



**Keeping Emulation Environments Portable**

**FP7-ICT-231954**

**System User Guide**

# **Emulation Framework**

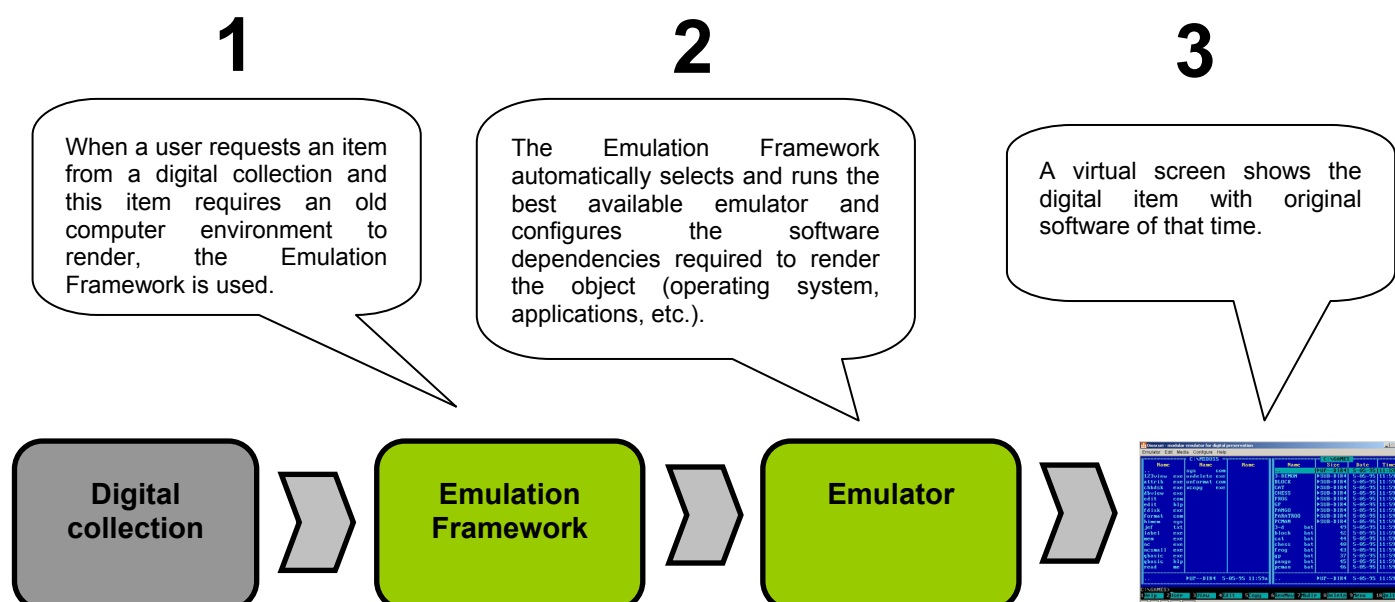
**Release 2.0.0 (February 2012)**

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<b>Organisation</b>	KEEP project

## Executive Summary

This is the System User Guide (SUG) for the KEEP Emulation Framework (EF). The EF is software developed by the international KEEP project, co-funded by the European Unions 7<sup>th</sup> Framework Programme.

The EF offers a convenient way to render digital files and programmes in their native computer environment. It offers users the potential to view these files in their intended 'look and feel', independent from current state of the art computer systems. The spectrum of potential computer platforms and applications that can be supported is practically unlimited. This release of the EF supports emulation of the x86, Commodore, Amiga, Amstrad CPC, BBC Micro and Thomson computer platforms. Emulation is done by using existing emulators which are carefully selected on their capability to mimic the functionality of these platforms. The following illustration shows how this works in three steps.



This guide contains information for end-users and administrators.

**End-users** are instructed on the use of the Emulation Framework. Detailed examples of how to use the supplied GUI are included which cover how to select a digital file, determine the possible ways for rendering the file, as well as setting up, configuring and running the emulation environment containing the digital file.

**Administrators** are instructed on how to install and uninstall the Emulation Framework as well as how to configure the Emulation Framework using a Graphical User Interface (GUI) or the configuration file. Furthermore, this manual explains how to manage the software and emulator archives.

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## 1 Introduction

This System User Guide (SUG) describes how to install and use the Emulation Framework (EF) developed by the KEEP project<sup>1</sup>. The document offers support to **end-users** and **administrators**.

If you are going to use the Emulation Framework for the first time and it is already installed on your system, please read on to the section **End-user guide**. This guide will explain how to use the EF and will give you insight into all features available.

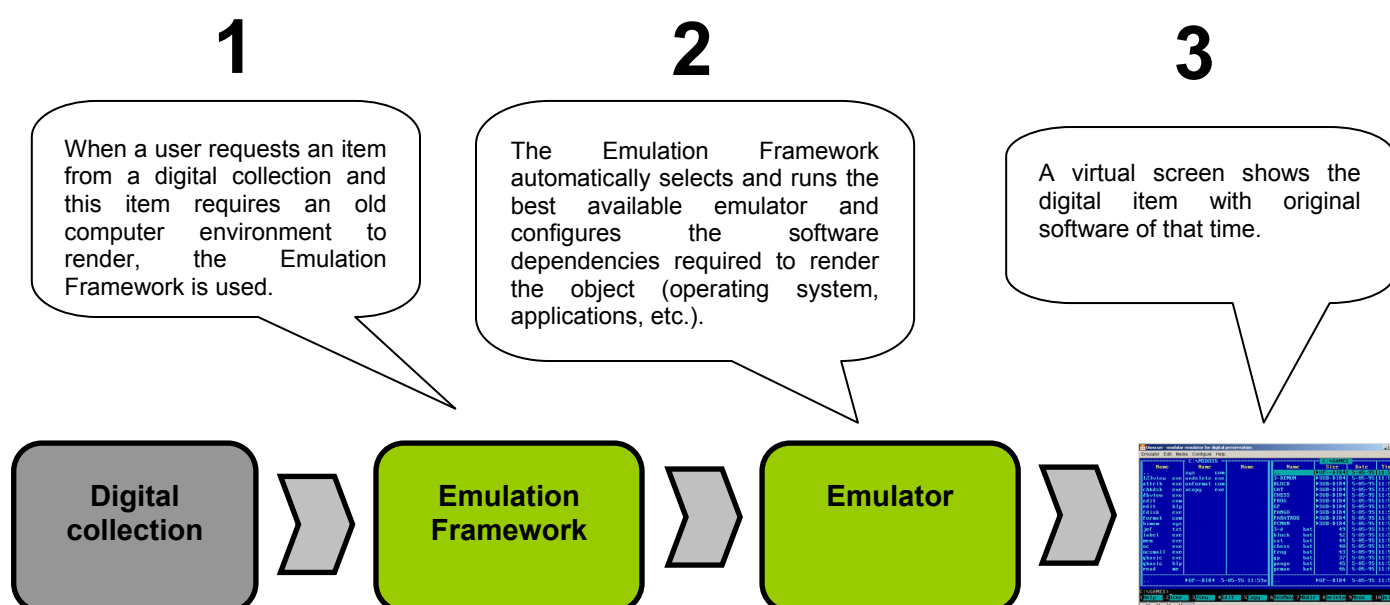
If you are the administrator that would like to install or change the EF in a computer environment, please follow the section **Administrator guide**.

If you are a home user that would like to install and test the EF on a standalone basis, please make sure you read both guides.

**Note:** this document is written for **EF Release version 2.0.0 (February 2012)**. For a previous version of the EF, please read the documentation for that particular release.

### 1.1 What is the Emulation Framework?

The Emulation Framework allows you to render digital files and computer programmes in their native environment. This offers you the potential to view these files in their intended 'look and feel', independent from current state of the art computer systems. The spectrum of potential computer platforms and applications that can be supported is practically unlimited. This release of the EF supports emulation of the x86, Commodore, Amiga, Amstrad CPC, BBC Micro and Thomson computer platforms. Emulation is done by using existing (open source) emulators which are carefully selected on their capability to mimic the functionality of these platforms. The following illustration shows how this works in three steps.



<sup>1</sup> KEEP project website, available at: <http://www.keep-project.eu>

## 1.2 About the KEEP project

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KEEP (Keeping Emulation Environments Portable) is an international research project co-funded by the European Union 7th Framework Programme. It does research into an emulation-based preservation strategy and develops several tools to support that. The consortium consists of eight organisations representing a wide range of stakeholders in Europe: cultural heritage institutes, research institutes, commercial ICT partners and the gaming industry. The project has a duration of three years and ended in February 2012.

More information can be found on the KEEP website: <http://www.keep-project.eu>

## 1.3 About the software in this release

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The EF software release 2.0.0 consists of three parts:

1. Core Emulation Framework with a choice of two Graphical User Interfaces (GUI)
2. Software Archive
3. Emulator Archive

The **Core EF** is the technical heart of the system, performing the automatic identification of file formats, selecting the required software and automatically configuring the emulation environment. It includes two GUIs to interact directly with the user: a basic GUI offering the most common functionalities for setting up an emulation environment for digital files, and a comprehensive GUI which offers more advanced functionalities, including options to manage the Software Archive and Emulator Archive. For selecting the software and emulator, the Core EF interacts with the Software Archive and the Emulator Archive.

The **Software Archive** is a separate web service that contains the software (applications and operating systems) available for the EF. The standard installation of the EF package comes with the following open source operating systems:

- FreeDOS – an open source MS DOS look-a-like operating system;
- Damn Small Linux – a small Linux kernel with limited functionality;
- Puppy Linux – a medium-sized Linux version with additional functionality compared to Damn Small Linux.

The **Emulator Archive** is a separate web service that contains the emulators available for the EF. The download package comes with the following open source emulators:

1. Dioscuri – x86 Java-based emulator capable of running MS DOS and Linux;
2. QEMU – x86 capable of running MS Windows and Linux;
3. VICE – Commodore 64 emulator;
4. UAE – Amiga emulator;
5. Java CPC – Amstrad emulator;
6. BeebEm – BBC Micro emulator;
7. Thomson T07 – Thomson T07 emulator;

The Core EF, Software Archive and Emulator Archive are developed by Tessella with support from the National Library of the Netherlands (Koninklijke Bibliotheek, KB). The basic Core EF GUI is developed by the University of Portsmouth. Finally, the comprehensive Core EF GUI is developed by the National Library of the Netherlands with support from Tessella.

## 2 End-user guide

This section provides a user guide for end-users of the Emulation Framework explaining how to use the EF and which features it offers.

### 2.1 What you should know...

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The Emulation Framework (EF) consists of three components:

- the **Core EF** including a choice of two Graphical User Interfaces (GUI):
  - Basic interface: offers the most common functionalities for setting up an emulation environment for digital files.
  - Comprehensive interface: offers advanced functionality, including options to manage the Software Archive and Emulator Archive.
- the **Emulator Archive** provides the EF with emulators.
- the **Software Archive** provides the EF with software required by the emulators.

**Note:** as an end-user, you will only deal with the interface of the EF (basic or comprehensive). It is assumed that all components of the EF are successfully installed, either locally or in client/server setup. If not, please ask your administrator or go to the section **Administrator Guide** to install and configure the EF yourself.

### 2.2 Starting the Software and Emulator Archives

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Before you can start using the EF, both Software Archive and Emulator Archive must be running in the background. If you have not installed the EF yourself, you may assume both Archives are already up and running. You may skip this step.

If you are a **home user** and installed the EF yourself you need to make sure that both Software Archive and Emulator Archive are running on the background. The EF needs a connection to these archives to function correctly.

To manually start the **Software Archive**, go to the folder `\swa` and double-click on:

`runServer.bat` (for Windows platforms)

or

`runServer.sh` (for Linux/MacOS X platforms)

To manually start the **Emulator Archive**, go to the folder `\ea` and double-click on:

`runServer.bat` (for Windows platforms)

or

`runServer.sh` (for Linux/MacOS X platforms)

## 2.3 Using the basic EF interface (GUI)

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### 2.3.1 What can you do with the basic GUI?

The basic GUI lets you:

- Run a digital file in an emulated computer environment automatically
- Run a digital file in an emulated computer environment manually configured
- View data in Software and Emulator Archives
- View data in TOTEM technical file format registry
- Configure the list of information accessible to users

### 2.3.2 Starting the basic GUI

To start the Emulation Framework and to launch the basic GUI, double-click on the following file in the home folder where the EF is located:

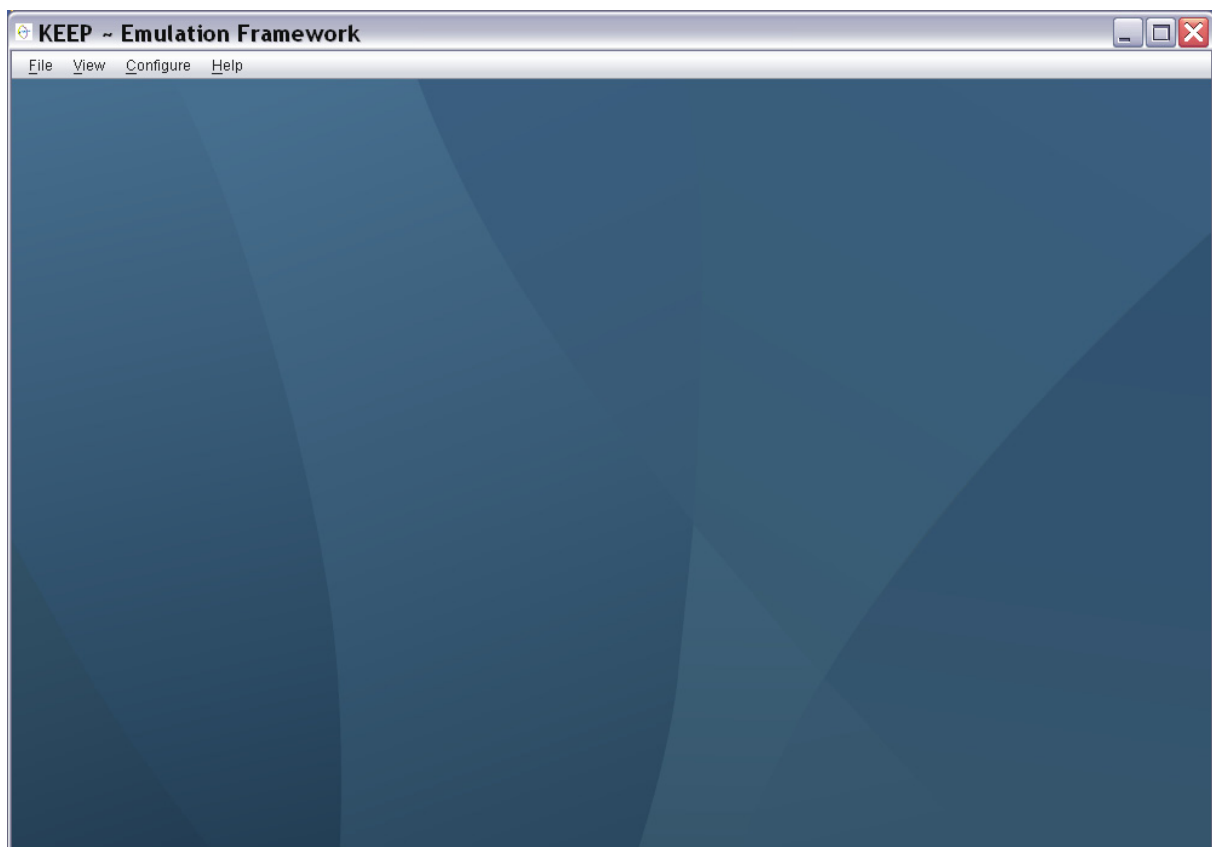
`runEF_basic.bat` (for Windows platforms)

or

`runEF_basic.sh` (for Linux/MacOS X platforms)

**Note:** your administrator should have installed and set up the system.

The following window should appear:



### 2.3.3 The basic GUI explained

The basic GUI window has the following functionality:

- Top menu bar:
  - a. *File* – render a digital file automatically or by manual configuration. Exit the application.
  - b. *View* – allows you to browse the available software packages, emulators, technical registries and the TOTEM online database.
  - c. *Configure* – define which options are accessible via the GUI.
  - d. *Help* – reference to help documentation and credits.
- Mid field: area where pop-up windows will appear depending on the options you select from the menu.

### 2.3.4 Choosing a file or application

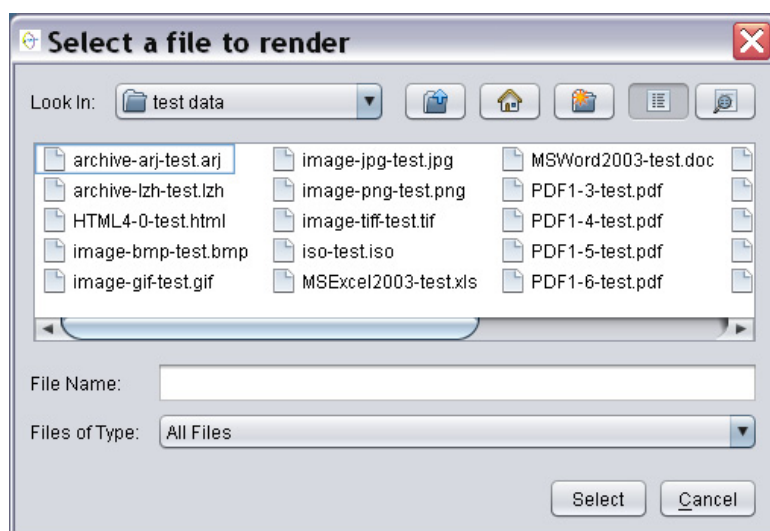
The Emulation Framework (EF) can emulate any of the supported computer environments listed in section 1.3. To run a computer environment you first need to offer the EF a file or application (disk image). The file can be an office document such as PDF, excel, Wordperfect, or an audio and video stream. It can also be a disk or tape image containing a computer application that can run on one of the supported computer environments. Examples are: a Commodore 64 disk image and an ISO CD-ROM file.

To select a file or application (disk image) click on the **File** menu and choose either:

1. Render automatically
2. Render via configuration

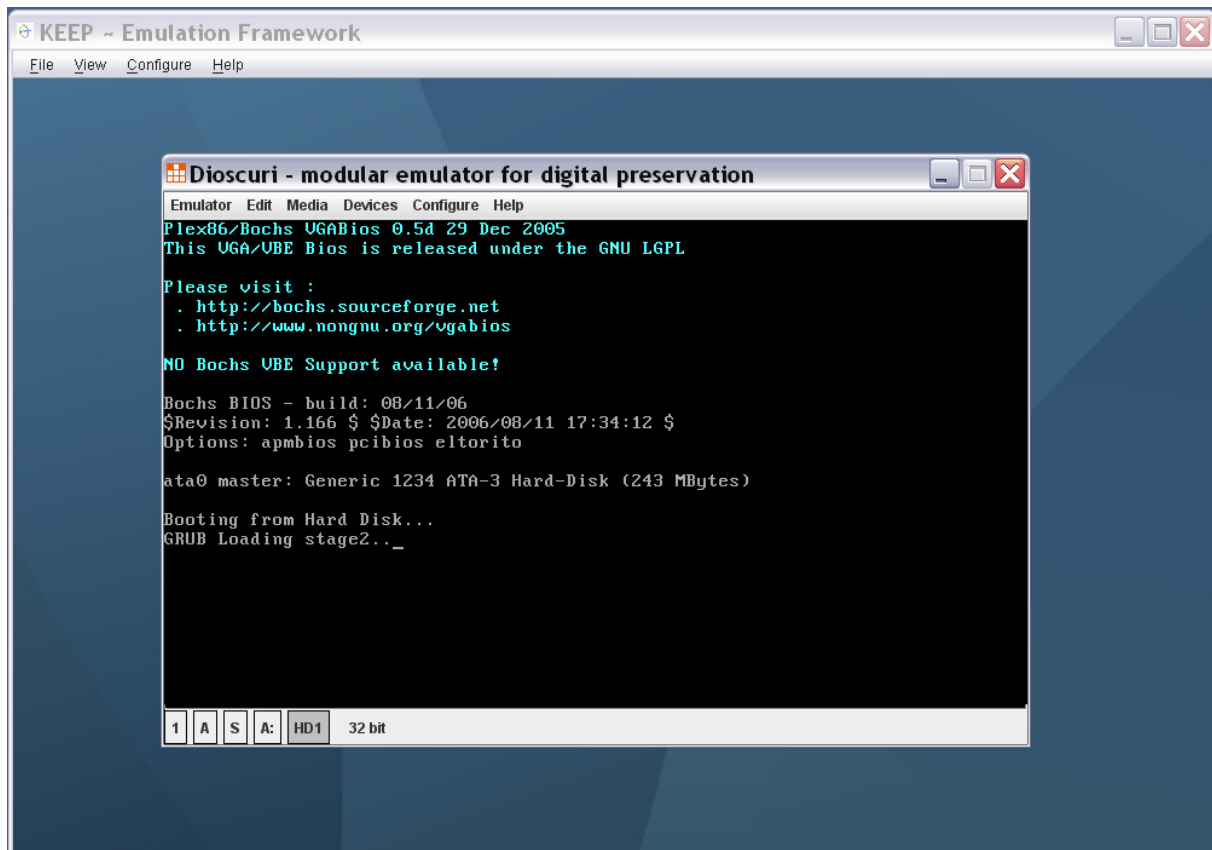
The first option starts the emulation process automatically. The EF chooses the best choice for you automatically. The second option offers you more control in which software and hardware should be emulated.

