Providing Karelian Language Support for an Educational Linux System

Konstantin Hyppönen

Report B/2004/1

UNIVERSITY OF KUOPIO
Department of Computer Science

P.O.Box 1627, FIN-70211 Kuopio, FINLAND

Providing Karelian Language Support for an Educational Linux System

Konstantin Hyppönen

Department of Computer Science
University of Kuopio
P.O.Box 1627, FIN-70211 Kuopio, FINLAND
Email: Konstantin.Hypponen@cs.uku.fi

Abstract

In this paper we describe a Linux distribution that is meant to provide a suitable educational and working environment for users that need support of Karelian language in the system. The distribution is CD-based, and can be booted up from the compact disc or installed on a computer hard drive.

We explain considerations behind the choice of the Knoppix platform for our distribution and list the main contents of the CD. We proceed then to the main topic of the paper, namely to description of the steps needed for introduction of Karelian language to Knoppix and to Linux in general. The final part of the report discusses possible ways of keeping the distribution up-to-date.

Keywords: Linux, Knoppix, Karelian language, computer science education.

1 Introduction

The aim of this project is to create a Linux distribution suited for the needs of basic computer science education. The distribution is intended for use in schools of Karelia [1] and lyceums of Finland. The main idea is to distribute compact discs with Linux and all programs needed for doing those computer science courses. Also we include some self-study materials and study guides in English and in Finnish. We decided to introduce the support of the Karelian language [2] to our distribution, since Karelian is now taught in schools, and students might want to prepare their written assignments on a PC or simply edit texts in this language.

2 Choosing the distribution

The decision of choosing the compact-disc based Linux system was driven by the conditions of its future usage. First, it is not sure that the software can be installed onto hard drives in computer classes. The second reason is the following: if a newbie knows that no harm will be made to the system she is working on, then she feels more relaxed and confident, making the educational process to proceed faster and with better results. The last, but not the least, is the easiness and low cost of delivering the distribution to students.

We chose Knoppix [3], since it is the most mature and wide-spread CD-based distribution, which is also fairly well tested and being constantly developed. It contains all necessary programs required for general computer literacy education, and also for some more advanced computer science courses.

Almost all software included into Knoppix distribution falls under the GNU General Public License. Individual packages may fall under another license (for example, Mozilla Public License). The rule of thumb applied to choosing the software is that licenses must allow non-commercial use free of charge. Hence, the programs in the distrubution are free of any license payments, and the main costs for dispensing the discs are practically constituted by the expenses for CDs manufacturing.

3 Contents of the CD

The contents of the distribution is comprised in a great extent by the original Knoppix CD contents. In order to free up some space needed for adding study materials on the same disc, we had to remove several packages (games, KOffice, etc.). The whole list of the software stored on the disc is pretty long; we present here the most important parts of the distribution contents:

- OS kernel: Linux kernel 2.4.x;
- Desktop environment: KDE ver. 3.1.2;
- Graphics manipulation: GNU Image Manipulation program (GIMP) ver. 1.2; XFig ver. 3.2.4;
- Office software, text processing: OpenOffice ver. 1.0.3; teTeX, the distribution of TeX/LaTeX for Unix; ESP GhostScript ver. 7.05; Adobe Acrobat reader ver. 4.0; Gnumeric ver. 1.1.19;
- Databases: MySQL 12.20 Distrib 4.0.13;
- Internet: Mozilla 1.4; Konqueror and KMail in KDE;
- Programming languages (C, C++, Java, Perl, ...), development tools and libraries for developers;

- Utilities for data recovery and system repairs, even for other operating systems.

The study materials written onto the CD include an overview of the studies structure and short introduction-level guides on databases, email, graphics, news, spreadsheets and text processing. Also two courses given in Finnish are available: Introduction to Computer Science (2 parts) and Introduction to Programming (2 parts).

4 Adding Karelian language support

The software support for some language or some territory where this language may be used in is divided into 2 main parts: internationalization (often abbreviated as "i18n") and localization ("l10n"). The difference between them is quite subtle, and definitions may vary. In order to free reader from ambiguity of these two notions, we shall divide the problem according to the following scopes:

- Locale
- Keyboard
- Support of Karelian in KDE [4]
- Support of Karelian in Knoppix

In this work we assume that all software installed on the disk can potentially handle multiple languages, customs, and so on in the world (which was one of the definitions of i18n). In this case we only implement a specific language, Karelian, for already internationalized software.

