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Sabayon Linux Management Framework Codename: **Entropy Project**

The "Web 2.0" evolution of binary package managers
Ready to jump in?

About: Sabayon Linux is a Gentoo-based distribution aimed to provide users the best out-of-the-box experience, being the first which endorsed exciting technologies such as: XGL/AIGLX (3D desktop), KVM (virtualization), NX (NoMachine Remote desktop) and so forth.

In one word: listen, as in "users need to be listened".

Background

The Problem

Package managers isn't an area where major OSS (as in *BSD/Linux/Solaris) distributions are investing. They think they already have what is needed to satisfy users in terms of ease of use, features, scalability and network transparency. This led us thinking that ANY solution out there is good enough to achieve what we are willing to. Also, none of them is compatible with Portage, thus with any Gentoo/Gentoo-based systems like Sabayon is and will always be.

The Challenge

The challenge is creating a **fast** binary package manager (using relational databases), with **strong** AI (allowing just 2/3 developers to maintain about 12000 packages), able to solve most of the user-side issues automatically (such as API/ABI breakages – missing libraries, database corruptions, automatic kernel dependencies for external drivers, inverse dependencies), able to provide users a **web2.0-alike experience** by allowing them to share, extend, manipulate any content connected to packages (like screenshots, URLs, images, videos, rankings) directly from their system, able to provide a transparent client/server infrastructure to **remotely manage** infinite Sabayon installations, able to provide hot packaging formats, like **Smart Packages** (multiple packages packaged into one) and **Smart Applications** (unpack & run applications). All this, by keeping a complete Portage compatibility and cooperating tightly with Gentoo Linux developers in bug hunting and features proposal, making our father distribution to fly again.

The Solution

Entropy officially bore in SVN revision 32 at <http://svn.sabayonlinux.org/projects>, it was the 31st of January 2007, 22 days before, Fabio's father passed away in a dramatic way, this drove his decision to start the challenge: make something good, share it and dedicate to his father.

Nowadays we're getting there! As written later on, after around 15 months of hard work. Sabayon Linux 3.5 (expected for mid-June), will be the first Sabayon release shipping with Entropy, not yet features complete. Good news are that it will already be our official package manager making Sabayon **the first GNU/Linux distribution** officially supporting both source and binary packages out-of-the-box.

Our Mission

Thus, our mission is to give a shake to the dusty tree of package management introducing and sharing innovative concepts, features, ways of coding in the Distributions Arena, bringing Web 2.0 to localhost, renaming it to **Software 2.0**. Putting Sabayon Linux, with **restricted budget** but **big heart**, in competition with 6-figures giants like Ubuntu, Fedora and openSUSE.

The Project

How It Works - Current Status

Entropy is a Python-based application, divided in two main interfaces, EquoInterface (client side) and ServerInterface (server side). The latter is used by textual, server-side apps called **Reagent** and **Activator**. On the build server, there is a chroot environment for every architecture and every release (called branch) currently supported (at the moment we've one branch: 3.5 and two architectures: i686 and x86_64, so two chroots in total). Inside each chroot, applications are compiled using any Portage compatible source package manager (Portage itself, Paludis, Pkgcore).

Once done with compilation, **Reagent**, is able to determine what new packages have been compiled and package them, collecting Portage VDB metadata and injecting it into the repository database and into the generated package as well (to allow stand-alone packages installation).

Along with these tasks, Reagent runs some QA checks on the work done to ensure a certain level of reliability. Once done again, **Activator** handles the synchronization with mirrors uploading/downloading data (packages + updated repository database) to them (master mirrors, usually just one). Two changelogs (in form of a RSS file), are also transparently updated and uploaded by it, one contains detailed information about what's been done while the other is dedicated to RSS clients, keeping users informed about what's being done. Client side (EquoInterface based applications), there are three applications in development, Equo, a textual Entropy client (like apt-get), Spritz, the graphical one (like Synaptics, GTK, forking YumEx) and the **Updates Notification Applet** (self explanatory, GTK, forking rhn-applet).

Along with these two, **there are other important interfaces already developed**, like the Socket (over TCP) interface, fundamental for making Entropy network-transparent and as a base for the "web-2.0" features, the Security Advisories interface, based on Gentoo Linux Security Advisories (GLSAs), and so forth. A really basic web interface is available at <http://packages.sabayonlinux.org> where users can find any information about our binary packages.

