Making use of e-Learning techniques for the study of Linux operating system installation

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Abstract

The e-learning techniques constitute an alternative to the traditional education methods based on chalk and blackboard that are being used in order to transmit items of knowledge and information. There occur situations when the electronic education stands for the only method of study that is to be used. Mastering the approaches envisaged for computer study represents a relevant example. One of the fundamental operations is the installation of the Linux operating system. This one is very complex and a simulation product is useful for understanding the necessary steps of installation. The article presents an interactive product for simulation of Linux operating system installation. The product is object-oriented projected to be easily customized for each type of Linux system installation.

Keywords: e-Learning, Linux Fedora Core 5, interactive simulation, installation

1. Introduction

E-learning contains modern methods and tools, based on ITC technologies (multimedia processing and synchron or asynchron communication) and which conduct the user to obtain new skills in a particular domain. In this mode, e-learning is a component part of the computerised society. A computerised society assumes the acces of its members to the ITC technologies, used for obtaining new knowledge and for other activities(solving economical and social problems etc.).

Through the fast access to the knowledge database, the educational software is alternative way of classical learning(blackboard, chalk, notebook, pencil etc.) or the only solution, when classical methods are unuseable, like the problem that we will approach in this paper. In a simple approach, the educational software divides in:

▶ Educational computerised applications projected for easier, faster and more efficient teaching of the same knowledge that can be told in the classic mode too;
▶ Computerised applications that approach subjects that cannot be told by classic methods; in this class are also included certain themes about the administration of a computer network, when the students don’t have the administration rights.

In [1.3.1] we have presented the Windows Xp installation as a Viewlet Builder film and in [1.2.1] as an interactive product, that simulates the interactive installation, with the participation of the installer, which introduces values asked by the wizard program. In this paper, we present an interactive product that simulates the operating system Linux Fedora Core 5 installation.
2. About Linux Installation
The Linux installation is a very complex operation; the installer must consider more aspects, such as:
- On the respective computer we intend to install only the Linux system and other operating system (e.g. windows XP) too;
- The configuration of the computer;
- The hard-disk partitioning;
- The type of installing (server, desktop etc.);
- From where it’s installed (CD or a server);
- What booting program will be used (GRUB or LILO).

From the presented aspects as well as the accumulated experience as a user of a computer system, we derive the complexity of this operation. When an operating system is installed, a wizard program is executed, that helps the installer to follow the steps. Obviously, every step contains a view that contains some fields, which must be completed and some needs the computer architecture knowledge.

So, we consider that a virtual product which simulates the Linux installation is useful, in order to accommodate the users with this complex operation. Also, the students work in a network medium where they don’t have the administration rights, then they can’t make a real installation. In the following, we will present some of the most suggestive views of the product, corresponding to some steps of the Linux Fedora Core 5 installation.

3. The product Description
This product was made using the facilities of IDE Delphi. Because Delphi is object oriented, this application inherit some classes corresponding to application that simulates Windows XP installation, presented in [1.2.1]. Also, by the standard components given by Delphi, were used:

- **AlphaTools** – set of components used in order to create a resemblance with the Linux components.
- **TjbEcran** – The class which defines the component used for simulation of a text terminal, derived from TdrawGrid, defined in the application described in [1].
- **TjfwCrt** – An upgraded version of previous class, derived from TcustomControl, that is used for simulating the installation of Linux Fedora Core in text mode.
- **TjfwXPBar** – The class that creates the left side menu of the main window of the application. From this window, we can chose the operating system that will be installed. This window is implemented in formMain.pas unit and the base class is TfrmMain.

The first form used for the simulating of installation of Linux Fedora Core 5 is TfrmLxText, derived from TForm. By this form, we generate the view for the text mode part of the installation (figure 1). In this view, the user can chose between the available kernels, can make the display and memory setups and the last option is the booting for reconfiguration if a problem appears. This form contains only TjfwCRT component, used for the graphic mode simulating and which behaves as a Linux terminal.
After choosing the wanted option, the kernel loading simulation begins, detecting pre-configuration, in order to start the graphic installer (Anaconda). For solving this problem, was made a new form `TfrmAnagraph`, in which was created all the necessary steps for graphical installing simulation. At the “Release-Notes” presentation, was used a `TwebBrowser` control, where a HTML file is loaded from the hard disk. In order to Wizard simulation, was used a `TPageControl` component with `TTabSheet`. So, the first thing the user does is to choose the language and the keyboard model of the computer. The next step, is one of the most important, it is the choosing of the way the hard disk is configured. For this, the wizard offers many ways of work, depending on the experience of the installer (Figure 2). If we chose the
partitions deleting, a checking view is generated, by the user is asked if he wants to do that. After this, the configuration of the partitions is simulated. (Figure 3)

![Figure 3](image-url)

Figure 3. The partitions configuration

In order to make this configuration, the user must have good knowledge. This window offers to the installer a partitioning model, which he can use when a real installation of Linux is made. Also, the user can simulate the adding, the modifying or the deleting of a partition. This window is found only for this version of Linux. In order to keep the data of the device and the partitions were defined two classes (TPartitie, Tdevice), described in the following.

