



2 Developing with the MSX-Box Live DVD

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Developing with the MSX-Box Live DVD



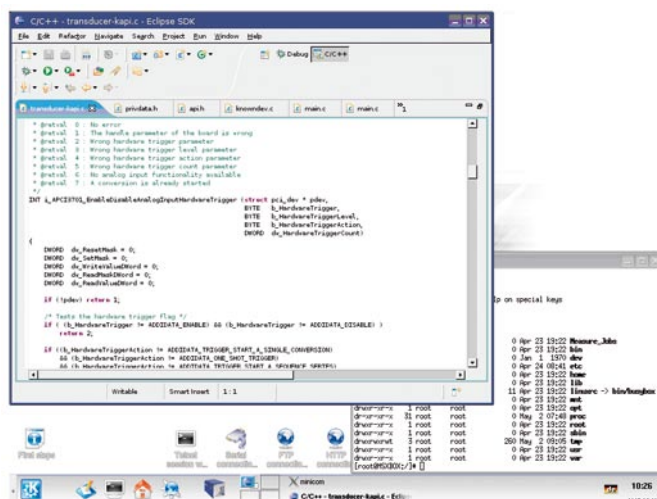
What is the Live DVD?

The **MSX-Box Live DVD** contains a work and development environment for the **MSX-Box**. It is based on a Knoppix Live DVD version 5.1.1 (<http://www.knoppix.org>) which was adapted by ADDI-DATA. The Knoppix distribution provides an automatically configurable operating system on the basis of the Debian distribution (<http://www.debian.org>).

We have chosen the KDE desktop environment for the **MSX-Box Live DVD**. Due to the multitude of functions and high adaptation options, day-to-day tasks can be accomplished as easily as possible with the **MSX-Box**.

- With the Live DVD you can work on a **Windows** computer with **Linux** without installing Linux:
- **Cywin**: **Linux** emulator, allows compiling with Compiler **Mipsel Linux GCC 2.95** and now with **Mipsel Linux GCC 3.3**
- Thanks to the **Virtual PC** program you can use the **MSX-Box Live DVD** directly on **Windows** without function limitation (e.g. Microsoft® Virtual PC, available for free download at www.microsoft.com)

You can change the language of the system environment.
Available languages: German, English, French



MSX-Box Live DVD work and development environment

2 Developing with the MSX-Box Live DVD

Live DVD mode

Use the **MSX-Box** Live DVD to get acquainted with working with the **MSX-Box**, for short development projects or for small administrative tasks without installing additional components.

Although the DVD is write protected, you still have the option to save your data (USB stick, hard disk, etc.) before you end a session.

Installed system

For larger projects it is recommended that the necessary components are installed on your computer.

In the installed mode you can perform automatic updates with the **Debian package manager**.

Use without MSX-Box

You can develop, compile, build a file system in Live DVD mode and in the installed system.

Use with MSX-Box

You can develop, compile, build a file system and establish a connection in order to run your applications (debugging possible), either in Live DVD mode or with installed system.

System requirements

- CPU: Intel-compatible CPU (i486 and higher)
- Bootable DVD-ROM drive (IDEA/ATAPI, Firewire, USB or SCSI): your computer will need a bootable DVD-ROM drive to boot from the **MSX-Box** Live DVD. Your computer's BIOS should be set for booting from DVD. "Boot from DVD-ROM" must be selected as the first item in the BIOS menu.
- RAM: the **MSX-Box** Live DVD requires at least 128 MB RAM
- Graphics card: standard SVGA-compatible graphics card
- Mouse: serial or PS/2 standard mouse or IMPS/2-compatible USB mouse

Starting the MSX-Box Live DVD

- Place the DVD in the DVD drive
- Save and close all applications running on your computer
- Restart your PC
- The **Knoppix** screen opens.
- Press the Enter key.

The **ADDI-DATA** screen will then open. Now you can work in the new development environment.

Please note that the starting procedure can last several minutes.

Ending the MSX-Box Live DVD

If you want to close your development environment and return to **Windows**, proceed as follows:

- Click in the bottom left corner on the blue KDE icon.
- Then on the "Log out" button.
- Click on "Restart computer" or "Turn off computer".
- Take the DVD out of the drive when prompted to do so.

