Debian Med
Integrated software environment for all medical purposes based on Debian GNU/Linux

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Abstract

The Debian Med project started in 2002 with the objective to bring free medical software into the focus of users. Those may be IT service providers for smaller clinics, the doctors themselves, researchers in pre-clinical environments or just skilled enthusiasts with an ambition to apply their talents to the biomedical domain. At that time, the communities in computational biology, medical imaging and medical informatics already had a number of high-quality Free Software solutions. Debian as a Linux distribution provided a solid foundation for bringing those products together. To assure complete coverage and harmonic integration, the Debian Med project was initiated to provide a software management infrastructure to improve communication among Debian package maintainers, *e.g.* to identify missing glue packages to translate data formats or to point out conflicts in the naming of binaries.

Over the past decade, the integrative Debian Med project has proven to have positive effects beyond the scope of Debian users. Many ties have been established between original software developers and Debian package maintainers. Large development teams started to upload their Debian packages directly. That communicated the experience of the developers back into the distribution and made medical software a constituent member of the Debian distribution.

The ideas behind the Debian Med generalised into the concept of Debian Pure Blends. Blends, such as Debian Edu, Debian Science, DebiChem (chemistry), Debian GIS, DeMuDi *etc.*, were created to provide a targeted appearance of the Debian distribution for different domains of applications. Today, Blend task pages complement canonical Debian package listings with additional information (e.g. scientific references) and also cover software products that are relevant for a given domain, but not yet integrated into Debian. A growing community with continuously improving maintenance procedures eases direct contributions to Debian, thus preventing unnecessary fractioning of the open-source community, and allow for supporting customised versions of Debian, such as Debian Med, within the Debian ecosystem.

1 Introduction

1.1 Motivation and purpose of Debian Med

The advent of Debian Med was stimulated by the rise of several Free Software projects that were addressing a series of diverse tasks in medical care. Several of these projects

– albeit initially appearing most promising – are now dormant. A few random examples for interesting projects with no visible release for longer than five years are: FreePM, OIO, OdontoLinux! which was even included in Debian formerly. Those failed to follow two basic principles of Free Software: care for a solid user base and recruit qualified developers from it. This is a difficult task that becomes even more difficult with increasing specialisation of software.

With a smaller number of potential contributors, one needs to help the community as much as possible to develop itself and to develop a tight relationship with its users. Debian as a Linux distribution already helps distributing software in a readily usable form. Moreover, modularisation aspects of Debian packaging do not only reduce the complexity of packaging individual software: by allowing to depend on other packages, it also eases maintenance of the complete system. For example, due to modularisation, updates and fixes in core libraries make end-user software upgrades unnecessary most of the time. Performing binary builds for more supported hardware platforms than any other operating system and extensive quality assurance guarantee robust performance of deployed Debian systems. Debian Med complements the Debian infrastructure with a communication platform for all involved parties: original software developers, Debian maintainers and Debian users.

Web search engines pick up the software tools and their descriptions on the Debian Med task pages. Beyond mere lists or announcement sites, *e.g.* Freshmeat.net, any Debian user can almost instantly start evaluating the software on the local computer.

1.2 Status of Free Software in health care

More common programs like a web server, or a mail user agent are installed on a vast amount of computers and have a very large user base. A large use base, in turn increases the likelihood of attracting skilled programmers that tackle unresolved problems or general improvements of the software they are using. This type of user is extremely valuable to a project, because they can implement and contribute any modification they need by themselves without having to rely on a project's manpower.

The fact that a piece of software is needed for one's own work is often the basic motivation to write Free Software. Biological software is frequently developed by scientists themselves, because they are experts in a particular topic and the development is inseparable from their research. Many authors of such software realise the benefits regarding prestige, feedback and facilitation of scientific progress that is expected from sharing their code and thus the field of computational biology is well covered by Free Software solutions.