In both cases you will be asked to select a file from your file system, as can be seen here:



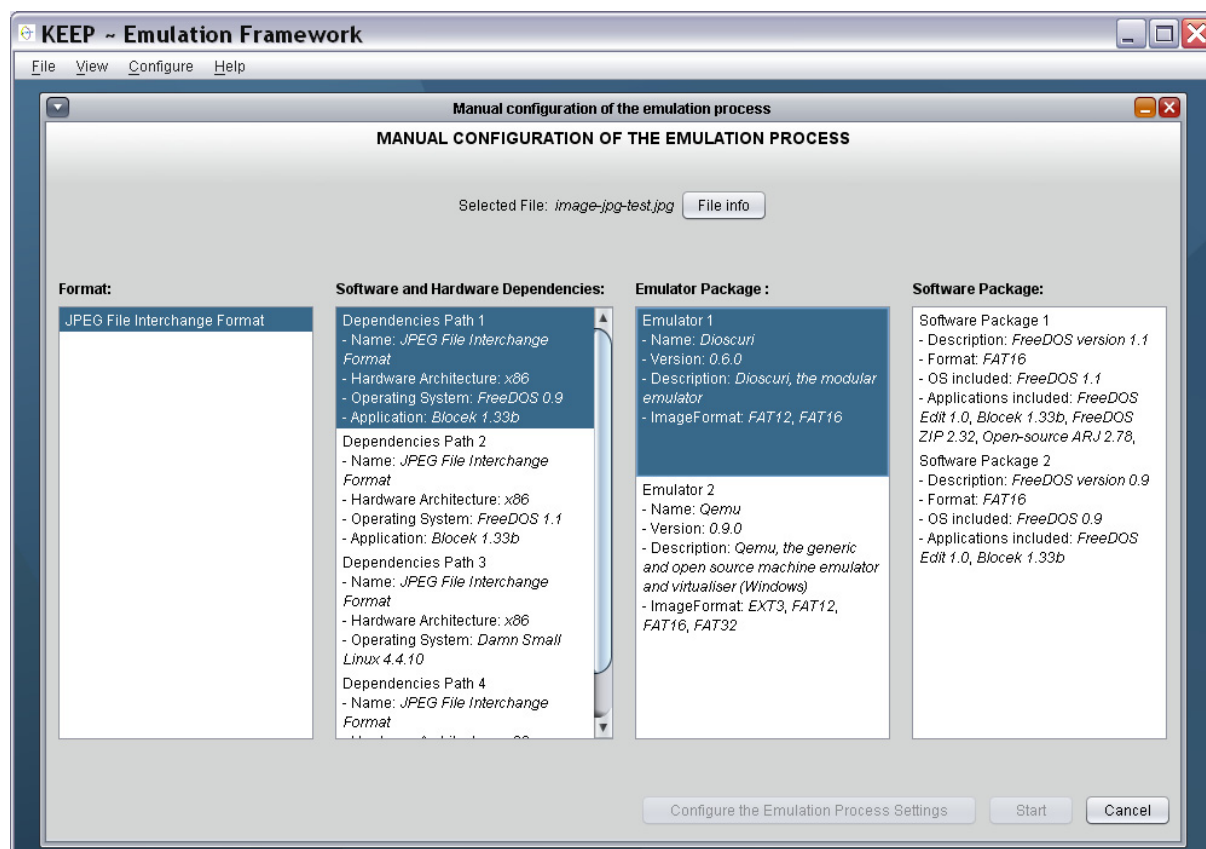
### 2.3.5 Render in automatic mode

If you selected to **render automatically**, the EF will download and configure the required emulator and software. As a result, the following screen could be shown (e.g. Linux with Dioscuri emulator):



## 2.3.6 Render via configuration

If you selected **render via configuration** you will be shown the following screen:

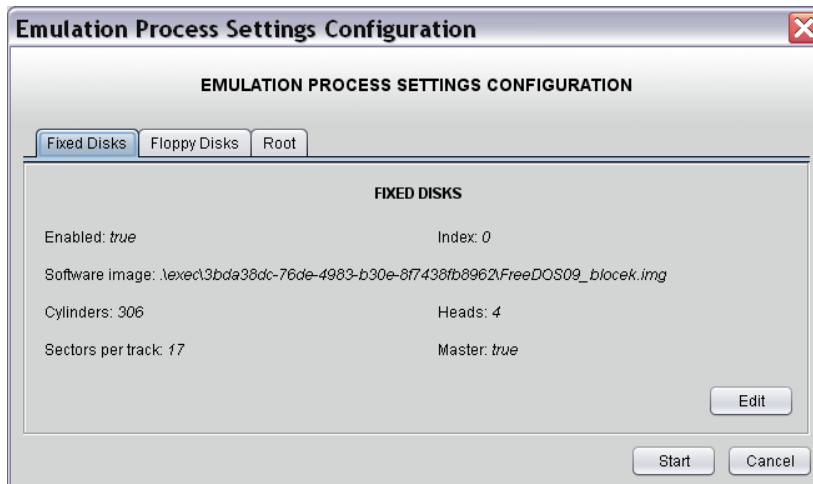


This dialog lists the possible formats of the file, its software and hardware dependencies for rendering this file correctly and finally the supporting emulators and software applications.

In this example, all configurations are shown for rendering a JPEG image file.

**Note:** the number of software and emulator configurations depend on how many emulators and software is actually stored in the EF. If you miss support for a particular file or application, please contact your administrator.

If you selected the preferred software and emulator, the buttons at the bottom of the dialog will be enabled. If you choose **Configure the Emulation Process Settings** you can make small adjustments to prepared configuration. The following dialog will be shown:



If you don't want to make any changes, just click **start**.

Now, the EF will start the emulator, boot the operating system and shows you the rendered computer environment.

### 2.3.7 View data in Software and Emulator Archives

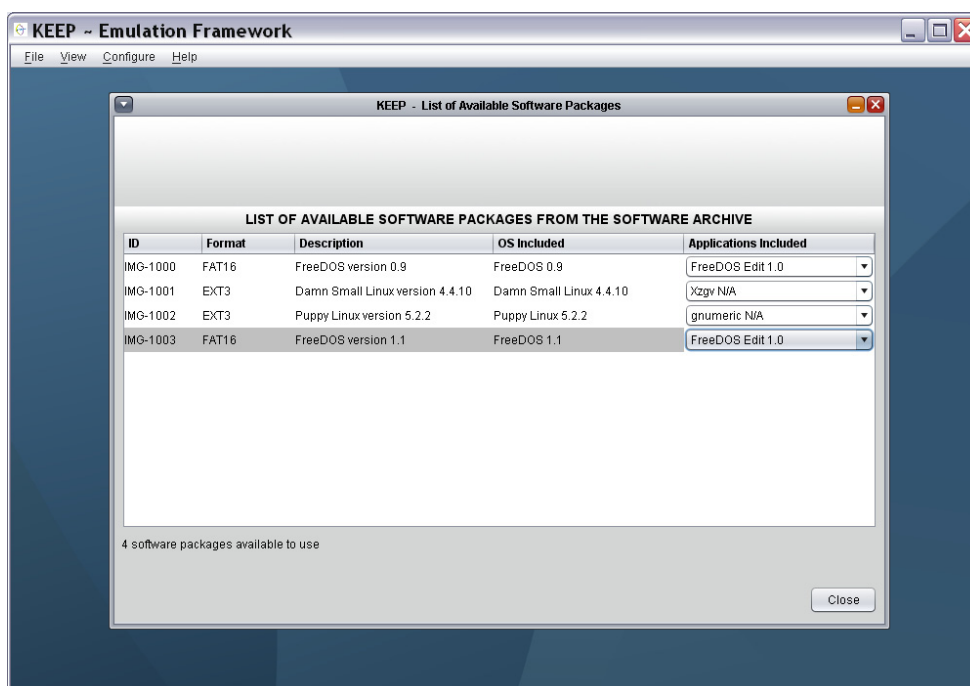
The Basic GUI also allows you to browse what is in the Software and Emulator Archives. You can look into that by clicking the **View** menu and select:

**View available software packages from the software archive**

or

**View available emulator packages from the emulator archive**

The following screen shows the dialog for available software in the Software Archive:

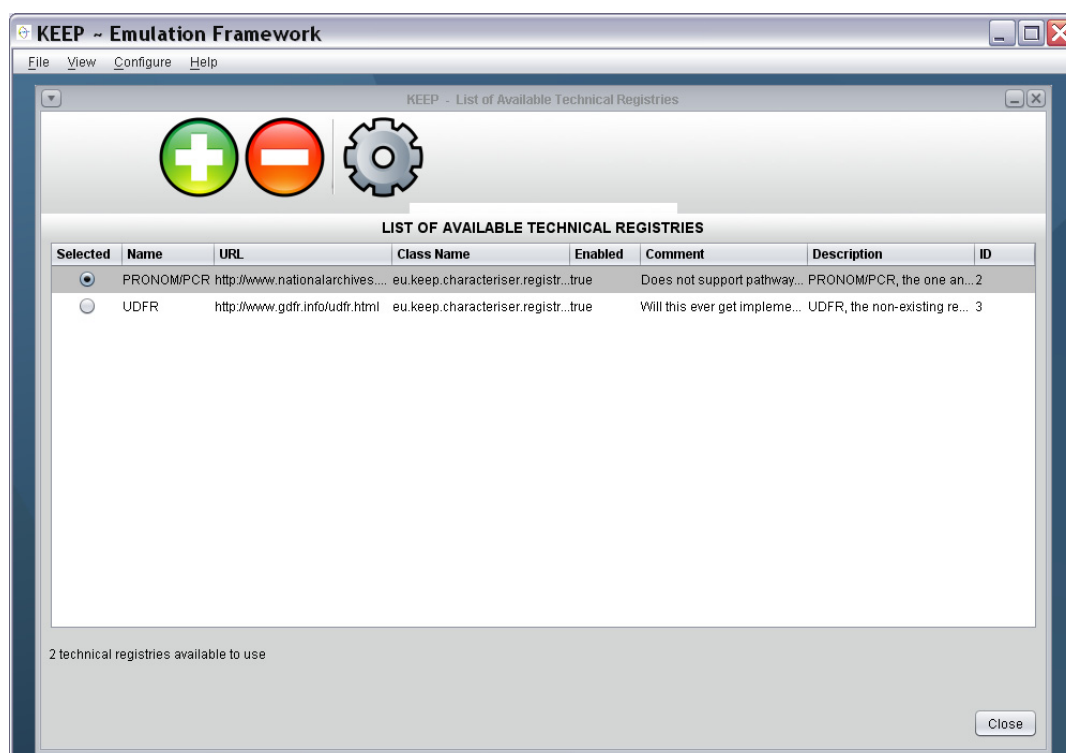


### 2.3.8 Access and edit the list of available technical registries

The Basic GUI offers you the possibility to add and adjust technical registry information. A technical registry can help the EF find a suitable emulation environment by analyzing the file format you selected and give information about software that can render this file.

At the moment, no online web service of a technical registry exists, but in the future that could become reality. The Basic GUI already supports these registries.

To open the dialog for available technical registries, click the **View** menu and select **Available technical registries**. A new dialog (see figure) will be displayed listing the technical registries entered in the system.



### 2.3.9 View data in TOTEM technical file format registry

The Basic GUI has an option to browse the TOTEM technical file format registry. This is an implementation of a registry as mentioned in the previous section.

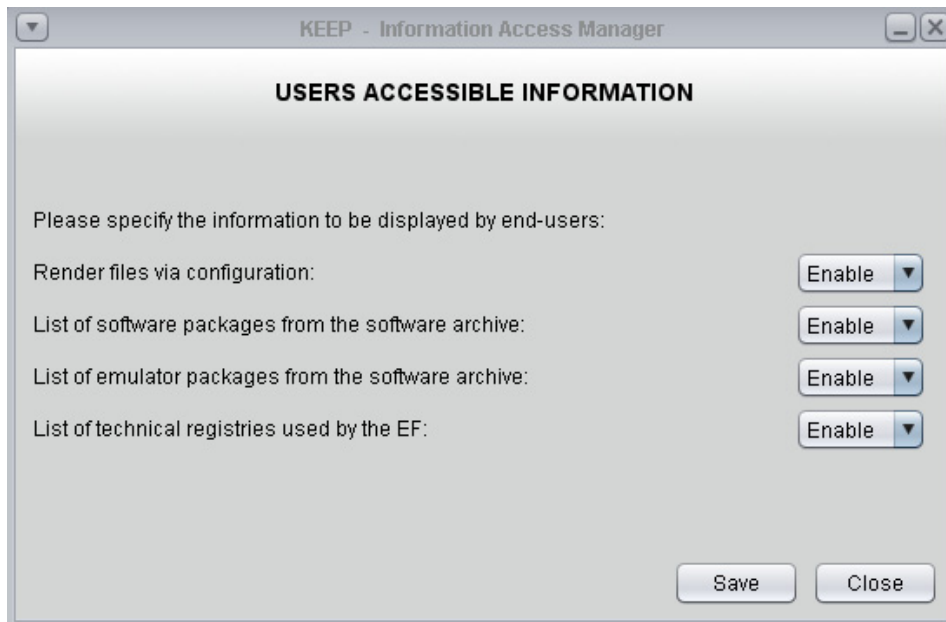
You can access the online TOTEM registry by clicking **View** menu and select **TOTEM Metadata Database**. This link will take you to the associated website.

**Note:** TOTEM is not a web service (yet) and thus can not be used as online technical registry by the EF. It does however give you information about file formats and software dependencies.

### 2.3.10 Configure the list of information accessible to users

In order to configure the amount of information users can access, click on **Configure** menu and select **Accessible information to users**. A new dialog (see figure) listing information

with their accessibility status will be displayed. The access to certain portions of information can be enabled or disabled via the dropdown menu associated with the specific information.



## 2.4 Using the comprehensive EF interface (GUI)

### 2.4.1 What can you do with the comprehensive GUI?

The comprehensive GUI lets you:

- Run a digital file in an emulated computer environment automatically
- Run a digital file in an emulated computer environment manually configured
- Run a emulated computer environment without a digital file (only platform & software)
- View and manage data in Software and Emulator Archives
- Choose your preferred language of GUI and emulated environment

### 2.4.2 Starting the comprehensive GUI

To start the Emulation Framework and to launch the comprehensive GUI, double-click on the following file in the home folder where the EF is located:

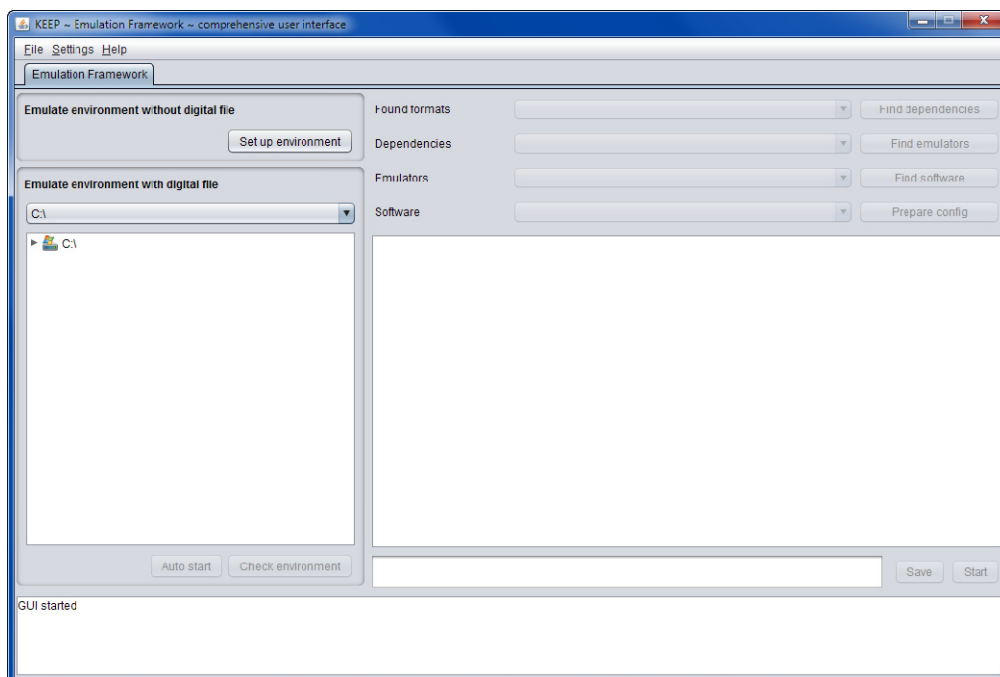
`runEF_comprehensive.bat` (for Windows platforms)

or

`runEF_comprehensive.sh` (for Linux/MacOS X platforms)

**Note:** your administrator should have installed and set up the system. You should also make sure the Software Archive and Emulator Archive are running. See section 2.2 for details.

The following window should appear:



### 2.4.3 The comprehensive GUI explained

The comprehensive GUI window has the following functionality:

- Top menu bar:
  - a. *File* – exit to close the EF application
  - b. *Settings* – manage the languages of the EF, the location of the Software Archive and Emulator archive web services and the Emulator Whitelist See section 2.4.7 for details.
  - c. *Help* – reference to online help documentation and credits.
- Tab *Emulation Framework* – select and render a digital file using emulation.
- Emulate environment without digital file – emulate an environment without wrapping an existing digital file in it.
- Emulate environment with digital file – overview of (local) file system. Here you can select a file on your local file system to render in an emulated environment.
- *Select boxes* – four steps in which you can manually select the appropriate dependencies on hardware and software for the selected file or desired environment. The steps are explained in detail in sections 2.4.6.1 -- 2.4.6.4.
- *Configure window (currently blank)* – area in which you can manually configure the selected emulator. This is explained in section 2.4.6.5.
- Buttons:
  - a. *Set up environment* – to manually select emulators and software to emulate an environment without an existing digital file.
  - b. *Auto start* – to automatically start the emulation process for a selected file without human intervention.
  - c. *Check environment* – to manually adjust the emulation process.
  - d. *Save* – save changes to the configuration of the emulator.
  - e. *Start* – manually start the emulation process after you have selected the hardware and software dependencies for the selected file.
- *Log panel* - all important status information will be shown here.

**Note:** if you see more than one tab next to the tab *Emulation Framework*, you have administrator rights and are capable of managing the Software and Emulator archives. In this section, only tab *Emulation Framework* is described. The other options are explained in chapter 3.

