FreeSBIE - A code walkthrough and a case study

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1   Introduction

FreeSBIE is a LiveCD based on the FreeBSD operating system developed by an Italian group of people, and supported mainly by the Italian FreeBSD Users Group, known as GUFI. The first release (1.0) was released on April 15th, 2004, and has already been downloaded almost 20.000 times. But FreeSBIE is not only an ISO file you can download from one of our mirrors, it is also a way to create your very own, fully customized, LiveCD. In this paper, we're going to depict how the FreeSBIE provided by the team can accomplish the task of letting everybody become a Release Engineer on his own.

2   The GUFI

The Italian FreeBSD Users Group is a small group of people whose aim is to spread the word about FreeBSD in Italy. It is composed of 15 people making up the staff, working together to keep the mailing lists and the IRC channel in good state. The main event for the group is GUFICon, having place every year around the end of September. This time it was in Milan on October 2 and 3.

3   The beginning

The project was started by Davide "dave" D'amico, in order to fulfill the need for a LiveCD based on FreeBSD. There already was a solution around, created by a Brazilian group, but it wasn't as flexible as dave needed. He brought the project on and found help form Dario "SaturNero" Freni initially, and from the whole GUFI, in a couple of months.

4   The team

The development team is now composed by five people, with many obviously co-operating on the official mailing list or on the IRC channel. We're looking towards finding more people to work on some areas that need reoworking, or simply things that need to be created from scratch. By the way, the development is constantly evolving, following the changes in the original FreeBSD source tree, and adapting FreeSBIE to work with it. We're still missing some key features that will be later depicted, and maybe will do it in the next release.

5 The architecture

The power of FreeSBIE is given by its simple nature. The concept behind the downloadable ISO is that everyone can create his own LiveCD, including all the packages he or she wants, obviously according to the space available on the media being used. That's why FreeSBIE is normally considered as a set of scripts rather than an operating system by itself.

6 Behind the magic

There is no great magic behind how FreeSBIE works. In fact, it makes use of simple facilities provided by all the BSD systems, such as buildworld and installworld. What makes the core of the system is a simple line in the kernel configuration file, which sets the system root to a device other than the normal hard disk. Support to handle usage on non-master devices such as a slave CD-ROM has been recently added and will be present in FreeSBIE-1.1, along with other important fixes to known problems. The creation of a new distribution is done starting from a buildworld and installworld procedure, using a destination directory other than the default one. After building a complete environment, including a custom kernel, the only thing remaining left is to decide the packages to be included on the media being built.

7 As easy as 1,2,3

There have been lots of concerns about the difficulty of creating a LiveCD from scratch, but with FreeSBIE it is enough that anybody can try. It is only a matter of downloading the sources from CVS maybe this is sometimes the harder part and running *./freesbie* inside the downloaded directory. A set of dialogues will guide the user through the creation procedure. At the moment the interface is in english only, but there are plans to bring it to be i18n compatible.

8 Performance

The first test releases suffered from a media problem, which consisted in great slowlyness accross all the system. This was due to the fact that data was roughly stored on the CD, without any compression, and it had to be read according to this. With FreeSBIE-1.0 a Cloop filesystem was introduced to reduce the size of the *usr, /var* and */root* partitions, so that more data could be stored this meant more application could be bundled and read times could be improved. This cloop filesystem

relies on the GEOM framework, so this introduction meant that FreeSBIE could not work anymore, as it was, on 4.X systems, where GEOM is not available, and so is the module written by Max Kohn.

9 Bundled applications

FreeSBIE is being distributed mainly as an ISO for people wanting to try it out, or just to give FreeBSD a try. There is a great deal of applications included in the official distribution, ranging from games, to browsers, to media players. Davide D'Amico, who released the first official version, tried to create a general purpose environment by using XFCE as desktop manager a good mean between GNOME and twm and putting in browsers such as Firefox and Dillo along with more expert level software such as ethereal or ntop. OpenOffice is not included, since it requires special work to be adapted to a FreeSBIE environment, and it needed so much space that it may have created serious problems. Anyway, the FreeSBIE scripts can already handle its addiction, but the part of code related to the issue is normally commented, and can simply be activated.

10 Childs

One of the projects that derive from FreeSBIE is called MiniBSD. It was developed by Gianmarco Giovannelli to adapt FreeSBIE to be run on embedded machines by installing it on flash cards. MiniBSD can fit on 16mb flash cards, and can bring all the options that FreeSBIE has into smaller systems. It is also included in a subdirectory in the FreeSBIE CVS repository.

There have also been rumors in the past about the need to have a frontend for IPFW or may even be IPF or, now PF included in FreeSBIE, for easier firewall configuration, but nobody ever started to effectively work on it.

11 Errors

Like any other project, FreeSBIE is no error-prone. The first release was shipped with an Italian heart. This meant that the localization of great part of the software is hardcoded to be in Italian, and can hardly be changed. This will be fixed in the next release.

We are also aware that the code that identifies video cards and sets up an XFree86Config file has problems identifying many cards, often falling to the use of the VESA driver. This can hardly be fixed, but the arrival of the XOrg system,

and its autoconfiguration capabilities may improve version 1.1 for what concerns this aspect.

12 Future

As said before, FreeSBIE now only has the *usr, /var and /root* partitions on a Cloop-compressed filesystem, thus we're planning on compressing more of them to increase speed and available space for applications.

There are also other aspects we are going to delve into, such as creating official ISO's for architectures other than I386 - mainly AMD64 and SPARC64 -.

The part we all would like to focus on now is the most requested feature of all, an installer. Many linux LiveCD's already have the hability to be installed from the CD to a hard disk drive, but FreeSBIE is still missing it. This is a long standing issue that will be the primary focus in order to release FreeSBIE-2.0, but work has just started on this. Edson Brandi recently took over it, announcing that he already as some parts of it done. We are all looking forward to be able to install a FreeBSD system starting from a FreeSBIE CD.