

Instruction Manual

Development Mode

Programming mode for the MSX-E modules



Product information

This manual contains the technical installation and important instructions for correct commissioning and usage, as well as production information according to the current status before printing.

The content of this manual and the technical product data may be changed without prior notice.

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Warning

The following risks result from improper implementation and from use of the product contrary to the regulations:



Personal injury



Damage to the module, PC and peripherals



Pollution of the environment

- Protect yourself, others and the environment!

- Read the safety precautions (yellow leaflet) carefully!

If this leaflet is not enclosed with the documentation, please contact us and ask for it.

- Observe the instructions of the manual!

Make sure that you do not forget or skip any step. We are not liable for damages resulting from a wrong use of the product.

- Used symbols:



IMPORTANT!

Designates hints and other useful information.



WARNING!

Designates a possibly dangerous situation.

If the instructions are ignored, the module, the PC and/or peripherals may be **destroyed**.



WARNING!

Designates a possibly dangerous situation.

If the instructions are ignored, the module, the PC and/or peripherals may be **destroyed** and persons may be **endangered**.

Contents

Warning.....	3
Chapter overview.....	6
1 MSX-E modules working with the Development Mode	7
1.1 Customised applications.....	7
1.1.1 Optimising your MSX-E module.....	7
1.1.2 Relieving the load on the central system.....	7
1.1.3 Stand-alone operating	7
1.1.4 Security of investment.....	7
1.2 MSX-E module levels.....	8
1.3 Distributed intelligence within your network	9
1.4 Application spectrum.....	9
1.5 Embedded Linux operating system: root rights	10
1.6 Programming steps.....	10
2 Information about the “MSX-E Live DVD”	13
2.1 Contents of the DVD	13
2.2 DVD live part.....	15
2.3 “MSX-E Live DVD” – system requirements.....	18
2.4 Requesting the MSX-E documentation	18
2.4.1 Internet.....	18
2.4.2 DVD.....	18
2.4.3 Ordering the documentation.....	19
3 MSX-E Live DVD.....	20
3.1 Introduction	20
3.2 Starting and quitting the “MSX-E Live DVD”	21
4 First Steps with the Live DVD	23
4.1 Booting the PC with the Live DVD.....	23
4.2 Other interfaces – Ethernet settings.....	24
4.2.1 Overview.....	24
4.2.2 Setting the IP address with the PC network board	24
4.2.3 IP address of the MSX-E modules and modification of the configuration file.....	29
4.3 Ethernet communication.....	30
4.3.1 TELNET	30
4.3.2 HTTP.....	32
4.4 Developing programs	32
4.4.1 Development tools.....	32
4.4.2 Programming environment ECLIPSE.....	33
4.4.3 Samples.....	35
4.4.4 Developing a simple program for the first time.....	35
5 Saving data.....	41
5.1 Read only.....	41
5.2 Saving data on the hard drive	41
5.3 Saving data on a USB stick	43
5.4 Starting your application automatically (autostart).....	45
6 Appendix	46
6.1 Glossary.....	46
6.2 Index	48
7 Contact and support	49

Figures

Fig. 1-1:	Block diagram	8
Fig. 1-2:	Cascading several Ethernet systems	9
Fig. 1-3:	MSX-E module web interface	12
Fig. 3-1:	MSX-E working and development environment.....	20
Fig. 4-1:	Start screen.....	23
Fig. 4-2:	Opening the configuration file wizard	29
Fig. 4-3:	Configuration file wizard.....	29
Fig. 4-4:	Opening a TELNET connection.....	30
Fig. 4-5:	TELNET console	30
Fig. 4-6:	Main commands in the Linux console	31
Fig. 4-7:	Development tools	32
Fig. 4-8:	Opening the programming environment ECLIPSE	33
Fig. 4-9:	Sample results on screen	40

Tables

Table 2-1:	Min. requirements to access the static content.....	13
Table 2-2:	Static contents of the "MSX-E Live DVD"	14
Table 2-3:	Contents of the "MSX-E Live DVD": Live part	15

Chapter overview

In this manual you will find the following information:

Chapter	Content
1	General information about the Development Mode
2	Information about the "MSX-E Live DVD"
3	Starting and quitting the Live DVD
4	Description of the first steps with the Live DVD
5	Data saving possibilities
6	Appendix containing a glossary and an index
7	Contact and support address

1 MSX-E modules working with the Development Mode

1.1 Customised applications

With the intelligent Ethernet I/O modules MSX-E by ADDI-DATA, you can realise both simple and complex measurement and control applications without the need for programming skills.

With the new development mode, you can now customise your application exactly to your needs. Therefore, you can both increase the efficiency of your processes and secure your investments.

1.1.1 Optimising your MSX-E module

As the MSX-E modules are designed to operate at temperatures from -40 °C to +85 °C and correspond to the degree of protection IP 65, you can use them directly in production halls.

With the new Development Mode, you can now even realise self-developed applications directly on site.

The procedure is easy: First write your program on a computer, then compile it and upload it into the flash memory of the MSX-E module by means of the MSX-E module web interface.

As a result, the MSX-E modules execute the commands just the way you have defined them.

1.1.2 Relieving the load on the central system

Tasks which you have always solved with the PC can now be realised directly with the Ethernet I/O modules.

Thanks to their onboard intelligence and the Development Mode, the modules can manage extended calculations. Acquired values can e.g. be immediately converted into physical values such as temperature, pressure or fill level and/or be filtered.

As soon as your application is saved on the modules, the load on the central system is relieved. Therefore, the system can be assigned other tasks.

1.1.3 Stand-alone operating

You can program the MSX-E modules to interact independently with other kinds of hardware within the Ethernet network (TCP/IP): SPS, computer, other MSX-E modules, etc.

With the Autostart function, the modules start the saved applications after booting and execute them independently.

1.1.4 Security of investment

Using the Development Mode of the MSX-E modules to realise your applications means to rely on a robust, high-quality hardware with an intelligent core which allows you to benefit for years from today's investment.

1.2 MSX-E module levels

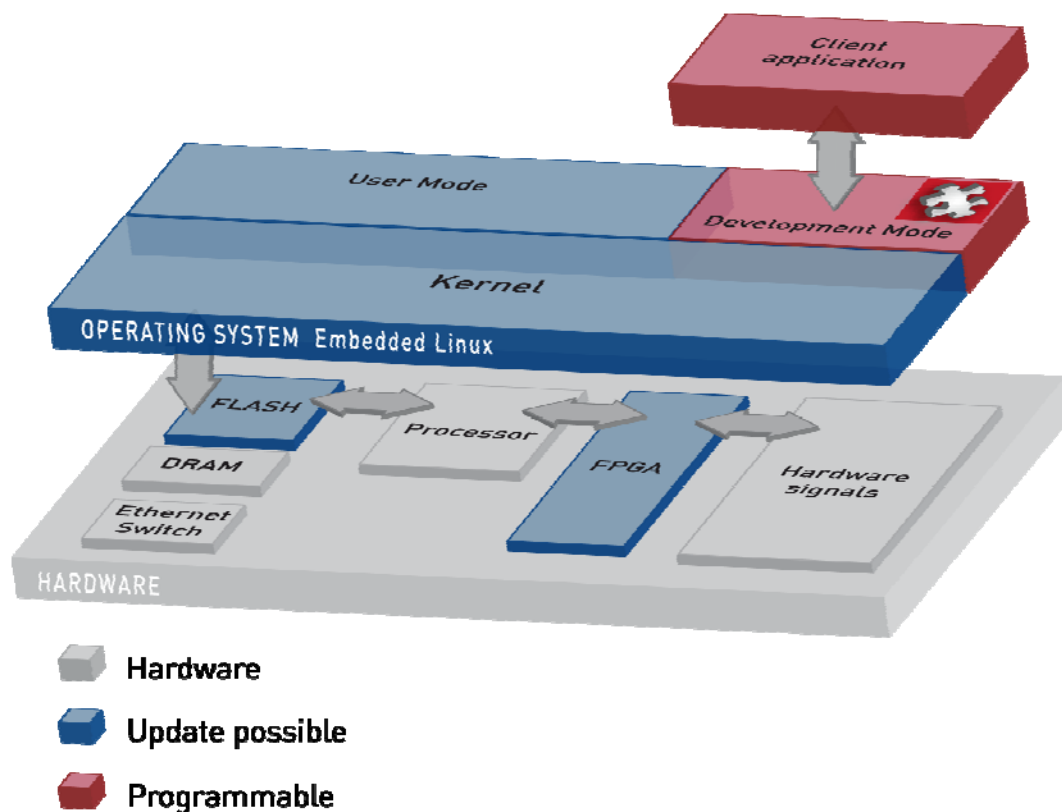
The MSX-E modules are organised in two levels: the hardware and the software level. The control part of the hardware (ARM9, Flash, etc.) is common to all module types. The signal part features the specific function of each module type: counter, digital I/O, analog I/O, length measurement, etc.

The Embedded Linux operating system is saved in the FLASH and loaded at booting via the ARM9 processor into the RAM and FPGA.

The operating system itself consists of a User and a Kernel mode. The Development Mode is a part of the User mode, in which customer applications can be loaded.

As the Development Mode exclusively accesses the functions in the User mode, the vital hardware and software functions of the MSX-E modules remain protected.

Fig. 1-1: Block diagram



1.3 Distributed intelligence within your network

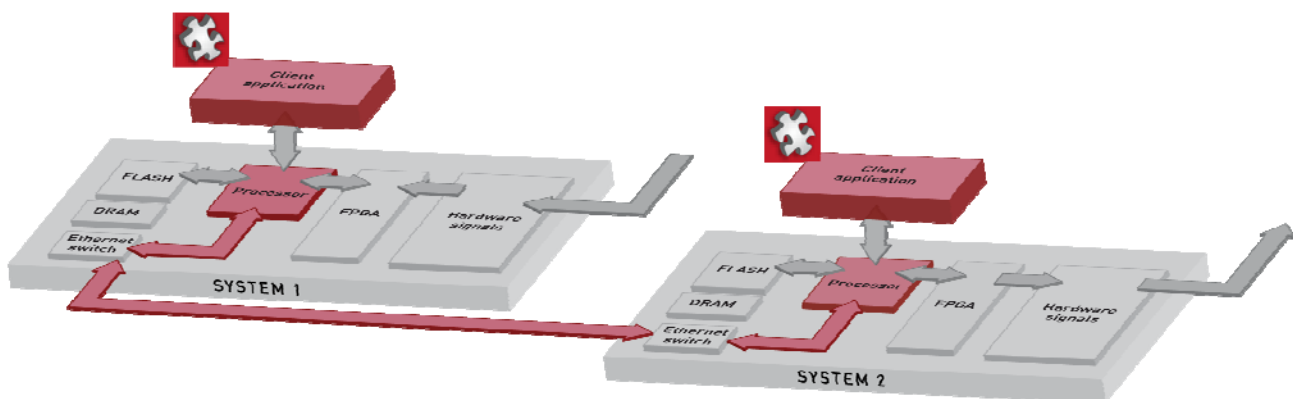
Customer applications written with the Development Mode can run either on one or on several modules. The acquired values are calculated and processed directly onboard.

The MSX-E module can communicate with other MSX-E modules or any other Ethernet hardware via the Ethernet switch.

The modules can thus access measurement values and/or variables from external materials and parameter, start or stop their measurement tasks. An additional computer is therefore unnecessary.

The connection via standard Ethernet allows to realise complex distributed stand-alone measurement and control tasks on site and close to the test item.

Fig. 1-2: Cascading several Ethernet systems



1.4 Application spectrum

The Development Mode can be used to perform the following tasks:

- Generating an additional data server for previously computed values
- Creating a network which consists of several Ethernet systems
- Setting up a customised SOAP server to simplify procedures and to develop your own functions
- Data computation directly on the module.

1.5 Embedded Linux operating system: root rights

In order to protect the vital functions of the MSX-E module, the user of the Development Mode neither has root rights nor access to protected passwords.

If the Development Mode is activated, the user can set up a connection to the module via TELNET. He can manage his files by using the MSX-E module web interface.

The Development Mode user has his own directory (/store/developer) in the flash memory. So it is possible for him to create and delete files as required.