There are many ties between adjacent fields of science and also software developers and users outside of biological research benefit from Debian Med's and similar efforts. Mutual interest in neuroimaging software led to the NeuroDebian project [NeuroDebian Team, 09] joining forces with Debian Med to improve the coverage of medical imaging software in Debian. Even if some important packages like the Bio Image Suite [Yale University, 2008] are not yet packaged for Debian, there is already an extensive coverage of viewers, data analysis pipelines, and development tools supporting a variety of data formats (*e.g.* DICOM, NIfTI) as well as other software products of particular utility in medical imaging.

Medical health record applications in patient management are considered essential by most people. As a starting point GNUmed [Hilbert, 2008] has been included into Debian. However, there are numerous similar Free Software projects that try to solve more or less the same problem, but diverge in implementation details (programming

language, database server, etc.), user interface (GUI or web application) and basic concepts of work flow and philosophy. It is planned to also integrate those alternatives that fit Debian's quality standards and look promising regarding the longevity of the respective project.

Still in the medical section, Debian has also packaged the first open source pharmaceutical drugs prescriptor and drug-drug interactions checker FreeDiams [Maeker, 2010], which can run on multiple drugs database (FDA, CA, FR, ZA) as a standalone application or in connection with other medical health record applications (like for instance GNUmed).

The even larger task of managing a hospital is also tackled by several projects, of which the most famous is OpenVista[OpenVista, 2008]. As an enterprise grade health care information system it is rather complex and needs a dedicated maintenance team beyond Debian Med, with a strong technical background and familiarity with the peculiarities of OpenVista. To overcome this problem, the strategy of Debian Med is to try to involve the upstream authors into the packaging. This has started in August 2009 and we are positive that we will see OpenVista in Debian at some point in the future.

Another application for hospital management is OpenMRS[Developers, 2010], which is in preparation of being included into Debian and chances are good that this will be finished in the beginning of 2011.

2 Principles of Free Software distribution

2.1 Sharing the work – Debian and cross platform

The Debian Project is an association of individuals who share the intention to create the best possible free operating system. This operating system is called Debian GNU/Linux, or simply Debian. Everybody on the Internet may initiate a site and offer Debian packages.

To make Free Software development work, it requires a critical mass of supporters. Development without feedback prior to the submission of the final product is disadvantageous. The development of programs is not the main concern of a regular Linux distribution. However, with the focus on Free Software and smooth local compilation, Debian considerably eases the contribution of comments and concise feedback of the technically skilled early adopters. Debian helps to bring developers and users of applications together.

With an increasing abstraction from the underlying hardware, e.g. via Java or various scripting languages, the actual platform becomes less of concern. The tools should work on any platform. So, the remoteness from the core infrastructure that renders keeping the platform-centric user community difficult, also helps finding contributors across platforms. The conditions under which those collaborations are most feasible are summarised in the Debian Policy and the Debian Free Software Guidelines.

2.1.1 Debian Free Software Guidelines and Debian Policy

Free or not free: Debian has a collection of criteria, referred to as the Debian Free Software Guidelines (DFSG), that allow to distinguish free and open source software from other categories of software. The most notable of these rules is that a software license must permit modifications and that those modifications are allowed to be redistributed, while granting the recipient the same rights. Moreover, there shall be no restrictions

imposed on the recipients to whom those rights are granted regarding the work that is exerted with that software. For example, Debian does not consider software as *free*, if it only comes as *free for academia*. Such software cannot become part of the Debian system, but may only by offered in supplemental repositories.

Another important rule is that any granted permission must not be specific to Debian, but shall be universally applicable to anyone, such as other software vendors or individual users. This requirement is another indication of an intrinsic impetus to help Free Software at large.

The technical constraints on the packaging are formulated in the Debian Policy document. While every package needs to comply with that policy, every single maintainer of a Debian package has complete freedom to decide what software to package. Those who package, *i.e.* those who do, give the distribution it shape. This is referred to as *do-ocracy* in Debian and refers to the fact that: the one who does something decides what is done and how it is done.