## 2.4.4 Choosing a file or application

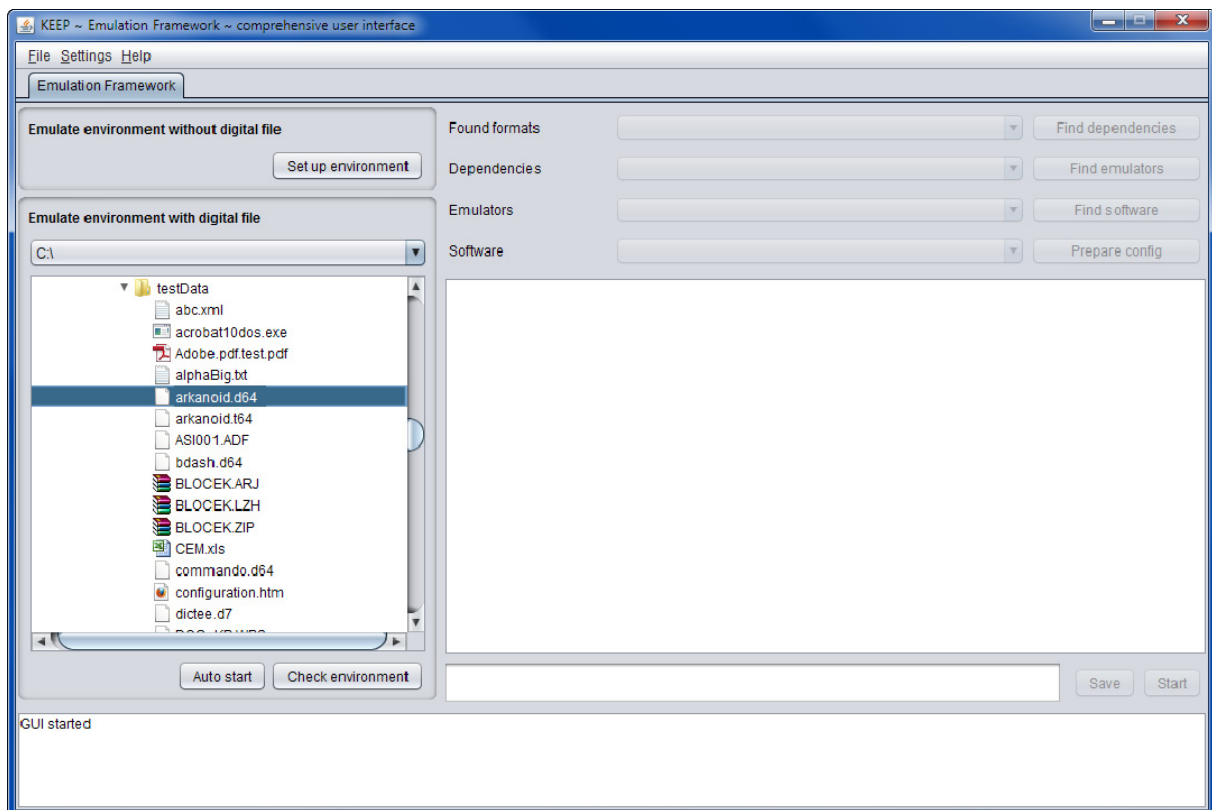
The Emulation Framework (EF) can emulate any of the supported computer environments listed in section 1.3.

Sometimes, you may want to simply emulate the environment, without wrapping an existing file into it. In these cases, you can simply press the button **Set up environment** in the panel **Emulate environment without digital file**. You can then select the software and emulator using the manual mode described in section 2.4.6.

In most cases, however, you will want to emulate an environment to be able to render an existing file on your file system. This file can be an office document such as PDF, excel, Wordperfect, or an audio and video stream. It can also be a disk or tape image containing a computer application that can run on one of the supported computer environments. Examples are: a Commodore 64 disk image and an ISO CD-ROM file.

The panel **Emulate environment with digital file** is used to select a file on your local file system. First, use the drop down box at the top to select the disk drive which contains the file you want to render using emulation (e.g. the **C:\**-drive). The **file tree** below will then show the files and folders on the selected drive. Click on the tree to select the file you want to render. By expanding the nodes of the tree you can browse the directories on the selected drive.

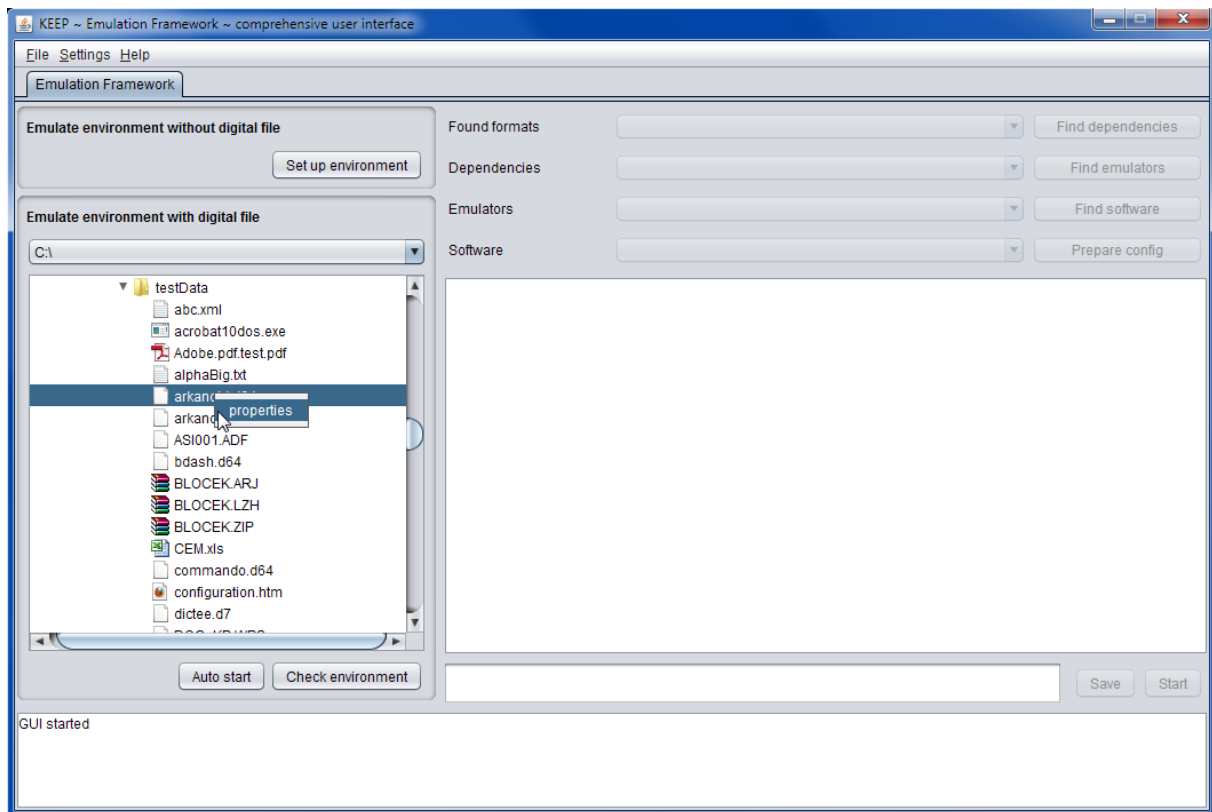
The following screen shows the GUI with a file on the **C:\**-drive selected:



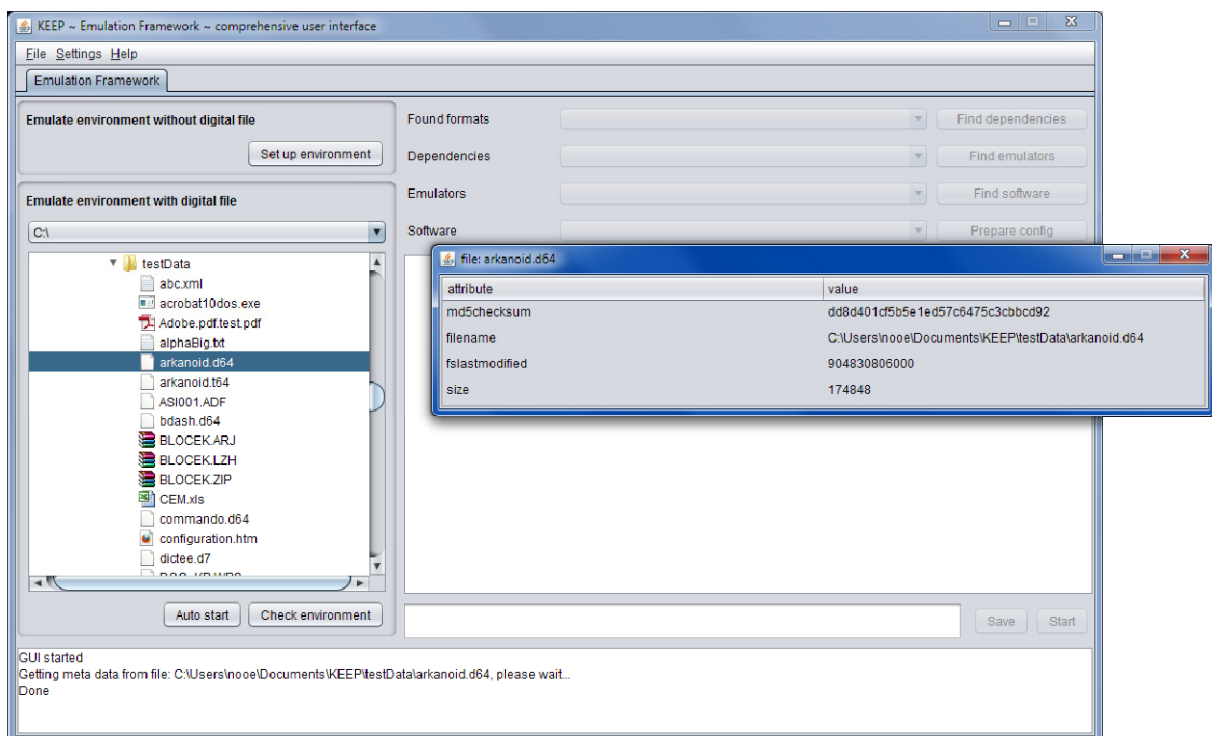
At the bottom of the screen two buttons are now enabled. At this point you can choose between the automatic mode by clicking the **Auto start** button, and manual mode by clicking the **Check environment** button. These two modes are explained in detail in sections 2.4.5 and 2.4.6 respectively.

### 2.4.4.1 Viewing technical metadata for a file

It is possible to extract technical metadata from a digital file. Use the right-hand button on your mouse to click on a file in the **file tree**, and then click (with the left-hand mouse button) on **properties**:



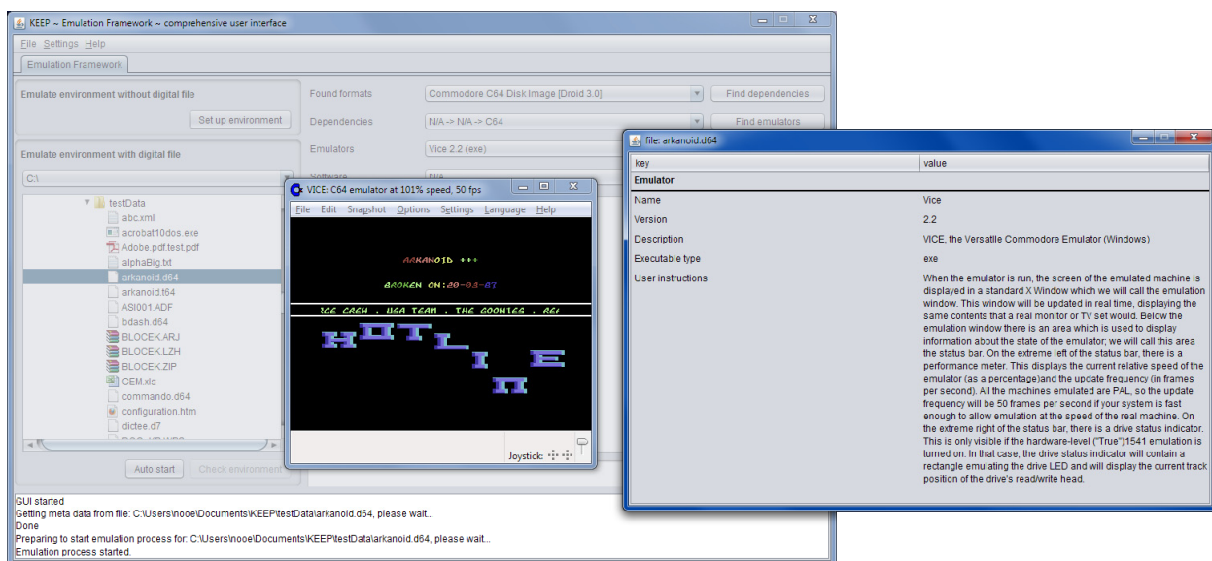
The technical metadata will be displayed in a separate window:



## 2.4.5 Automatic mode – starting an emulator

The EF has an automatic mode which, when given a digital file or application, will automatically characterise it, and select an environment (consisting of an emulator and the required software) that is able to render it. The success of this automatic process depends on the correct identification of the file format and the available emulators and software.

To start the automatic mode for a given file, **double-click the file** in the file tree with the mouse. Alternatively, once a file has been selected, the **auto start** button can be pressed. With either option, the EF will automatically try to find the required software and emulator for the selected digital file and if successful, automatically starts the emulation process. Depending on the size of the emulation software to download from the Software Archive, this process may take a few minutes. The result is shown in the following screen.



The emulator is running (in this example Commodore 64 emulator VICE) and a popup window is opened showing extra information about the emulator and loaded software.

When finished the emulator can be closed by the user and the emulation process ends automatically.

## 2.4.6 Manual mode – starting an emulator

The manual mode allows you to influence the way the emulated computer environment is constructed. To do so, you need to follow the following five steps:

1. Select a file format
2. Select a dependency
3. Select an emulator
4. Select software
5. Prepare configuration & start

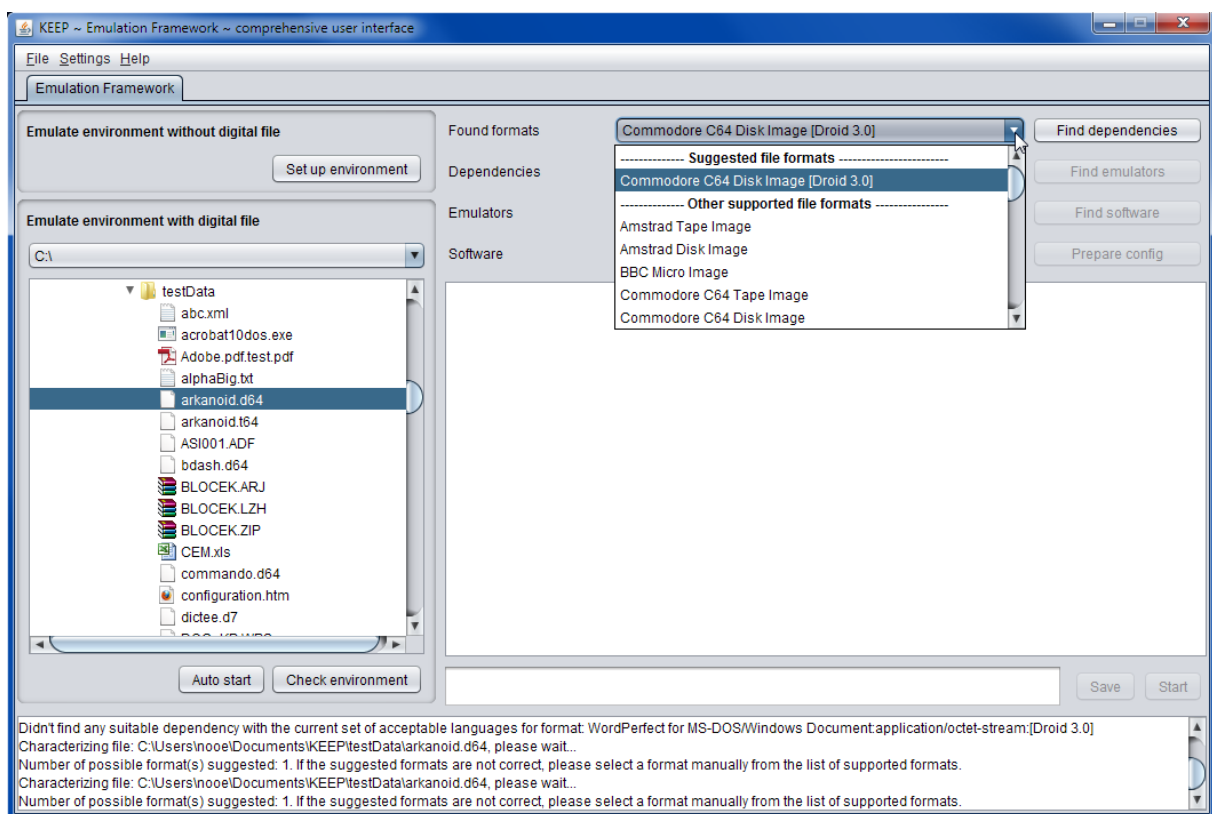
In the following sections, each of these steps are explained in more detail.

**Note:** if you pressed the **Set up environment** button in the panel **Emulate environment without digital file**, you do not need to select a file format, and you can directly proceed to step 2.

#### 2.4.6.1 Step 1 – Select a file format

Once a file is selected in the **file tree**, the **Check environment** button will be enabled. Pressing this button starts the manual mode. The first step is to identify the file format. By clicking the **check environment** button the EF tries to determine the type of format the digital file has. This forms the basis for creating an emulated computer environment.

After a few seconds, the top slot of the right pane contains the results of the identification process. In addition, it will also contain a list of all file formats that the EF currently supports. This is shown in the following figure:

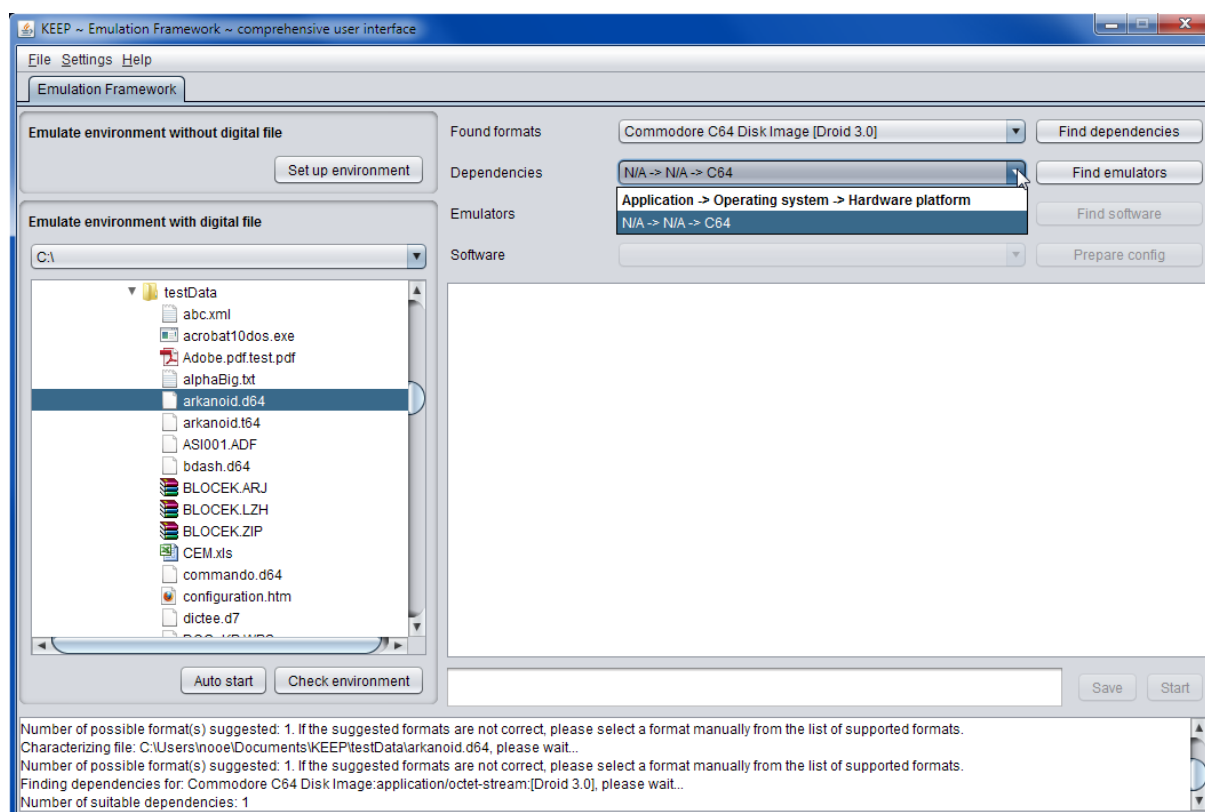


In this example, the EF has found a single result, and it is automatically selected. In other cases, the EF may find multiple suggestions for the file format. In either case, you can always ignore the EF's suggestion(s), and choose one of the other file formats.

#### 2.4.6.2 Step 2 – Select a dependency

Once a file format from the previous step has been selected, the **Find dependencies** button is enabled. A dependency is a computer environment consisting of an application, operating system and hardware platform. By pressing this button the EF contacts the Software Archive and requests a list of all possible combinations to render the selected file format.