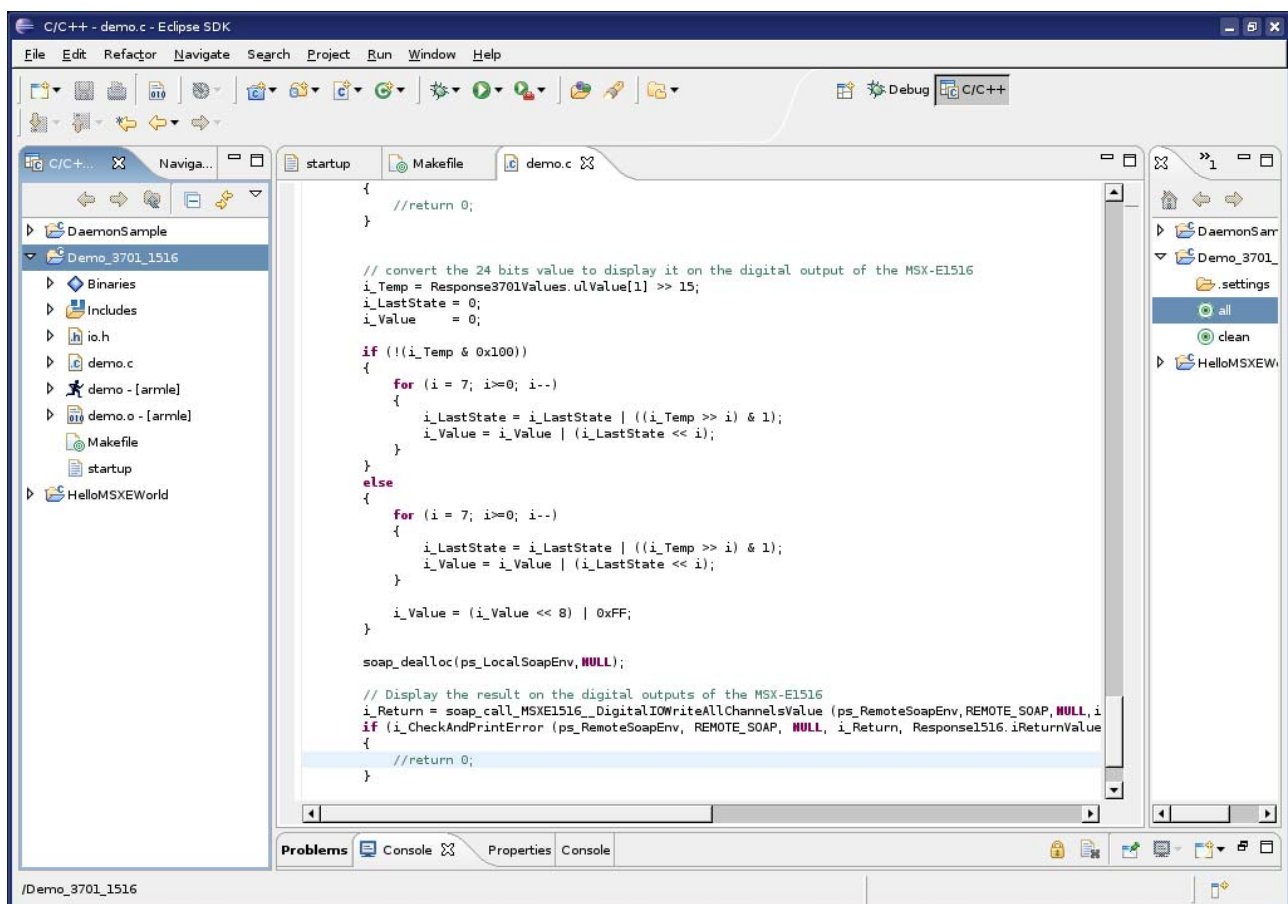


IMPORTANT!

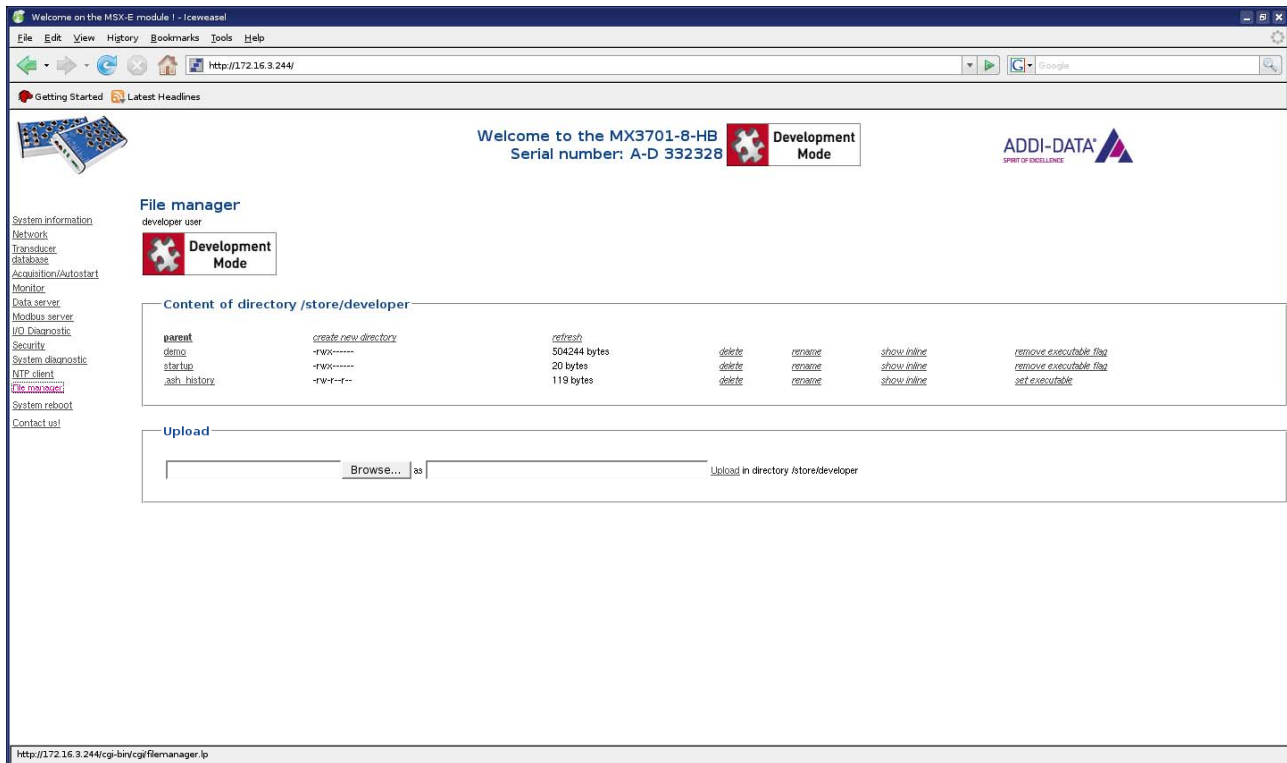
When the Firmware is updated, the directory of the Development Mode user is not deleted.

1.6 Programming steps

- The user develops his own application on a PC operating with Linux or the Live DVD programming environment. In doing so, he uses SOAP interfaces, which makes debugging easier. A SOAP documentation is provided with each MSX-E module.



- After its completion, the application is cross-compiled for the MSX-E architecture. Cross-compiling on the Linux PC during the testing phase is recommended in order to detect incompatibilities earlier.
- The compiled file is uploaded via the file manager on the MSX-E module web interface. After that, the "startup" script, which starts the application, can be uploaded.

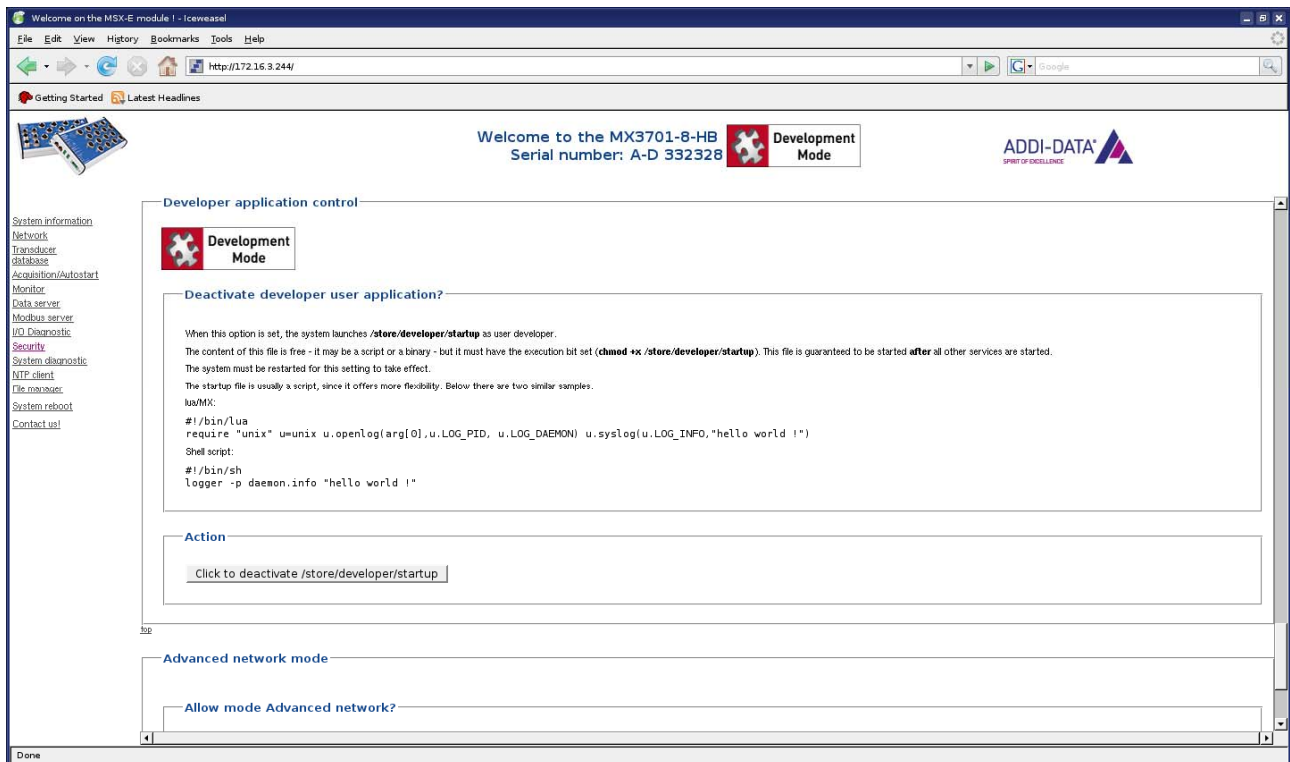


- If the application has been successfully implemented, the user can activate the autostart option on the MSX-E module web interface. The "startup" file will then be executed automatically after booting.



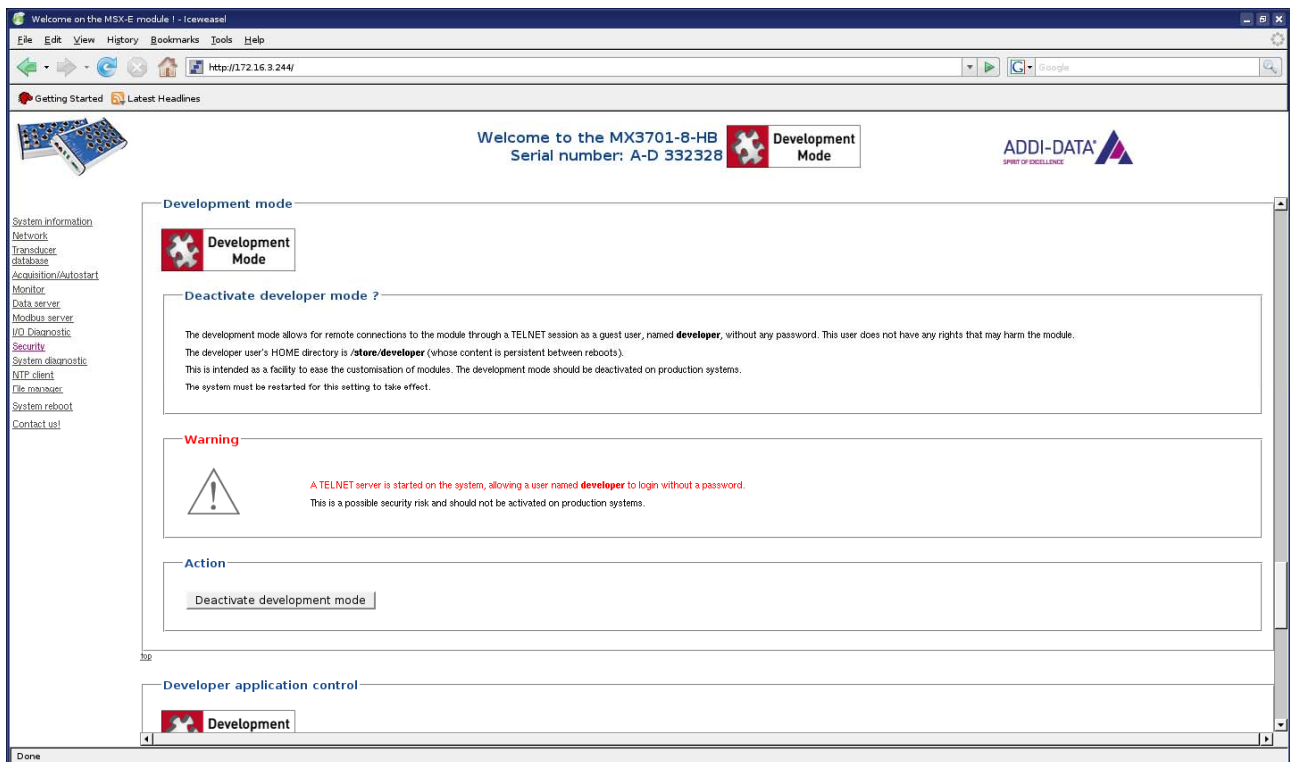
IMPORTANT!