A **Subversion repository** (development tree) can be found at:

<http://svn.sabayonlinux.org/projects/entropy/trunk>

WebSVN available at:

<http://svn.sabayonlinux.org> (under Projects/Entropy folder)

Entropy **development news** can be found at:

<http://planet.sabayonlinux.org>

Spritz Screenshots:

<http://planet.sabayonlinux.org/?p=109>

Entropy **developers' TODO** list:

<http://svn.sabayonlinux.org/projects/entropy/trunk/TODO>

Entropy counts around 35000 lines of code with the prediction to double this barely important value before 1.0 (latest stable branch is 0.14.x), all of them solely written by Fabio Erculiani.

The **current status** can be summed up in a few words: Sabayon Linux 3.5, which is the new release expected in June, is going to ship with Entropy as the **default package manager**, this means although a lot of work is still to be done, **the project has already reached a good point of stability** and got all the basic functionalities. Database interface, its structure (as in SQL schemas), other core functions and Equo itself **are already considered reliable**.

Proposed milestones

Milestone 1 - 1300€ - More power

Our actual Build Server is a Dell PowerEdge 860 with a Quad Core Xeon, 4GB of RAM and 2x250GB RAID 1 array. Our server currently needs more space and improved I/O performance (due to current slow software raid setup) to grow the number of supported packages to 7500 (from 6000) quite easily. A new RAID1 array is needed and should be composed of two 750GB hard drives and a 3ware hardware RAID Controller on PCI-X.

On the ISO images server, there are currently two configured software RAID 1 arrays, to improve I/O speed (for virtual machines and to build ISO image snapshots), a new (w/ at least 4 ports) hardware RAID controller and 2 more GB of RAM are extremely needed (actually, an Intel Q6600 with 6GB of RAM is running like a single core due to all the math needed to handle multiple software RAIDs). New hard drives will be recycled from the build server, so no new drives are needed for this one.

Milestone 2 - 1600€ - Complete the work done

Finalise the work on Entropy library, Spritz and Equo for Sabayon Linux 3.5 Final release. Two weeks of QA (debugging) after having completed the following features:

- **Spritz**
 - Add configuration menu (to avoid touching .conf files directly)
 - Add Package Masking interface
 - Allow .tbz2 files installation (even from file browser)
 - Skip mirrors button
 - Allow stopping installation queues
 - Show more information about each package list shown
- **Entropy**
 - Move Spritz i18n support to this library
 - Add i18n support
 - Server-side: improve RDEPEND check routines for QA
 - Server-side: test compiled libraries for every new added package
 - Server-side: improve dependencies test for QA (also making it a blocker)
 - Add Community Repositories support
- **Equo**
 - Add i18n support
 - Add Community Repositories support
- **Socket Interface**
 - Implement the Repository Daemon and add EAPI=3 support (which means differential repository and package (if applicable) updates.

Milestone 3 - 1600€ - Starting a new path

After Sabayon Linux 3.5, preparing for Sabayon Linux 4.0, which will hopefully bring real innovation into package managers arena. First of all, a ncuses-based application is needed to easily handle package updates (compilation) server-side. This is gonna replace reagent and activator on the long term, will reduce maintenance requirements and man-power by a good 70% and allow easy handling of multiple packages in

the same scope ("package name" + slot).

Along with that, the Repository Daemon should start to handle external packages metadata (pictures, videos, music, and such), a pluggable authentication method (accounts management to submit stuff).

Once done, support will be added to Spritz and users will start adding and sharing content directly from it.

Milestone 4 - 2500€ - Now the website and a new release cycle starting (4.0 Loop1)

Sabayon Linux website will be updated, with a new template engine (written by Michele Tameni, some money needed for him) and a new skin. The new version, along with eventually bringing "sane" HTML, will include deep interaction with Entropy and with packages.sabayonlinux.org, the latter will be updated with features stated at "*Milestone 3*": users will be now able to interact with Entropy also from the portal (without the need of having a Sabayon installation running).

Once done, Sabayon Linux 4.0 Loop 1 (beta 1) will be launched with new artwork and packages. Depending on user requests, add Community Repositories management support to Spritz too.

Milestone 5 - 1200€ - Entropy, more features and a new release (4.0 Loop2)

Work out the current Entropy TODO list adding minor features like PDEPEND support (Post-Dependencies), packages ChangeLog, a Notice board (to ease communication between Staff and users), chroot snapshotting (to restore previous package state after big compilations), package sets (allow user to define package groups), add quickpkg (re-creation of a .tbz2 package from filesystem) and smart packages (multiple packages into a single one) to Spritz, add configuration files backup tool to Equo and Spritz.

Release Sabayon Linux 4.0 Loop 2 (beta 2).

