Repacking of Repository Software:

Installing DSpace on Ubuntu using an installation tool

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Abstract. Usability of installation and configuration of digital repository software is one of the major issues for the implementation of digital repositories. There has been an increase in the need to share collections amongst institutes; however a problem still lies in the complexity of installation of the software. This paper highlights the complexity of installation of DSpace and a description of an installation tool that was developed and its underlying architecture. Experiments were carried out on the developed tool. The paper then gives a summary of the users, perceptions on the developed installation tool compared to their past experience of installing and configuring DSpace. The results showed that users viewed that installation and configuration made much simpler by the tool. Consequently this suggests that installation and configuration of digital repository tools could be much simpler.

1. Introduction

There has been an increase in the recognition amongst students and faculty members, of the need to store their intellectual output in the form of On-line collections. Moreover they also have a need to share their results within and outside the institute. This led to the development of institutional repository software [2].

 In as much as end user usability has improved to keep up with the pace of Web application development, little has been done on the administrative side to improve ease of installation [1]. Looking in particular at DSpace [5], it is the most widely used institutional repository software while it is also one of the most challenging to install and configure on the administrative side [3]. DSpace, just like the other digital repository tools, is not installable from software repositories and so it still remains challenging to install [4].

The main objective of this research project was to be able to make the general installation and configuration complexity of DSpace to an administrative end user much easier. This was derived from the increasing complexity in installation and configuration of repository tools and variance in installation for the different versions. This was highlighted by Sueli Mara on his report on human-computer-interaction [8] and the increasing number of posts on the problems of installing DSpace with the changing of the versions [9]. The installation instructions are greatly changing from the predecessor versions of DSpace. Upgrading DSpace has also been a variance with setting up of an upgrade which has been of disturbance to the novice administrators.

The candidate software of focus for the research was DSpace. A single session presentation was made to obtain feedback from a pool of five candidate DSpace users. This was to be able to obtain the installation experience using the installation tool versus following user manual from DSpace. A questionnaire was given to the participants who took part in the study. T he questionnaire helped find the level of change the tool provided in making installation simple from the previous installations the end users had experienced. Finally conclusions were derived and this gives rise to further research and developmental work.

As an Open Source project, DSpace has neglected usability for administrative users and so remains a topic of interest in the field of Digital Libraries [1] [3] [8]. There has been a point of note of a possible Open Source usability problem.

DSpace was created as a digital repository tool to capture intellectual output of multidisciplinary research organisations. Many institutions have adopted DSpace as their preferred repository software. In analysis of the DSpace mailing list, messages of problems with installation summed up to 13 506 listings in 2011[9] with a comparison of 1451 listings in 2008[1]. Over the period there has been a great increase in the number of users but at the same time there has also been an increase in the number of people finding difficulty in the software installation.

The findings can simply be interpreted as a sign that there is great need for measures to be put in place to enhance the process of installation of DSpace. This shows that the usability of installation of DSpace has not yet been considered as a point of interest.

2. Methodology

The objective of this study was to finally come up with a software tool that could make DSpace installation easier to the administrative user and also make installations more robust. There was a single user study carried out about installing DSpace using the installation tool for DSpace that was developed.