The TPartitie class is derived from the Tdevice class, because they have same properties and methods.

```pascal
TPartitie = class(TDevice)
private
  fFormat: boolean;
  fpStart: integer;
end;

public constructor Create(aName: string; pType: string; pStart, pEnd, aSize: Integer); reintroduce;

property pType: string read fpType write fpType;
property pStart: integer read fpStart write fpStart;
property pEnd: integer read fpEnd write fpEnd;
```

```pascal
TDevice=class
private
  fSize: Integer;
  fName: string;
public
  constructor Create(aName: string; aSize: Integer); virtual;
published
  property Name: string read fName write fName;
  property Size: Integer read fSize write fSize;
end;
```

**TPartitie class is derived from the Tdevice class, because they have same properties and methods.**
The next very important step, is the boot-loader choosing (Figure 4), i.e. a program that is loaded when is starting the computer and with the help of which we can choose the desired operating system to load.

![Figure 4. The boot-loader configuration](image1.png)

Initial the operating system Linux offered to the users only the boot-loader LILO, after that LILO and GRUB. The last versions of Linux (fedora core 5) gave up to LILO, because GRUB is much easier to use and he has more options for booting, configuration and a better security. After the user configures the network (Figure 5), he must choose the region where he lives and the root password. The next view (figure 6) simulates the installing program facility to offer to the user some pre-settings (The package for the office computer, the package for programmers, the package for server).

![Figure 5. The network configuration](image2.png)
The installed components are kept in a XML file which is found on the installing DVD. His name is `comps.xml` and it has the following structure:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE newcomps PUBLIC "-//Red Hat, Inc.//DTD Comps info//EN" "comps.dtd">
<comps>
  <group>
    <id>admin-tools</id>
    <name>Administration Tools</name>
    <description>This group is a collection of graphical administration tools for the system, such as for managing user accounts and configuring system hardware.</description>
    <default>true</default>
    <uservisible>true</uservisible>
    <packagelist>
      <packagereq type="default">authconfig-gtk</packagereq>
      <packagereq type="default">system-config-date</packagereq>
      <packagereq type="default">system-config-keyboard</packagereq>
      <packagereq type="optional">system-config-kickstart</packagereq>
      <packagereq type="default">system-config-language</packagereq>
      <packagereq type="default">system-config-lvm</packagereq>
      <packagereq type="default">system-config-network</packagereq>
      <packagereq type="default">pirut</packagereq>
      <packagereq type="default">system-config-rootpassword</packagereq>
      <packagereq type="default">system-config-soundcard</packagereq>
      <packagereq type="default">system-config-users</packagereq>
    </packagelist>
  </group>
  <category>
    <id>development</id>
    <name>Development</name>
    <description>Packages which provide functionality for developing and building applications.</description>
    <display_order>70</display_order>
    <grouplist>
      <groupid>development-libs</groupid>
      <groupid>development-tools</groupid>
      <groupid>gnome-software-development</groupid>
      <groupid>eclipse</groupid>
      <groupid>kde-software-development</groupid>
      <groupid>x-software-development</groupid>
      <groupid>java-development</groupid>
      <groupid>ruby</groupid>
      <groupid>legacy-software-development</groupid>
    </grouplist>
  </category>
</comps>
```

In order to keep the groups and the categories in the computer memory, there were defined two classes, described in the following sequence:

```cpp
TCategory = class
  private
  fID: string;
  fdescription: string;
  fname: string;
  fdisplay_order: integer;
  fgrouplist: TStrings;
  public
    constructor Create;
```
The window from figure 7 simulates the choosing of the wanted packages; after which is displayed a view that checks if the conditions verifies some dependencies and it passes to the continuing of the installing process, where the intervention of the installer is not necessary.

Figure 6. The packet programs pre-setting
4. Conclusions
The utility of this is paper is the approach in an interactive manner of a problem that can’t studied using the classical teaching methods. All the users of the computer which have installed an operating system know the necessity of a experience in order to make correctly this operation. This fact is more relevant for the Linux system, whose installation is more complex.

The paper belongs to our concerns in order to make a “virtual laboratory” for the computer system studying, that can’t approach using classical tools.

In this paper we have presented only those parameterized windows, which assume a dialog between user and system.

References
Books:
Acostachioaie, D., (2006), Administrarea si configurarea sistemelor Linux, Editia a III-a revizuita si adaugita, Polirom, Bucuresti

Journal Articles:

Conference Proceedings:

Internet Sources:
http://fedora.redhat.com/docs/
http://fedorawiki.org/index.php/Fedora Core 4 Linux Installation Notes
http://www.howtoforge.com/perfect_setup_fedora_core_5