An example of the dependencies returned for the above file format is as follows:



In this case, one pathway has been found, and the following environment is selected:

N/A (no application) -> N/A (no operating system) -> C64 (platform)

Other examples of possible pathways are (for respectively a wordperfect file and a DOS executable:

WordPerfect (application) -> MS-DOS (operating system) -> x86 (platform)

N/A (no application) -> MS-DOS (operating system) -> x86 (platform)

### Notes:

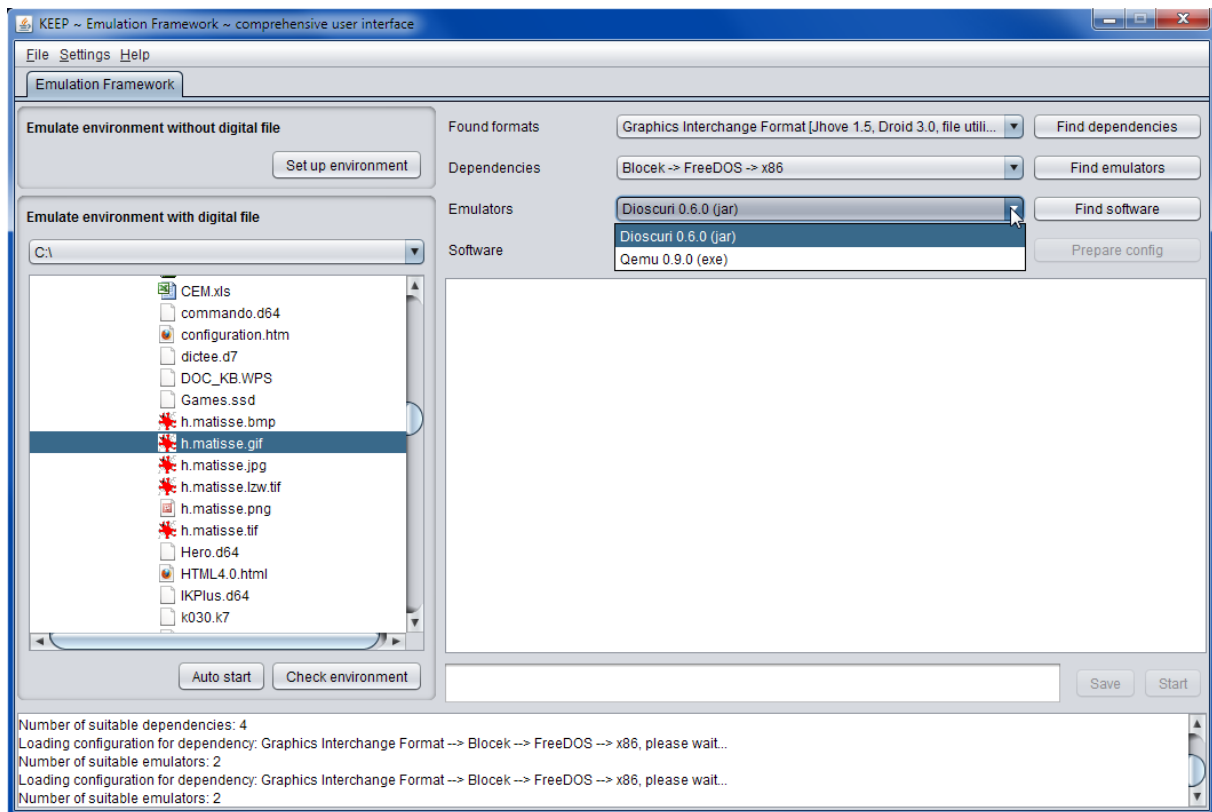
- If no dependencies can be found for a file format, a warning will be given and a message will be displayed in the log panel at the bottom of the screen.
- Sometimes, the fields for application and/or operating system are defined as N/A. In this case, no application and/or operating system are required to run the file (e.g. the file is a computer game depending only on operating system and hardware).
- If you pressed the **Set up environment** button in the panel **Emulate environment without digital file**, the EF will skip step 1 and immediately request a list of all supported dependencies from the Software Archive and display them in the list. You can then manually select a combination of software and hardware platform that you want to emulate.

#### 2.4.6.3 Step 3 – Select an emulator

Once a dependency has been selected, the **Find emulators** button is enabled. By pressing this button the EF requests all available emulators for this dependency from the Emulator Archive.

Once the process is completed, the next drop down box will be populated with these results. If there are no valid results, you will get a warning and a message will be displayed in the log panel at the bottom of the window.

A list of valid results is shown in the following view:



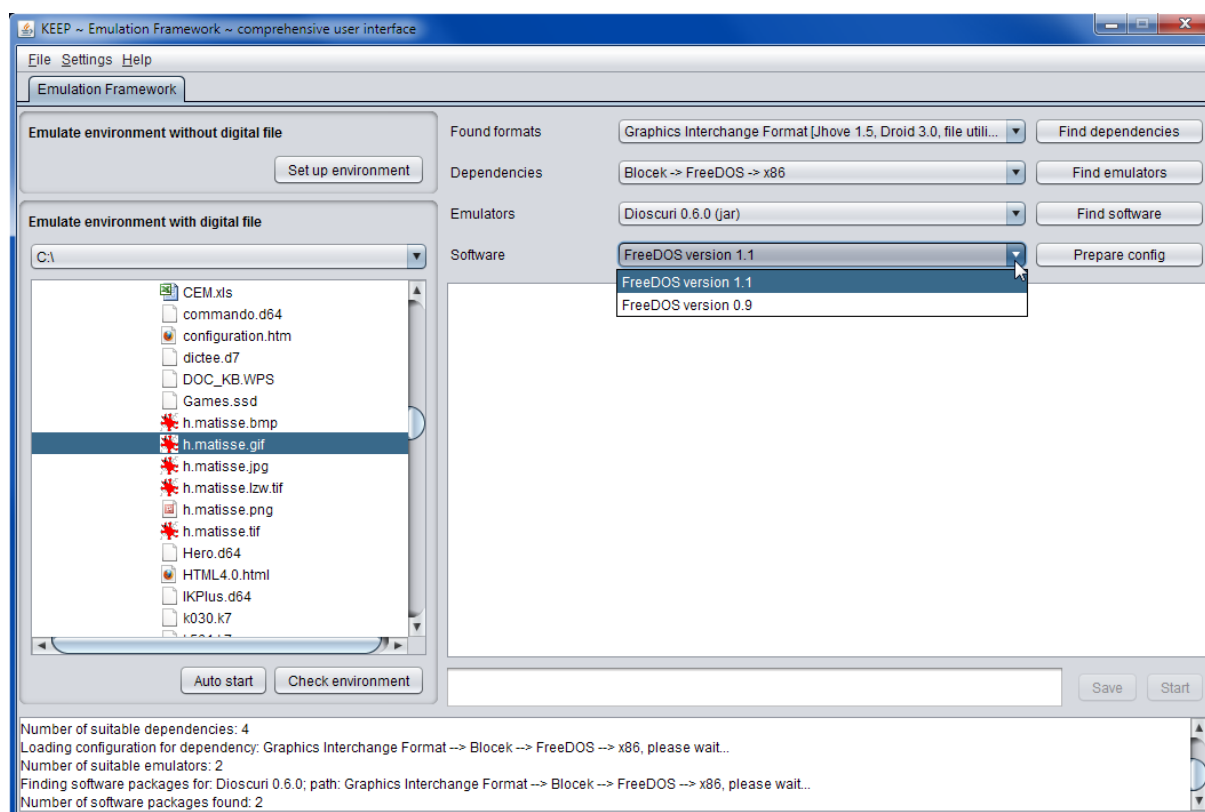
In this case, two emulators have been found and one of these, Dioscuri, is selected.

**Note:** based on language settings of the EF, it is possible that you see less available emulators than you expected. See section 2.4.7.1 for more information.

#### 2.4.6.4 Step 4 – Select software

Once an emulator has been selected, the required software that is part of the dependency needs to be selected and downloaded. Therefore, the EF queries the Software Archive for available software images (pre-installed operating system and applications) that match the required dependency stack. To start this process, the button **Find software** must be pressed.

Similar to querying the Emulator Archive either a warning and a message in the log panel at the bottom of the screen will inform you that no software has been found, or the valid software will be shown in the result box, as can be seen in the following screenshot:



This example has returned two software packages that offer different versions of the required operating system (FreeDOS) and both contain the required application (Blocek).

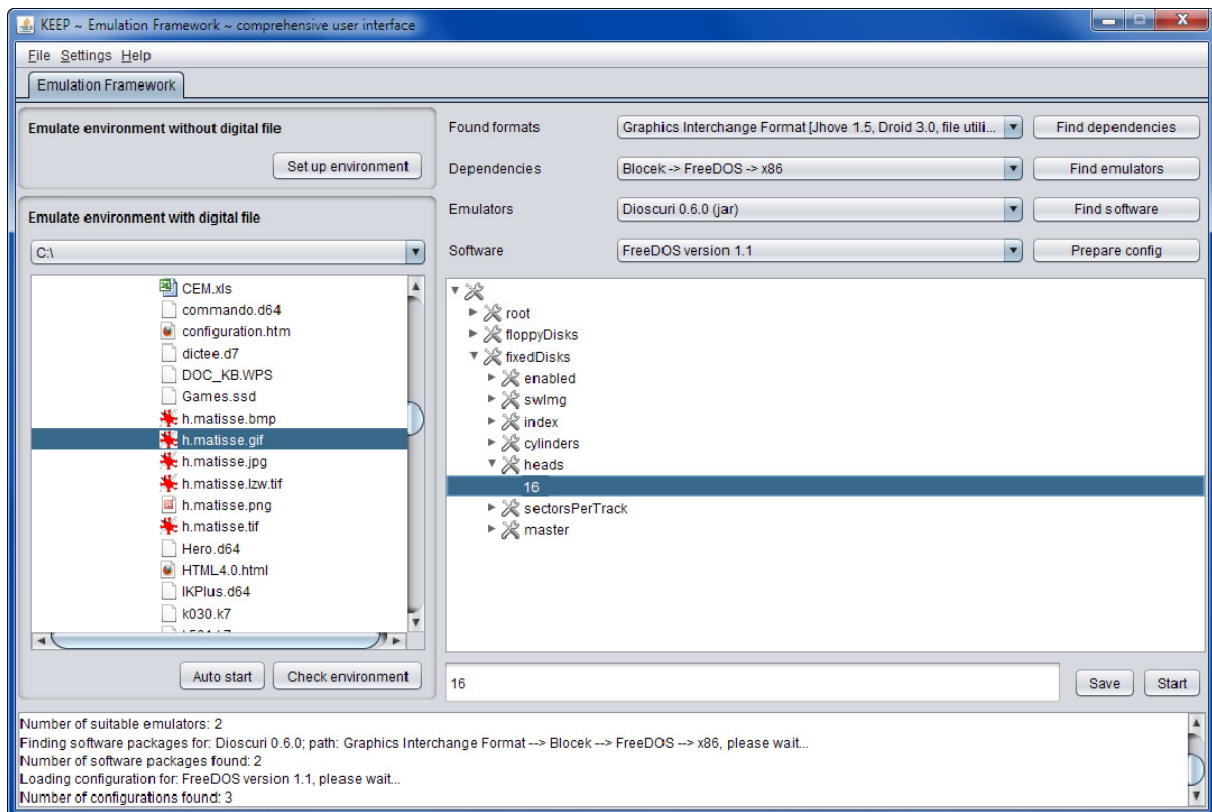
Now the selection process is complete.

#### 2.4.6.5 Step 5 – Prepare configuration & start

The final step before starting the emulator is configuration of the whole environment. By clicking the **Prepare config** button the EF automatically defines a suitable configuration. This configuration contains information about how the software and digital file should be loaded into the emulator.

The user can accept the predefined configuration and directly start the emulator by clicking the **Start** button.

If you would like to view or alter the predefined settings, you can take a look at the bottom right panel of the GUI. A sample of such configuration is shown in the following view:



The configuration can be expanded by pressing the tree nodes. Parameters can be modified by selecting them, and in the textbox below the configuration tree, entering a new value.

Once a value is changed, the textbox will light up yellow to indicate a new value has been entered. The value is saved in the configuration by pressing the **Save** button.

**Note:** it is recommended that only expert users change parameters in the configuration; entering the wrong parameters may stop the environment from running correctly! Once the configuration update is complete (or no changes have been made), the **Start** button can be pressed to load the environment and show the digital file.

## 2.4.7 User settings

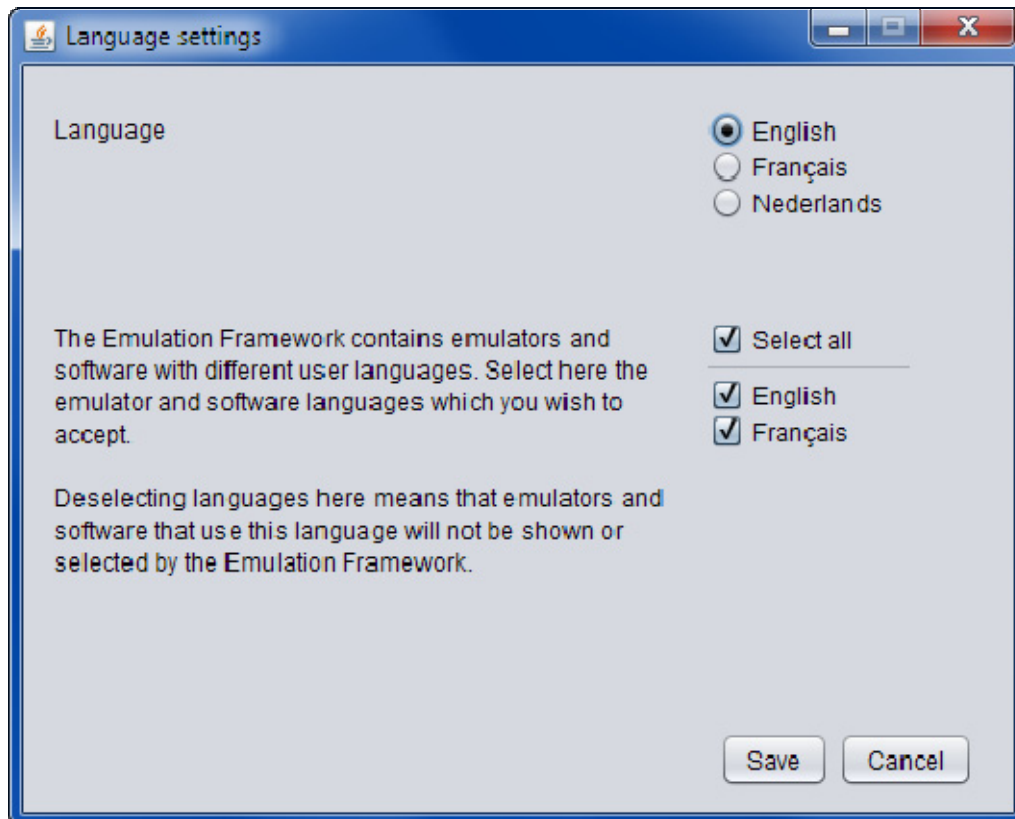
The EF comprehensive GUI offers several user settings to:

- select the language of the EF GUI;
- select the preferred language(s) of the emulated computer environments;
- setup the connection to software and emulator archives;
- manage the **Emulator whitelist**.

You can find those settings by opening the menu item **Settings** in the menu bar.

### 2.4.7.1 Language settings

By clicking option **Languages** from the menu **Settings**, the following window will appear:



At the top of the window, you can select the language of the EF comprehensive GUI.

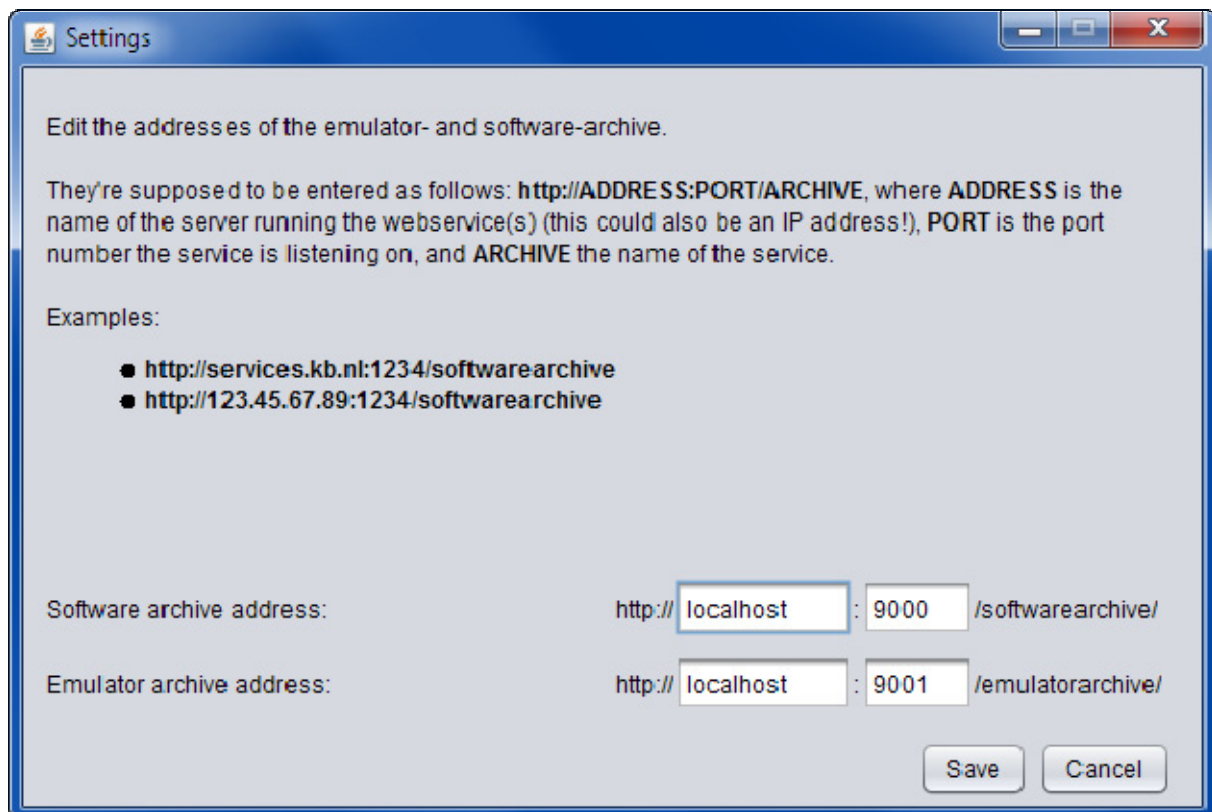
**Note:** in the current release, the EF supports English, Dutch (Nederlands) and French (Français). Future releases will include support for other languages as well.

In the lower part of the window you can select the languages used by the emulator and software under emulation. The selection you make here will influence which emulators and software are selected by the EF in automatic or manual mode. If an emulator or software uses a language that is not checked here, it will not be selected by the EF.

The default is that all available languages are accepted, so that emulators and software with all languages are selected. You can uncheck any of the boxes if you wish to exclude emulators and software using certain languages from being selected.

#### 2.4.7.2 Web service settings for software and emulator archives

By clicking option **Web-service addresses** from the menu **Settings**, the next window will be shown:



In this view, you can adjust the connection to the Software archive and Emulator archive. Please make sure you know the server name and port number of each of the web services. If you are unsure, please contact your system administrator.

Click the **Save** button to make the changes.

