EDOS

Scope

With the growing number of the open-source software ecosystem in terms of contributors, applications and users, the production of large scale open-source software such as a Linux distribution raises complex issues. As Ian Murdock (creator of the Debian project) notes, «*Linux is not a product. Rather, Linux is a collection of software components, individually crafted by thousands of independent hands around the world, with each component changing and evolving on its own independent timetable.[...] Linux is not a product. It is a process.*" [1] Edos tackled this process by bringing together theoretical specialists in constraint programming and formal methods, distributed databases, software engineering and open-source editors. Edos delivered innovative solutions for dealing with three key Linux processes: (i) software dependency management, (ii) system testing, (iii) code and binaries dissemination over the Internet in P2P. The benefit is a dramatic productivity increase for Linux editors.

Advances

The key innovations brought by the Edos project are in: package dependencies, distribution testing, dynamic content dissemination, and process modelling. Edos is available from public forges under an open-source license.

- **Edos dependency tool chain**: one goal of Edos was *"to build new generation tools for managing large sets of software packages, like those found in free software distributions, using formal methods"*. Edos addresses issues related to dependency management for large sets of software packages, with particular attention maintaining consistency of a software distribution on the repository side – essenital to ensure the software assembly will scale up. Edos proved that both RPM and Debian package installation are NP-complete problems equivalent to 3SAT. This shows a clear connection between dependency resolution and SAT-solving, an area where world-class researchers have worked for over thirty years, and where Edos advanced the state of the art by producing efficient tools to check consistency of repositories. Edos also reached out to the Java platform with the release of SAT4J and the use of Edos and SAT4J[2] outcomes within the Eclipse provisioning platform p2[3] and Maven.

- **Edos Flexible Testing Framework**: Edos designed an integrated quality assurance framework based on code analysis and runtime tests, operating at the system level to enhance the quality assurance process of industry grade custom Linux distribution or custom application comprising several open source software components.
- **Edos Content Dissemination System**: the data distribution process is challenging because of the scale of the Linux distributions and their dynamicity. The Edos Content Dissemination System – Edos CDS – is aP2P content dissemination platform which improves load balancing, resource sharing, robustness, data coherence and freshness in the dissemination process.
- **Edos Process Reference Model**: Edos designed a Process Reference Model (PRM) that captures the activities, roles and resources of the OSS process. The model allows reasoning about the coherency and efficiency of the process as a whole. The PRM works on three different levels: descriptive, execution and analysis.

Positioning in global context

Edos has been inspirational to other initiatives such as OPIUM – Optimal Package Install/Uninstall Manager – a project sustained by Linspire and University of San Diego. Edos content dissemination system advanced the state of the art in P2P semantic databases. Edos Process Reference Model is among the first model covering the entire OSS development process. Edos paves the way for further innovative achievements in the area of OSS engineering and complexity management. The EU project Mancoosi (http://www.mancoosi.org), standing for Managing the complexity of open-source infrastructure, is a follow up of Edos.

Contribution to standardization and interoperability issues

Edos contributed to the field of *Software Release Management*, specifically to the evolution of metadata management for software packages. As software grows in importance in all industry fields, software release management is becoming a crucial topic for the whole economy. Standards on which Edos had and will have an impact include the following: RPM and DEB standards, testing formats, Linux Standard Base, JXTA.

Target users / sectors in business and society

Users of the end results include system integrators, technology providers (in particular Linux editors), service providers, software developers.

1 http://news.com.com/2010-1071_3-5057321.html
2 http://www.sat4j.org
3 http://wiki.eclipse.org/Category:Equinox_p2

Overall benefits for business and society

The outcomes of Edos have strengthened the quality of the complete range of products of the two SMEs involved in the project – Mandriva and Caixa Mágica. Beside the take up by commercial companies, the Debian community has appropriated the Edos tool chain.
By enhancing the quality of the family of Linux operating systems in general, and of two commercial flavours of it used by millions of citizens in Europe, Edos contributed to the experience of those citizens running a Linux system for accessing digital information, working, learning and communicating.

Examples of use

Edos tool chain has brought the Linux processes to a new stage in terms of efficiency and dependability. Typical use cases include the following: software repository checking, software bundles downloads, software testing, software modelling.

Achievements

Software Distribution Analysis Chain: Tools building on formal methods for the analysis and the streamlining of the dependencies of large sets of software packages. Stable, GPL v2.
SODIAC http://sodiac.gforge.inria.fr roberto@discosmo.org

Edos Flexible Testing Framework is a modular framework for system testing, both automatic and manual. Prototype software, GPL v2.
Edos FTF http://sourceforge.net/projects/ftf francois@dechelle.net

Edos-CDS is a large scale content distribution software articulated around a P2P information system. Prototype software, LGPL
Edos CDS http://edos-cds.gforge.inria.fr/ serge.abiteboul@inria.fr

Edos Process Reference Model captures the activities, roles and resources of the open-source software engineering process. The model allows reasoning about the coherency and efficiency of the process as a whole. Stable API, Apache Licence.
Edos PRM ciaran.bryce@inria.fr

Managing the Complexity of Large Free and Open Source Package-Based Software Distributions.
Edos ASE 2006 paper roberto@dicosmo.org

Large Scale P2P Distribution of Open-Source Software.
Edos VLDB 2007 paper serge.abiteboul@inria.fr

Linux distribution testing and quality assurance: current developments of the Edos project and open questions.
Edos FOSDEM 2007 paper ciaran.bryce@inria.fr

A reference model for F/OSS process management.
Edos PRM FOSDEM 2007 paper ciaran.bryce@inria.fr

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