Use the **MSX-Box** Live DVD to get acquainted with working with the **MSX-Box**, for short development projects or for small administrative tasks without installing additional components

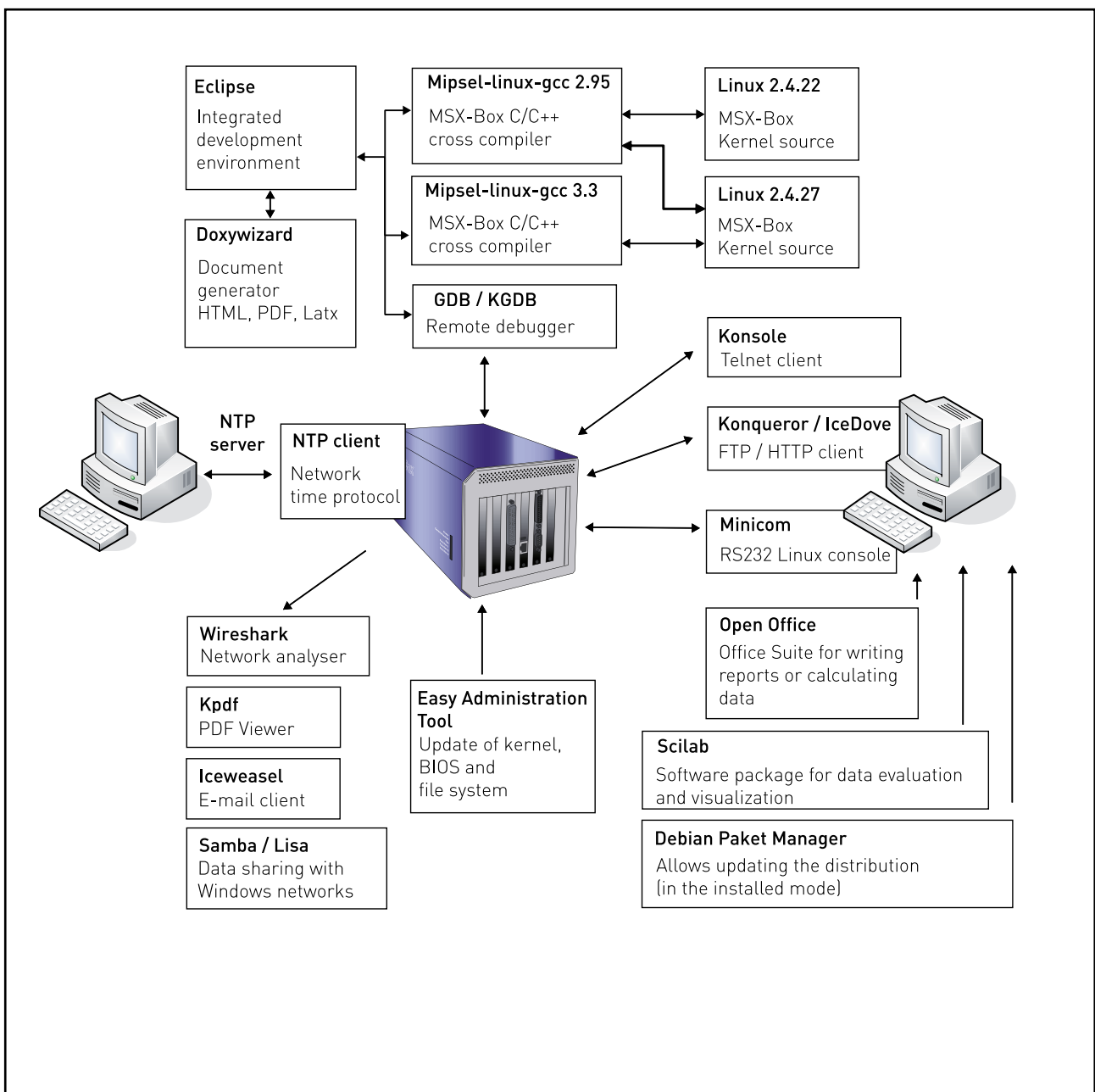
The MSX-Box development tools

The **MSX-Box** development tools are licence-free open source programs which **ADDI-DATA** has selected and compiled for you.

You can fully develop, compile, transfer, run and debug your applications with the supplied development tools.

If, however, you wish to use other programs, you can of course do so, as the **MSX-Box** is based on standards. The application will always remain transparent and you decide what components you would like to use.

Save licence fees
with the free
development tools



The **MSX-Box** development tools

Accessing the MSX-Box

You have four access options:

- **Telnet**: access to the Linux console of the **MSX-Box**, Ethernet access
- **Minicom**: access to the Linux console of the **MSX-Box**, serial access (RS232)
- **Konqueror**: FTP (data transfer)
- **Konqueror**: HTTP (monitoring)

Eclipse

In order to make the development with the **MSX-Box** easier, **ADDI-DATA** has adapted an **Eclipse** plug-in which helps you to save a lot of time.