4.1 Locale

By defining a locale we mean here making programs able to represent times, numbers, currency etc. in the way specific to a language or to a territory where this language is used.

There are no existing standards for Karelian locale. Since the language itself is spoken mainly in Russia and Finland, we made the decision of choosing Finnish localization rules with the only exception of monetary unit description for the territory of Russia. It means that we use the Finnish locale completely when describing "Karelian language spoken in Finland", and the Finnish locale with Russian ruble (RUR, `rublu`) instead of Euro (EUR, €) when describing "Karelian language spoken in Russia".

When specifying a locale, one has to use language codes defined by the ISO-639 standard and country codes defined by the ISO-3166 standard. Unfortunately, the language code for Karelian is not standardized, so we had to invent one. We took the code "kr" and used it through the project as the language code for Karelian. Please note that "kr" cannot be thought as a country code here (actually, "kr" is the country code for

South Korea). ISO-3166 specifes codes “fi” and “ru” meaning “Finland” and “Russia” correspondingly,—and we use them, strictly adhering to the standard.

The choice of language code for Karelian was made in August, 2002, and at that time the code “kr” was not used according to the standard. Later on, in January 2003, the ISO 639/Joint Advisory Committee [5] released a new edition of code tables, where “kr” was reserved for Kanuri language [6] spoken mainly in Nigeria by approximately 4 million people. Hence, the character code for Karelian has now to be changed in our distribution—but we shall do it only upon official standardization.

We had also to choose a charset. In the Karelian language there are 6 letters with diacritical marks: ü, ž, š, č, ö, ä. Since letters ž, š, č are not included in the standard ISO-8859-1 encoding [7] used in Finland, we couldn’t apply the same encoding for Karelian. Instead, we chose the ISO-8859-2 encoding [8], which can be used also for e.g. Czech, Hungarian and Polish languages. The drawback of this decision is that ISO-8859-2 does not include the ‘å’ letter. Though, while ‘å’ is important in the bilingual Finland, it is not necessary in Karelian.

Please note that the “Charset” concept is needed only for old-style applications that do not support Unicode UTF-8 encoding. Thus, for instance, the lack of the ‘å’ letter is not a drawback in KDE, where UTF-8 is used globally.

GNU `locales` package is a collection of tools, which allow programs to use national language in communication with a user. Supported locales are generated from their definitions and stored in the `locales archive` afterwards. `locales` package is installed on the Knoppix system and can be updated by usual Debian tools such as `apt-get`. We did not update the package itself (adding support of Karelian language), but rather modified some of its files on the local system. This implies that updates of the `locales` package have to be applied with care.

Technical details

In this section and all other “Technical details” sections used throughout this document we present changes that have been made to various configuration files. First we specify the name of the file in the Knoppix distribution and then list the lines that we have added or changed in it. Comments to these changes are given using *slanted font*. In most of the cases we also explain meaning of the file.

► `/usr/share/i18n/locales/kr_FI`

The file specifies a locale for Karelian language used on the territory of Finland. It is almost a copy of `fi_FI@euro` locale file, only the identification part (`LC_IDENTIFICATION`) is changed.

► `/usr/share/i18n/locales/kr_RU`

The file defines a locale for Karelian language used on the territory of Russia. It is based on `fi_FI@euro` locale; the identification part (`LC_IDENTIFICATION`) is changed to “Karelian language in Russia”. The part describing the monetary unit is presented here:

Start of file changes

```
LC_MONETARY
int_curr_symbol      "<U0052><U0055><U0052><U0020>"
```

("RUR ")

```
currency_symbol      "<U0072><U0075><U0070>"
```

("rup")

```
=> Verbatim copy of other parameters (radix character, separator for groups
=> of digits, etc.) from fi_FI locale
END LC_MONETARY
```

End of file changes

- `/usr/share/locale/kr/LC_MESSAGES/*`

The directory contains translations of messages printed by different programs. These files are used by `gettext` utilities for outputting text in the current language defined in the locale environment variable. Since no Karelian translations can be found even for widely used programs, we copied Finnish translations into this directory. Thus, core utilities use the Finnish language when outputting messages if the `LANG` environment variable is set to ''`kr_RU@ISO-8859-2`'' (Karelian language); KDE programs opt for Finnish if Karelian language is chosen in the Control Panel. In this case KDE also uses files from this directory.