2.1.2 Active influence of small groups

A decision to use the distribution as the main working operating system can only be made when the user can be as productive as with an alternative OS. Part of that consideration is the availability of software that contributes to everyday's routine and beyond.

This *do-ocracy* principle enables individuals or small groups to actively influence the support of certain fields of work. Here, community-driven Linux distributions have an edge over commercial Linux distributions. The number of users that may use a package, *i.e.* that "pay back" for an initial packaging effort, is not the decisive factor in favor of or against the maintenance of a package. One only needs a sufficiently large community of active package maintainers to have confidence that the current infrastructure will be maintained, that new packages will be brought into the distribution, and that one will possibly be allowed to improve current workflows with personal contributions. Debian Med is actively benefiting from this aspect and is supporting a lot of applications that are very specific to medical care and are not integrated in any other large distribution.

The advantage of plugging Free Medical Software directly into a large Linux distribution as opposed to creating a separate distribution with a specific focus on medical care will be further discussed below.

2.2 Technological infrastructure of Debian

2.2.1 Bug tracking system

Users should be able to give immediate feedback about problems affecting a software. While they always have the choice of reporting these to the upstream developer, usually per email, the Debian Bug Tracking System (BTS) offers an additional channel for tracking software defects efficiently. The maintainer of a piece of software can investigate whether a particular report is actually valid before upstream developers need to deal with it. Moreover, in many cases the Debian maintainer can suggest or even implement fixes, that are then sent to upstream alongside the bug report, if the problem is not Debian-specific. All problems are made public, and hence the whole community may contribute to solving a particular issue.

In the case of Free Medical Software the upstream projects frequently do not feature a bug tracking system. Thus the inclusion of such software into Debian adds extra value

to the respective projects, because users can report issues via the Debian BTS and the maintainer of a package works as a proxy to the software authors. For a user this has the benefit of a consistent bug reporting interface and software authors might get extra technical information provided by the Debian maintainer who generally has decent technical knowledge.

2.2.2 Quality Assurance

Debian has several technical means to assure a constant high level of quality:

Autobuilders There are periodical tests to rebuild all software targeting a future release. This verifies compilation against recent build tools and might uncover technical problems in software. This is an additional check to the build daemons mentioned below.

Automated upgrade checks Before a new version of Debian is released, automated tests are done, where every single package will be automatically installed into a clean stable system of the last published Debian release and then the system will be upgraded to the future stable release. This makes sure that new Debian releases can be rolled out smoothly in release critical applications.

Package Installation and De-installation The tool `piuparts` tests that .deb packages (as used by Debian) handle installation, upgrading, and removal correctly. It does this by creating a minimal Debian installation in a chroot, and installing, upgrading, and removing packages in that environment, and comparing the state of the directory tree before and after.

2.2.3 Build daemons

Individual software developers or projects often only have access to a limited variety of hardware for testing and building their products. The Debian project, however, automatically compiles software for 13 architectures, including all widely used platforms for servers, desktops and embedded devices. To get a package into Debian, be it novel or an update of an existing package, the maintainer of a package submits the source code of the program together with his modifications of the code to create a package. The build daemons (or autobuilders) compile the packages for each of the supported systems and make the resulting binary package publicly available for download. Logs of the build platforms are available online for everybody's inspection.

2.3 Selection of packages

Debian contains more than 20,000 binary packages, and this number is constantly increasing. There is no single user who needs all these packages. To specify packages of one's particular interest, several options are provided by Debian:

tasksel Provision of a reasonable software selection for rather general tasks that can be accomplished using a set of packages installed on a Debian GNU/Linux system. However, these are not yet covering scientific applications. The Blend toolkit will support `tasksel` to enable selection of *niche* software collections, *e.g.* Debian Med, right after a fresh installation of a general Debian system.

command line package management `apt` and `aptitude` provide means to search for packages of particular interest by name or words in the package's description, or assigned tags like "works with DICOM". Additionally, every package also lists related packages that, for example, enhance its functionality or offer alternative implementations of some particular functionality.