Write the C / C++ source code and **Eclipse** will generate the make files automatically. As soon as a new C / C++ source code file is added, Eclipse updates the make files in order to generate (issue) your executable code.

Creating projects

You can create various kinds of projects:

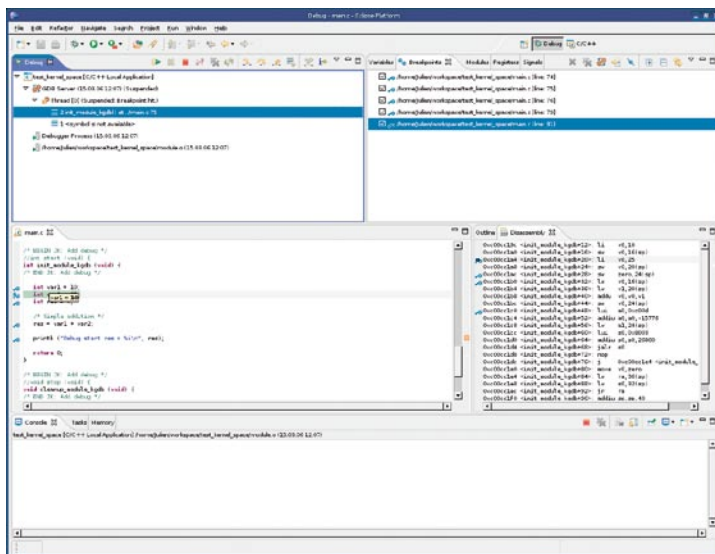
- Managed make C project
 - **MSX-Box kernel module**
for processes at kernel level, allows direct hardware access.
Real-time-enabled.
You can write drivers and have access to the entire system.
 - **MSX-Box application**
To write applications in user mode
E.g. data socket server, web server, etc.
See example on the Live DVD
 - **MSX-Box shared library**
(function library, comparable to Windows DLL)
- Managed make C++ project

2 Developing with the MSX-Box Live DVD

Debugging with Eclipse (with MSX-Box only)

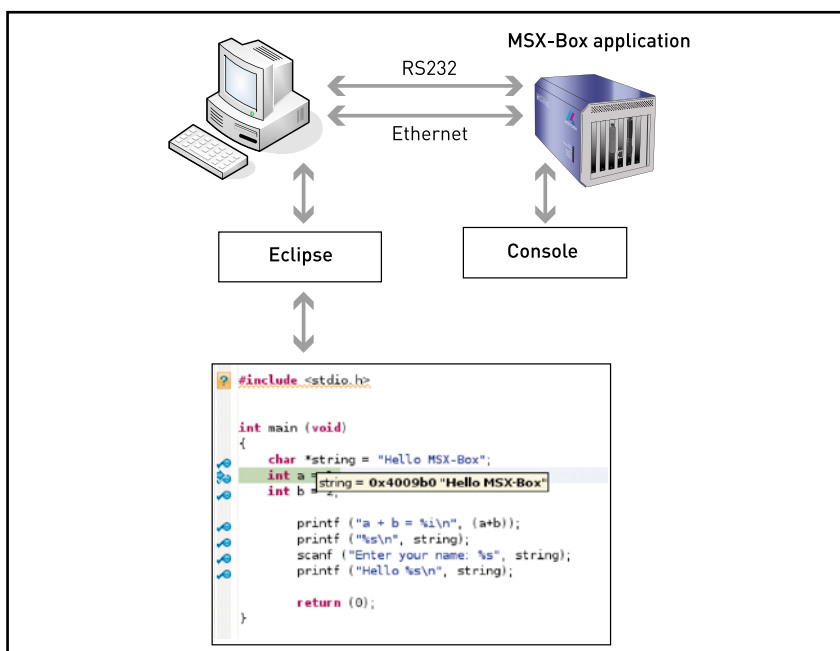
Debugging with **Eclipse** has two benefits: it allows for remote debugging (step-by-step debugging) and it works in user as well as kernel mode.

- Remote debugging, step-by-step debugging under Eclipse with **GDB/KGDB**.
Simple handling with graphical interface.
During execution on the **MSX-Box** live visualisation, set break point, check and change variable values.
- Works in user and kernel mode,
application or kernel process.
You can also debug interruption functions in the kernel process.
- Debugging network applications: the **Network Analyser Wireshark** tool monitors all data strings at the Ethernet connection.