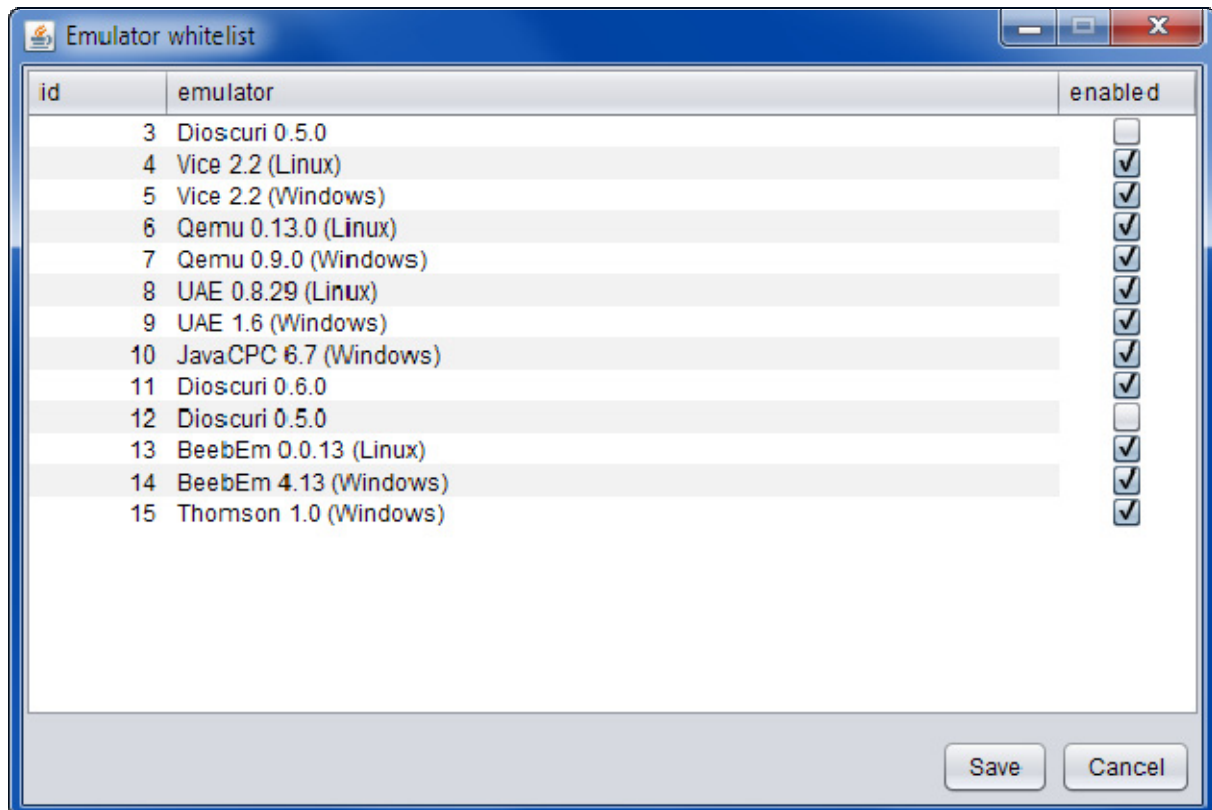
**Note:** the default settings for the web services are:

- Software archive: localhost on port 9000
- Emulator archive: localhost on port 9001

These settings are only appropriate if the Software Archive and Emulator Archive are installed on the same computer as where the EF is running.

#### 2.4.7.3 Emulator Whitelist

By clicking option **Emulator whitelist** from the menu **Settings**, the next window will be shown:



In this window, a list of all installed emulators will be shown. By checking or unchecking a tick-box in the right-hand column, you can respectively add an emulator to the **whitelist**, or remove it from the list.

The selection you make here will influence which emulators are selected by the EF in automatic or manual mode. Emulators which are not on the **whitelist** will not be selected or displayed.

## 3 Administrator guide

This section is intended for administrators that would like to deploy the Emulation Framework (EF) on a server or local computer. Furthermore, this guide describes how to configure the components, and how to create and update the contents of the Emulator Archive and Software Archive.

### 3.1 Installation

---

The software is distributed via a single installation package. This is a self-extracting jar file that contains a wizard for installing the software. The software can be downloaded from:

<http://sourceforge.net/projects/emuframework/files/>

#### 3.1.1 System requirements

Before you install the EF software, please make sure your computer and/or server(s) meet the following minimum system requirements:

<b>Processor</b>	x86 32/64 bit 1.5 GHz or faster
<b>Memory</b>	at least 2GB of RAM
<b>Storage space</b>	400 Megabytes of free available space for the base install. Depending on the number of emulators and software images, from 1 GB upwards.
<b>Operating system</b>	Linux / MS Windows / MacOS X, with a compatible JRE and network support
<b>Java Runtime Environment (JRE)</b>	Java JRE version 1.6 or higher / compatible.

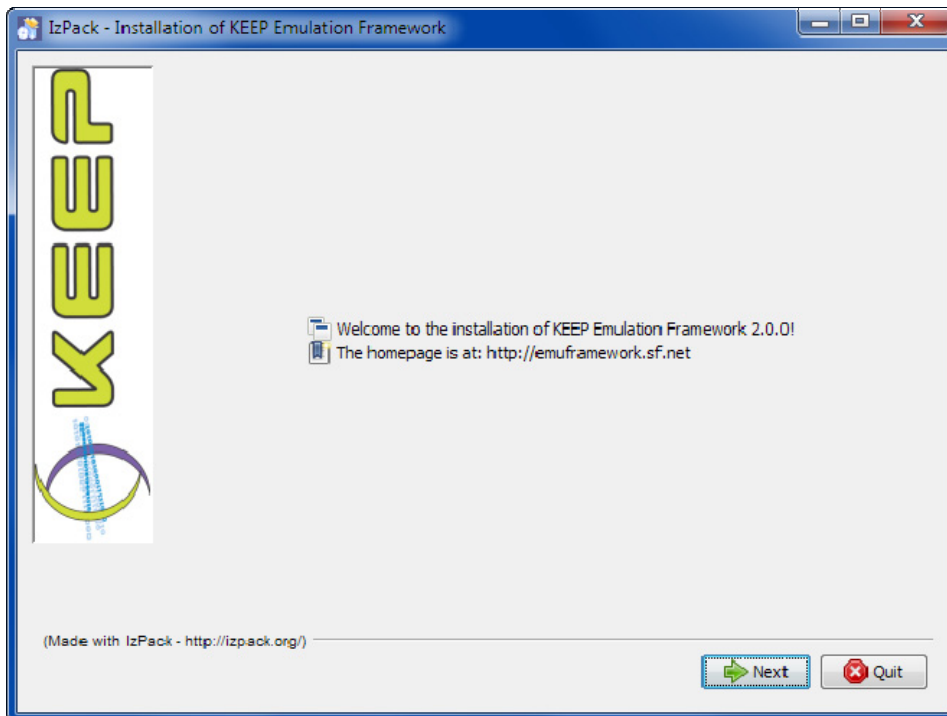
**Note:** the latest Java JRE can be downloaded from:

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

#### 3.1.2 Installation instructions

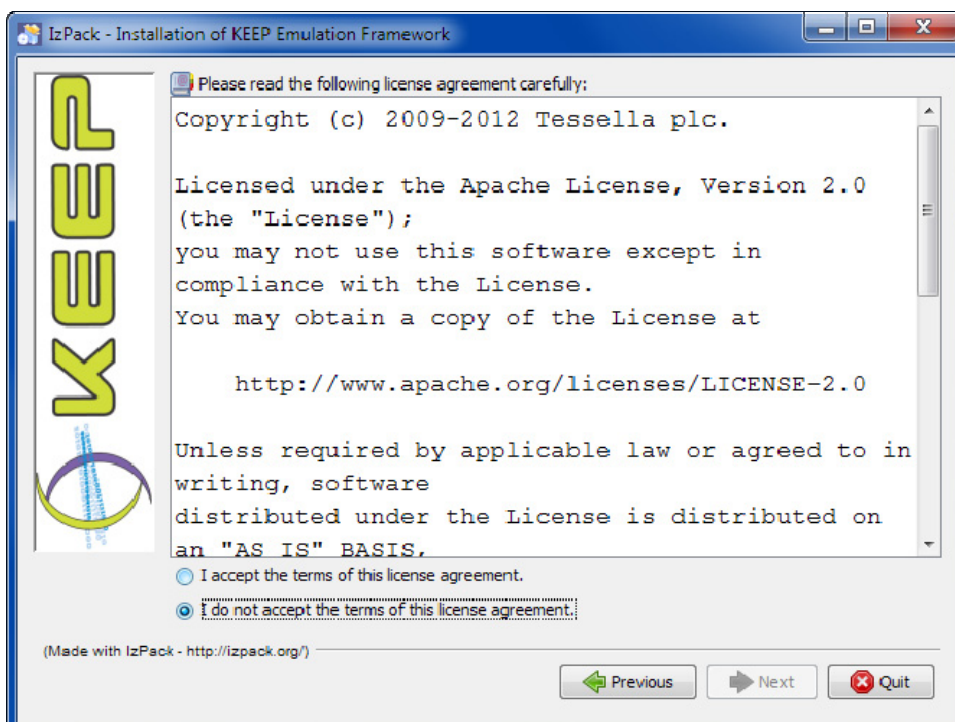
After you have downloaded the installation package, start the JAR-file by double clicking or starting it via the command prompt. This will start the installation wizard.

A welcome screen is displayed which contains a brief introduction to the project and Emulation Framework:



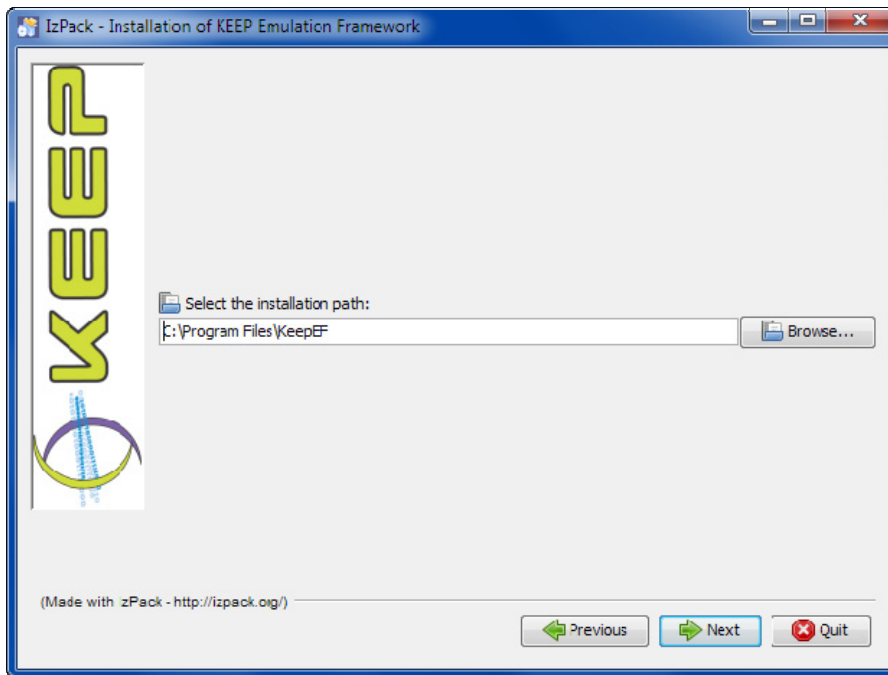
Click **Next** to proceed.

A license agreement is then presented to the user:



If you agree, tick the *“I accept the terms of this license agreement”* and click **Next**.

Once the license agreement is accepted, the user is prompted for a location to install the software.

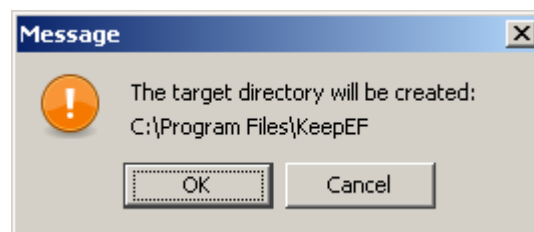


The default is set to:

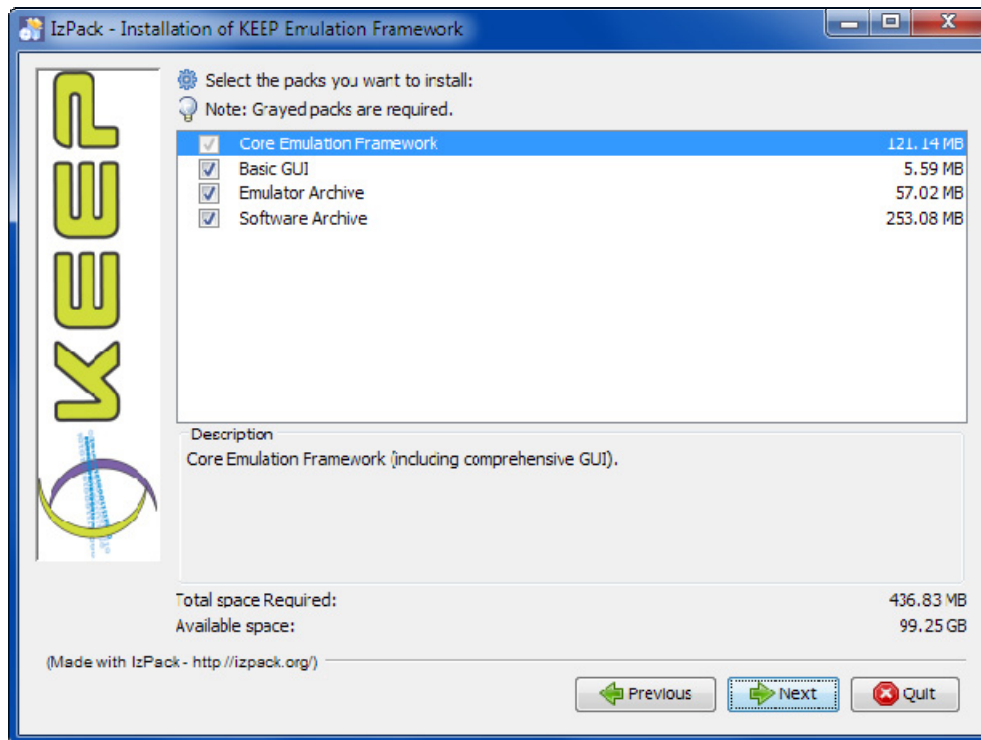
C:\Program Files\KeepEF	(MS Windows)
~/KeepEF	(Linux/MacOS X)

Click **Next**.

**Note:** if the directory specified does not exist, the user will be asked for a confirmation to create that directory (see dialogue box). In case a write error is shown, you probably do not have enough rights to install the EF in the selected folder. Please try a different storage location or make sure you have enough access rights.



The next screen displays a list of the available components to be installed for the EF:

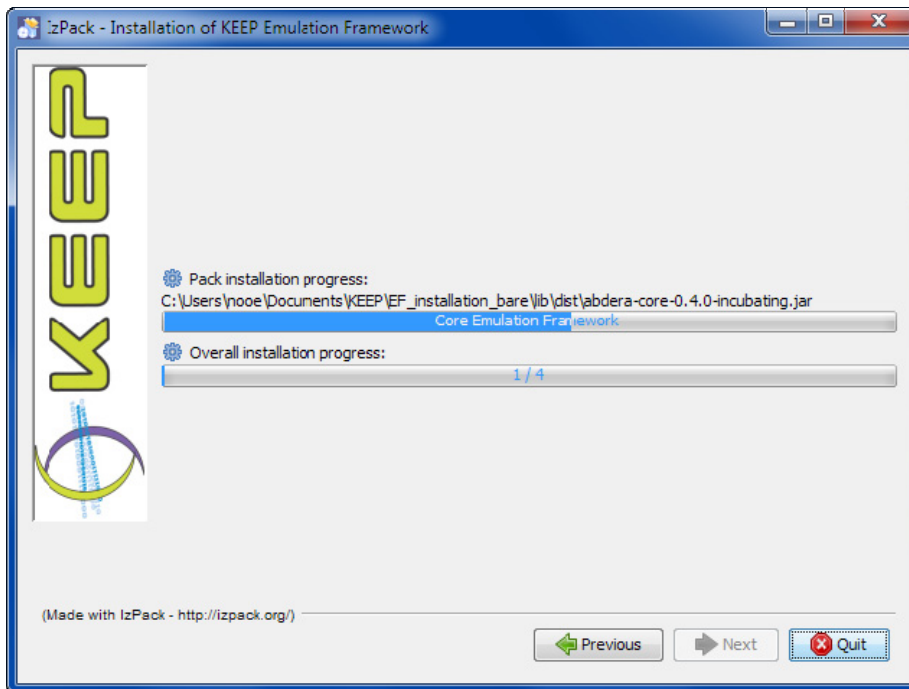


The Core Emulation Framework is the only required component and thus always selected. The Core Emulation Framework includes the comprehensive GUI. The basic GUI, the Emulator Archive and the Software Archive can optionally be selected.

**Note:** although the Emulator Archive and Software Archive are optional, the Core still requires these to function correctly. However, if these are available on a central server via a remote http-connection, there is no need for a local installation and the Core Emulation Framework can be installed in 'client' mode. If the Emulator Archive and Software Archive are not available remotely, or if you are installing the Emulator Framework on a server, the Emulator Archive and Software Archive need to be included, and the Emulation Framework will be installed in 'server' mode.

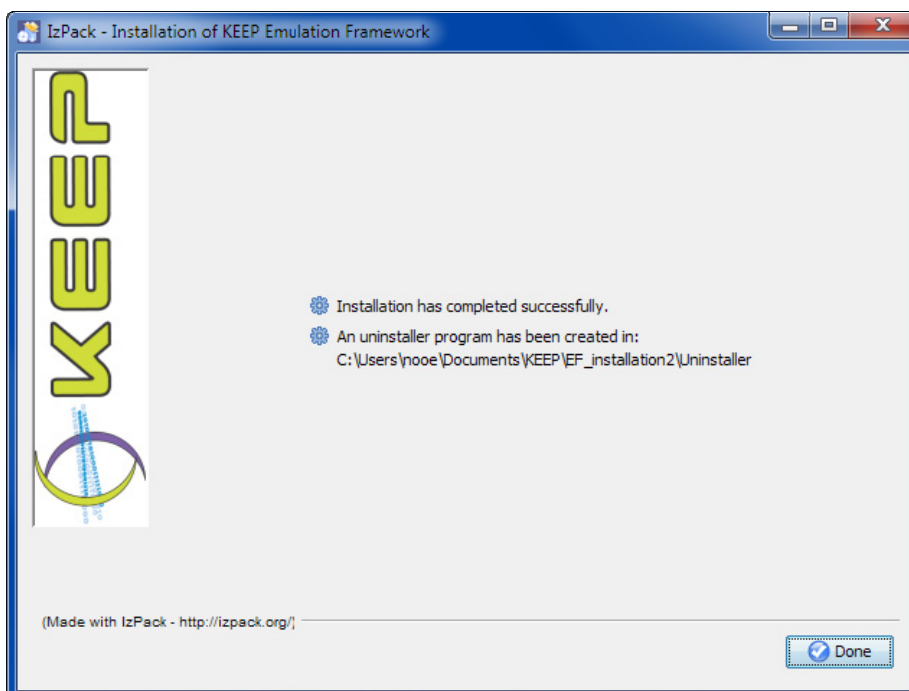
Click **Next**.

The progress of the installation process is shown for each component and the overall system.



Installation might take a couple of minutes depending on your computer. After installation is finished, click **Next**.

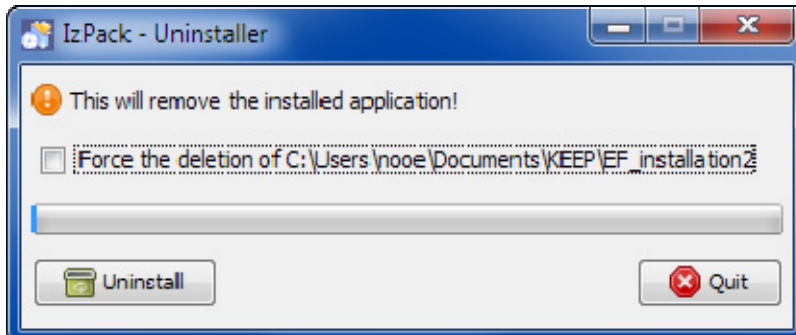
Finally, you are prompted that installation has completed:



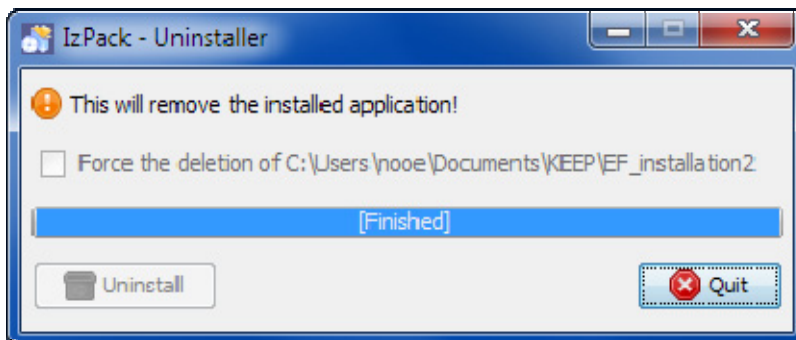
Click **Done** to close the installation wizard.

## 3.2 Uninstall

An uninstall program is provided automatically by the installation wizard and can be found in the **uninstall** subdirectory of the chosen installation directory. It will remove all installed components, and will remove the installation directory (optional).