GUI There are several graphical user interfaces to manipulate the installation of packages on a Debian system. The most popular is `synaptic`. It allows users to seek for certain packages and to display detailed information about each package.

In addition to its 13 officially supported architectures, there are ports to even more hardware architectures and operating system kernels. Moreover, Debian package management and distribution infrastructure has been adopted to other operating systems lacking a built-in equivalent, *i.e.* Fink on Mac OS X (fink.sourceforge.net).

A *distribution* is a collection of software packages. There are general distributions, which do not have a specific target user group and try to provide a universal coverage, and there are several specialised distributions targeting specific groups of users.

Distributors are those companies or organisations that are building these collections of software. Since the software provided by GNU/Linux distributions is Free, the user purchasing a copy of the distribution pays for the service that the distributor is providing. These services might be:

- Preparing a collection of the software for the target domain of use nicely integrated within a uniform environment.
- Guaranteeing overall quality of the product and smooth installation procedure.
- Making software accessible to the users by writing documentation to enable the usage of the system with maximum effect.
- Assuring robust performance with timely software updates and security fixes.
- Providing technical support and troubleshooting.
- Selling installation media and printed documentation.
- Offering training and qualification.

3 Distribution of free medical software

3.1 Dedicated bioinformatics and medical distributions

Between 2003 and 2005 several adapted distributions targeting bioinformatics and medicine emerged. Most of them were based on Knoppix[Knopper, 2005] (and thus indirectly on Debian). The motivation behind them was to allow a small team of not more than five people to release a product with the following features:

- easy to assemble
- tailored for the personal needs of this specific work group
- attractive web appearance

Due to the complexity of the task, these projects had to make compromises regarding the quality of their products and were frequently being

- sloppy about policy of the underlying Debian system
- sloppy about the licenses of the included programs

It is hard to estimate the user base of such distributions, but it can be assumed that they were basically only used inside the institution where they were developed. As a consequence, usually not much effort was invested in setting up a complete support infrastructure: bug tracking system, active mailing lists, forums, IRC, etc.

It turned out that this approach is not sustainable for the distribution of Free Medical Software. Some of these distributions issued only a single release, others remained longer but were constantly losing manpower. Furthermore, no security updates were made available, and the distribution of general software tools stagnated at the moment at which the original fork from Debian, Knoppix or other distribution happened. Especially the latter aspect made such an approach to distribute software unacceptable for sensible medical data.

To prevent these problems, Debian Med took a different approach. The initial team was also quite small, but has grown in the eight years of its existence to more than 20 active maintainers. The primary idea is to maintain medical applications *inside* Debian. This automatically solves all drawbacks of the separate distributions mentioned above: security updates are provided without any specific effort of the Debian Med team. There is a huge and reliable infrastructure with a bug tracking system, several FTP servers all over the world, autobuilders and an QA team running intense tests regarding software quality (see above).

An effort similar to Debian Med exists in Fedora as FedoraMedical SIG (Special Interest Group) and in openSUSE as openSUSE Medical. Both projects share the same idea of putting medical applications inside a larger distribution instead of trying to do the work of the distributor themselves. The difference with Debian Med (besides of being different distributions) is that both teams are much smaller and thus the number of packaged applications is in both cases less than 5% of the applications available for Debian. Moreover Debian does not distinguish between a core distribution and optional extensions. Consequently, a full Debian distribution on whatever medium also automatically contains all medical applications as well.