Debugging with Eclipse

Debugging with
Eclipse allows remote
debugging
and works in user and
kernel mode



With step-by-step debugging you can set break points,
set break point, check and change variable values

Compiling

You can choose between two cross compilers:

- Mipsel-Linux-gcc 2.95
- Mipsel-Linux-gcc 3.3 (new)

MSX-Box kernel

Two **MSX-Box** kernel versions are available:

- Linux 2.4.22
- Linux 2.4.27

The kernels are already patched.

Kernel patches

- Big physical area: Allocation of large storage areas
Especially interesting for the operation of analog input boards with DMA acquisition.
- RTAI (Real Time Application Interface): enables using real-time applications.
- USB, Firewire: with these patches the Linux 2.4.27 kernel version can use these functions.

The kernels are also available in binary form for direct installation on the **MSX-Box**.

Simple kernel installation with the Easy Administration tool

The supplied **Easy Administration Tool** allows:

- Convenient update kernel and file system
- **Pmon** update (**MSX-Box** BIOS)
- **MSX-Box** backup (kernel and file system)

The backup of the **MSX-Box** with the **Easy Administration tool** is particularly interesting if you wish to install or update several configured **MSX-Boxes** at the same time:

- Create image of an **MSX-Box**
- Copy image to all other **MSX-Boxes**
- Reset IP addresses of the **MSX-Boxes**
(You can also conveniently do this with the **Easy Administration tool**).

Use floating points function

The **MSX-Box** gives you the option to process the captured data onboard using mathematical functions.

The **Linux** operating system does not generally allow the use of floating point values at kernel level. But in the field of measurement and control, floating point calculations are important when you need to process the values captured (FFT) or develop sophisticated controls. That is why **ADDI-DATA** has developed a floating point function for the **MSX-Box**, which you can enable or disable as required. This is because the **MSX-Box** is fitted with an **MIPS** micro-controller with integrated FPU (floating point unit).

The **MSX-Box** kernels are already patched and are also available in binary form

Save time creating and maintaining documents

Creating documentation with Doxywizard (Doxygen GUI)

Doxywizard automatically creates a documentation from your source code files if you have written your comments in java doc format.

You save time creating and maintaining the documentation.

For changes to the source code, change your comment and start an update: the documentations are automatically updated.

File system on PC with File System Generator

With the **File System Generator** you can create and compile a file system on the PC.

- The tree structure on the PC is copied with the **Easy Administration Tool** to the **MSX-Box**.
- You can install a version administration with the **Subversion** program, for instance (more details on: <http://subversion.tigris.org>)

Native compilation with NFS Generator

The **NFS Generator** (Network File System) can make file systems available on the PC (mount). The file system acts as if it was mounted on the **MSX-Box**.

You thus have the MIPS processor of the **MSX-Box** and the hard disk of the Linux computer. The file system of the Linux PC can therefore include all components which are necessary to perform native compilations.

Native compilation is especially suitable for projects which are difficult to implement with cross compilation.

As an open system,
the **MSX-Box** allows you
to add any components
you choose

Preinstalled file system on the MSX-Box

The following list includes the components which are already installed and can be used immediately. As an open system the **MSX-Box** allows you to add further components of your choice: drivers, applications, PC boards, etc.

- Dynamic Host Configuration Protocol is a protocol for the automatic assignment of IP addresses. If the **MSX-Box** is part of a network which includes a DHCP server, the IP address does not need to be entered manually.
- Watchdog
- Timer
- RTAI
- USB
- Firewire
- CAN interface
- Samba client (access to a Windows PC)
- Allows data sharing between PC and **MSX-Box**
- NTP (network time protocol)
- Synchronises the **MSX-Box** with a time server.
- Busybox: contains most frequently used Linux commands (more details at www.busybox.org)

Additional tools

- Webservice: TinyHTTPD
- Debian packet manager:
allows updating the distribution
(only sensible if the Live DVD is installed on a PC)
- E-mail client: IceWeasel, Kmail, ...
- Webbrowser: IceDove, Konqueror, etc.
- Scilab: Matrix-based scientific software package resembling MATLAB and Xmath. Scilab contains hundreds of build-in mathematical functions, rich data structures (including polynomials, rationals, linear systems, lists, etc.) and comes with a number of specific toolboxes for control, signal processing, ... This package contains the architecture specific binary files.
Scilab © INRIA-ENPC.
www.scilab.org

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