- `/usr/share/i18n/SUPPORTED`

This file tends to contain the list of valid supported locales along with the encodings for them. Though, the information in this file is not used neither by `locales` package nor by KDE or the X-Window system in general. It is probably kept only as a reference for historical reasons. Almost the same information (which is used by the `locales` package for updating the locale archive file from locale definitions) is actually contained in the next file:

- `/etc/locale.gen`

This file contains the list of locales, which are to be generated from their definitions and put to the locales archive. We added the following lines into this file:

Start of file changes

```
kr_FI ISO-8859-2
kr_FI UTF-8
kr_RU ISO-8859-2
kr_RU UTF-8
```

End of file changes

There are two basic ways of updating the locales archive after making abovementioned modifications. One is to use the `locale-gen` tool. It takes the list of locales from the `locale.gen` file and updates the archive according to it. The second way is to reconfigure the whole locales package:

```
dpkg-reconfigure locales
```

The user is presented with the list of available locales, so that she can choose the needed locales. The reconfiguration program updates the `locale.gen` according to the user's choice and calls the `locale-gen` utility.

- `/etc/locale.alias`
- `/usr/lib/X11/locale/locale.alias`

`locale.alias` is the locale name alias database. It provides correct substitutions for alternative locale names. For example, on HPUX 9.x the Finnish locale may be simply referred to as "`finnish`", while the correct locale name accepted by the X-Window system is "`fi_FI.ISO8859-1`" (`LanguageCode_CountryCode.CharsetName`). We did not modify these files given the fact that they are not necessary if we use the right locale names—and their modification can complicate possible updates of the corresponding packages.

4.2 Keyboard

We took the proposal of the Karelian keyboard layout devised by Esa Anttikoski [9]. The idea was extended to provide support for Q and W letters (which had been replaced by Ü and Ž). Also we had to invent new ways of entering ¨, ˆ and ˜ signs.

We took the Finnish keyboard mapping as the basis, and by addition of Karelian letters we achieved the keyboard layouts both for text-mode terminal and the X-Window system. Our proposal of the keyboard layout (included into the modified Knoppix distribution) for the X-Window system is represented in Figures 1–4.

Since some people who prefer working in a text-mode terminal might need Karelian support as well, we included a keymap for it into our modified Knoppix distribution. Although lack of easy access to Q and W characters may influence work efficiency significantly, the main result is that Karelian support covers both possible scenarios of the distribution usage—text-mode and graphical interfaces.

The layout without modifiers is exactly the same as in the X-Window version. It is possible to enter 'q' and 'w' letters using the Alt modifier key (in combination with Shift for capital letters). Keymaps for text-mode terminal with Shift or AltGr keys are depicted in Figures 5 and 6.

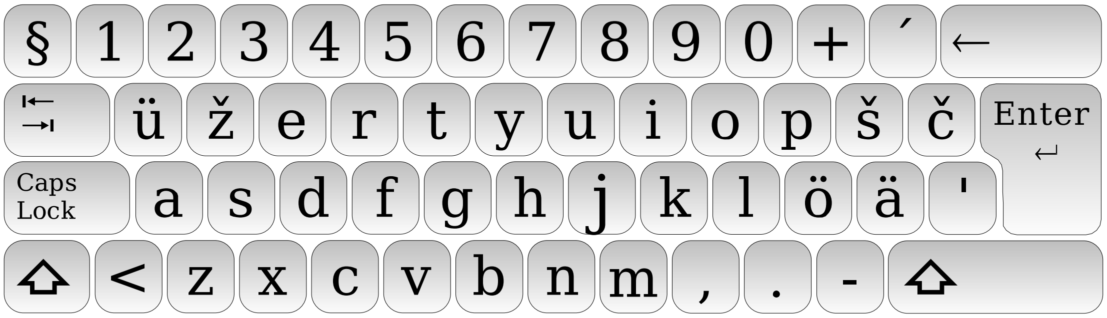

Figure 1: X-Window Karelian keyboard layout, no modifier keys pressed.