Milestone 6 - 1200€ - QA of the work done, preparing code freeze for Entropy 1.0

By this, Entropy must be feature completed. It is needed a month to stabilise all the new code (client/server), setting up a real i18n team and bring Entropy a good localisation support, hopefully reaching 10 supported languages). Take time to discuss upstream (Gentoo) Portage features with its developers and improve Portage-Entropy interaction. Improve automation server side by setting up an automated build system. Freeze all the API and prepare release Sabayon Linux 4.0 Loop 3 (beta 3).

Milestone 7 - 1600€ - Documentation and final release

Use Entropy API freeze time frame to write tons and tons of developers and users documentation to attract more third parties (at this point in fact, Nova Linux {official Cuban Linux distributors} should have released a distribution featuring Entropy).

Release Sabayon Linux 4.0 and do some PR.

Project management

Issues to be resolved

We just have two issues need to be addressed, one is about hardware resources, while the other is about human resources. While the first can be solved by NLNET sponsoring the latter needs an extra step, finding good volunteers and making them working harmoniously is not that easy. Community Repositories will get developers closer to the core project and this will surely attract them into coding for us, it's just a matter of making the system self-sustainable. On the tech side, every implementational decision has been already made.

People and skills involved

Project founder, leader, developer, maintainer, chief architect: Fabio Erculiani

Project consultant: Michele Tameni (also the portal {www.sabayonlinux.org} engine developer)

Project contributor and packages maintainer: Joost Ruis

Project Core/Testing team, i18n, Wiki or general internal contributors: Dave Hardy, Daniel Robbins, Andre Parhan, Nathan Powell, Inaeth Dragonmist, Ian Whyman, Rand Aijala, Jeremy Katz, Mitch Harder, Robert and Cheryl Heatherlys, Roger Calvò, Alan McGeoch, Kelly Schwartz, lythandrel (nickname).

Needed skills for project development, contribution: Basic Unix/Linux knowledge, >=Python-2.5, GTK/PyGTK (GUI), Ncurses (TUI), Sockets (Networking), XML (information manipulation), SQL (SQLite3 dialect), fd.o standards (GUI), html + apache mod_python + Mako template engine (web interface) + basic PHP, good English + other language knowledge (i18n), Gentoo Linux/Portage (Entropy library, projects communication).

Project risks

Missing funds to continue maintaining repositories and distribution. Fabio Erculiani wishes to be able to work full day on it without worrying of money issues. We don't see any other risk.

Oversight and reporting

Monthly development reports can be made and sent to respective supervisors by Fabio Erculiani.

Planning

We are already working on the TODO list written in previous pages. We think to clear it out by the end of March 2009, if not even before. So, we can make the following reports: June 2008, July 2008, Sep 2008, Oct 2008, Nov 2008, Dec 2008, Jan 2009, Feb 2009, Mar 2009.

Funding/Costing of the Project

- **FTE Assessment:** 1,5 (12hrs/day) – Fabio Erculiani (he actually works from 8 to 16 hours/day) + possible extra paid help
- **Equipment Assessment:**
 - Hardware for testing/replacement/development, such as video cards, wifi cards, hard drives, mainboards, CPUs, notebooks, etc: 2500€ for 2008/2009 including contingent expenses
 - Hosting of *.sabayonlinux.org (dedicated server, costs shared with Michele Tameni, 100€/mo in total): 50€/mo = 1100€/yr
- **Articles, banners, comm. Agreements:** 500~1000€
- **Travelling Assessment:** No travelling planned.

Other sources of financing

About banners, Google AdSense and Kontera In-Text Adv (around 300€/mo depending on the distribution release plan and on EU-USD change). University of Brescia (<http://www.unibs.it>) is currently housing our compilation server for free. Itsnew.nl hosting company is currently housing our portal server at a special price (100€/mo). Daniel Robbins (Gentoo Linux founder) officially endorses our efforts (<http://funtoo.org>). We also have a Fundraiser always running on our main page from where we get some extra funds through PayPal. Fabio Erculiani is currently using these sources to try funding himself and payback his dedication.

Promotion plan – community userbase growth

By releasing Entropy with a complete set of features, we think to not need much “active” promotion. Users will start realizing we are providing something exclusive, perfect and FAST binary packages support on a Gentoo based environment, allowing us to cover users from top (elite) to bottom (newbies). We estimate a 100% userbase growth with just releasing Sabayon Linux 3.5.

Future?

Technically speaking, for Entropy 1.0+ we could think about supporting more SQL databases, like PostgreSQL, MySQL, allowing centralized package repositories, moving to Python 3.0, and making the whole system profitable, providing “Premium” features to users willing to financially support us. But one thing we should keep in mind is, moving towards market moves.

People responsible of the implementation:

Fabio Erculiani - Sabayon Linux Founder and Chief Architect