

Applicability of OSS to Space Thermal Engineering

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- Overview

- Assessment of OSS for Space Thermal Engineering
- Establishment of an European Thermal OSS Community
- Software Tool Development
- Software Architecture and Elements

- Assessment of OSS for Space Thermal Engineering
 - OSS has generally a bad reputation for use as a “professional” engineering tool
 - “Free“ software not professional
 - Bad quality and thus low reliability
 - To give source code away means to loose control, to strengthen the competitor and not to gain any profit

- Principles of OSS Concept
 - Performed in a large developer community
 - Development performed by an abundance of specialists and not any more by a few persons in a single company
 - The source code will be released to anyone, who is interested. Developers catch up the code for checking, debugging, improving, extending and redistribute it to the community
 - An open source license scheme is the vehicle to regulate this approach (GNU General Public License, Sun Community Source License Principle and others)

– Advantages of the OSS Approach

- Development is shared among many (excellent) developers, which are presently out of reach for a single company
- The OSS community cares for inclusion of advancement in the software state-of-the-art
- Maintenance and implementation is shared among the users
- New features (or modules) related to specific applications can be set up on distributed codes, which avoids redoing the entire job
- S/W remains alive whatever happens to a single developing company (This is in contrast to the present closed source approach, where a single company, which owns a particular source code, could disappear from the market)

– Advantages for Space Engineering Tools

- Development, maintenance, implementation resources and associated budget can be shared between the users and thus reduced for a single company
- Approach ensures long-term availability (present risk that a developer with propriety S/W disappears from the market is deleted)
- User dependency on S/W developers is greatly reduced (development will be performed by the user himself and not by a S/W house which sometimes have reduced space system and engineering background)
- Development of specific applications is cost-effective, since it can be set up on existing source codes

- Quotation from the Open Source Initiative web page:

“Because the user can get access to the source, he can survive the collapse of the vendor. The user is no longer totally at the mercy of unfixed bugs. The user is not shackled to every strategic decision the vendor makes. And if the vendor’s support fee becomes exorbitant, the user can buy support from elsewhere. For this reason alone, every software customer should absolutely demand open source and refuse to deal with software vendors who close and shroud their code. It’s a matter of controlling the users own destiny.”

– Prerequisite for introducing the OSS approach

- **Space industry (i.e. their managers) must recognizes that**
 - Propriety closed engineering tools and the investment to establish them will not increase the competitiveness of a company (see the example automotive industry)
 - OSS will not transfer know-how to the outside – in the contrary, the company will gain knowledge through many excellent outside developers, which are now out of reach
 - A company will receive back application software modules from the community, which he otherwise needs not to develop himself
 - The OSS approach will deliver software products, which are as robust, reliable and validated as today’s propriety programs or are even superior
 - The OSS approach saves budget and manpower for a company since development, maintenance and implementation is shared within the user community
 - Companies do not engage in the risk of development discontinuity in case software developers of a certain program are no longer available to the company.

- **Objective of the Present Study**

- It shall be demonstrated that a thermal engineering tool from reliable and mature OSS building blocks can be created. In case building blocks are not available a specific routine can be programmed to fill the gap. (Will be presented by Matthias Haupt)
- A user community shall be established which operates according to the principles of the OSS philosophy
- Demonstration that the organization is capable to involve the members as active partners for testing, feedback and maintenance according to the principles of the OSS philosophy.
- Shall be seen as pre-runner of a future membership organization

- **User Community Concept**

- Membership limited to organizations within the ESA member states (this restriction must be in accordance with OSS license schemes)
- Responsibilities of members:
 - Acceptance of OSS working principles by signing a license agreement
 - Distribution and re-distribution of source codes shall be the rule
 - Propriety software accepted case-by-case by the community for an interim period.
 - Members are develop new software according to OSS interfaces of the community, check new software, elaborate alterations and extensions, report bugs...
- Responsibilities of the leading organization (OHBSYSTEM for the study)
 - Cares for validation of all software, performs configuration and version control
 - Decides on modifications, extensions, new software to be included
 - Decides whether propriety software shall be included
 - Provides quality maintenance, support, custom engineering, and training services

– Basically three types of members:

- Software houses, which develop software to make profit. Business shifts however from traditional software “manufacture” to support, tailoring, implementation, custom design, etc.
- System companies, who use software as tools to support development of their space products
- Academia

– Dedicated study community web site:

<http://www.therm-oss.org/>

- Contains open and restricted part
- Includes:
 - Discussion forum, mailing list, S/W problem reporting system
 - Possibility to down-load / up-load source codes