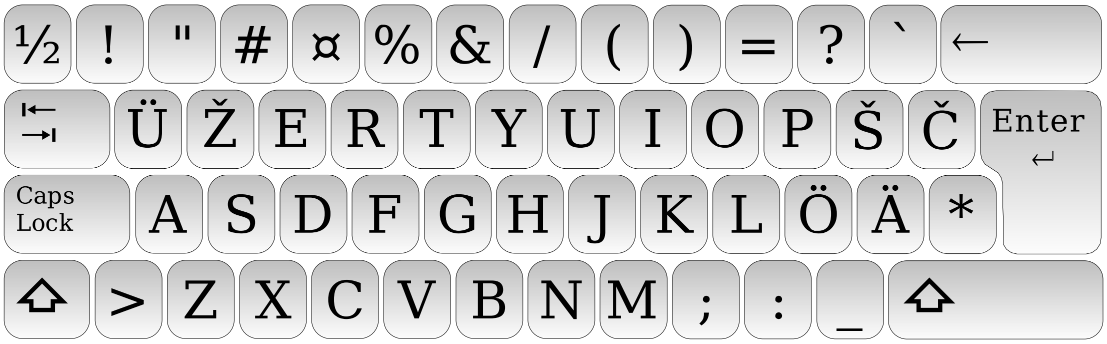

Figure 2: X-Window Karelian keyboard layout, Shift key pressed.

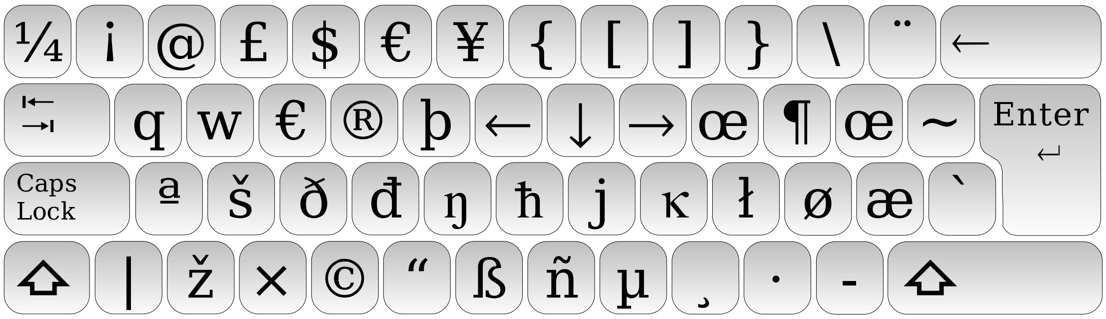

Figure 3: X-Window Karelian keyboard layout, AltGr key pressed.

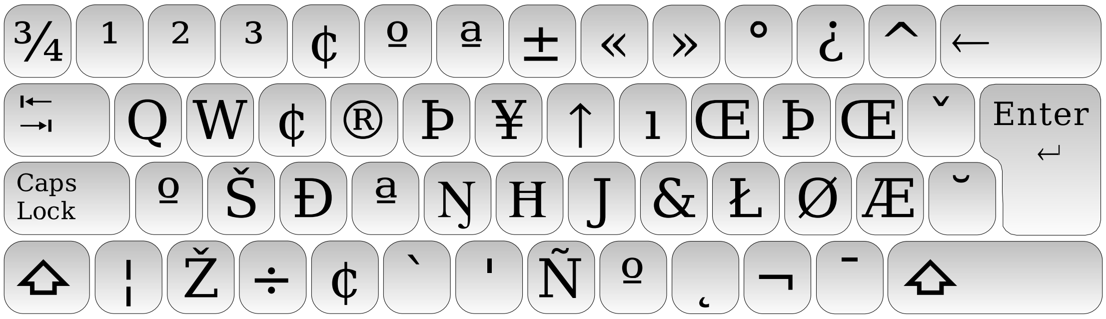

Figure 4: X-Window Karelian keyboard layout, AltGr+Shift keys pressed.

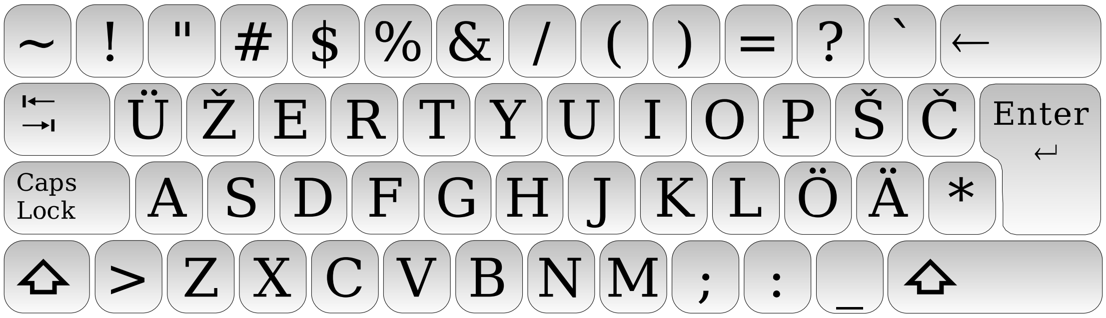

Figure 5: Karelian keyboard layout for text-mode terminal, Shift key pressed.