Looking beyond Linux distributions there is also FreeBSD. The ports collection also contains a versatile collection of biological software. The remarkable fact here is not the underlying operating system (you can easily have Debian with a FreeBSD kernel with Debian 6.0) but rather the fact that the same strategy to support a specific field as in Debian Med was followed: Use a large and technically well supported system and put the specific software for special use cases *into* this system instead of deriving a whole *new* system from the existing one.

3.2 Comparison with Debian Med

3.2.1 Other fields than only biology

Looking at all efforts mentioned above (except Fedora Medical and openSUSE Medical) it becomes evident that they are all limited to biological software. Previously it was stated that one strong column of Debian Med is this specific field. This is the case for a specific reason: The amount of free biological software is large and most of these projects are relatively easy to turn into packages – therefore the amount of work per package is much smaller compared to, for instance, medical record applications with preparation of databases, dedicated user management.

There is one major difference between the projects mentioned above and Debian Med: While the biological part is really interesting for medical care, Debian Med tries to cover all other fields of medical care as well. This goal is not yet reached but work in this direction is continuously performed and some important steps are done.

3.2.2 Debian Pure Blend

An even more important difference than the more general approach compared to the other repositories, is the fact that Debian Med is not only about just packaging software. The Debian Med project is one of the earliest so called *Debian Pure Blends* and aims to do more for the comfort of their users than adding binary packages to the Debian package pool. The main goal is to turn Debian into the distribution of choice for people working in the field of medicine and to make Debian an operating system that is particularly well suited for the requirements of medical practice and research. The goal of Debian Med is a complete system for all tasks in medical care that is built completely on Free Software.

3.2.3 Flexibility in supporting small user groups

On the organisational side the project tries to attract people working in the field of Free Software in medicine to share the effort of building a common platform that reduces the amount of work for developers and users. Sharing the effort in publishing free medical software to a large user base is a main advantage of Debian Med.

The strength of Debian is the huge number of developers (more than 1,000) all over the world working in different fields. Some of them are working in the field of biology or medicine and thus have a natural interest in developing a rock solid system they can rely on for their own work (not only commercial interest to sell service per accident). Often, chances for providing support for small user groups are greater inside a community driven distribution than in a commercial distribution: it just needs some developers who have a specific interest and they will realise and publish an environment for their needs and will share it with other users. A company that has to gain a certain market share is not flexible enough in this regard to cover very specific interests.

The underlying principle that those things will be done if there is somebody who just does the work is called *do-ocracy* – which just means the doer decides what gets done.

That is the reason why Debian is often the platform of choice for researchers in the field of computational biology: Some biologists are Debian maintainers and so they added support for biological packages. The more the Debian users in the field of biology report back about problems or wishes, the more Debian maintainers are able to enhance their system for their own and their users' benefit.

3.2.4 Metapackages

Debian offers tens of thousands of software, data and documentation packages. It is considered helpful for the users (who might not have the right to install packages themselves) to specify all biomedical software with a single instruction given to the local shell or to the local system administrator.

Debian Med contains a set of metapackages that declare dependencies on other Debian packages that can be used to prepare the system for solving particular tasks. The user only needs to search for metapackages starting with prefix `med-`, and install just few of them to fulfill his or her software selection requirements. The package management system then will take care about the installation of all packages that are in the list of dependencies of these metapackages – so the user can be sure that all packages he or she might need for the job will be installed on his or her system. If at least one of the metapackages is installed, a special user menu is created to enhance usability for the user working in the field of medicine.

Currently, Debian Med applications are provided in certain categories: medical practice and patient management, medical research, hospital information systems, medical imaging, documentation, molecular biology and medical genetics and others.

Technically these categories are implemented as appropriate metapackages, for instance `med-bio` for packages concerning molecular biology and medical genetics and `med-practice`, which is helpful to manage a medical practice. The sense of using metapackages is that you have to install only a single package using a package management software tool to get all interesting packages that are necessary for a single task. For instance a single command

```
apt-get install med-bio
```

results in installation of all applications inside Debian that are related to the field of molecular biology and medical genetics.