Click **Uninstall** to start the uninstall process:



## 3.3 Managing the EF, Software Archive and Emulator Archive

If you have installed the EF including Software and Emulator archives locally or on a server, you will have the possibility to manage the EF and archives via the Comprehensive GUI.

Before you can start managing the archive you need to make sure both Software Archive and Emulator Archive are running in the background (locally or on the server). The EF needs a connection to these archives to function correctly.

To manually start the **Software Archive**, go to the folder `\swa` and double-click on:

`runServer.bat` (for Windows platforms)

or

`runServer.sh` (for Linux/MacOS X platforms)

To manually start the **Emulator Archive**, go to the folder `\ea` and double-click on:

`runServer.bat` (for Windows platforms)

or

`runServer.sh` (for Linux/MacOS X platforms)

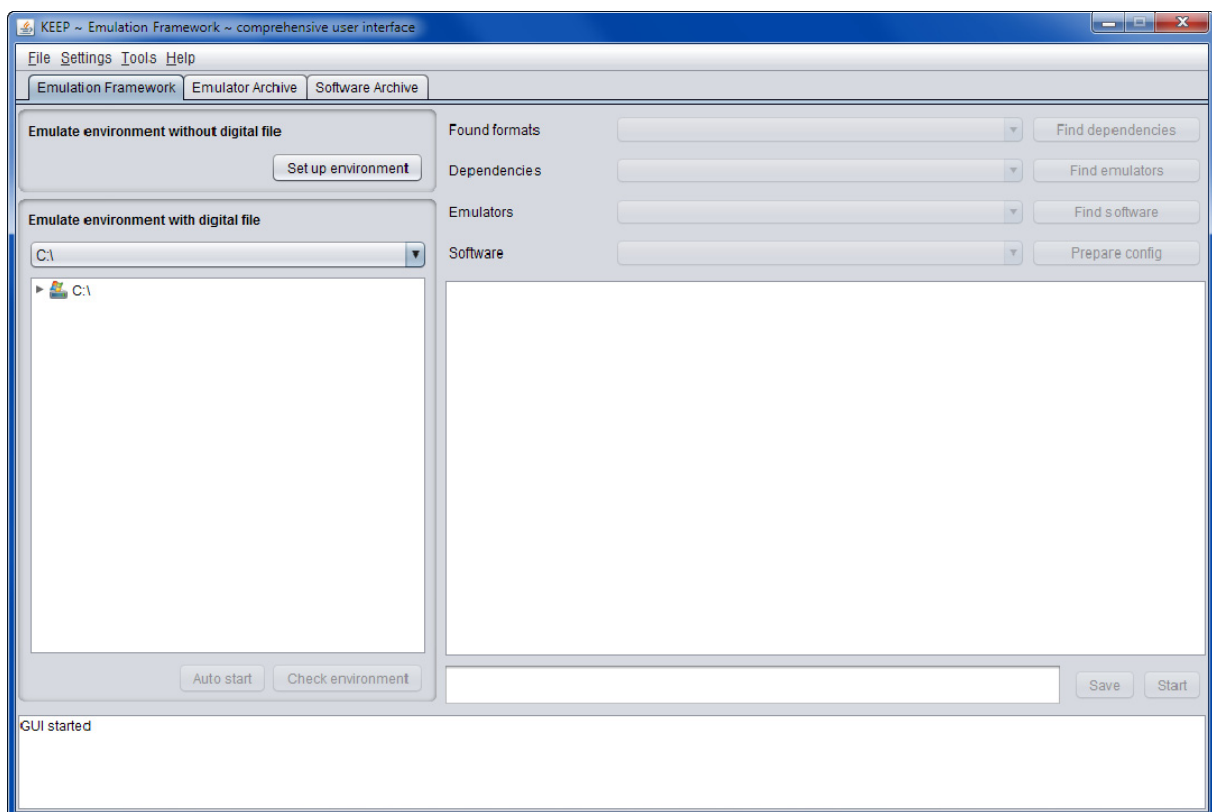
Now, you are ready to start the Comprehensive GUI by double-clicking on:

`runEF_comprehensive.bat` (for Windows platforms)

or

`runEF_comprehensive.sh` (for Linux/MacOS X platforms)

**Note:** as an administrator you will have more functions available via the Comprehensive GUI than an end-user. The following view shows the GUI with administrator rights.



Aside from the default tab Emulation Framework, you also have two extra tabs:

- **Emulator Archive**
- **Software Archive**

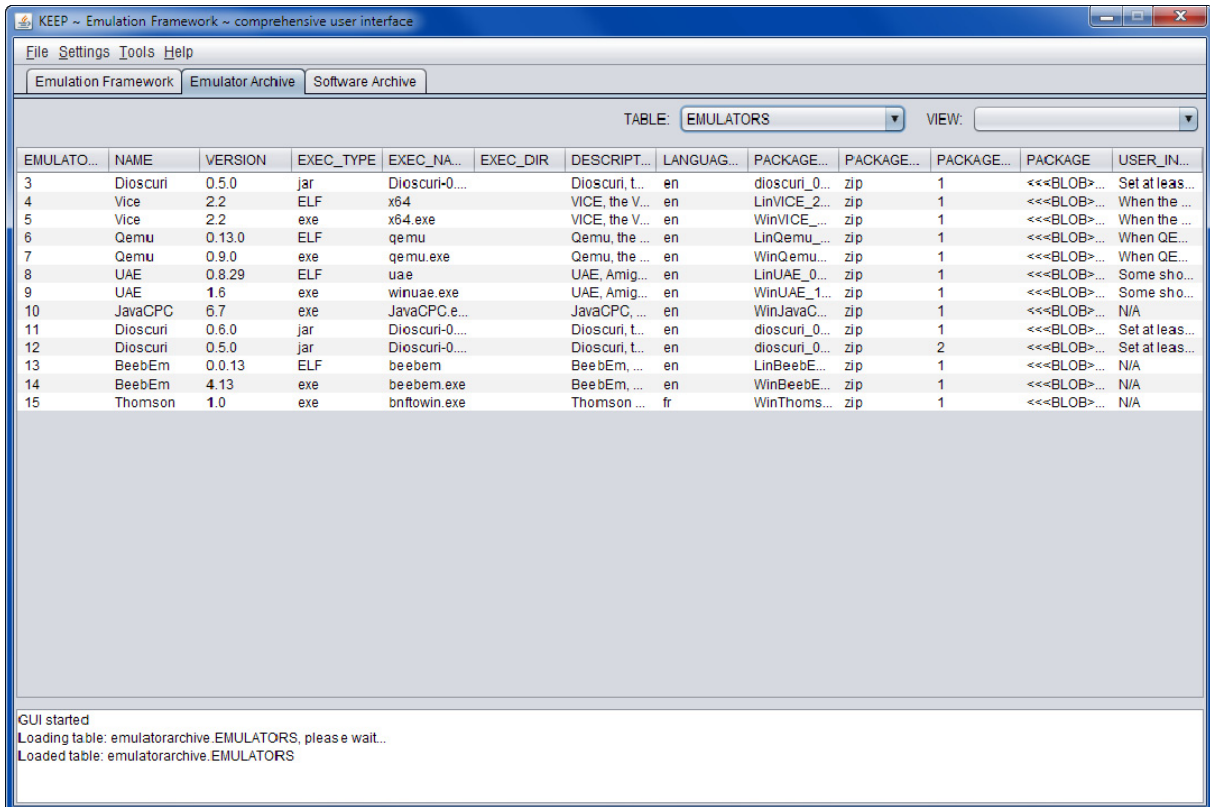
Furthermore, the menu bar shows the menu item **Tools**. The next sections will explain in more detail how to use the extra functions.

### 3.3.1 Inspect Emulator Archive database

The tab **Emulator Archive** allows you to view the contents of the Emulator Archive database.

Click on the drop down box **Table** to select a database table. Click on **View** to select a particular merged view on several tables at once (if available).

The following screen shows a listing of all available emulators in the archive (from the Emulators table):



KEEP ~ Emulation Framework ~ comprehensive user interface

File Settings Tools Help

Emulation Framework Emulator Archive Software Archive

TABLE: EMULATORS VIEW:

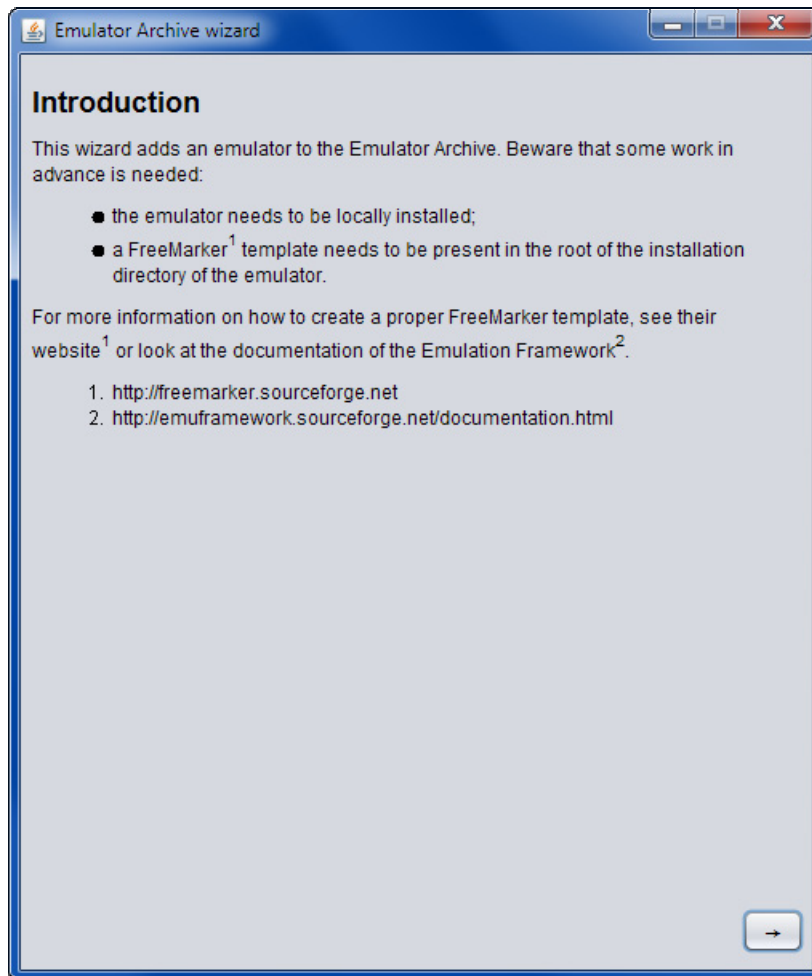
EMULATO...	NAME	VERSION	EXEC_TYPE	EXEC_NA...	EXEC_DIR	DESCRIPT...	LANGUAG...	PACKAGE...	PACKAGE...	PACKAGE...	PACKAGE...	USER_IN...
3	Dioscuri	0.5.0	jar	Dioscuri-0...		Dioscuri, t...	en	dioscuri_0...	zip	1	<<<BLOB>...	Set at leas...
4	Vice	2.2	ELF	x64		VICE, the V...	en	LinVICE_2...	zip	1	<<<BLOB>...	When the ...
5	Vice	2.2	exe	x64.exe		VICE, the V...	en	WinVICE_...	zip	1	<<<BLOB>...	When the ...
6	Qemu	0.13.0	ELF	qemu		Qemu, the ...	en	LinQemu_...	zip	1	<<<BLOB>...	When QE...
7	Qemu	0.9.0	exe	qemu.exe		Qemu, the ...	en	WinQemu...	zip	1	<<<BLOB>...	When QE...
8	UAE	0.8.29	ELF	uae		UAE, Amig...	en	LinUAE_0...	zip	1	<<<BLOB>...	Some sho...
9	UAE	1.6	exe	winuae.exe		UAE, Amig...	en	WinUAE_1...	zip	1	<<<BLOB>...	Some sho...
10	JavaCPC	6.7	exe	JavaCPC.e...		JavaCPC, ...	en	WinJavaC...	zip	1	<<<BLOB>...	N/A
11	Dioscuri	0.6.0	jar	Dioscuri-0...		Dioscuri, t...	en	dioscuri_0...	zip	1	<<<BLOB>...	Set at leas...
12	Dioscuri	0.5.0	jar	Dioscuri-0...		Dioscuri, t...	en	dioscuri_0...	zip	2	<<<BLOB>...	Set at leas...
13	BeebEm	0.0.13	ELF	beebem		BeebEm, ...	en	LinBeebE...	zip	1	<<<BLOB>...	N/A
14	BeebEm	4.13	exe	beebem.exe		BeebEm, ...	en	WinBeebE...	zip	1	<<<BLOB>...	N/A
15	Thomson	1.0	exe	bnflowin.exe		Thomson ...	fr	WinThoms...	zip	1	<<<BLOB>...	N/A

GUI started  
Loading table: emulatorarchive.EMULATORS, please wait...  
Loaded table: emulatorarchive.EMULATORS

### 3.3.2 Adding Emulators

Aside from viewing the contents of the Emulator Archive, the EF offers a wizard to automatically add a new emulator to the archive. To start the wizard, open the menu **Tools** and click on **Add emulator...**

The following pop-up window will appear.



Before you can continue to add a new emulator to the Emulator Archive, please make sure you have done the following:

1. have a locally installed copy of the emulator;
2. have a Freemarker template for that particular emulator. This template file (ftl format) needs to be stored in the root of the folder of the installed emulator.

Depending on the type of template, the Freemarker file must comply to one of the following names:

templateCLI.ftl

templateXML.ftl

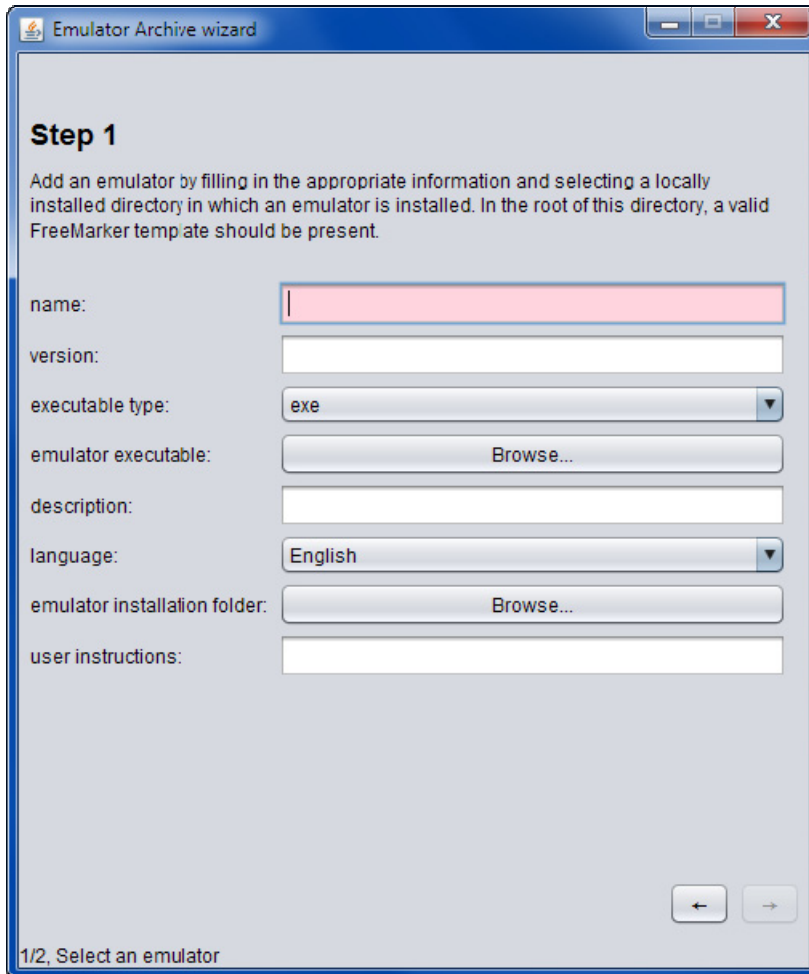
templateProps.ftl

**Note:** to learn more about how to create an emulator package, please read the document EF-howto-EmuAdoption.pdf, which is available on the EF documentation page (<http://emuframework.sf.net/documentation.html>) and in the **documentation\** folder in the EF installation root folder, or go to the Freemarker website, <http://freemarker.sf.net>.

If you have accomplished above preparations, please click the -> **[ARROW]** button at the bottom to continue. This will start the wizard containing three steps.

### 3.3.2.1 Step 1

In this step you are asked to enter some basic information about the emulator:



The image shows a Windows-style dialog box titled "Emulator Archive wizard". It has a blue title bar with standard minimize, maximize, and close buttons. The main area is light gray and contains the following fields and controls:

- Step 1**: A bold heading.
- Instructions: "Add an emulator by filling in the appropriate information and selecting a locally installed directory in which an emulator is installed. In the root of this directory, a valid FreeMarker template should be present."
- name:** A text input field with a pink border.
- version:** A text input field.
- executable type:** A dropdown menu with "exe" selected.
- emulator executable:** A text input field with a "Browse..." button to its right.
- description:** A text input field.
- language:** A dropdown menu with "English" selected.
- emulator installation folder:** A text input field with a "Browse..." button to its right.
- user instructions:** A text input field.
- At the bottom right, there are two buttons: a left-pointing arrow and a right-pointing arrow.
- At the bottom left, it says "1/2, Select an emulator".

Name – enter the name of the emulator (e.g. Dioscuri).

Version – enter the version number of the emulator (e.g. 3.1.4).

Executable type – exe for DOS/Windows, JAR for Java, ELF for Linux.

Emulator executable – point to the file that launches the emulator (e.g. start.bat).

Description – extra information about the emulator (e.g. 8086 emulator).

Language – the native language of the emulator (e.g. English).

Emulator installation folder – the root folder in which the emulator is installed.

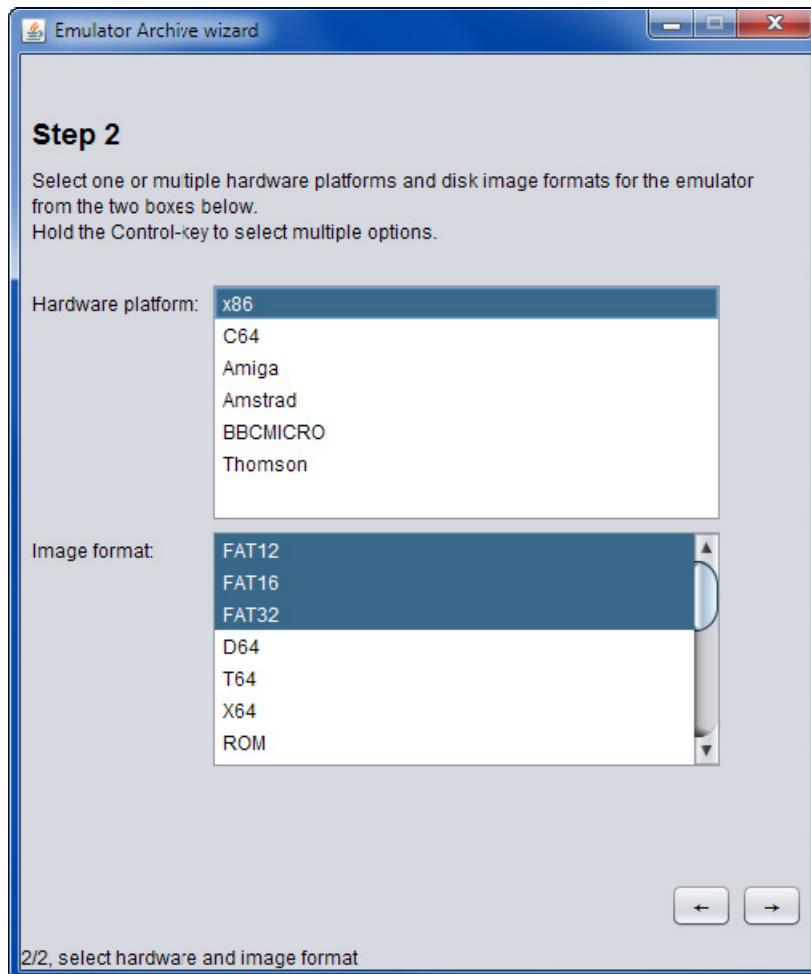
User instructions – extra information for end-users (e.g. "To run in full screen mode, press F4")

**Note:** the installation folder of the emulator needs to contain the FreeMarker template file as well.

Click the -> **[ARROW]** button to continue. Or click the <- **[ARROW]** button to go back.