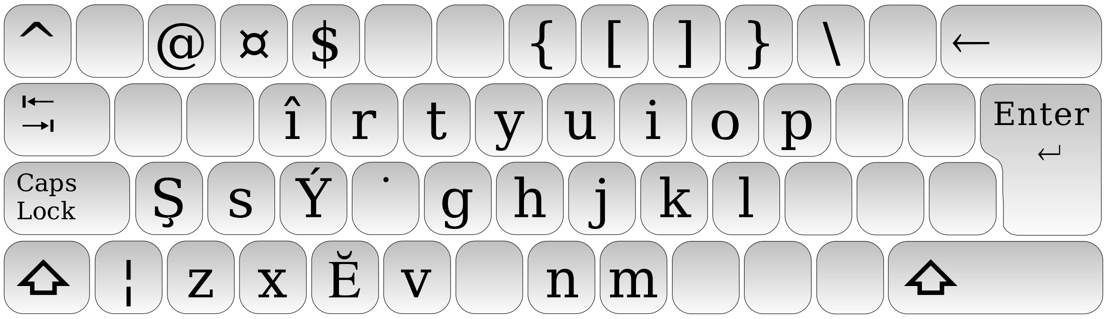

Figure 6: Karelian keyboard layout for text-mode terminal, AltGr key pressed.

Technical details

We updated the following files in order to obtain the Karelian keyboard layout. Changes are given in the `diff` format, i.e. lines of old file contents are preceded by the symbol ‘<’, and new file contents marked with the sign ‘>’ follow after the “`---`” delimiter.

▶ `/usr/share/keymaps/i386/qwerty/kr.kmap.gz`

The file contains description of the Karelian keyboard layout (keymap) for the text-mode terminal. It is based on the `fi-latin1` keymap. The following changes have been made:

Start of file changes

```
< charset "iso-8859-1"
---
> charset "iso-8859-2"
```

(charset changed to ISO-8859-2)

```
< include "euro"
---
> # include "euro"
```

(the euro cent sign ¢ is not available in the ISO-8859-2 encoding, and the font for displaying ISO-8859-2 -encoded texts does not include the euro sign €, so we skip them)

```
< keycode   4 = three            numbersign       sterling
---
> keycode   4 = three            numbersign       currency
```

(the polish character Ł has taken the place of the sterling sign £ in the font for ISO-8859-2 -encoded texts, we replace it by the currency sign ¤)

```
< keycode  26 = +aring           +Aring
---
> keycode  16 = udiaeresis       Udiaeresis
>       alt keycode             16 = q
>       alt shift keycode       16 = Q
> keycode  17 = zcaron           Zcaron
>       alt keycode             17 = w
>       alt shift keycode       17 = W
> keycode  26 = +scaron          +Scaron
```

(characters Q, W and Å are replaced by Ü, Ž and Š correspondingly)

```
< keycode  27 = dead_diaeresis   dead_circumflex  dead_tilde
---
> keycode  27 = ccaron           Ccaron
```

(the place for the letter Č is found, we now have to allocate a button for the characters ˆ and ˜)

```
< keycode  41 = section          onehalf
---
> keycode  41 = section          tilde            circumflex
```

End of file changes

(rarely used ½ character is replaced by the tilde ˜, and we add the circumflex sign ˆ onto the same button with the AltGr modifier)

▶ `/etc/X11/xkb/symbols/pc/kr`

The file contains information about Karelian keyboard layout for the X-Window system. The differences between Finnish and Karelian layouts are the following:

Start of file changes

```
> key <AD01> { [udiaeresis, Udiaeresis, q, Q ] };
> key <AD02> { [zcaron, Zcaron, w, W ] };
```