3.2.5 Continuous growth

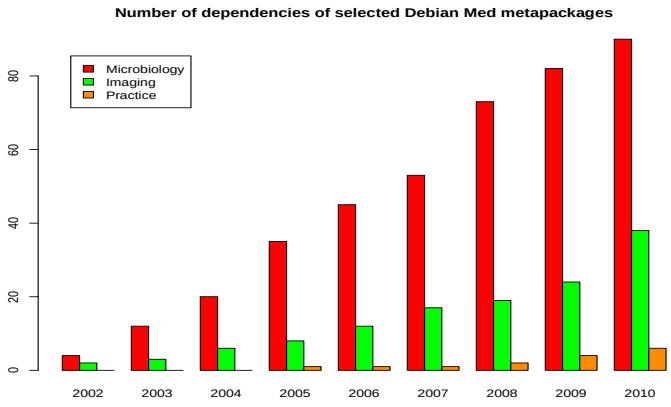


Figure 1: Number of dependencies of selected metapackages

Once a piece of software is packaged, the effort needed for its future maintenance is relatively small. Nevertheless, care is needed not to exhaust initial maintainers' enthusiasm since continuous maintenance requires investigation of submitted bug reports and following the "upstream" development. Also, for many package maintainers, to understand the upstream code, to learn from it, and to contribute back is a part of their motivation – and that often does not scale. In the longer run, continuous growth can only come through attracting additional contributors to the Debian project. Debian welcomes contributions and has set up Sponsored Maintainer and Debian Maintainer programs to lower the entry barrier. Those programs allow anyone to contribute without requiring an official Debian Developer status, obtaining of which requires going through an often lengthy Debian New Maintainer process. Moreover, the Debian policy is not requiring any kind of a *Contributor Agreement*, thus ownership for any contributed work remains with the authors, which is an important incentive in the true spirit of open source. As a result, anyone interested can easily contribute and acceptance might be only a couple of emails away.

Several Free Software projects which try to deal with small user group software started with a lot of enthusiasm but at some point in time developers had other interests

or changed their job. There are just several reasons why people are not able to continue maintenance of a project because of lack of man power.

To make sure the manpower of the team can fully concentrate on the field of work they really want to do the strategy of Debian Med is to stay strictly inside Debian – so even if the team started with a few people they were able to relay on a solid technical basis without extra effort.

Thus Debian Med is not a derived distribution and is a part of the Debian project. Debian Med relies on the core Debian infrastructure (*e.g.* build farm for a variety of architectures, online repositories and mirrors, bug tracking system) and only complements it with an additional thin layer yet again functioning within Debian infrastructure. That guarantees that the overall development system remains robust and does not require extra effort from the Debian Med sub-community. Moreover, adherence to common principles and organisation helps Debian Med project members to improve efficiency and share overall maintenance cost because many actions can be performed on the entire pool of maintained packages at once. Admittedly, quite frequently software products maintained by Debian Med are of generic utility, such as Java or Python libraries, and thus of interest to the Debian audience outside of the target scope of Debian Med– Medicine, as a result benefiting Debian as a whole.