If the execution of an application is finished, the latter will **not** be restarted by the MSX-E system, unless otherwise set.



The Development Mode is activated on the MSX-E module web interface.

Fig. 1-3: MSX-E module web interface



2 Information about the “MSX-E Live DVD”

2.1 Contents of the DVD

The “MSX-E Live DVD” is divided into two parts:

- The Live-DVD part contains all the development tools for operating the MSX-E modules. With this DVD you can execute a development environment on your PC without the additional effort of installation. You will find more detailed information about the use of the “MSX-E Live DVD” in chapters 3 and 4.
- The static content of the “MSX-E Live DVD” can be read e.g. under Windows, without running it in Live-DVD mode. This accessible content contains samples and technical manuals for the MSX-E modules.

The pdf files of the manuals can be opened on a PC which has the following minimum system requirements:

Table 2-1: Min. requirements to access the static content

Processor Pentium	1 GHz or faster
Operating system	Microsoft Windows Linux
Working memory	1 GB DRAM
Drives	DVD-ROM drive
Monitor	Colour monitor, resolution: 800 x 600 pixels
Software	Mozilla Firefox Internet Explorer 3.0 or higher Netscape Adobe Acrobat Reader 4.0 or higher

Index.htm file

In this file you will find the index for the “MSX-E Live DVD”. To open the manuals, please follow the instructions below:

- Insert your DVD.
- Open the “index.html” file.
- Click on the required manual.

Now you can either read the manual as a PDF file or print it.

Table 2-2: Static contents of the “MSX-E Live DVD”

Directory/File	Description/Contents
doc (documentation)	
ADDIDATA\doc\index.html	Html page that contains information about the documentation and the Live-DVD
ADDIDATA\doc\Manuals	Contains all manuals about the MSX-E module hardware, software, and programming

Directory/File	Description/Contents
src (source)	
ADDIDATA\src\samples\development_mode	Contains Development Mode program samples for the MSX-E modules
ADDIDATA\src\samples\standard	Contains Linux standard samples for the MSX-E modules

2.2 DVD live part

Table 2-3: Contents of the “MSX-E Live DVD”: Live part

Functions	Description	Proposed package
1) Basic system		
Installation	Using the “MSX-E Live DVD” is helpful when learning to work with the MSX-E modules , for short development projects or “on-the-fly” administration tasks, without the need to install previously required additional components. However, for longer projects it is more convenient to install the required components on your computer.	Knoppix installer
MS-Windows file system compatibility	Gives the user the opportunity to read and amend data that is saved on data carriers (for example floppy disks, hard disks, USB etc.)	DOS, FAT32, and NTFS driver
2) Network		
Network exploration	This tool explores the network environment and searches for available network resources (for example File, FTP and HTTP server). Clicking on Explorer allows you to access the shared resources.	Lisa + Lisa configuration tool + Samba + Samba configuration tool
DHCP client	If you have a DHCP client that is configured to give your station network configuration information (for example IP address), you will get network access without additional configuration.	Dhclient
Telnet client	A tool to connect a remote MSX-E module over the network.	telnet
SAMBA server	SAMBA is a Linux implementation of the NETBIOS network protocol. With this you can share your data with other computers running the Windows operating system.	

3) User interface		
a) Miscellaneous		
System localisation	Most of this DVD is translated into English.	
Debian Package Manager	The “MSX-E Live DVD” is built upon the Debian distribution. The Debian project aims to develop a set of Linux related software of the highest quality on several architectures. The DVD contains a full featured package management subsystem.	Aptitude + kpackage
b) Graphical interface		
MSX-E icon and link to the MSX-E module	Gives easy access to programs and information that is required for operating the MSX-E modules (for the use of the MSX-E interface and for the development of programs of the MSX-E modules).	
4) Development		
a) MSX-E module related		
Cross Development Tools	This set of tools allows you to program for the MSX-E modules on an x86 host. Until now, the “MSX-E Live DVD” has included GCC version 3.3.6.	arm-linux-gcc
GNU Autotools	These are often used as standard tools in the open source world. They enable the source code to be automatically adapted to the compilation host.	Automake Autoconf
Doxygen	Doxygen is a code documentation robotic generator. It parses C, C++ and Java source and uses specially formatted commentaries which developers have inserted to generate documentation in several formats, including HTML, PDF und RTF (Word compatible).	Doxygen doxywizard
b) Graphical tools		
Integrated Development Environment	On this DVD you will find a ready-to-use ECLIPSE customised for the development of MSX-E applications and drivers.	Eclipse and C/C++plugins

c) Documentation		
GNU libc documentation	The C library is a fundamental library used by user space applications. The GNU C library supplies a wide range of API including access to operating system services. One big advantage of using Linux on the MSX-E modules is that the API is the same as any other Linux distribution. The “MSX-E Live DVD” includes the extensive C library reference manual.	
ADDI-DATA documentation about the MSX-E modules	ADDI-DATA has written an important set of documentation on the MSX-E modules . The “MSX-E Live DVD” contains the full documentation.	
GNU tool documentation	The development tool chain used with the MSX-E modules is built on the GNU set of tools. It includes the compiler, the debugger and the “autotools”. These free products are of the highest quality and have been chosen by several world wide leading providers of software. The DVD includes extensive manuals on the use of these tools.	Gcc GNU Auto Tools

2.3 “MSX-E Live DVD” – system requirements



IMPORTANT!

Please ensure before starting the “MSX-E Live DVD” that all the requirements are met.

CPU:

Intel-compatible CPU (x86)

Bootable DVD ROM drive (IDEA/ATAPI, Firewire, USB or SCSI):

When booting from the “MSX-E Live DVD”, your computer requires a bootable DVD-ROM drive. The BIOS of your PC needs to be set to boot from a DVD. Therefore **Boot from CD/DVD-ROM** needs to be selected as first option in the menu.

RAM:

The “MSX-E Live DVD” requires at least 1 GB RAM (the higher the better).

Graphics card:

Standard SVGA compatible graphics card

Mouse:

Serial or PS/2 standard mouse or PS/2-compatible USB mouse

2.4 Requesting the MSX-E documentation

2.4.1 Internet

Please find more information about the **MSX-E modules** on our website:

<http://www.addi-data.com>

2.4.2 DVD

The MSX-E documentation and further information is available on the “MSX-E Live DVD” included in the delivery. This DVD is updated regularly and the information contained in it is more detailed than the printed documentation.

You can also order this DVD.

2.4.3 Ordering the documentation

You can contact us directly for ordering the **MSX-E module** documentation:

Address: ADDI-DATA GmbH
Airpark Business Center
Airport Boulevard B210
77836 Rheinmünster
Germany

E-mail: sales@addi-data.com

Phone: +49 7229 1847-0

Fax: +49 7229 1847-200

3 MSX-E Live DVD

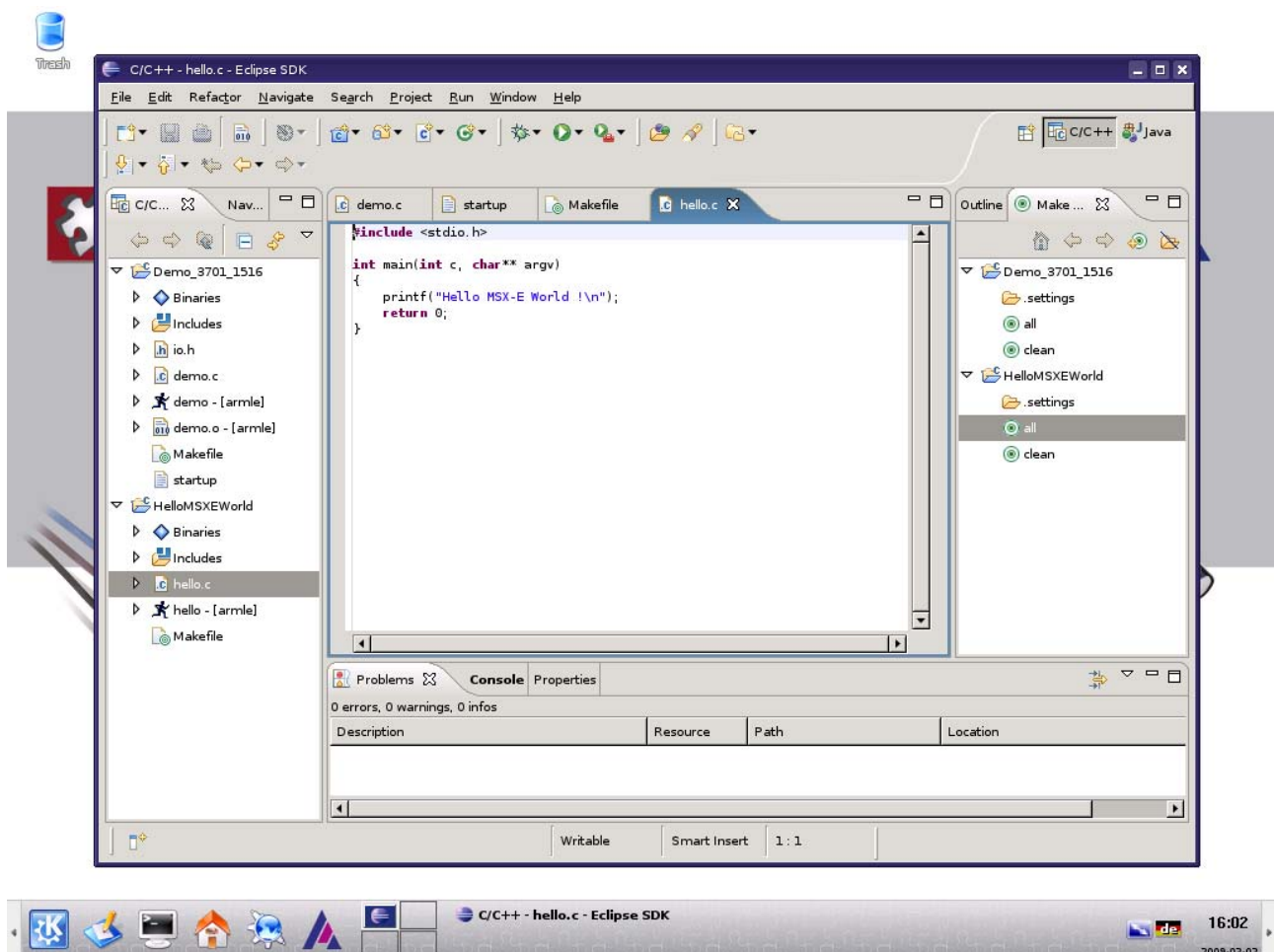
As already mentioned in chapter 2.2, the “MSX-E Live DVD” contains all the development tools required for the MSX-E modules. You can therefore create a development environment without the additional effort of installation.

3.1 Introduction

The “MSX-E Live DVD” provides a customised working and development environment for the **MSX-E modules**. The DVD is especially based on the Knoppix Live DVD Version 5.1.1 (<http://www.knoppix.org>), customised by ADDI-DATA. The Knoppix Distribution provides an automatically configurable operating system that is based on the Debian Distribution (<http://www.debian.org>).

ADDI-DATA has chosen the KDE desktop environment for the “MSX-E Live DVD”. Since there are many functionalities and possibilities for adaptations, daily tasks can be carried out easily with the **MSX-E modules**.

Fig. 3-1: MSX-E working and development environment



3.2 Starting and quitting the “MSX-E Live DVD”

a) Starting the “MSX-E Live DVD”

- Put the DVD in the DVD drive.
- Save and close all the applications on your computer.
- Restart your PC.