(we map letters Ü and Ž; letters Q and W are now available by using AltGr modifier)

```
< key <AD11> { [aring, Aring, oe, OE ] };
< key <AE12> { [dead_acute, dead_grave ] };
< key <AD12> { [dead_diaeresis, dead_circumflex,
                dead_tilde, dead_caron ] };
---
> key <AD11> { [scaron, Scaron, oe, OE ] };
> key <AE12> { [dead_acute, dead_grave,
                dead_diaeresis, dead_circumflex ] };
> key <AD12> { [ccaron, Ccaron, dead_tilde, dead_caron ] };
```

End of file changes

(Å letter is replaced by Š. After placing the letter Č we have to find a new place for symbols ¨ and ˆ; they are mapped onto the same button with ´ and `, with AltGr modifier)

Also we had to make similar modifications to the so-called "nodeadkeys"-version of the layout. This version is contained in the same file, and it is a slight modification of the usual scheme with no support for dead keys (i.e. user does not need to press ˜ key twice for getting tilde sign, but at the same time she cannot enter ã, õ and similar letters directly from the keyboard).

► `/etc/X11/xkb/symbols/kr`

This file also contains the same keyboard layout. This duplication is made because of backward compatibility and version conflicts issues. Prior to XFree86 version 4.3 keyboard layouts (on the PC systems) were stored in the `symbols` directory, and since version 4.3 in the `symbols/pc` directory. Still, some programs show unpredictable behaviour because of this change. For instance, KDE keyboard tool fetches names of the keyboard layout modifications, analyzing the corresponding file from the `symbols` directory, but after that loads the chosen keyboard layout from the `symbols/pc` directory. This behavior of the KDE keyboard tool is to be changed in future versions.

► `/etc/X11/xkb/rules/xfree86.lst`

This list describes, among other things, correspondence between human-readable names of the keyboard layouts and the files containing these layouts. We added the following reference into this file:

Start of file changes

```
kr              Karelian
```

End of file changes

The file is used by the KDE keyboard tool (and other similar keyboard managers) for obtaining the list of available keyboard layouts.

► /etc/X11/xkb/rules/xfree86.xml

In the future `xfree86.lst` will be replaced by its XML-based version. The old version would be probably saved for backward-compatibility reasons. We left this file without modifications, since it is currently not used, but in the future the following additions should be made:

Start of file changes

```
<layout>
  <configItem>
    <name>kr</name>
    <description>Karelian</description>
    <description xml:lang="bg">Карелски</description>
    <description xml:lang="fi">Karjala</description>
    ...
    <description xml:lang="it">Karelica</description>
    <description xml:lang="lt">Karelų</description>
    <description xml:lang="ru">Карельский</description>
  </configItem>
  <variantList>
    <variant>
      <configItem>
        <name>basic</name>
        <description>kr(basic) -  No description</description>
        <description xml:lang="bg">без описание</description>
        <description xml:lang="fi">perus</description>
        ...
        <description xml:lang="it">base</description>
        <description xml:lang="lt">paprastas</description>
        <description xml:lang="ru">простая</description>
      </configItem>
    </variant>
  </variantList>
</layout>
```

End of file changes

Please note that these changes do not provide Karelian keyboard for all systems with XFree86. Appropriate keyboard layouts have to be defined for Macintosh, SGI and other systems.

When described changes are applied, the KDE Keyboard Tool may be configured to provide an easy access to the Karelian keyboard layout (see Fig. 7).

Figure 7: KDE Keyboard Tool

4.3 Support of Karelian in KDE

Thanks to overall support of the UTF-8 encoding in KDE and availability of Unicode fonts, simple work with Karelian language like entering texts can be performed without modifications to the environment. Karelian keyboard support is added to the KDE keyboard tool automatically after introducing the new keyboard layout to the XFree86 system (as it was described in the previous section). And even if the Karelian keyboard mapping wouldn't be accessible for some reason, all necessary accented characters are available for choosing in text processors from menus ("Insert special character" or similar commands), and they can be also entered using the KDE character map tool. Some minor changes are still necessary for completing Karelian language support in the KDE environment.

Technical details

In order to provide easy access to Karelian settings from drop-down menus in the KDE environment, we modified the following files:

- `/usr/share/locale/kr/entry.desktop`

This file specifies the name of the language for the "kr" language code. The contents of the file is as following:

Start of file changes

```
[KCM Locale]
Name=Karelian
Name[bg]=Карелска
Name[fi]=Karjala
Name[kr]=Karjala
Name[it]=Karelico
Name[lt]=Karelų
Name[ru]=Карельский
```

End of file changes

KDE allows to choose the Karelian language as the main language of the desktop environment only if the `entry.desktop` file is located in the `/usr/share/locale/kr` directory.