### 3.3.2.2 Step 2

In this final step you are required to define which hardware platform this emulator emulates and which image file system format it supports:

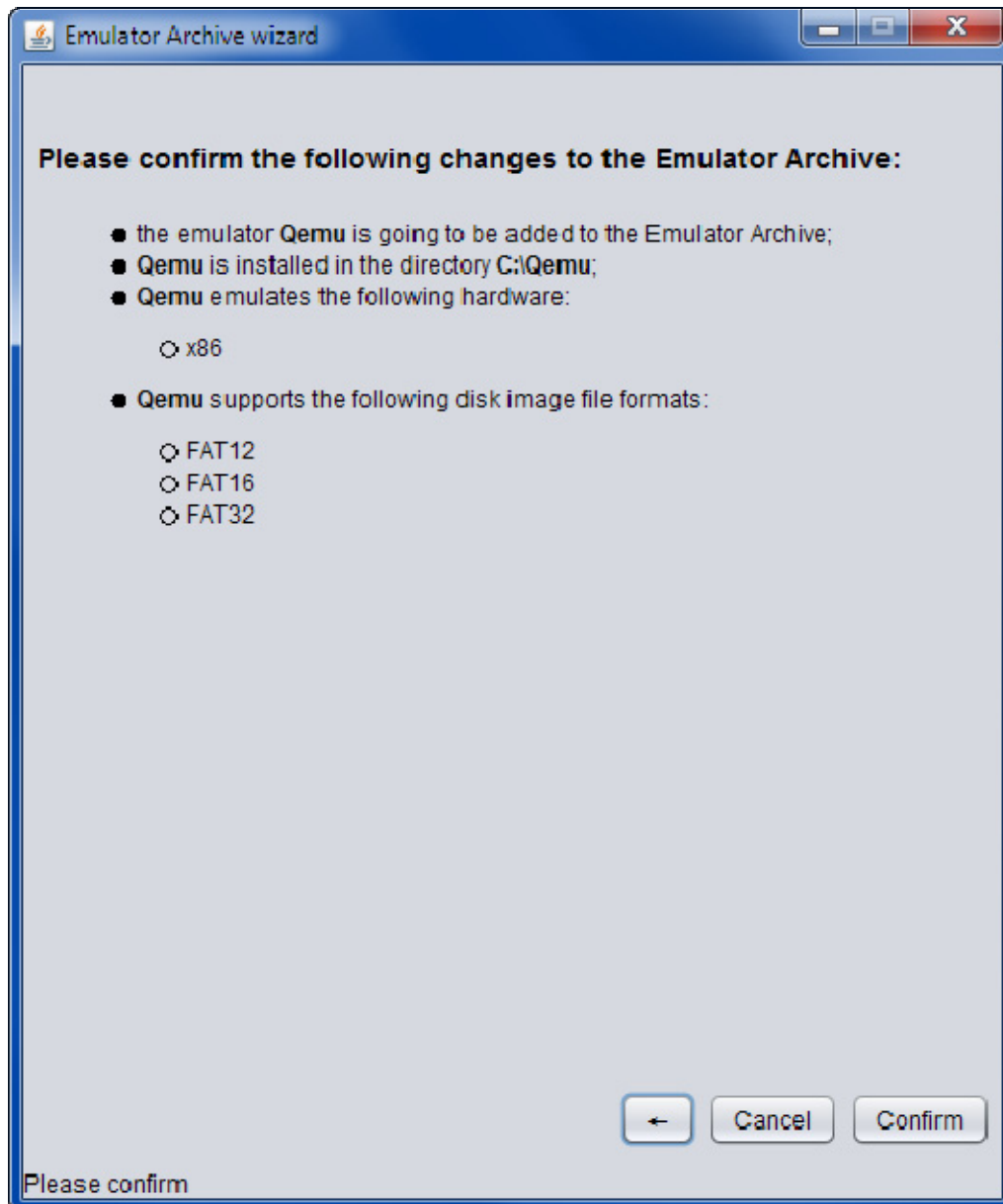


Use the selection boxes to make a choice. You can select multiple options by holding down the control-key while clicking on the entries.

Click the -> **[ARROW]** button to continue. Or click the <- **[ARROW]** button to go back.

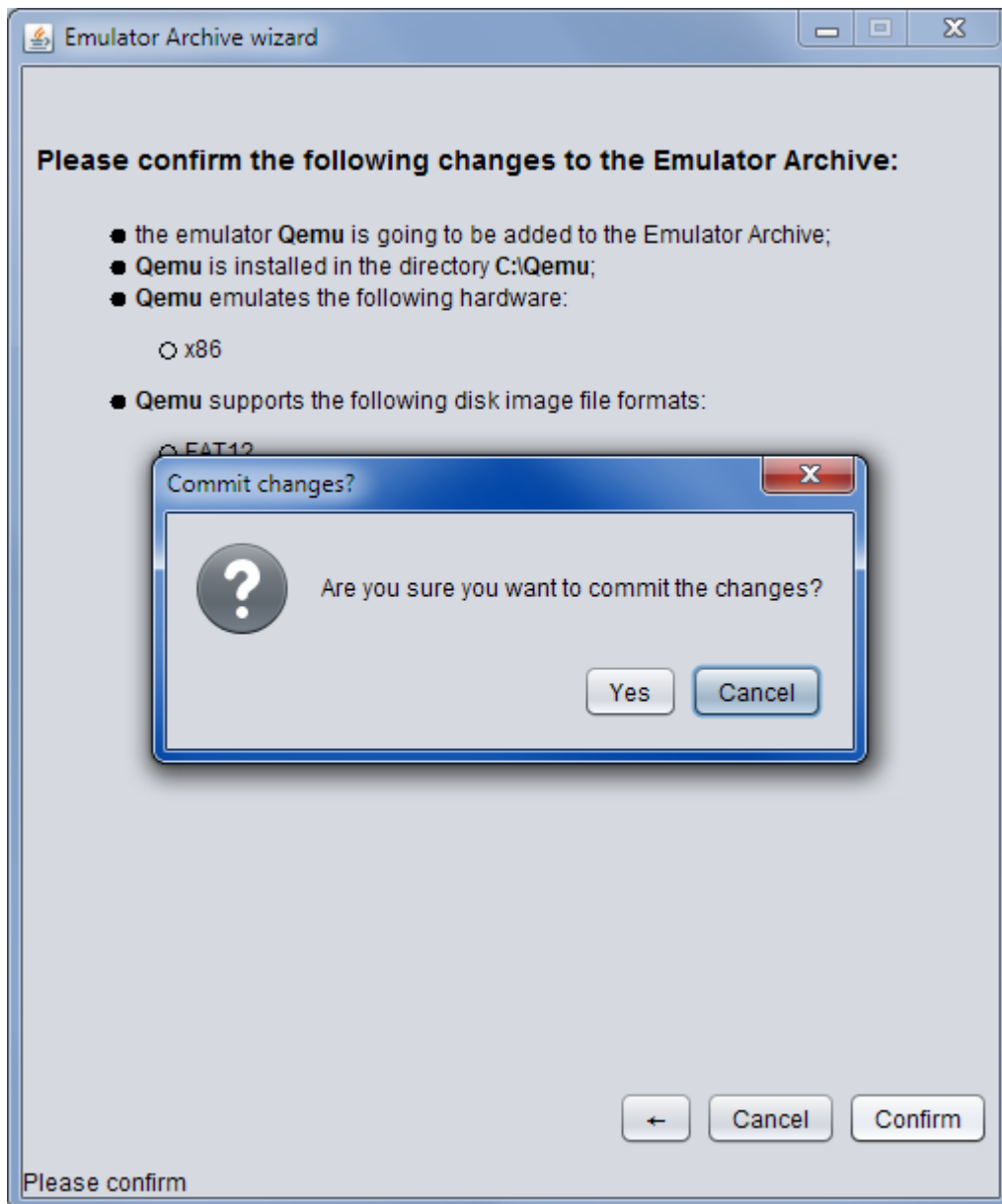
### 3.3.2.3 Step 3

You will now be asked to review your entered information and confirm it by clicking the **Confirm** button. The following screen gives an example of how this could look like.



If you would like to make any changes you can step back clicking the <- **[ARROW]** button. Or you can press **Cancel** if you want to stop the wizard.

To confirm the information and to insert the emulator into the archive, please press the **Confirm** button. An additional pop-up window will ask you to confirm:



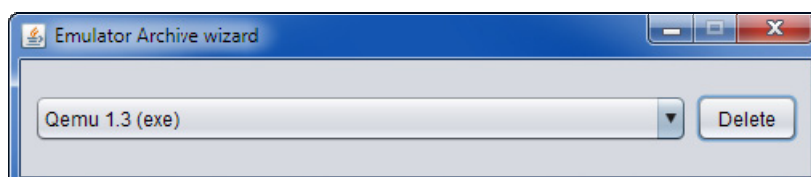
Press **Yes** to confirm.

### 3.3.3 Removing emulators

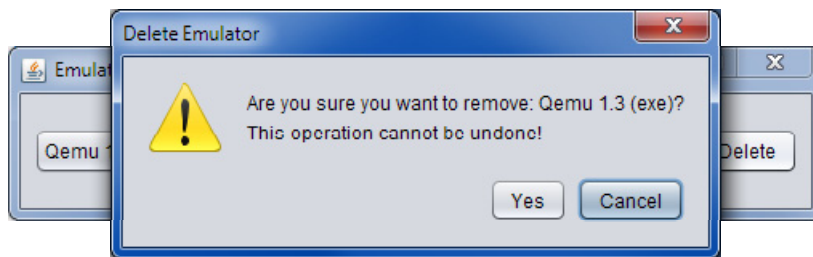
The EF offers a wizard to remove an emulator from the Emulator Archive. The wizard will take care of removing all associated links to the emulator in the archive database.

To start the wizard, open the menu **Tools** and click on **Remove emulator...**

The following pop-up window will appear.

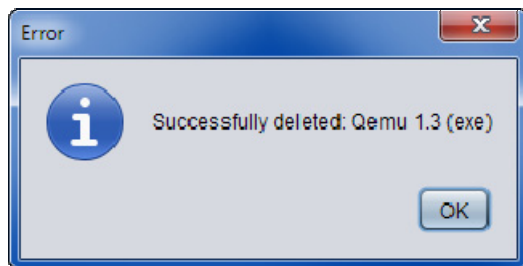


Use the drop down box to select the emulator which you want to remove. Then press the **Delete** button. An additional pop-up window will ask you to confirm:



Press **Yes** to Confirm.

The emulator will be removed, and a message will be displayed to confirm the deletion:

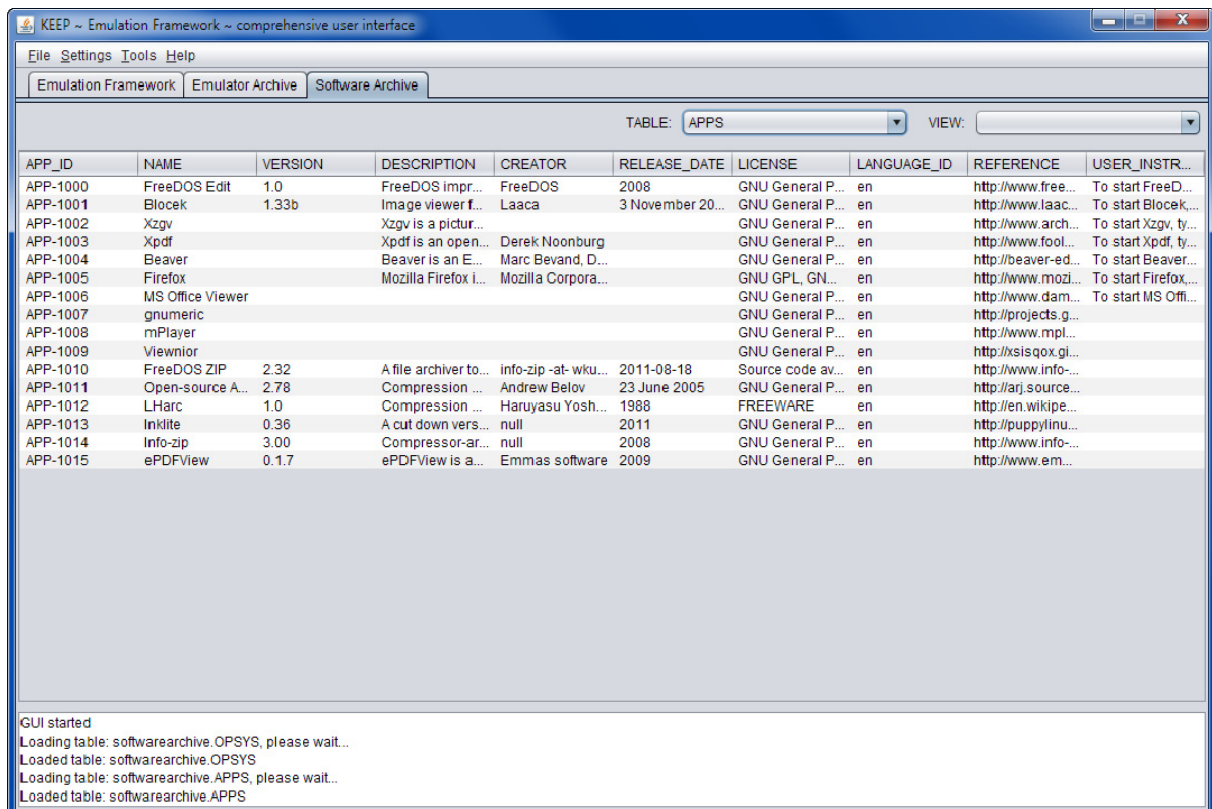


### 3.3.4 Inspect Software Archive database

The tab **Software Archive** allows you to view the contents of the Software Archive database.

Click on the drop down box **Table** to select a database table. Click on **View** to select a particular merged view on several tables at once (if available).

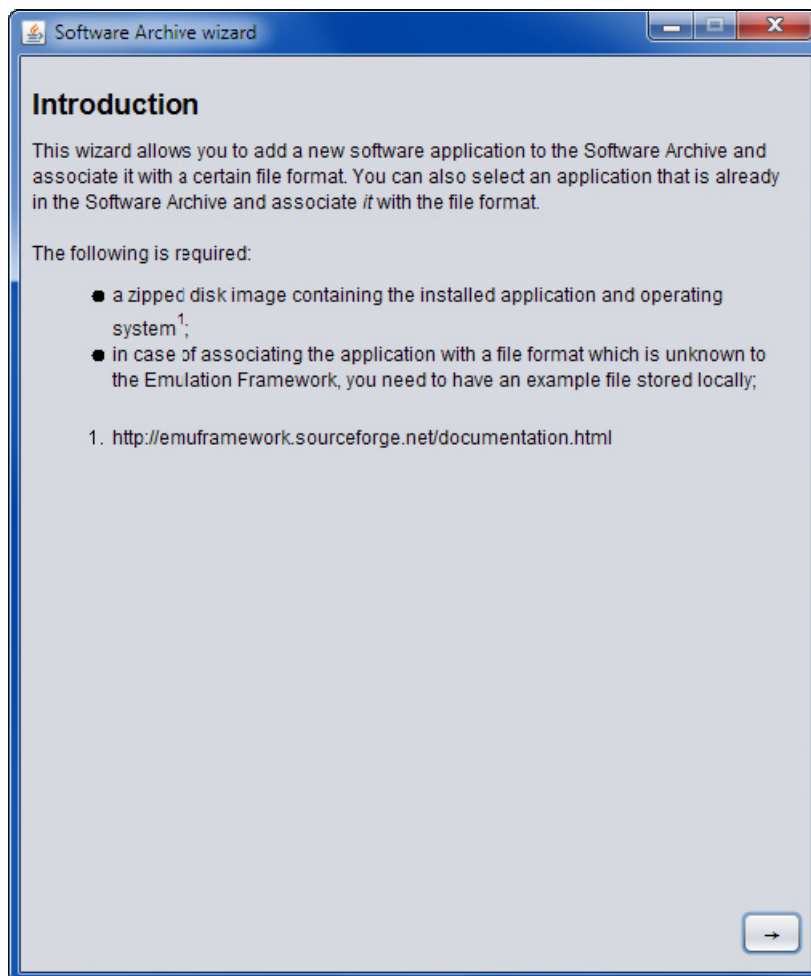
The following screen shows a listing of all available applications in the archive (from the Apps table):



### 3.3.5 Adding Software

Aside from viewing the contents of the Software Archive, the EF offers a wizard to automatically add new software to the archive. To start the wizard, open the menu **Tools** and click on **Add software...**

The following pop-up window will appear.



Before you can continue to add new software to the Software Archive, please make sure you have done the following:

1. prepared a zipped disk image containing the installed application and operating system. The disk image should be in a format that is known to one or more of the emulators in the Emulator Archive. In that case, you are assured that the file will be recognised by the EF.

For example, the emulator QEMU supports flat file disk images. The best approach is to create such a disk image using supporting tools often supplied by open source emulators such as QEMU. In the case of QEMU disk images, you can find detailed instructions in the document EF-howto-diskimage.pdf, which is available on the EF documentation page (<http://emuframework.sf.net/documentation.html>) and in the **documentation\** folder in the EF installation root folder.

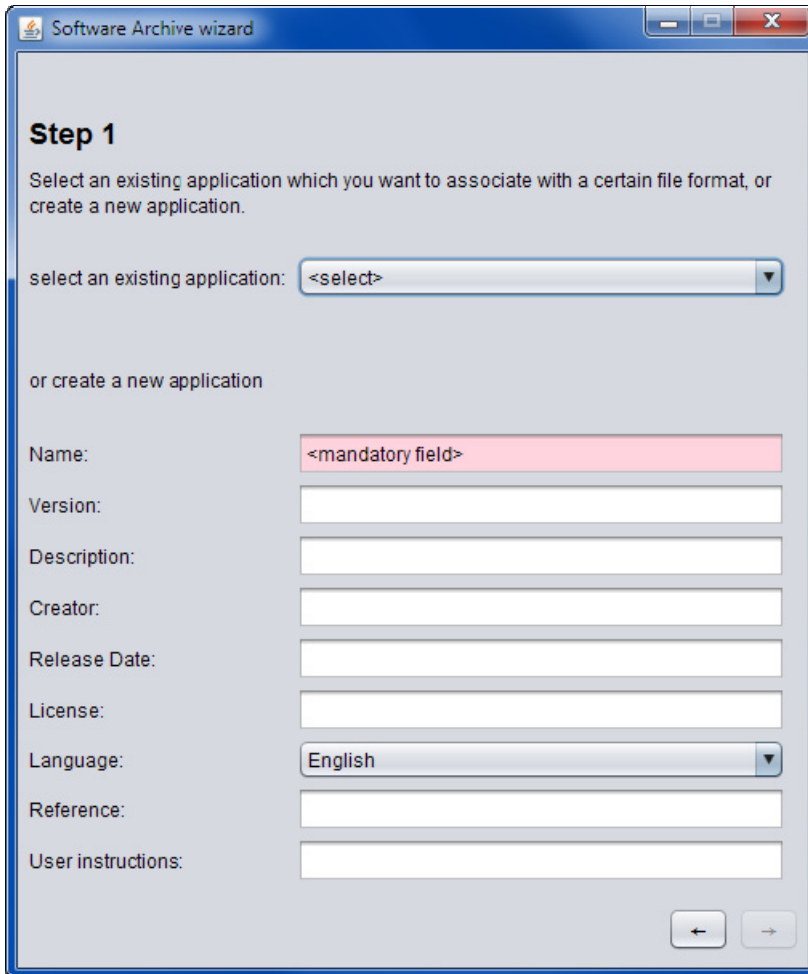
After creating the disk image file the file should be zipped using a standard zip-tool (e.g. WinZIP, 7zip). The zipped file may either be compressed or uncompressed.

2. have an example file available in the file format that you would like to be opened by the software you are about to add. For example, a Wordperfect file if you would like to upload Wordperfect with MS DOS into the archive.

If you have completed these preparations, please click the -> **[ARROW]** button at the bottom to continue. This will start the wizard containing six steps.

### 3.3.5.1 Step 1

In the first step you will be asked to enter some basic information about the software you would like to add:



If similar software is already in the database (i.e. might be an older version or running a different operating system), you can do a quick match selecting the right software from the drop down box.

If this software does not yet exist in the archive, make sure you enter the following field:

Name – the full name of the application (Microsoft Office 2000).

Version – the version number (e.g. 9.0).

Description – short description of the software (e.g. Office suite containing ...).

Creator – the organisation or person(s) that created the software (e.g. Microsoft).