Now the “Knoppix” screen will open.

- Press the Enter key.

After a few seconds/minutes, the ADDI-DATA screen will open and you can work in your new development environment.



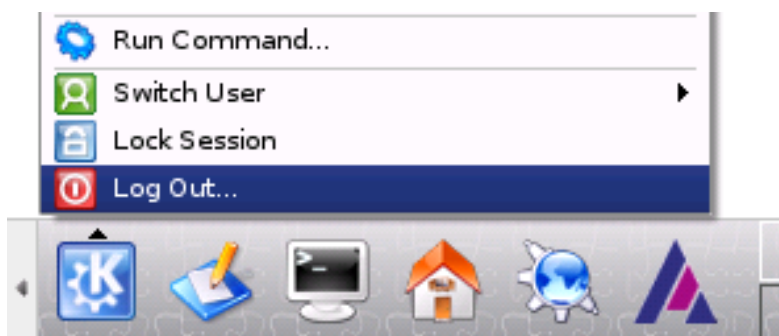
IMPORTANT!

Please note that the start process may require a few minutes.

b) Quitting the “MSX-E Live DVD”

If you want to quit your development environment and return to Windows, please follow the instructions below:

- Click in the left edge on the blue KDE icon (below) and then on the Log Out button.



- Click on "Restart Computer" or "Turn Off Computer".



- When asked, remove the DVD from the drive.

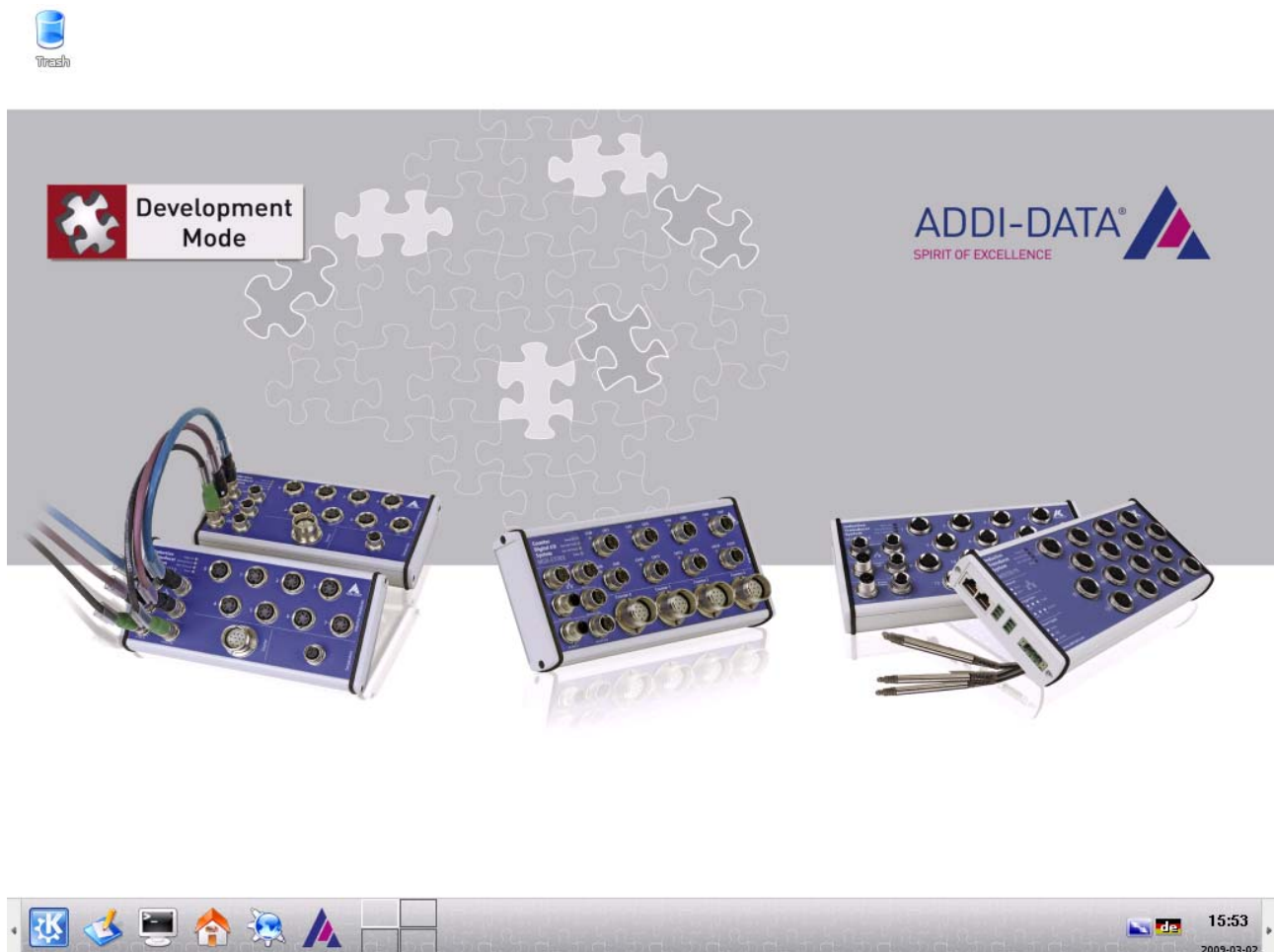
4 First Steps with the Live DVD

4.1 Booting the PC with the Live DVD

- Boot your PC with the "MSX-E Live DVD".

You can find a more detailed description on starting the DVD in chapter 3. After you have booted, you will find the following environment:

Fig. 4-1: Start screen



Behind the ADDI-DATA icon in the taskbar (see Fig. 4-1) are all necessary connections for programs that are necessary to configure the interfaces to the **MSX-E modules** and to use them afterwards and finally develop programs for the **MSX-E modules**.

4.2 Other interfaces – Ethernet settings

4.2.1 Overview

This chapter describes the Ethernet (TCP/IP) communication.

One of the advantages of the **MSX-E modules** is that they provide common TCP/IP services. The following chapters explain how the TELNET services of the **MSX-E modules** are used.



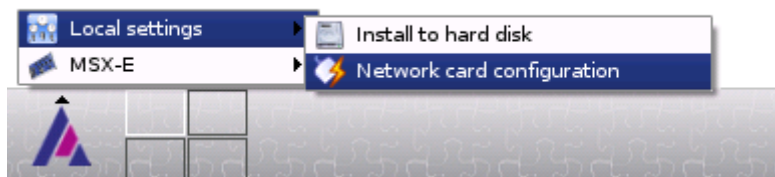
IMPORTANT!

When using TCP/IP services, ensure that your **MSX-E module** is connected directly to the computer or the internal EDP network with a network cable.

4.2.2 Setting the IP address with the PC network board

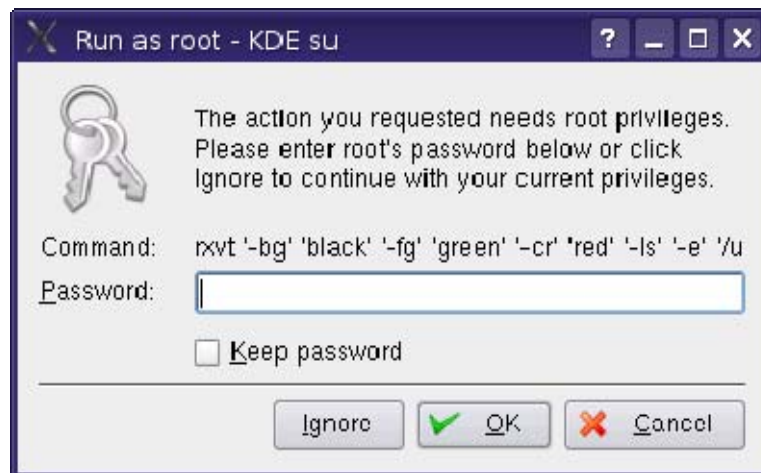
Before you can use the TCP/IP services, you must set the IP address of the computer by following the step below.

- Click on the ADDI-DATA icon and select “Local settings / Network card configuration”.



Login

The following mask is displayed for the login:



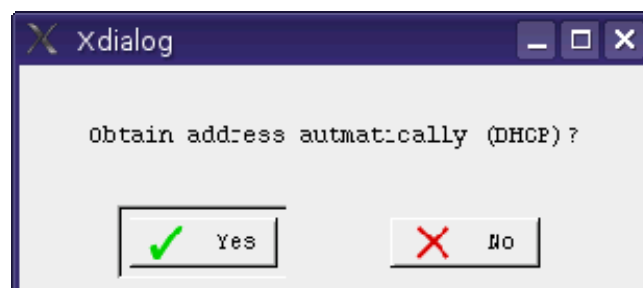
- Enter "root" as password.

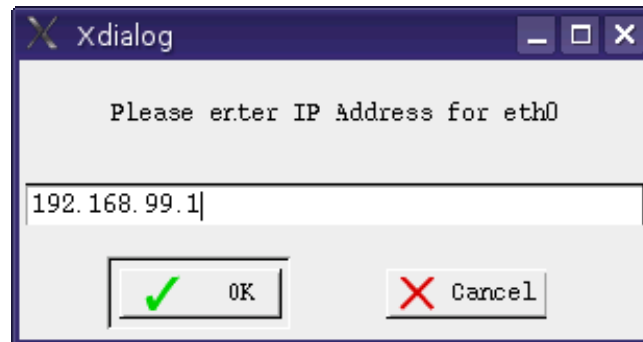
DHCP settings

DHCP (Dynamic Host Configuration Protocol) is a protocol for the automatic allocation of IP addresses. If your **MSX-E module** is directly connected to the computer, no DHCP procedure is required and therefore you can in this case answer the question "Use DHCP broadcast?" with "No".

However, answer by clicking on "Yes" only when the computer is connected to an EDP network in which a DHCP server is available und allocates IP addresses automatically.

Should you have any questions please consult your system administrator.

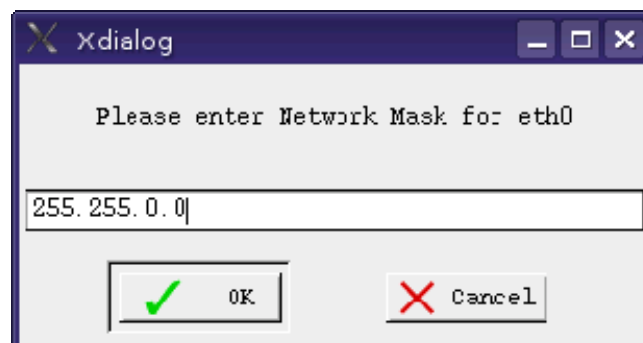


Entering the IP address of the network board**IMPORTANT!**

When entering the IP address of the network board, please ensure that it is compatible with your network.

If the **MSX-E module** is connected directly to your computer and you have not changed the IP address of the **MSX-E module** (192.168.99.99), you can keep the predefined IP address (192.168.99.1) in the insert field and confirm it with "OK".

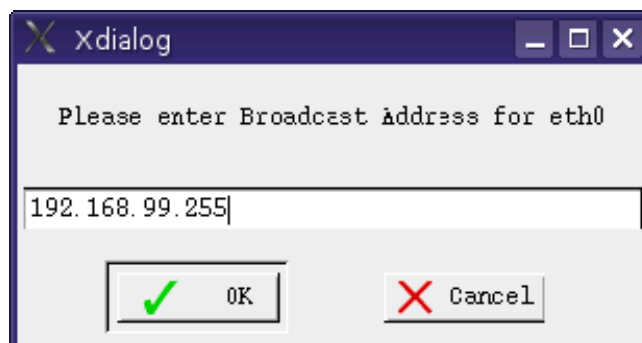
Should you have any questions please consult your system administrator.

Entering the network mask**IMPORTANT!**

When entering the network mask, please ensure that it is compatible with your network.

If the **MSX-E module** is connected directly to your computer and you have not changed the IP address of the **MSX-E module**, you can keep the predefined network mask in the insert field (255.255.0.0) and confirm it with "OK".

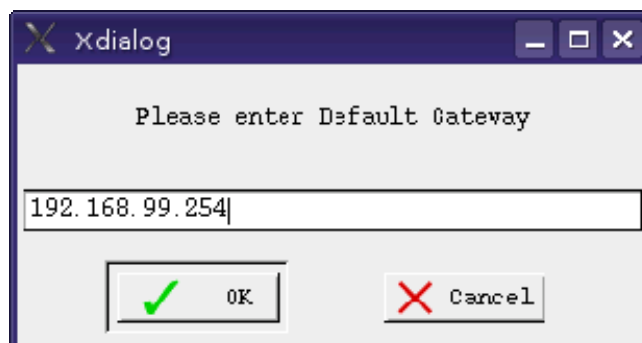
Should you have any questions please consult your system administrator.

