory for Aeronautics and Space

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SourceForge
Outline

- DLR
- Software at DLR
- Software Catalogue
- Allura
- DLR Software Portal
German Aerospace Center

- Research Institution
- Space Agency
- Project Management Agency
8000 employees across 33 institutes and facilities at 16 sites.

Major research areas of DLR institutes

- Aeronautics
- Space
- Transportation
- Energy
- Security

Software research and development

- Simulation and Software Technology division
Software at DLR
Size and Amount

Some numbers…

• More than 1200 employees are developing software

• More than 100 Million EURO personnel costs per year

• DLR is one of Germany largest software developers
Software at DLR

Typical Software in Space and Aerospace

Simulation Software

• High performance computing and scientific computing

Mission-critical software

• Real-time | embedded | decision making  software

Supporting software

• Data | Workflow | Knowledge management

Administrative software

• Web-based intranet software for accounting and project management
Software at DLR

Characteristics

- Most software developed at DLR is non-standard software
- Often very special and specific requirements
- A great many number of software projects
- Open Source or proprietary software licenses
- Overview of existing software is extremely difficult
Example
Future Aircraft Design

Complex task with many involved scientific and engineering disciplines
Future Aircraft Design
Software Engineering Strategy
Dealing with DLRs Software Characteristics

Methods and Tools

• Development processes tailored for scientists, documentation via Web-based tools

• Development tools seamlessly integrated with working environment

• Tools are available and accessible easily via intranet for every employee

• Standard trainings offered for most important tool chains and software technologies
Software Engineering Strategy

Knowledge Management

Exchange of knowledge and information

- Network of software engineering representatives
  - Information sharing via intranet and workshops
- Wiki for documentation and collaboration
- Question & Answer system (such as Stack Overflow)
- Software catalogue

Disclaimer: This list is intentionally not complete!
Software Catalogue
Goal and Essential Requirements

Intention and goal

- Employees can get an overview of all software software packages, tools, and products developed at DLR
- To prevent double development of software

Essential requirements

- Searching for existing software
- Browsable directory of all software
Software Catalogue

Major Requirements

Technical requirements

- Web-based
- Access control
- Basic project information
- Tagging
- Screenshots and diagrams
- Public page
- Code hosting
- Collaboration and documentation
- Commenting and rating
- Social media integration
- Scalability
Software Catalogue
First Version

Software-Katalog 16.04.2011

Suche nach Software-Einträgen der letzten 6 Monate liefert folgende Ergebnisse:

<table>
<thead>
<tr>
<th>Name</th>
<th>Beschreibung</th>
<th>Kategorie</th>
<th>DLR-GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Python WebDAV</td>
<td>Die in Python entwickelte Bibliothek erlaubt die client-seitige Nutzung des WebDAV-Protokolls. Weiterhin werden die Funk...</td>
<td>Kommunikation</td>
<td>SC-VK</td>
</tr>
<tr>
<td>SAFE</td>
<td>Software für die Bedienung der SAFE-Hardware (Streulicht-Analyser mit flexibler Endoskopietechnik) - Datenaufnahme und A...</td>
<td>Signal- / Datenverarbeitung</td>
<td>AT-TM</td>
</tr>
<tr>
<td>GerLeEO Communication</td>
<td>Data Link Layer, Resource Management and Signaling software for data relay satellite system....</td>
<td>Kommunikation</td>
<td>KN-DV</td>
</tr>
</tbody>
</table>

Suche-Ergebnisse einschränken durch
Suche im Feld Haupt-Kategorie: nach DLR - Wissenschaftl. / Techn.:
Software Catalogue
First Version

[Image of software catalogue screenshot]