▶ `/usr/share/locale/l10n/`

The `l10n` directory contains folders with information on localization settings for different countries. Settings are stored in `entry.desktop` files. We added the following lines to the files corresponding to Russia and Finland:

▶ `/usr/share/locale/l10n/fi/entry.desktop`

Start of file changes

```
Languages=fi,sv,se,kr
DateFormat[kr]=%A %e. %Bta %Y
```

End of file changes

▶ `/usr/share/locale/l10n/ru/entry.desktop`

Start of file changes

```
Languages=ru,kr
DateFormat[kr]=%A %e. %Bta %Y
DateFormatShort[kr]=%d.%m.%Y
```

End of file changes

In this way we can specify that Karelian is spoken in Finland and Russia, and KDE will show it in the drop-down menu of the Control Center, if either of countries is chosen. The user can also select some other country—and in this case she will find Karelian in the list of "other" languages.

▶ `/usr/share/locale/l10n/kr/flag.png`

The KDE keyboard tool chooses the flag of the corresponding country, not the language, when showing the flag for a keyboard layout in the tray of the KDE panel. Using this (ambiguous, in our opinion) rule it would show the South Korean flag when the Karelian keyboard is chosen. That's why we had to replace this flag with the Karelian flag (red-blue-green) [10].

4.4 Support of Karelian in Knoppix

In Knoppix the default language of the system may be entered at the command prompt before the loading of the operating system. This can be achieved by the parameter `lang`, for example

```
knoppix lang=de
```

will force system to load the German locale, German keyboard, set the language of KDE, and so forth. We decided to provide the same possibility for choosing Karelian language at the starup. By entering

```
knoppix lang=kr
```

at the command prompt (see Fig. 8), the user will get:

- Karelian keyboard in the terminal;
- `kr_RU.ISO8859-2` as the default locale;
- Settings for Karelian (actually, Finnish due to the lack of Karelian translations) language and the territory of Russia in KDE;
- Finnish, Karelian, Russian and US keyboard layouts chosen by default in the KDE keyboard tool.

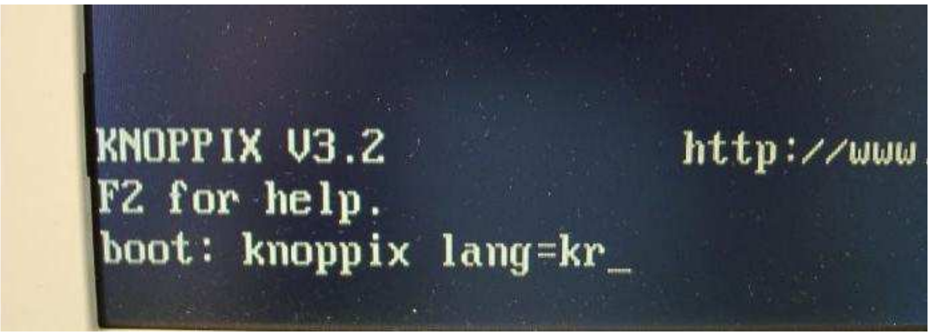

Figure 8: Starting Knoppix with Karelian settings

Also we selected English instead of German as the default language of the system and made some other minor changes to the default keyboard layouts.

Technical details

Only one script had to be modified for managing these command prompt options. It is specific to Knoppix distribution and cannot be found in other Linux versions.

► `/etc/init.d/knoppix-autoconfig`

This file is the main script for automatic configuration of Knoppix. Among other things, it processes the “lang” parameter of the command prompt. File was modified as follows:

Start of file changes

```
< [ -n "$LANGUAGE" ] || LANGUAGE="de"
---
> [ -n "$LANGUAGE" ] || LANGUAGE="us"
```

(change the default language from German to English)

```
> kr)
> # Karelian version - added by Konstantin Hyppönen (03.09.2003)
> LANGUAGE="kr"
> COUNTRY="ru"
> LANG="kr_RU"
> KEYTABLE="kr"
> KDEKEYBOARD="kr"
> XKEYBOARD="kr"
> CHARSET="iso8859-2"
> CONSOLEFONT="lat2u-16"
> CONSOLEACM="iso02.acm"
> CONSOLESFM="lat2u.sfm"
> # Additional KDE Keyboards
> KDEKEYBOARDS="us,fi,ru"
> ;;
```

(choose `kr_RU.ISO8859-2` locale, set up the Karelian keyboard for terminal and the KDE keyboard tool (providing U.S., Finnish and Russian keyboard layouts as additional), select appropriate application character map and screen font map for terminal)

```
< KEYTABLE="fi"
---
> KEYTABLE="fi-latin1"
```

End of file changes

(in the Finnish language section we selected the more commonly used keyboard layout "fi-latin1" instead of "fi")

5 Updating the distribution

We considered two different ways of keeping our distribution up-to-date. We describe both ways of updating CD here and explain our choice.