Entering the broadcast address**IMPORTANT!**

When entering the broadcast address, please ensure that it is compatible with your network.

If the **MSX-E module** is connected directly to your computer and you have not changed the IP address of the **MSX-E module**, you can keep the predefined network mask in the insert field (192.168.99.255) and confirm it with "OK".

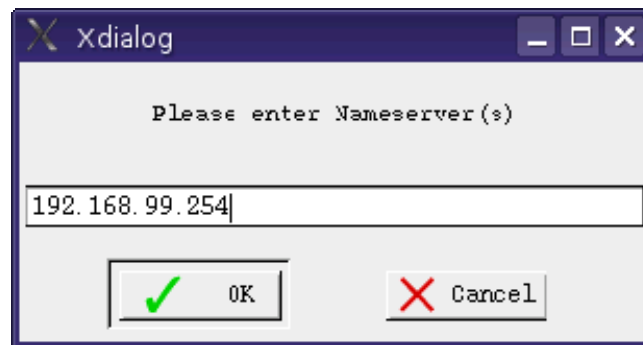
Should you have any questions please consult your system administrator.

Entering the default gateway address**IMPORTANT!**

When entering the broadcast address, please ensure that it is compatible with your network.

If the **MSX-E module** is connected directly to your computer and you have not changed the IP address of the **MSX-E module**, you can keep the predefined gateway address (192.168.99.254) and confirm it with "OK".

Should you have any questions please consult your system administrator.

Entering the name server address**IMPORTANT!**

When entering the name server address, please ensure that it is compatible with your network.

If the **MSX-E module** is connected directly to your computer and you have not changed the IP address of the **MSX-E module**, you can keep the predefined name server address (192.168.99.254) and confirm it with "OK".

Should you have any questions please consult your system administrator.

4.2.3 IP address of the MSX-E modules and modification of the configuration file

As already mentioned in the previous chapter, the IP address of the **MSX-E modules** can be modified. Upon delivery it is set on 192.168.99.99.



IMPORTANT!

If the IP address of the MSX-E module is modified, the central configuration file must be adapted.

Please follow the steps below to adapt the configuration file:

- Click on the ADDI-DATA icon and select "MSX-E / Local settings / Environment configuration" for opening the configuration file wizard.

Fig. 4-2: Opening the configuration file wizard

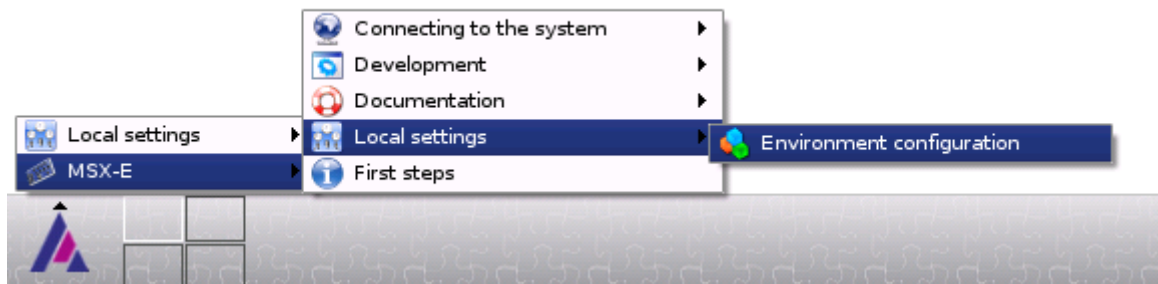
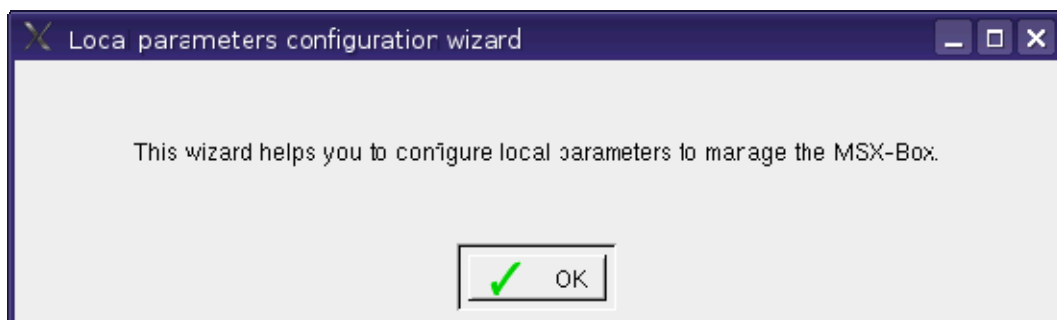


Fig. 4-3: Configuration file wizard



Follow the instructions and update information if necessary. If the **MSX-E module** is set to the default IP address 192.168.99.99 and the PC network card is set to 192.168.99.1, you can keep all default values.

4.3 Ethernet communication

The following access options are available for Ethernet communication:

- TELNET
- HTTP.

4.3.1 TELNET

- Click on the ADDI-DATA icon and select "MSX-E / Connecting to the system / Telnet session".

Fig. 4-4: Opening a TELNET connection

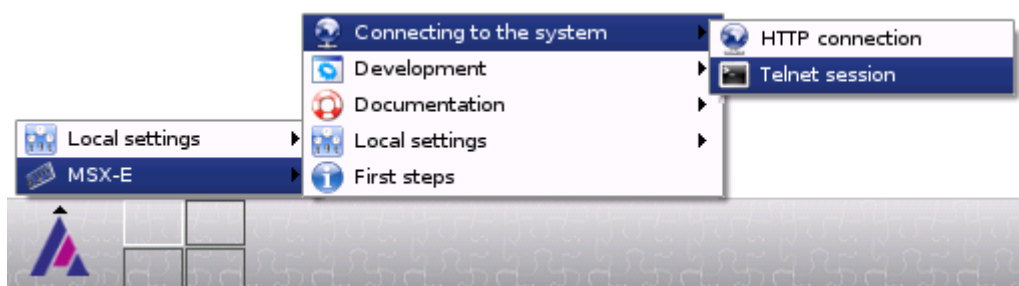
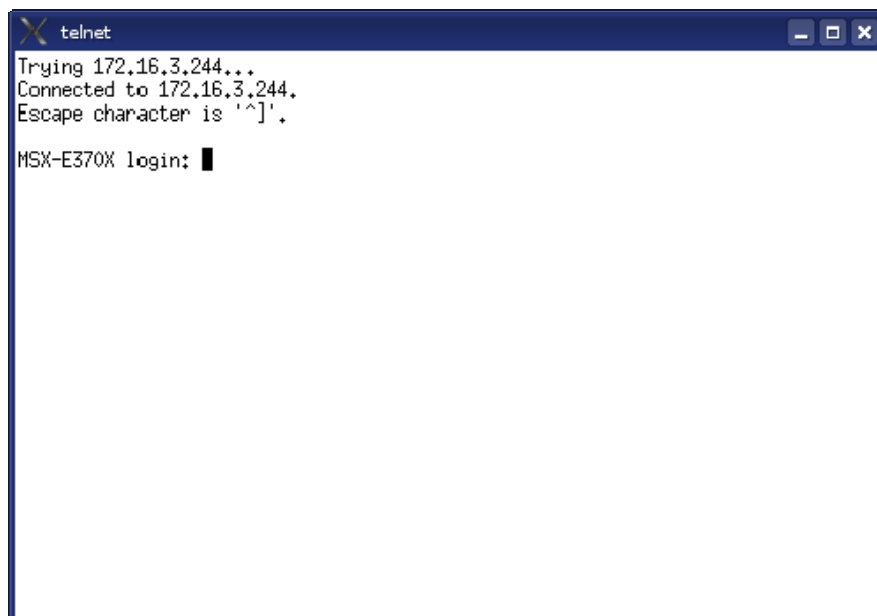


Fig. 4-5: TELNET console



Here you have access to the Embedded Linux of the **MSX-E modules**.

Login input

```
MSX-E3701 login: developer
```

After logging in, some of the standard Linux commands are available in order to work with the Linux Embedded operating system. A few of the main commands are listed in Fig. 4-6.

You can learn more about it in the relevant manual, which you can find as a PDF file on the "MSX-E Live DVD" in the directory **ADDIDATA\doc\Administration-Update\Busybox** in the file **Busy Box – The Swiss Army Knife of Embedded Linux.htm**.

Main commands in the Linux console

Fig. 4-6: Main commands in the Linux console

```
cd : change directory
cd / : go to the root directory (= the top )
ls : list files and the directory
ls -l : detailed files and directory list
df -h : disks informations
ps -e : displays all processes
help : list of the built in commands
cp : file copy : Usage: cp [OPTION]... SOURCE DEST

touch <filename> : create a file
cat <filename> : display the file content

uname -a : display the linux kernel version
ifconfig : display the network board configurations

rm <file name> : delete a file

rmdir <directory name> : delete directory

<command> --help : display informations about the command
```

4.3.2 HTTP

You can open the MSX-E module web interface by using HTTP.

- Click on the ADDI-DATA icon and select "MSX-E / Connecting to the system / HTTP connection".

4.4 Developing programs

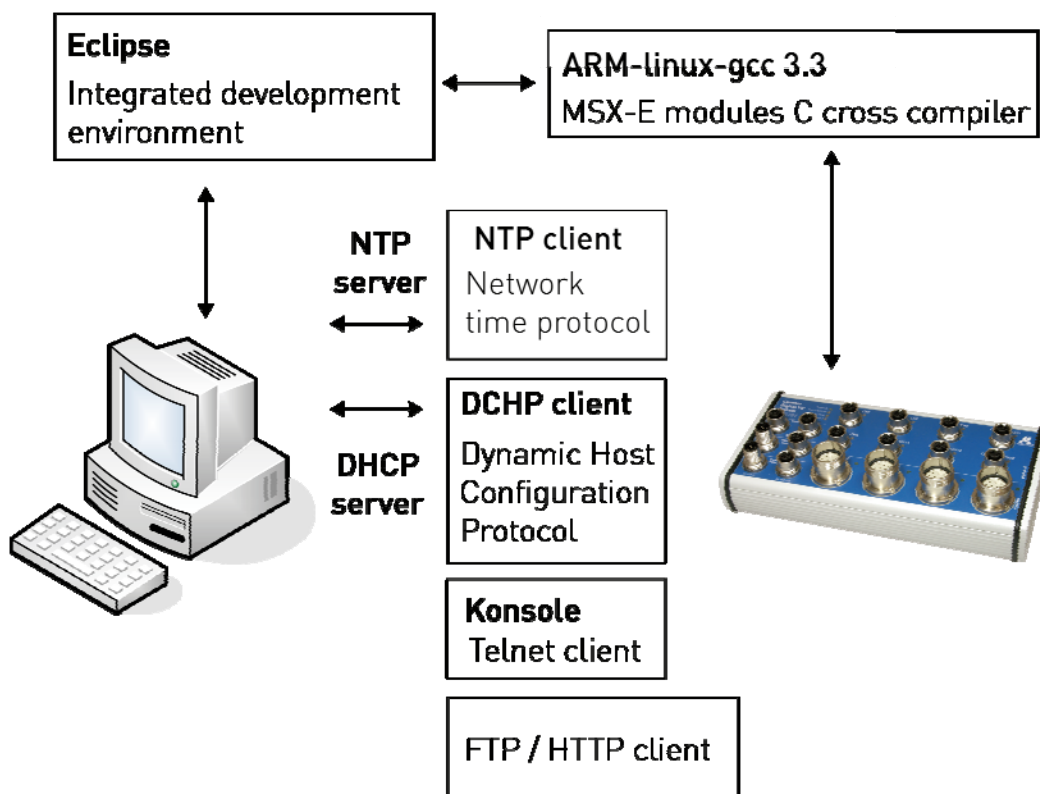
4.4.1 Development tools

All the programs required for development jobs for the **MSX-E modules** are preinstalled on the "MSX-E Live DVD", so that the start-up and the first steps are as user-friendly as possible for the developer.

C is the programming language for the development of programs for the **MSX-E modules**. The operating system is Linux Kernel 2.4.36.

The compiler is a GNU ARM Compiler. For the convenient creation of programs, the programming environment **ECLIPSE** is provided.