Five candidate participants were used in the test of the installation tool. All of the participants were recruited from the Computer Science Masters class, who had installed DSpace at least once before using the standard technique without the installation tool. The technologies used to create the installation package included bash scripts, a custom-made DSpace configuration application and DSpace version 1.7 source files [5].
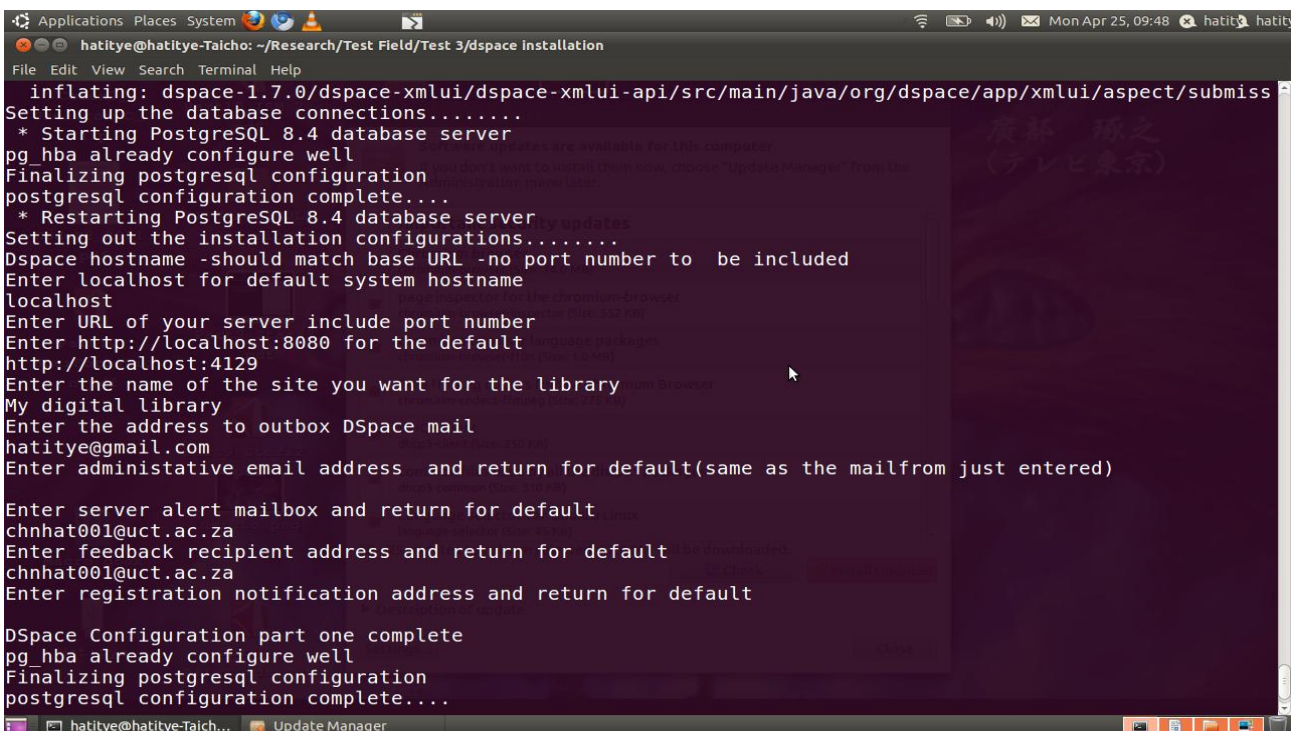
The tool was aligned in a three tier architecture that had the application layer for all user interaction with the tool, business logic layer to manage the activities the tool handled and physical layer that managed all the files for configurations and installation. The management of activities was monitored by a bash-script that mainly managed the stages of installation and all the dependency checks at each stage of the installation. The script was the backbone of the tool's functionality. In addition the script also checked, validated, installed and configured the prerequisites for DSpace installation.

The tool then unpacked the DSpace [5] source file package and sourced the configuration file for DSpace from the DSpace source package. A configuration program was then run to edit the configuration file for DSpace. The program requested configuration input from the user who edited the DSpace configuration file. The tool then verified configuration of the database (PostgreSQL)

and Web application server (Tomcat). The source file package was built (using maven) and then was complied using ant. Installation was completed with the creation of an administrator and launching a browser to confirm the installation. The program that was run in the tool was mainly for configuration of DSpace, the database, to deploy the webapps to Tomcat [10] and to launch a browser to confirm installation.

The configuration program was launched from a bash-script in a terminal. The program also had files and packages that were used for installation and configuration. Moreover the tool was only tested on desktop computers running Ubuntu 10.10(Maverick) and also required an open Internet connection for the installation to be completed. This was because of the use of maven that had some online dependency packages from its central repository. In addition the tool also could not process advanced DSpace configurations. The tool did not have options to select alternative prerequisite software such as database and Java software.