The first method is to take an older version of the CD as the basis for the new version. The contents of it must be extracted and written to the hard drive, as described in the

Knoppix remastering manual [11]. The next step is to update packages of the distribution; standard Debian utilities like `apt-get` can be used for this. These tools download new versions of packages from the Internet (or from other data sources), install and configure them. Finally, the updated distribution ISO image has to be generated and written onto a compact disc.

However, the Knoppix distribution is more complicated than a standard Debian distribution, due to its compressed storage format (`cloop`), its ability of automatic hardware detection and its ability to self-configuring of many components starting from terminal up to high-level environments like KDE or Gnome. These features are also being constantly updated. New versions of Knoppix support auto-detection of a broader range of various hardware, provide better abilities for saving users' session data and include other improvements. These services are also available in the form of packages and can be updated by standard tools. In our view these updates comprise an integral part of the distribution evolution, and we have to include them into our modified version of Knoppix as well.

Unfortunately, an update of the distribution is not a simple matter. There is more than a mere installation of fresh packages into it. Interaction of different packages can bring some problems of broken dependencies and incorrect work of some services. It can also require non-trivial configuration of some packages. That's why we consider also the second way of updating the distribution that can be described by the following procedure:

1. Get the new version of Knoppix distribution from the Internet;

2. Extract its contents to the hard drive, as explained in the Knoppix remastering guide [11].

3. Remove some packages from the distribution in order to free up space needed for study materials. Good candidates for removal are games and KOffice (we need only basic text and spreadsheet editor functions for educational purposes, and OpenOffice.org is more than enough for these needs). `apt-get` and `dpkg` tools can be used for this process.

4. Add support of the Karelian language following the procedure described in this document. Only about 15 files and directories have to be altered for Karelian support—and many of them can be copied from an older version of our distribution. Modification of other files is also quite straightforward.

5. Add new self-study materials.

6. Generate the distribution ISO image and burn it onto a compact disc.

Using this way, we get all "hidden" updates of a fresh Knoppix version automatically. When comparing the time and work requirements of both methods, it is necessary to take into account that the latter one eliminates the posibility of broken package dependencies and other complicated situations that can occur in the update process. These problems are solved by Klaus Knopper, the author of Knoppix, and repeating his work could be extremely time and work consuming. Adding the support of Karelian to a ready distribution is much easier than leaving Karelian support intact and performing untrivial updates of all other components.

6 Future Work

In the future, the main work should concentrate on improving the study materials of the CD. Subject and audience of the courses should be broadened, and new language versions of the material have to be prepared. Due to exchange programs, there is more and more demand of computer science teaching in English.

As for the distribution, it must be kept up-to-date. Possibly, adding the Karelian language support should be automated, but given the fact that internationalization packages are constantly changing, this could be a fairly sophisticated problem. One of the solutions could be standardization of the language code and finally adding Karelian into the `locales` package. However, before that Karelian translations of at least the most common programs have to be ready. Depending on the demand, Karelian support might be introduced also to platforms other than i386: the procedure is the same, and we consider this task to be simple.

References

[1] http://en2.wikipedia.org/wiki/Karelia_(republic)

[2] http://en2.wikipedia.org/wiki/Karelian_language

[3] http://www.knopper.net/knoppix/

[4] http://www.kde.org/

[5] http://www.loc.gov/standards/iso639-2/iso639jac.html

[6] http://www.koeppe.de/html/e_kanu.htm

[7] http://en.wikipedia.org/wiki/ISO-8859-1

[8] http://en.wikipedia.org/wiki/ISO-8859-2

[9] http://www.onego.ru/win/pages/karjalakbd/

[10] http://heninen.net/flags/english.htm

[11] http://www.knoppix.net/docs/index.php/KnoppixRemasteringHowto