Fig. 4-7: Development tools



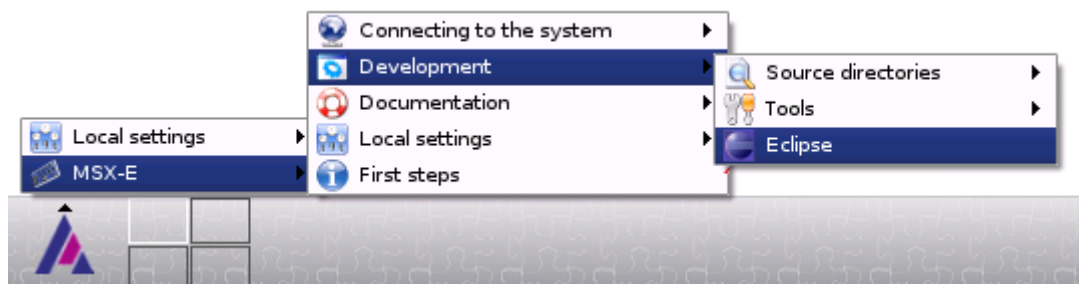
4.4.2 Programming environment ECLIPSE

As already mentioned in the chapter above, the programming environment **ECLIPSE** is a tool for creating programs easily.

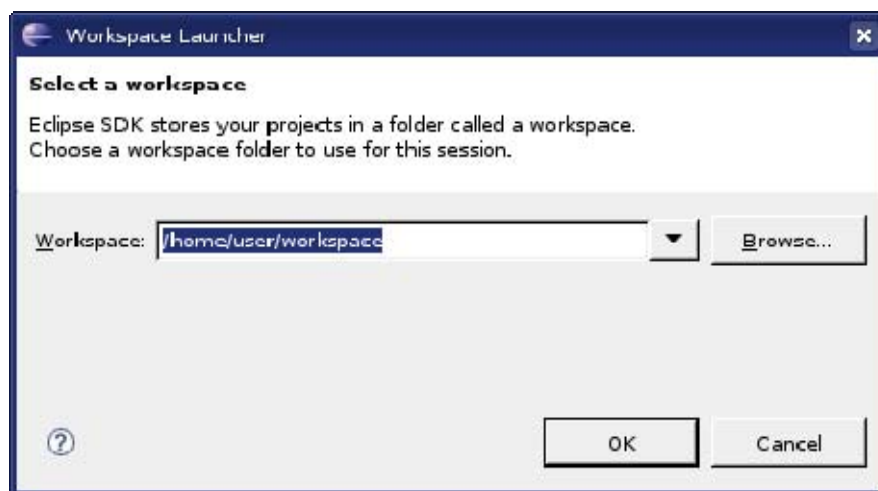
Starting ECLIPSE

- Click on the ADDI-DATA icon and select "MSX-E / Development / Eclipse".

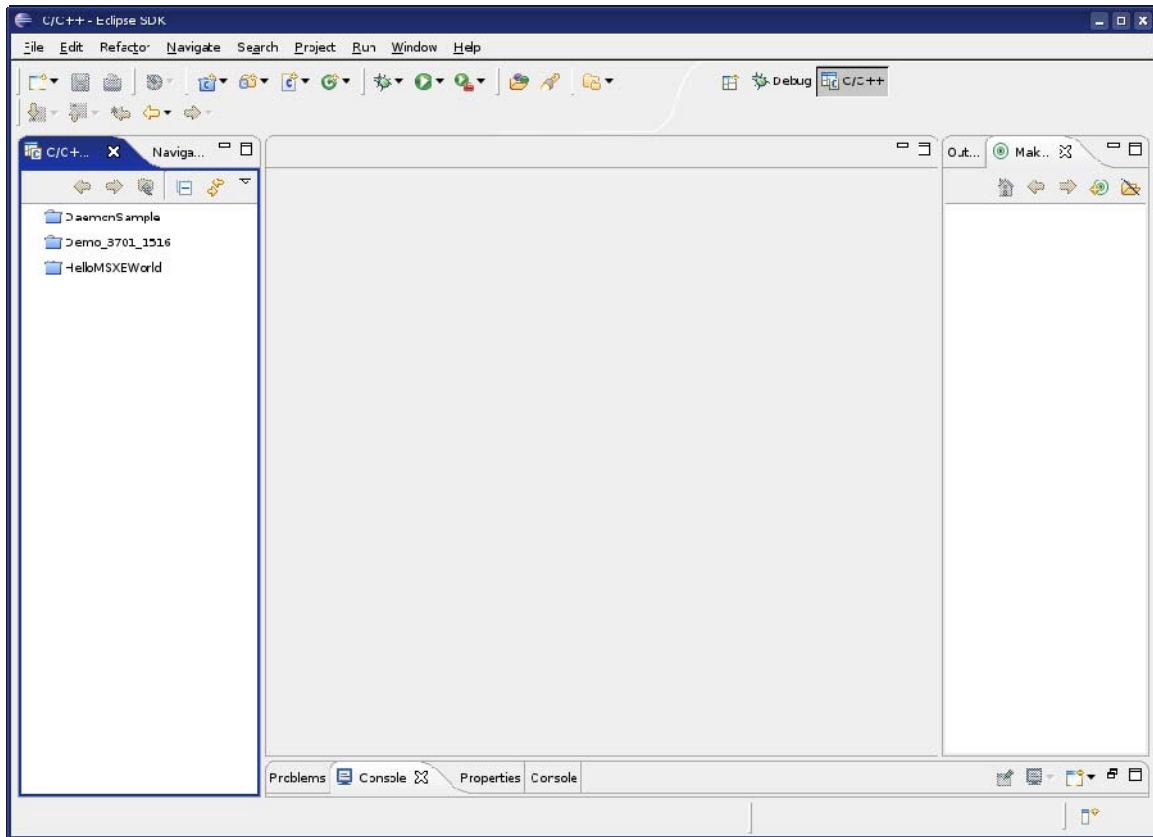
Fig. 4-8: Opening the programming environment ECLIPSE



- Confirm "Select a workspace" with "OK".

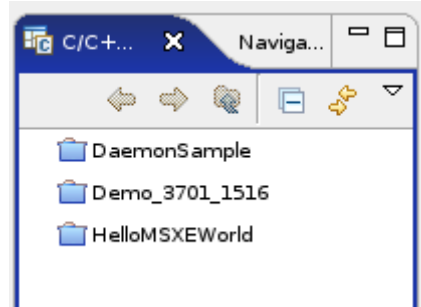


ECLIPSE is opened.



4.4.3 Samples

There are two program samples available:



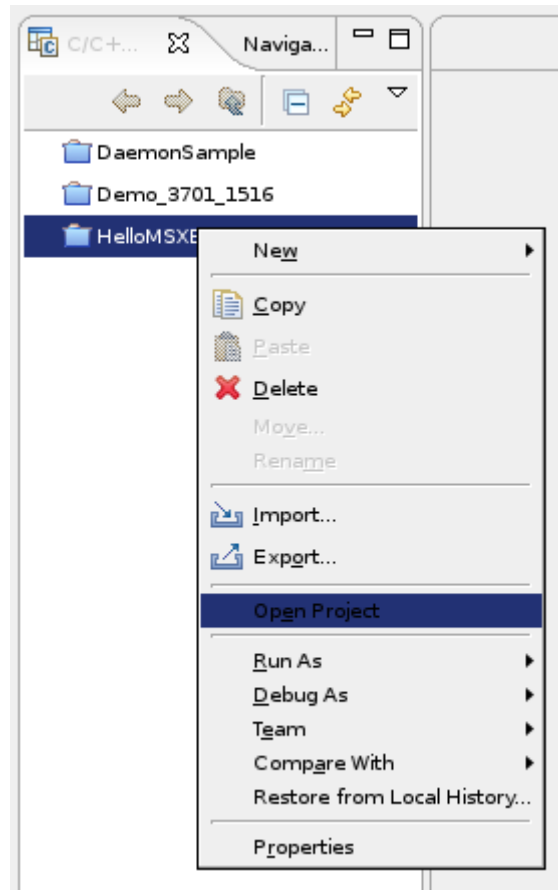
- **„HelloMSXWorld“:**
With this sample, you can develop a simple program for the MSX-E modules, which displays the text "Hello World".
- **„Demo_3701_1516“:**
With this sample, you can create a program that is uploaded to an MSX-E3701 module. The program reads the transducer values and, depending on the values read, sets digital outputs on an MSX-E1516 module.

Please check on our website if further or updated samples are available.

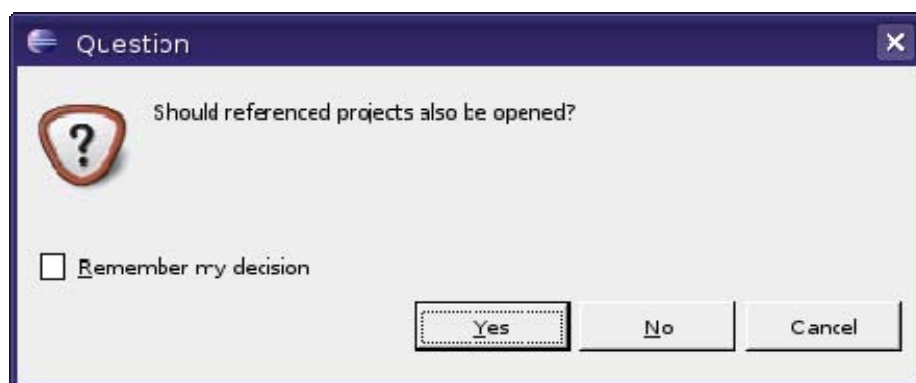
4.4.4 Developing a simple program for the first time

To develop the simple program "Hello World", please follow the instructions below:

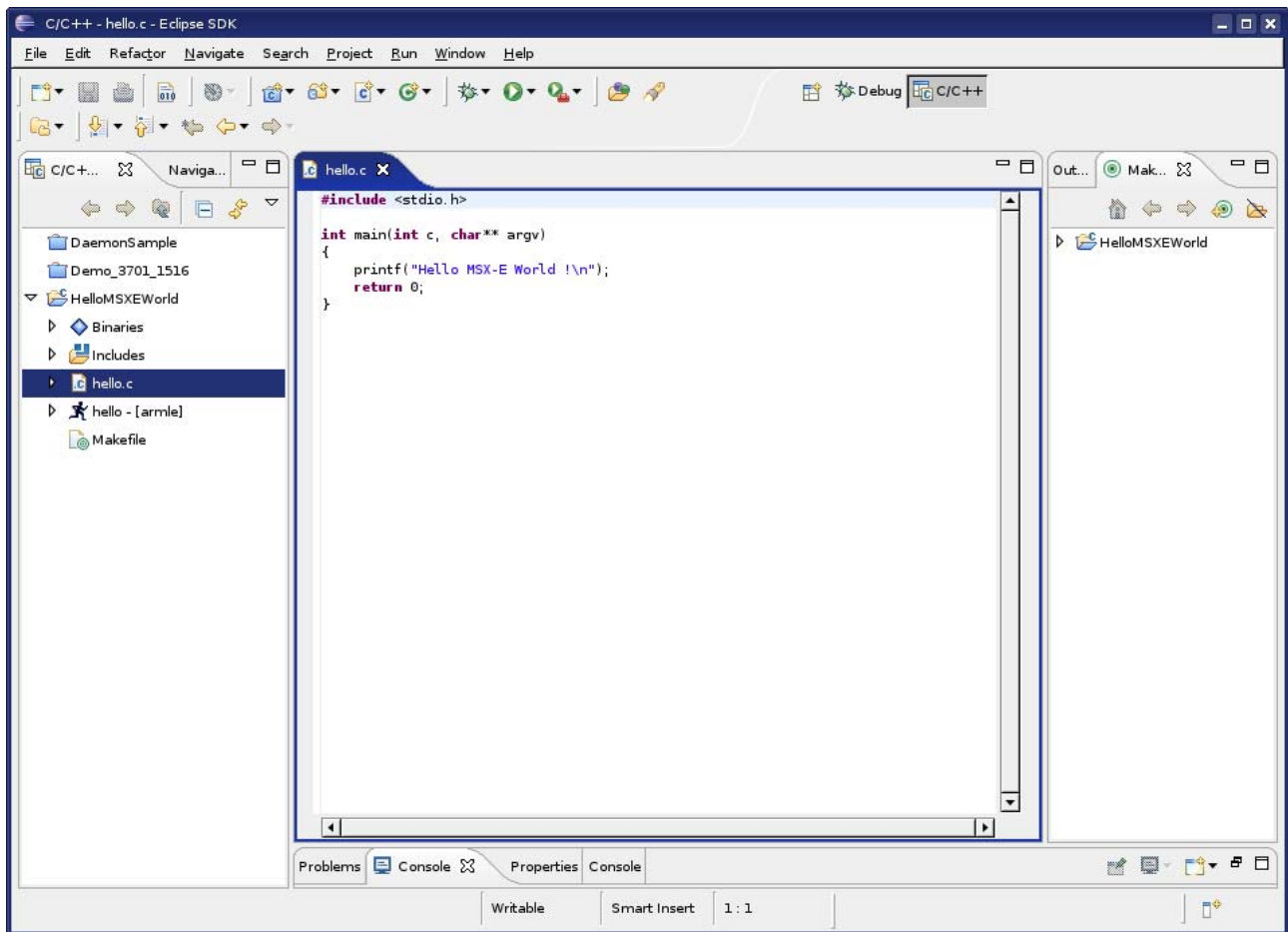
- Right-click on the requested sample.
- Select the menu option "Open Project".
- Open the sample "HelloMSXWorld".