All the user interaction with the tool was carried out using the terminal as in Fig1 below. The tool was dependent on some internet resources from the maven repository and if the tool failed to gather any of the online resources or the prerequisite software, installation was cancelled. If the Internet connection problem was resolved, the tool was simply re-run and it skipped any other pre-satisfied conditions except the main DSpace configuration from the user input.
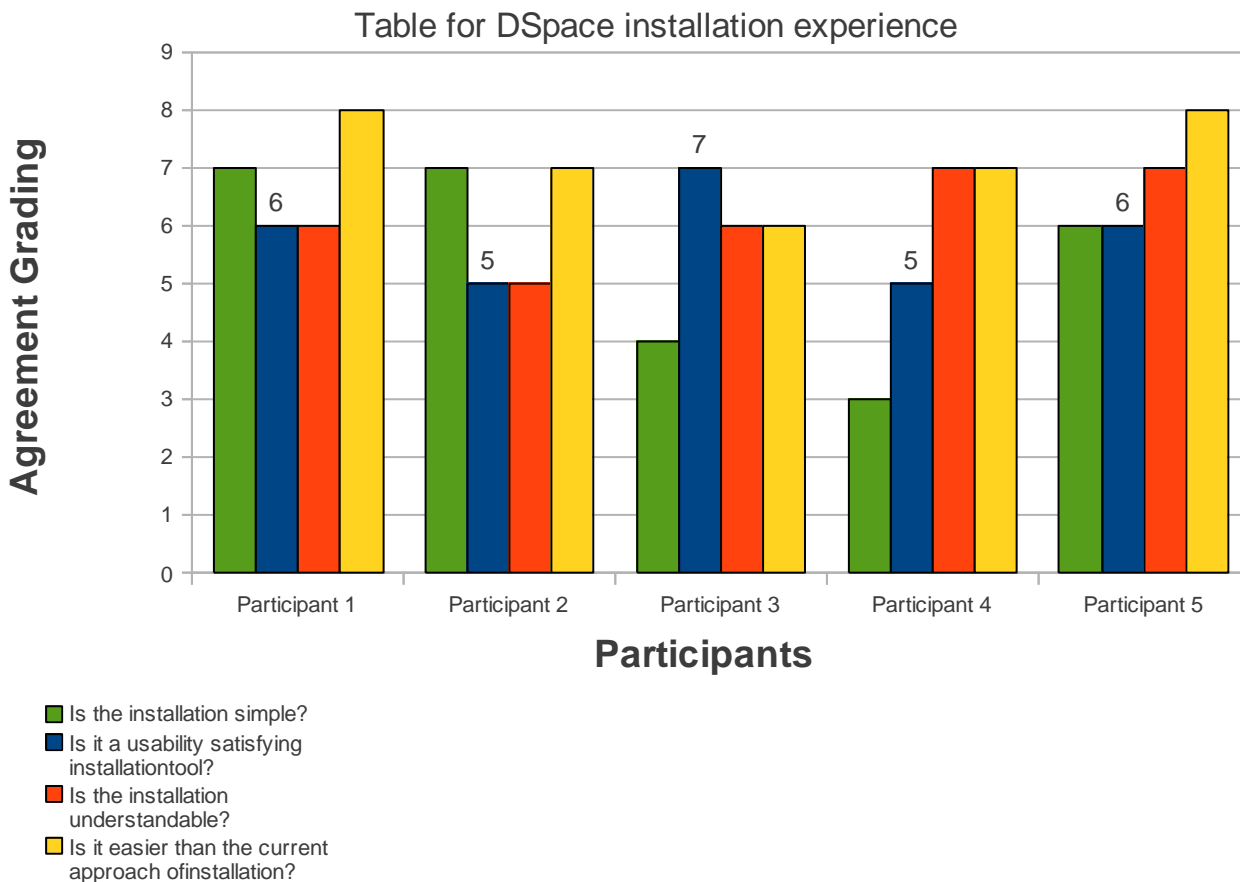

Fig 1 User interaction with tool

A demo presentation session was carried out, displaying the installation of the software using the installation tool. This allowed the participants to discuss the installation procedure in more detail and have firm individual understanding of the tool. Questionnaires were given to the participants to fill in after the installation. The questionnaire was structured to extract information on each

participant's views of the installation versus their DSpace installation experience. The installation procedure was carried out with a description of what events were being handled by the package installation. This ensured that participants understand the scope of the installation. Results from the

Table for DSpace installation experience

Legend:
- Is the installation simple?
- Is it a usability satisfying installationtool?
- Is the installation understandable?
- Is it easier than the current approach ofinstallation?

questionnaires were then collected. The participants generally saw the installation tool as making installation of DSpace much simpler than their past installation experience. Results are given in detail in Fig 2 below.

Fig 2 **Results from Demonstration**

3. **Conclusions and future work**

While the study was carried out for DSpace in particular, a similar approach could be implemented with other digital repository tools. The results from the new implemented installation tool show that installation and configuration of DSpace can be made much simpler to the administrative users. A similar approach was proposed by Koerber and Suleman [1].

Future work may involve the packaging of the installation tool together with DSpace. The tools also have to be available on mainstream software repositories such as those for Ubuntu.

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