Software-Katalog 16.04.2011

<table>
<thead>
<tr>
<th>Name</th>
<th>Beschreibung</th>
<th>Kategorie</th>
<th>DLR-CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoE CFD</td>
<td>Software für statistische Versuchsplanung (design of experiments), speziell für numerische Simulationen mit TAU - Die...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>FLOWER</td>
<td>Simulation kompressibler Strömungen von Unterschall bis Überschall auf blockstrukturierten Netzen, auch zeitgenau...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>FlowSimulator</td>
<td>The target of the FlowSimulator is to provide a common environment for high-performance, multi-disciplinary numerical...</td>
<td>Numerische Simulation</td>
<td>SC-VK</td>
</tr>
<tr>
<td>PDAPE</td>
<td>Simulation kompressibler Strömungen auf unstrukturierten Vierecks und Hexaeder Gittern mit DG Verfahren hoher Ordnung...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>POD</td>
<td>Proper Orthogonal Decomposition (POD) Zerlegung - Methode, welche die stationäre Oberflächendruckverteilungen an bell...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>TAU</td>
<td>Simulation kompressibler Strömung von Unterschall bis in den Hyperschall auf hybriden unstrukturierten Netzen, auch zeit...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>THETA</td>
<td>Inkompressible Version des TAU Codes für Strömung in Brennkammern mit der Möglichkeit der Kopplung mit Strahlung und Ver...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
<tr>
<td>THETA-ST</td>
<td>CFD-Software...</td>
<td>Numerische Simulation</td>
<td>VT-CS</td>
</tr>
<tr>
<td>VFM</td>
<td>Methode unterschiedlicher Eindringtiefe (Variable Fidelity Modeling) - effiziente Ermittlung von aerodynamischen Last...</td>
<td>Numerische Simulation</td>
<td>AS-CA</td>
</tr>
</tbody>
</table>
Software Catalogue
First Version
First Version

Problems

Problems of the first version

- The solution was not ergonomic
- Employee acceptance was low
- Not suitable for the public
- Code (PHP) not very maintainable

Conclusion

- Development of a new version based on existing Open Source software
  → Apache Allura
SourceForge.net

Find, Create, and Publish Open Source software for free

Search from thousands of software titles

Recommended

- System utility for your Mac
  
  Clean and speed up your Mac in 5 minutes

Projects Of The Month

- Staff Choice  CMDBuild - CMDB for IT Asset Management
  Free software tool for configuration and management IT asset database

- Community Choice  VASSAL Engine
  VASSAL is a game engine for creating electronic versions of traditional board and card games. It provides support for game piece rendering and ...

Audio & Video

Business & Enterprise

Communications

Development

Home & Education

Games

Graphics

Science & Engineering

Security & Utilities

SOURCEFORGE

SOLUTION CENTERS  Go Parallel  Smarter IT  Resources  Newsletters

Apache Allura
The Software behind SourceForge.net

„Forge“ implementation

• Source Code Repositories
• Bugs & Issues
• Discussions
• Mailing Lists
• Wiki
• Blogs

Open Source, Apache project since 2013

• https://allura.apache.org
Allura

https://forge-allura.apache.org
Allura
Integrated Tools

Wiki

Repositories
Git, Mercurial, Subversion

Forum

Tracker

Administration
Allura Software Components

**WSGI Stack**
- TurboGears
- Pylons
- Beaker
- Paste
- WebOb

**Rendering**
- Pygments
- Markdown
- Jinja2
- FormEncode
- EasyWidgets

**Search**
- PySolr

**Repositories**
- GitPython
- Mercurial
- PySVN
Knowledge and Data Management

BACARDI

The Backend Catalog for Relational Debris Information (BACARDI) is the DLR’s approach to a space debris database. The custom middleware components are implemented in Python using ZeroMQ and Protocol Buffer technology.

Simulation and Modeling

Simulation Model Library

Simulation Model Library (SimMoLib) is a distributed system to manage a library of simulation models. SimMoLib’s main goal is to promote the preservation of knowledge that lies in simulation and calculation models and encourage reuse of those models.