Release date – the official date the software was published (7 June 1999).

License – the type of license the software was distributed with.

Language – the language of the application or operating system.


Reference – information for further reading (e.g. [http://en.wikipedia.org/wiki/Microsoft\\_Office\\_2000](http://en.wikipedia.org/wiki/Microsoft_Office_2000))

User instructions – extra information to guide the user through the software.

Click the -> **[ARROW]** button to continue. Or click <- **[ARROW]** button to go back.

### 3.3.5.2 Step 2

In this step you are asked to give details on which operating system the software runs:



Similar as with step 1, you can chose between selecting an existing operating system or to enter a new one.

Click the -> **[ARROW]** button to continue. Or click the <- **[ARROW]** button to go back.

### 3.3.5.3 Step 3

Now that the details of the application and operating system are known, the EF needs to know which hardware is required to run the software:

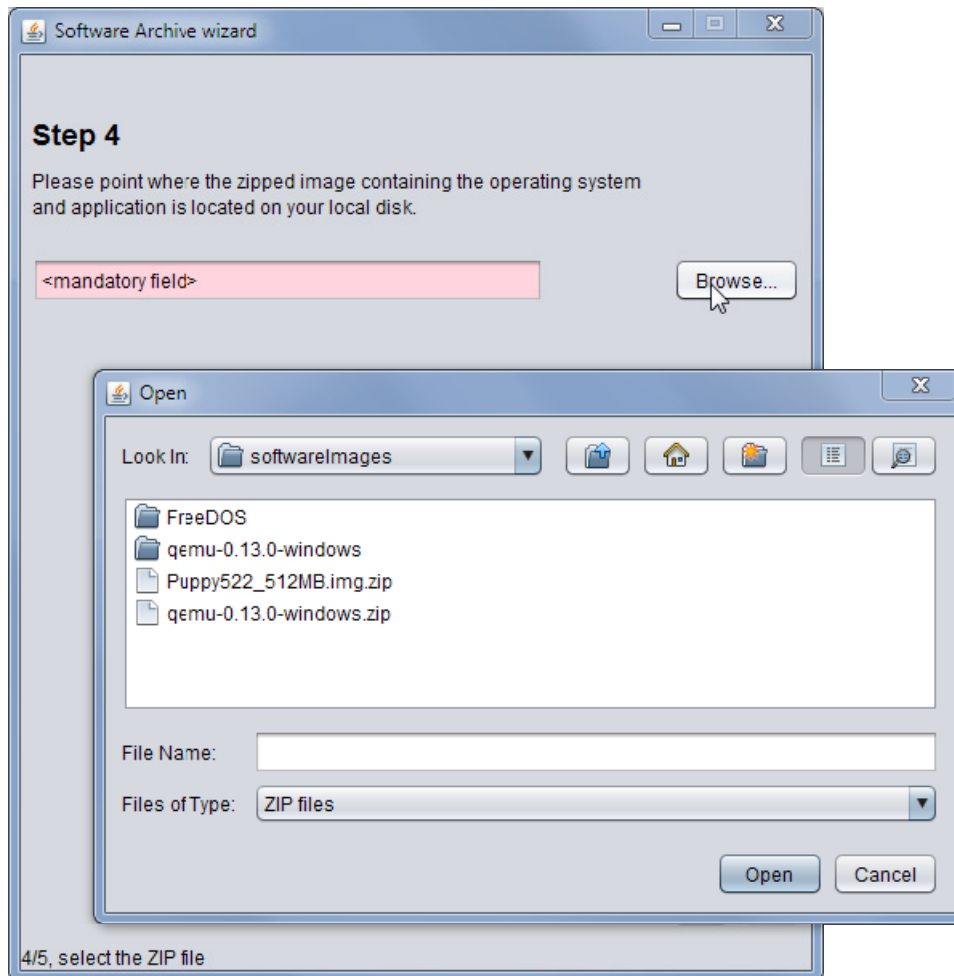


Via the drop down boxes you can select one of the supported hardware platforms and the type of file system the disk image is organised in.

Click the -> **[ARROW]** button to continue. Or click the <- **[ARROW]** button to go back.

#### 3.3.5.4 Step 4

In this step you are asked to point the wizard to the location where the zipped disk image containing the software (preinstalled application and operating system) is kept:



Use the **Browse** button to select the zipped image file on your local file system.

Click the -> **[ARROW]** button to continue, or click the <- **[ARROW]** button to go back.

#### 3.3.5.5 Step 5

Finally, you are asked to associate the software with a file format. This is necessary to let the EF understand that a certain file format can be opened with this software:



To make more than one association, you can go through this wizard several times, this time selecting the application and operating system from the lists of existing software, rather than uploading the software again.

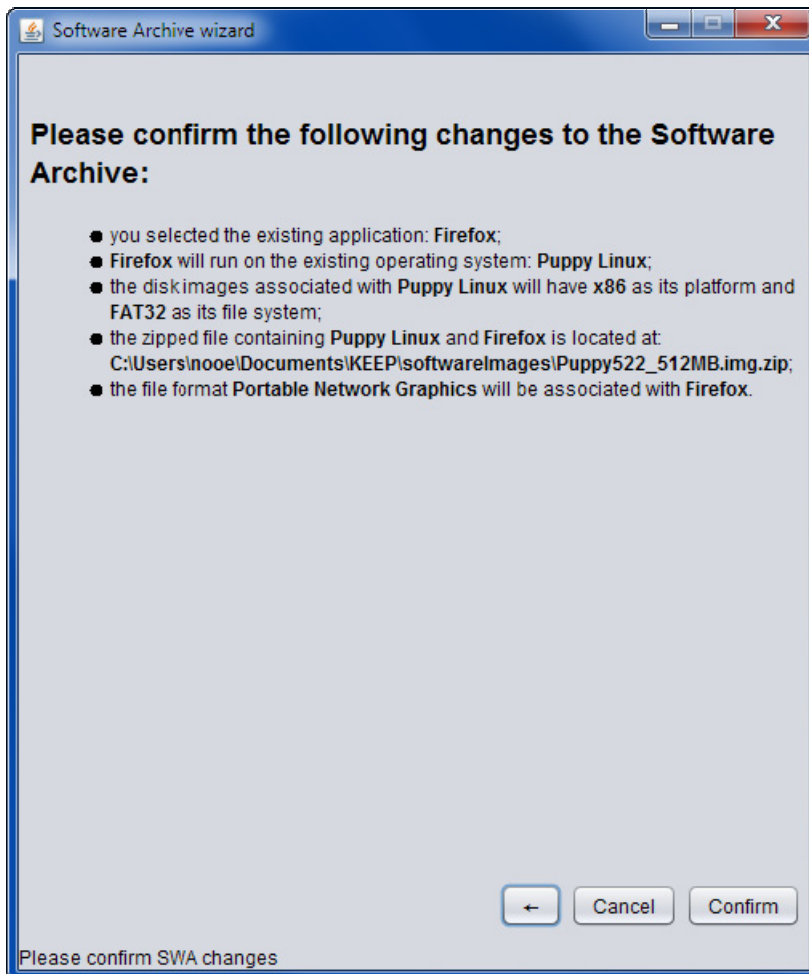
Again, two approaches for associating file format with software exist: select an existing file format or create a new file format.

Creating a new file format should be done by uploading an example file and let the EF automatically detect it. Furthermore, you are requested to enter the version, description and a reference for the format.

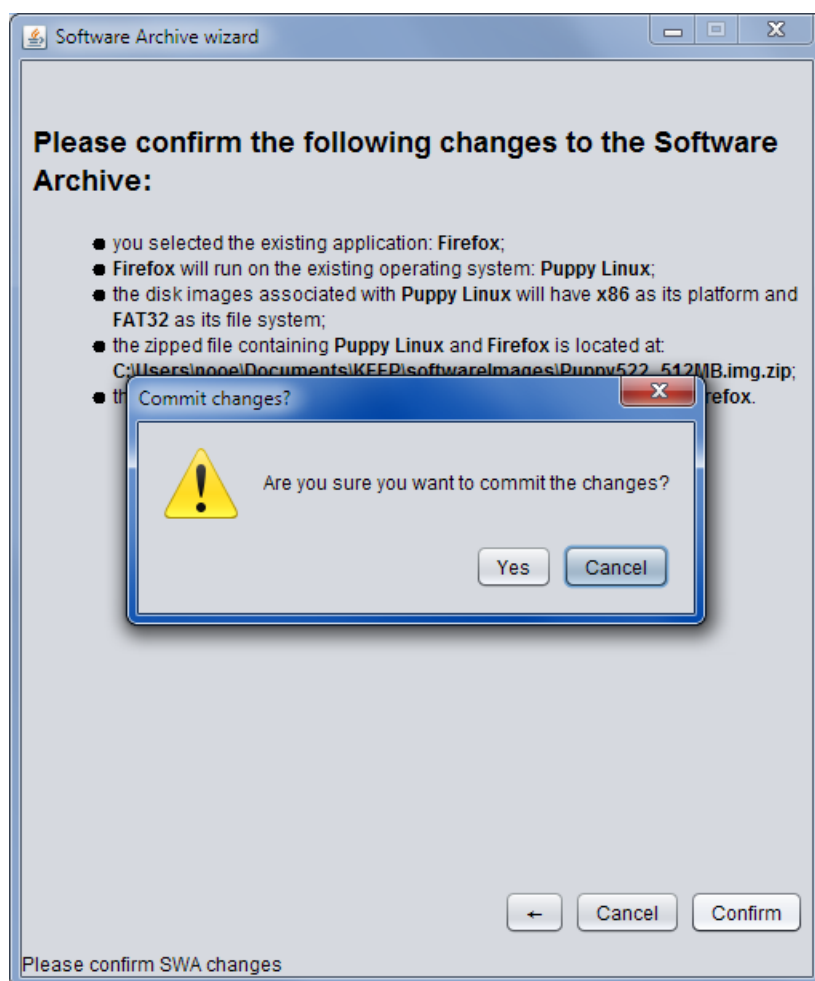
Click the -> **[ARROW]** button to continue. Or click the <- **[ARROW]** button to go back.

### 3.3.5.6 Step 6

Finally, you are asked to review and confirm your entered information. The following screen gives an example of what this could look like:



If you are happy with the information shown, click the **confirm** button to enter the new software into the Software Archive database. An additional pop-up window will ask you to confirm:



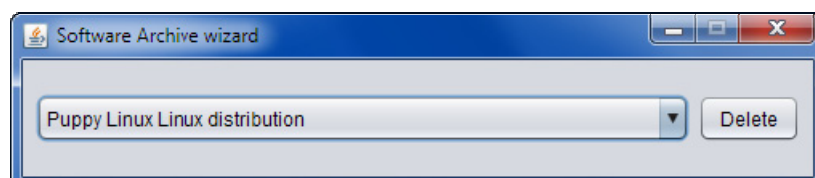
Alternatively, if you would like to make any further changes, you can still step back clicking the **<- [ARROW]** button. Or **cancel** if you want to stop the wizard completely.

### 3.3.6 Removing software

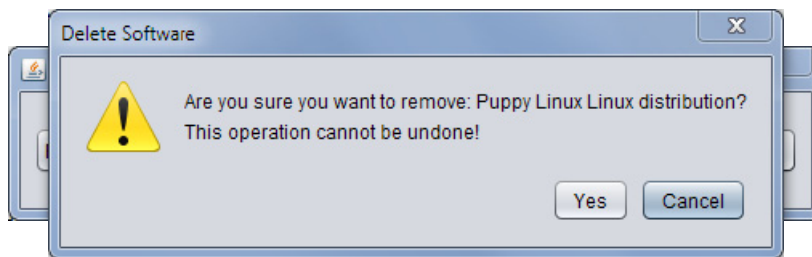
The EF offers a wizard to remove software images (containing an operating system and associated applications) from the Software Archive. The wizard will take care of removing all associated links to the software image in the archive database.

To start the wizard, open the menu **Tools** and click on **Remove software...**

The following pop-up window will appear.

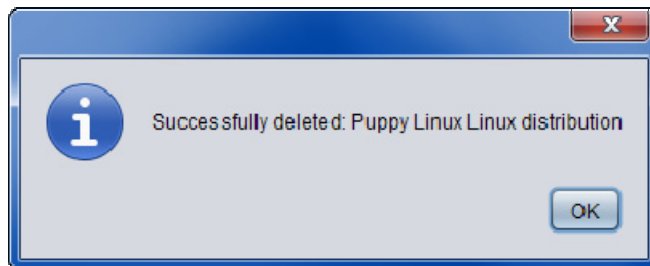


Use the drop down box to select the software image which you want to remove. Then press the **Delete** button. An additional pop-up window will ask you to confirm:



Press **Yes** to Confirm.

The software image will be removed, and a message will be displayed to confirm the deletion:



## 3.4 Advanced configuration

The three EF components can all be separately configured by editing the configuration files. Although each file configures each component separately, there are some parameters that need to match between them to be able to connect to the Software and Emulator Archive successfully. The details for each configuration file are outlined in the next sections.

### 3.4.1 Core configuration

The configuration is stored in a file called **user.properties**, located in the `./eu/keep` subdirectory, and contains the internal database connection properties, the location of the Emulator and Software Archive, as well as the various directories used by the system.

This file can be edited by hand. The table below outlines the configuration properties and their defaults.

Property key	Default property value	Comment
h2.db.driver	org.h2.Driver	JDBC driver class
h2.jdbc.prefix	jdbc:h2:	JDBC url prefix
h2.db.url	./database/h2/EF_engine	Database location on disk
h2.db.exists	;IFEXISTS=TRUE	Flag to indicate whether the database should be created (FALSE), or fail (TRUE) if it doesn't exist.
h2.db.server	;AUTO_SERVER=TRUE	The database connection type
h2.db.schema	;SCHEMA=engine	Name of the schema used for the internal database
h2.db.admin	sa	Database admin login name
h2.db.adminpassw	CEF_Engine	Database admin password
h2.db.user	cef	Database user login name

h2.db.userpassw	cef	Database user password
software.archive.url <sup>2</sup>	http://localhost:9000/softwarearchive/	Location of the Software Archive
emulator.archive.url <sup>2</sup>	http://localhost:9001/emulatorarchive/	Location of the Emulator Archive
exec.dir	./exec	Temporary directory where the emulators are installed for use (will be deleted after use)
system.tmpdir	./tmp	Directory used by the host system to store temporary files
accepted.languages <sup>3</sup>	all	<p>Emulator and Software languages which are accepted. Emulators or Software which use other languages will not be selected or displayed.</p> <p>Languages are entered as a comma-separated list of 2-letter 'locale'-codes, e.g. en (English), nl (Dutch), fr (French), de (German). See the System Maintenance Guide for a complete list of language codes.</p> <p>To accept all available languages, enter 'all'.</p>

**Note:** the './' in some path definitions describe the installation directory (see section *Installation*).

### 3.4.2 Comprehensive GUI configuration

The comprehensive GUI has a separate configuration file called **gui.properties**, also located in the ./eu/keep subdirectory.

This file contains the database connection parameters for the different components; depending on whether the Emulation Framework was installed in 'client' or 'server' mode, this may be just the EF, or the EF, EA and SWA. This file can also be edited by hand.

The table below outlines the configuration properties and their defaults.

Property key	Default property value	Comment
ef.db.driver	org.h2.Driver	JDBC driver class
ef.jdbc.prefix	jdbc:h2:	JDBC url prefix
ef.db.url	./database/h2/EF_engine	Database location on disk
ef.db.exists	;IFEXISTS=TRUE	Flag to indicate whether the database should be created (FALSE), or fail (TRUE) if it doesn't exist.
ef.db.server	;AUTO_SERVER=TRUE	Database connection type
ef.db.schema.name	engine	Name of the schema used for the internal database
ef.db.schema	;SCHEMA=engine	Name of the schema used for the internal database
ef.db.admin	sa	Database admin login name
ef.db.adminpassw	CEF_Engine	Database admin password
ef.db.user	cef	Database user login name
ef.db.userpassw	cef	Database user password
ea.db.driver	org.h2.Driver	JDBC driver class
ea.jdbc.prefix	jdbc:h2:	JDBC url prefix
ea.db.url	./ea/database//EF_ea	Database location on disk
ea.db.exists	;IFEXISTS=TRUE	Flag to indicate whether the database should be

<sup>2</sup> The Software Archive and Emulator Archive url can also be configured via the EF GUI (see section 2.4.7).

<sup>3</sup> The list of accepted languages can also be configured via the EF GUI (see section 2.4.7).

		created (FALSE), or fail (TRUE) if it doesn't exist.
ea.db.server	;AUTO_SERVER=TRUE	Database connection type
ea.db.schema.name	emulatorarchive	Name of the schema used for the internal database
ea.db.schema	;SCHEMA=emulatorarchive	Name of the schema used for the internal database
ea.db.admin	sa	Database admin login name
ea.db.adminpassw	EA_Engine	Database admin password
ea.db.user	ea	Database user login name
ea.db.userpassw	ea	Database user password
swa.db.driver	org.h2.Driver	JDBC driver class
swa.jdbc.prefix	jdbc:h2:	JDBC url prefix
swa.db.url	./database/h2/EF_swa	Database location on disk
swa.db.exists	;IFEXISTS=TRUE	Flag to indicate whether the database should be created (FALSE), or fail (TRUE) if it doesn't exist.
swa.db.server	;AUTO_SERVER=TRUE	Database connection type
swa.db.schema.name	softwarearchive	Name of the schema used for the internal database
swa.db.schema	;SCHEMA=softwarearchive	Name of the schema used for the internal database
swa.db.admin	sa	Database admin login name
swa.db.adminpassw	SWA_Engine	Database admin password
swa.db.user	swa	Database user login name
swa.db.userpassw	swa	Database user password
language	en	User language for the comprehensive GUI.  Languages are entered as 2-letter 'locale'-codes, e.g. en (English), nl (Dutch), fr (French).  See the System Maintenance Guide for a complete list of language codes.

### 3.4.3 Emulator Archive configuration

Similar to the Core, the Emulator Archive also has a **user.properties** file for configuration. It contains the emulator database connection properties, and the location of the Emulator Archive.

The table below outlines the configuration properties and their defaults.

Property key	Default property value	Comment
h2.db.driver	org.h2.Driver	JDBC driver class
h2.jdbc.prefix	jdbc:h2:	JDBC url prefix
h2.db.url	./ea/database/EF_ea	Database location on disk
h2.db.exists	;IFEXISTS=TRUE	Flag to indicate whether the database should be created (FALSE), or fail (TRUE) if it doesn't exist.
h2.db.schema	;SCHEMA=emulatorarchive	Name of the schema used for the internal database
h2.db.admin	sa	Database admin login name
h2.db.adminpassw	EA_Engine	Database admin password
h2.db.user	ea	Database user login name
h2.db.userpassw	ea	Database user password
server.soap.address	http://localhost:9001/emulatorarchive/	webservice Server address

Note that the `server.soap.address` property must match the `EF emulator.archive.url` property for the connection between the two components to be successful.

### 3.4.4 Software Archive configuration

Similar to the Core, the Software Archive also has a **user.properties** file for configuration. It contains the software database connection properties, and the location of the Software Archive.

The table below outlines the configuration properties and their defaults.

Property key	Default property value	Comment
<code>swa.db.driver</code>	<code>org.h2.Driver</code>	JDBC driver class
<code>swa.jdbc.prefix</code>	<code>jdbc:h2:</code>	JDBC url prefix
<code>swa.db.url</code>	<code>./database/h2/EF_swa</code>	Database location on disk
<code>swa.db.exists</code>	<code>;IFEXISTS=TRUE</code>	Flag to indicate whether the database should be created (FALSE), or fail (TRUE) if it doesn't exist.
<code>swa.db.schema</code>	<code>;SCHEMA=softwarearchive</code>	Name of the schema used for the internal database
<code>swa.db.admin</code>	<code>sa</code>	Database admin login name
<code>swa.db.adminpassw</code>	<code>SWA_Engine</code>	Database admin password
<code>swa.db.user</code>	<code>swa</code>	Database user login name
<code>swa.db.userpassw</code>	<code>swa</code>	Database user password
<code>server.soap.address</code>	<code>http://localhost:9000/softwarearchive/</code>	Server address

Note that the `server.soap.address` property must match the `EF software.archive.url` property for the connection between the two components to be successful.



## 4 Problem solving

If you experience any troubles during installation or operation of the EF, please browse to the Emulation Framework support forum, available at:

<http://sourceforge.net/projects/emuframework/support>

Or visit the overall project website: <http://emuframework.sf.net>