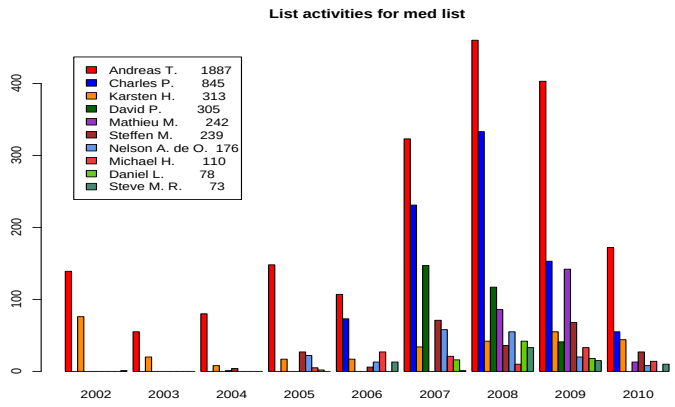


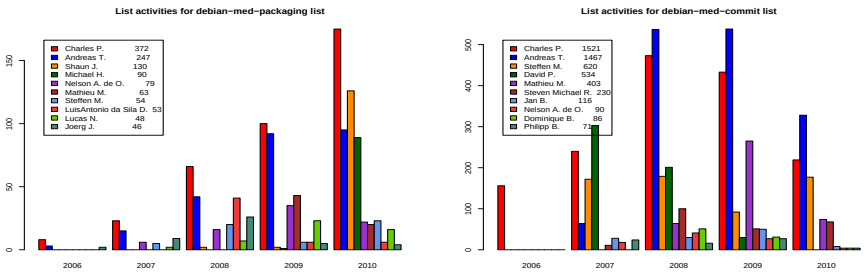
Figure 2: Activity of most active authors on the Debian Med mailing list

The success of the Debian Blends approach finds evidence in *e.g.* a continuous growth of the number of packages inside Debian that are of interest for health care. Taking the number of dependencies of some metapackages into account (see figure 1), only a small set of packages useful for medical care was available at the beginning of the Debian Med project in 2002. A nearly linear growth with a gradient that perfectly reflects the availability of programs in this field can be observed.

Besides the growth of the output of a project it is useful to characterise the commitment of people involved in the project. It is important to ensure that fresh blood is coming into the project to compensate for the normal loss of supporters, which always happens in Free Software projects (people find new jobs with different orientations or have less spare time for private reasons etc.). A raw measure for the activity of members might be their mails to the project mailing list. Figure 2 shows the number of mails from the ten most active posters on the Debian Med mailing list. This graph shows that the number of active supporters was growing constantly in the first years and is now at

some constant level.

Considering that some technical discussions initiated at Debian Med mailing lists quite often naturally migrate to the packaging list (see Figure 3(a)) the number of postings of the most active people remained quite constant and only one member of the team became inactive (while some new people came in but are not yet visible in the graphs).



(a) (b)

Figure 3: Activity on development list

The most active people committing packaging materials are shown in Figure 3(a). In the last year 26 developers did 1,108 commits to the SVN repository and since the beginning of Debian Med, 47 developers did 5,545 commits regarding packaging medical applications or documentation about the project.

3.2.6 Backports

Debian comes in releases. Once a release is out, updates to it are limited primarily to security-sensitive or grave functionality issues. New features may introduce regressions and are avoided. That guarantees a very stable and robust functioning of the system as a whole. For scientific packages and for packages reacting to continuous changes in the health care system, this is not an adequate situation. The long established Debian backports service has being integrated within the official Debian project. It offers updates to the latest versions of packages while relying on the core components – whenever possible – that were shipped with the official releases. This compromise allows to brings maximal usability and maximal robustness together.

3.2.7 Role inside Debian

The Debian Pure Blends framework was mainly inspired by the Debian Med needs. The implementation by, for example, the Debian Edu project – another Blend – is far more advanced. There are several reasons for this fact. The main reason is an enormous availability of software for education and the fact that a Norwegian company paid developers to work full time on this project. Debian Med profited from those technologies and generalised some tools from Debian Edu for all Blends. Conversely, inside Debian Med some new Blend tools were developed which now enhance the easy preparation of metapackages.

Beyond the metapackages, another service of the Blends is the so-called web sentinel. It is a web portal to guide the contributors to the current active tasks (packages)

and their associated bug reports. The task pages are providing an overview of all fields of work, such as biology, medical imaging, practice management, etc., that are covered by Debian Med. The list of all the packages is regenerated on a daily basis and includes some meta information to *e.g.* point to relevant scientific publications and the description of the packages in this task. The output of the project can be easily viewed at the tasks page of Debian Med .