Simulation and Modeling

Virtual Satellite

Designing space systems and planning space missions relies on many separated phases and disciplines. The virtual satellite aims at closing the gaps in the development life-cycle and between disciplines by using model-based systems engineering.
DLR Software Portal
http://software.DLR.de

Basics

• Development started in 2011
• Available for DLR employees and the public
• For Open Source as well as proprietary software
Customization of Allura

- Web templates (DLR corporate design)
- Metadata (project overview and basic information)
- Categories
  - DLR site
  - Development status
  - Institute
  - License
  - Operating system
  - Programming language
  - DLR research program
DLR Software Portal

Rollout

Rollout in four major steps

- [2012:] Open to the public for searching and browsing. Access to add entries for two selected institutes of DLR and for selected users. Code hosting is disabled.
- [2013:] Access to every DLR employee for adding entries. Changed layout for project home pages, project editor, and user profile pages.
- [2014:] Extended features for faceted search and browsing.
- [2015:] Code hosting enabled. Access to registered external users (who must have an account at DLR, which is usually given to project partners or students)
The TiGL Geometry Library can be used for easy processing of geometric data stored inside CPACS data sets. TiGL offers query functions for the geometry structure. These functions can be used for example to detect how many elements of a certain type are present in the geometry.
The TIGL Geometry Library can be used for easy processing of geometric data stored inside CPACS data sets. TIGL offers query functions for the geometry structure. These functions can be used for example to detect how many segments are attached to a certain segment, which indices these segments have, or how many wings and fuselages the current airplane configuration contains. This functionality is necessary because not only the modeling of simple wings or fuselages but also the description of quite complicated structures with branches or flaps is targeted. The developed library uses the Open Source software OpenCASCADE to represent the airplane geometry by B-spline surfaces in order to compute surface points and also to export the geometry in the IGES/VTK format. The library provides external interfaces for C, C++, Python, MATLAB and Fortran.

For more information, please visit the project page on http://tigl.googlecode.com .
Project Setup

Please set up and update all information for your project.

Important: Don’t forget to set and maintain correct permissions!

Basic Project Information

Metadata Update basic project metadata, such as project name, links to other websites, a short summary of your project, the software category, and the icon. (Tips: You can also remove your project here.)

Homepage Provide a solid description, so colleagues can figure out what the project is all about.

Screenshots Add as much screenshots, pictures, and diagrams as you like.

Categorization

Categories Categorize your project. Currently, you can categorize according to license, programming language, and DLR research program.

Access

Permissions Set permissions to groups for reading, updating, administrating or creating project content.

User groups Manage user groups for your project.

History

Audit trail Show all changes on the project information.
### Metadata

**Project Overview and Basic Information**

<table>
<thead>
<tr>
<th>Name</th>
<th>TiGL</th>
</tr>
</thead>
</table>

This is the publicly viewable name of the project, and will appear on project listings. It should be what you want to see as the project title in search listings.

| Category       | Simulation and Modeling                                              |

| Summary        | A library for generating 3D geometries from parametrized CPACS/XML data sets |

174 characters left

Add a short one or two sentence summary for your project.

| Homepage       | http://code.google.com/p/tig/                                       |

The homepage of your project where people can find extensive documentation, downloads, presentations etc.

| Support page   | URL: http://code.google.com/p/tig/                                 |

### Icon

[Icon Image]

**Delete Icon** or replace: [Durchsuchen...] Keine Datei aus
Categorization

Categories of the Project

DLR site

- DLR site :: Cologne
  - Augsburg
  - Add

Development Status

- Development Status :: 5 - Production/Stable
  - 5 - Production/Stable
  - Add

Institute

- Institute :: Simulation and Software Technology
  - Design Organisation
  - Add

License

- License :: OSI-Approved Open Source :: Apache Software License
  - OSI-Approved Open Source
    - Academic Free License (AFL)
    - Add
DLR Software Portal

Current State

• Open for all DLR institutes
• First set of projects added
• Adding projects not mandatory yet
• Feedback by project owners
  • Many bugs and feature requests
  • New contacts within DLR and with external companies
DLR Software Portal
Current and Future Work

Technical

• Upgrade to latest version of Allura
• Faceted search
• Activation of code hosting

Organizational

• Engage DLR employees to add their projects
• Extend access to other organizations (ESA, NASA, …)
Thank You!

Questions?

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