- Click on the project name for displaying the project files.
- You are requested to open the referenced project. Click on "No".



- Double-click on the file "hello.c".



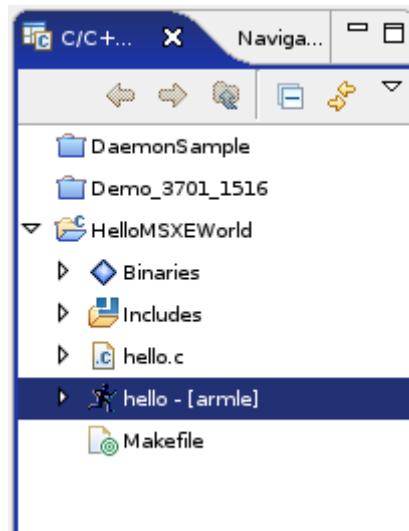
You can modify the content of the "printf" parameter as required.

- Save it by using the shortcut "CTRL+S".

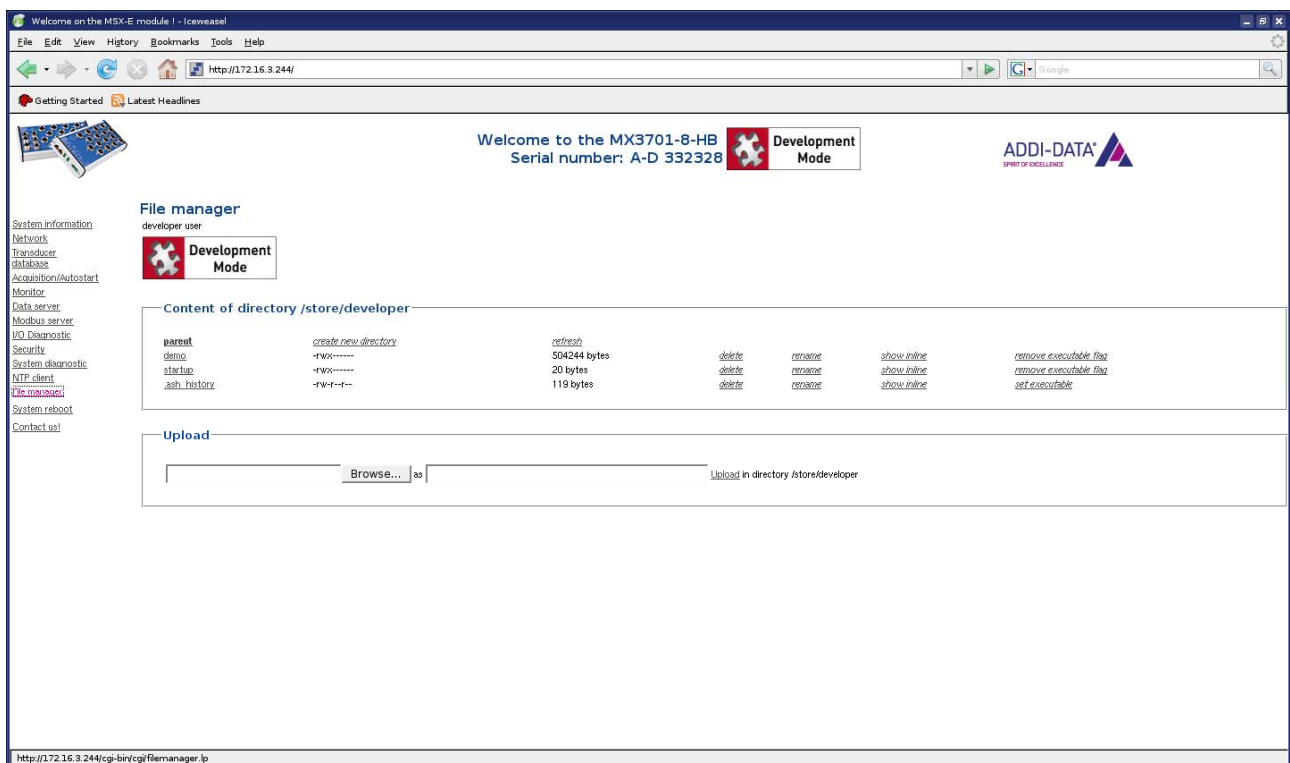
After you have saved it, the program will be compiled and linked automatically. The automatic compiling and linking of a program can be switched off in the menu "Project / Build Automatically".



In the project window, the newly created program is displayed.



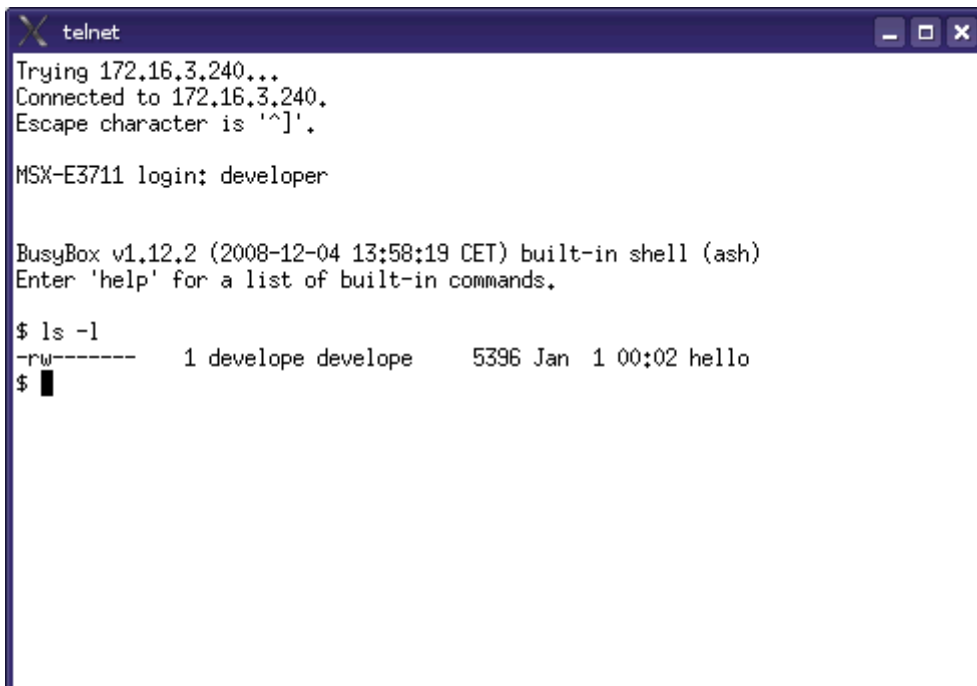
If the Development Mode is activated, the application is now uploaded via the file manager (MSX-E module web interface) to the MSX-E module.



With TELNET, you can access the **MSX-E modules** and display the “developer home” directory (see chapter 4.3.1).

- Start TELNET.
- With the command “ls -l”, all the files in the directory will be listed in detail (including the file attributes).

```
$ ls -l
```



```
telnet
Trying 172.16.3.240...
Connected to 172.16.3.240.
Escape character is '^]'.
MSX-E3711 login: developer

BusyBox v1.12.2 (2008-12-04 13:58:19 CET) built-in shell (ash)
Enter 'help' for a list of built-in commands.

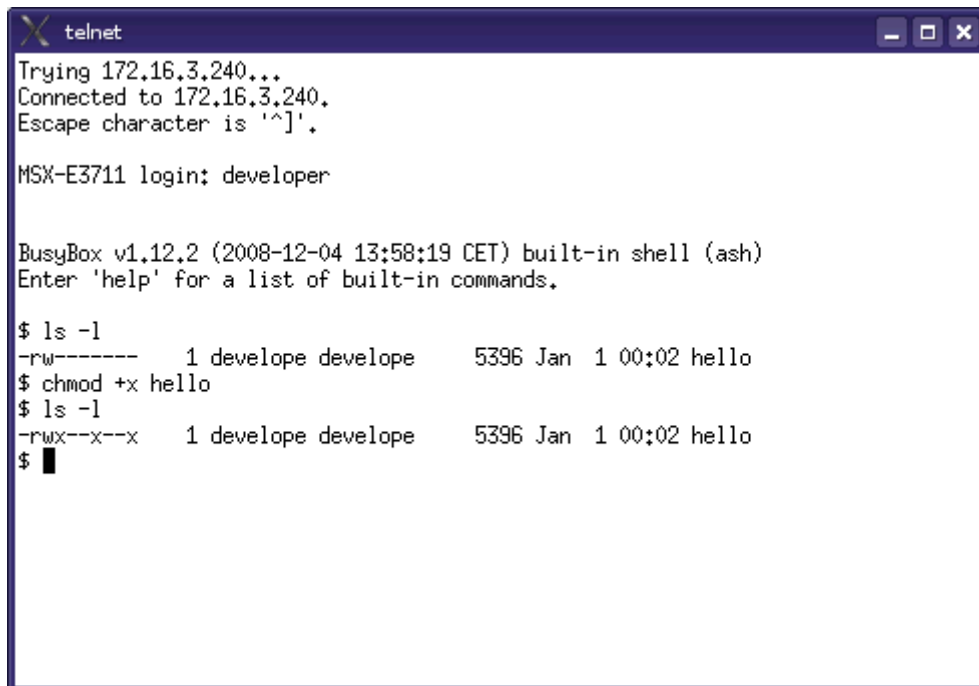
$ ls -l
-rw----- 1 developo developo 5396 Jan 1 00:02 hello
$
```

- Set the file attribute for the application “hello” to “executable”. It is also possible to use the file manager on the MSX-E module web interface for this step.

```
$ chmod +x hello
```

With the “ls -l” command, you can check the “executable” state (-rwx--x--x).

```
$ ls -l
```



```
telnet
Trying 172.16.3.240...
Connected to 172.16.3.240.
Escape character is '^]'.

MSX-E3711 login: developer

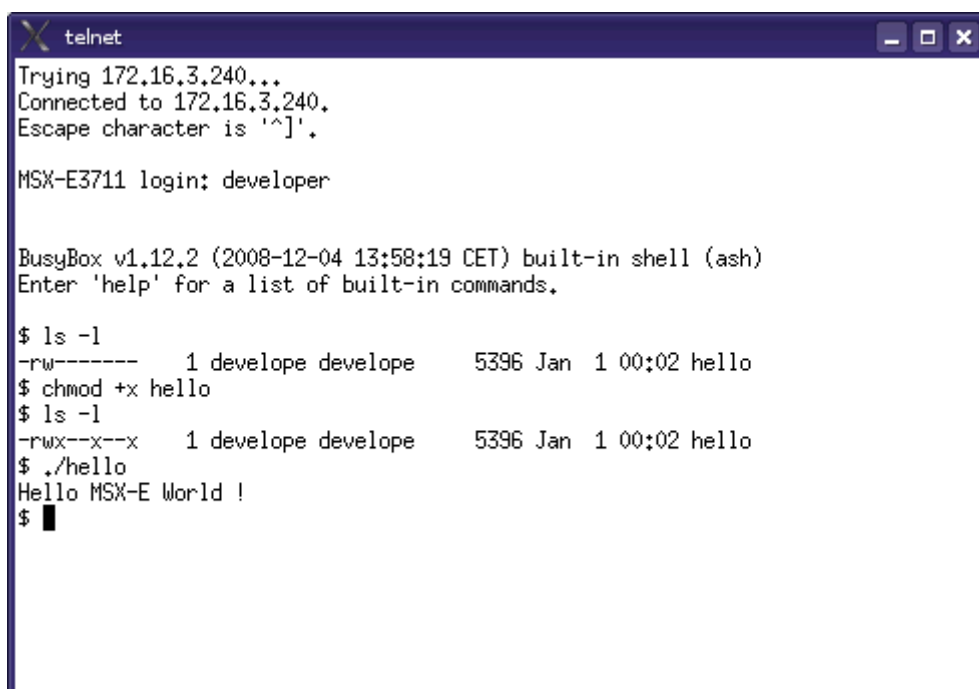
BusyBox v1.12.2 (2008-12-04 13:58:19 CET) built-in shell (ash)
Enter 'help' for a list of built-in commands.

$ ls -l
-rw----- 1 develop develop 5396 Jan 1 00:02 hello
$ chmod +x hello
$ ls -l
-rwx--x--x 1 develop develop 5396 Jan 1 00:02 hello
$
```

- Execute the program “hello” by using the following command in the TELNET input console:

```
$ ./hello
```

Fig. 4-9: Sample results on screen



```
telnet
Trying 172.16.3.240...
Connected to 172.16.3.240.
Escape character is '^]'.

MSX-E3711 login: developer

BusyBox v1.12.2 (2008-12-04 13:58:19 CET) built-in shell (ash)
Enter 'help' for a list of built-in commands.

$ ls -l
-rw----- 1 develop develop 5396 Jan 1 00:02 hello
$ chmod +x hello
$ ls -l
-rwx--x--x 1 develop develop 5396 Jan 1 00:02 hello
$ ./hello
Hello MSX-E World !
$
```


5 Saving data

5.1 Read only

By default there is no write access from the “MSX-E Live DVD” to the media (hard drive, USB, etc.), because the Live DVD only works with the RAM memory of the computer. This means, as soon as you do not use the Live DVD anymore, all data that you have generated until then, gets lost.