For the comfort of the user these pages are translated (if the Debian Description Translation Project has provided translations), include screenshots from screenshots.debian.net if available, give information about the usage of a package by querying Debian Popularity Contest results and inform about versions packaged for Debian as well as a notification about new releases. Moreover, the visitor of these pages gets an easy option to provide a screenshot or a missing translation as well as fixing a wrong translation, *i.e.* everyone is visibly invited to contribute.

There are also quality assurance tools developed; for instance there is an overview of all bugs concerning the packages in Debian Med .

By providing this kind of tools for other Blends as well Debian Med has set a cornerstone in the technical cooperation between user oriented projects inside Debian. This in turn awakes the interest of other Debian developers who might provide other tools for Debian Med.

4 Discussion

The Debian Med project serves as a common platform for all Free Software that may be utilised in medical care. Tools developed in computational biology are just a part of it because they are an important brick in medical sciences.

The contributors to Debian Med aim at providing the best possible platform for medical work. The freedom of users to apply those technologies for local needs, *e.g.* new scientific problems or particular regulations in health care, are intrinsically connected with that prime ambition. The Debian Free Software Guidelines match those nicely and are applicable across platforms.

Debian is open. It welcomes new members, welcomes new packages and shares its developments across platforms.

4.0.1 Importance of community support

That strong support within the community of users is essential for the development of software, for quality assurance, feedback on features, and not at least for the motivation of staff, that all commercial distributors are well aware of. For example, Red Hat has initiated Fedora as a free supplement to their commercial distribution. This is the reason why Debian Med is part of Debian and why groups external to the Debian society, like Bio-Linux[NERC Environmental Bioinformatics Centre, 2010], are also keen on close collaboration with the community.

4.0.2 Approaching Debian Med

Anybody already using regular Debian or Ubuntu and having a package installed that is maintained by Debian Med, is already a user of Debian Med. To have a new package shipped with the distribution, one can ask on the Debian Med mailing list. The devel-

opers of the software would be helped with the packaging process and offered guidance towards self-uploading future versions.

4.1 Developments

Some scientific funding agencies put considerable pressure on research grant applicants to explain how to possibly bring their developments to practical applications, *i.e.* to distribute the software. Debian and its derivative distributions are a very suitable medium for this purpose.

Debian Med hopes to help the communication between developers for the sharing of data management, *i.e.* the input for their tools that should be consistent for all tools contributing to a scientific workflow. While some ideas like *e.g.* getData [Charles Plessy, Steffen Möller, 2010], have been developed, this still needs to be amended to suit the community better.

Another aspect is education. Debian or Ubuntu are used in many student computer labs around the globe with many having packages from Debian Med installed. We should hope for the development of courses that involve Debian packages and those course materials to be shared similarly to the tools themselves.

5 Conclusions

The real use of Free Software for medical care is very heterogeneous, even if some fields like microbiology are better covered than others. The continuous updates of data and the addition of novel important tools for a general medical environment cannot be performed by a single individual. The adherence to a policy and the sharing of maintenance are basic technologies to allow inter-institutional software projects of different kinds in health care.

Debian and its special dedication to medical software in Debian Med, but also the technical infrastructure behind this community project, renders a comfortable solution. The volunteers behind Debian Med strive to support everybody's specific projects as well as they possibly can. It is a particular challenge of users of Free Software, to determine together with the community the available packages that already serve their needs or may be adapted respectively.

All that said about Debian, at the end of the day it is the freeness of the software that is important. openSUSE and Fedora, with slight variations, have adopted much of the principles that Debian spearheaded. We still need to advance mechanisms like the packaging format conversion tool `alien` to work together as Free Software users, maybe along the lines of the collaboration between Debian and Ubuntu. And we all, users, packagers and developers, need to understand more about cross platform developments that also includes Mac OS X and Windows.

6 Acknowledgements

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