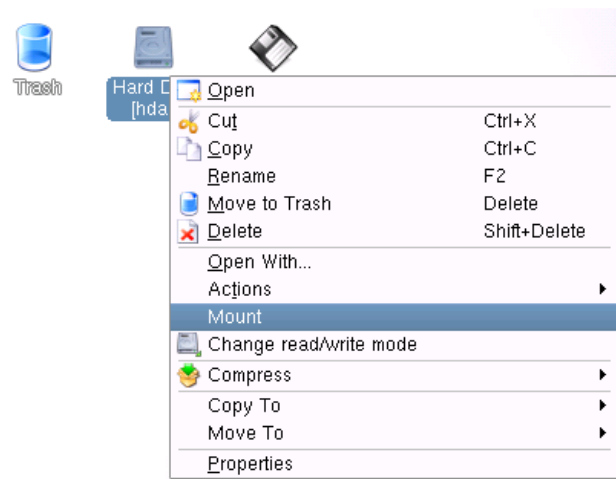
The following chapters describe how to save data on a USB-stick or a hard drive.

5.2 Saving data on the hard drive

- Select on the desktop the hard drive on which the data is to be saved.

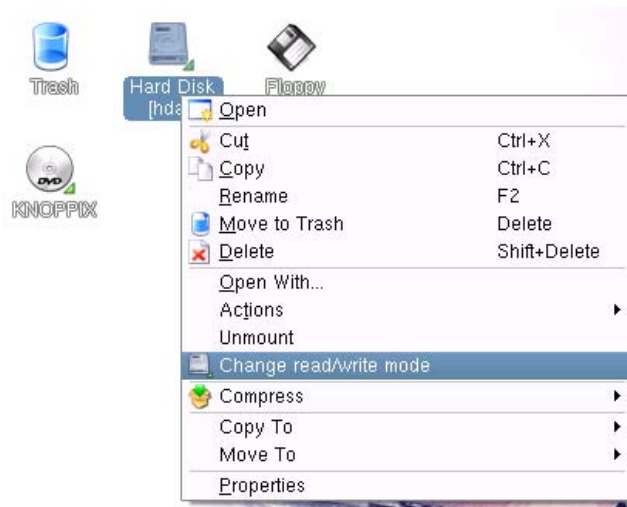
By default it is not mounted.

- In order to mount it, click on the hard drive icon and select “Mount”.



After this step, the write mode needs to be set.

- Click again on the hard drive icon and select "Change read / write mode".

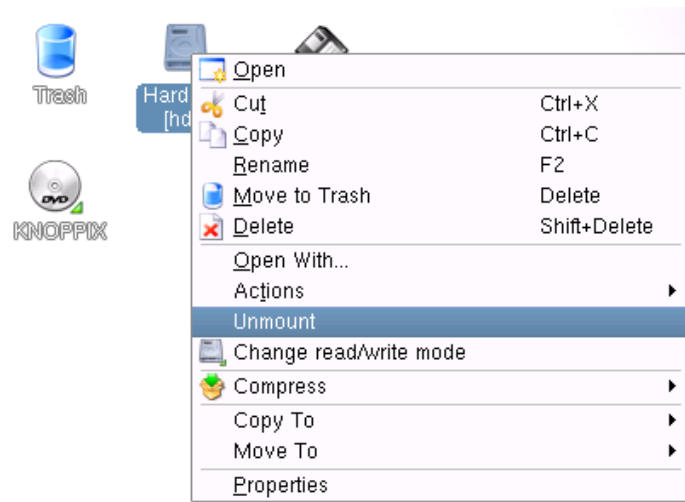


The following message will be displayed:



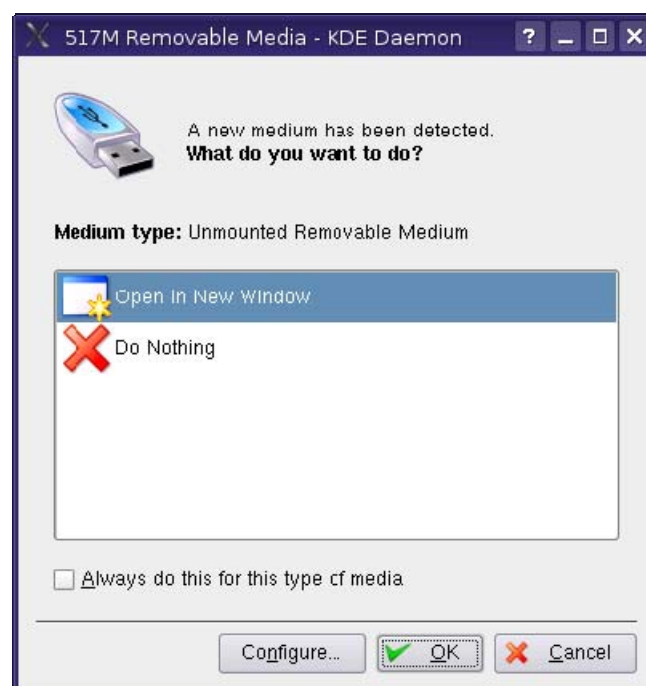
- Click on "Yes".
- Now you can click on the hard drive icon to open the hard drive and to copy your data.
- As soon as you have finished copying, close all the windows of the Explorer (e.g. Conqueror) that access to the hard drive.

- Click on the hard drive icon and select "Unmount".



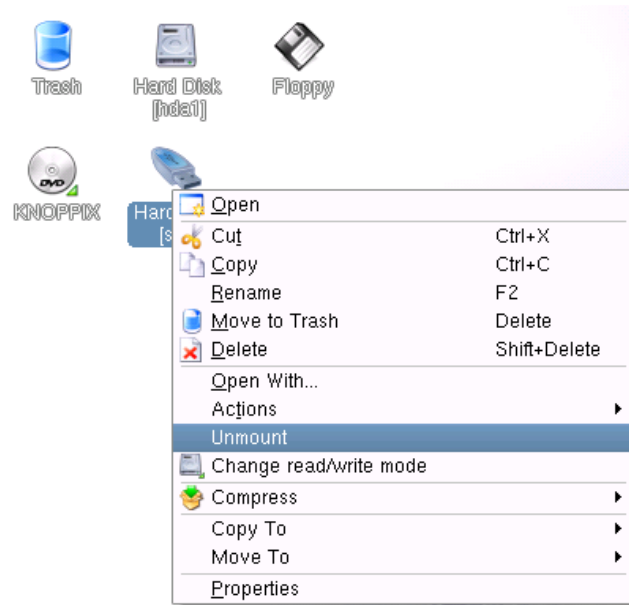
5.3 Saving data on a USB stick

- Insert your USB stick and wait a few seconds until Linux has detected it.



- Click on "OK" to open the file explorer.
- As soon as the copy is finished, close all the windows of the Explorer (e.g. Conqueror) that access the USB stick.

- Then click on the USB stick icon and select “Unmount”.

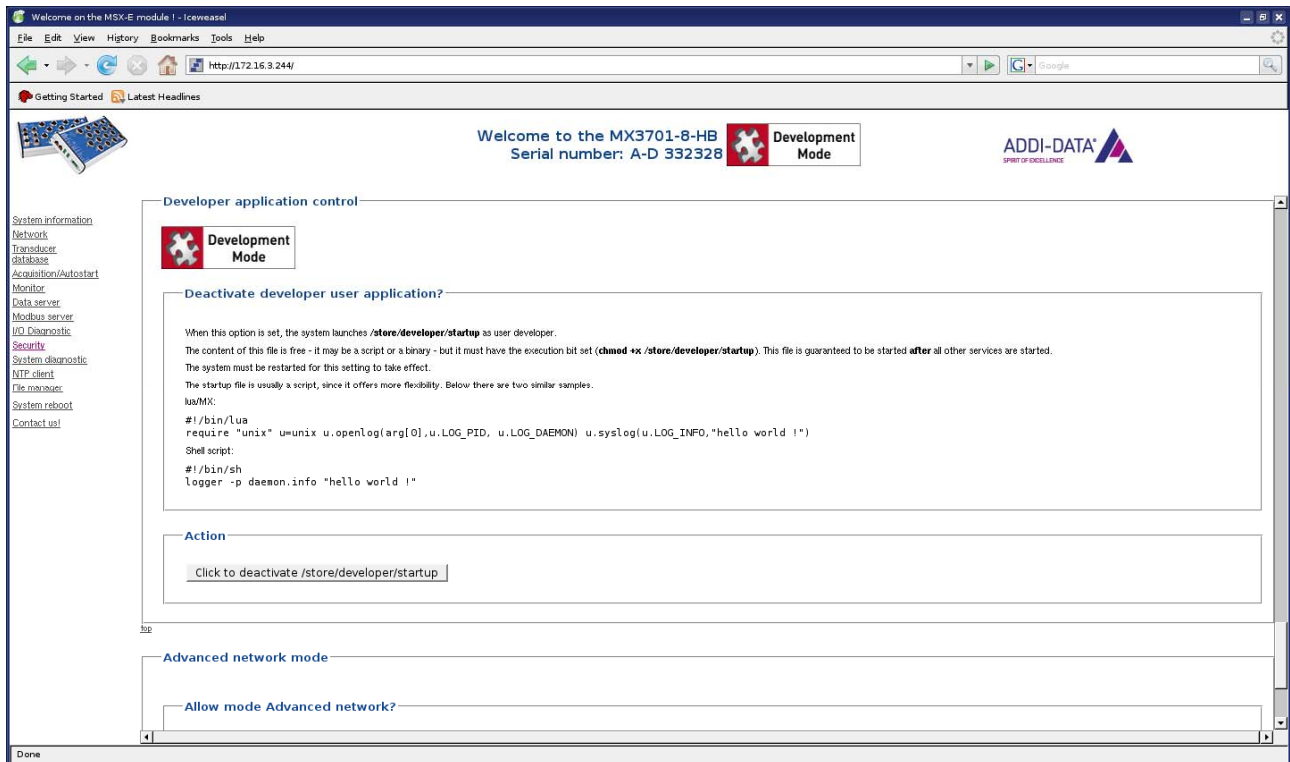


5.4 Starting your application automatically (autostart)

After booting, the user application can be started automatically on the module, if the user has uploaded the "startup" file (/store/developer/startup). The file content may be a script or the application itself.

The autostart option works independently of the Development Mode.

It is recommended to deactivate the Development Mode as soon as the development process is finished.



6 Appendix

6.1 Glossary

API

= application programming interface

API is a set of standard program functions and commands that allow any programmer to interface a program with another application.

BIOS

BIOS is a program that is usually stored in ROM and provides the fundamental services required for the operation of the computer. These services range from peripheral control to updating the time of day.

DHCP

=Dynamic Host Configuration Protocol

DHCP is a communications protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organisation's network. Using the Internet Protocol, each machine that can connect to the Internet needs a unique IP address, which is assigned when an Internet connection is created for a specific computer. Without DHCP, the IP address must be entered manually at each computer in an organisation and a new IP address must be entered each time a computer moves to a new location on the network. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

Ethernet

Ethernet is a system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems.

IP address

The IP address is a unique string of numbers separated by full stops that identifies each computer attached to the Internet. Usually it also has a version containing words separated by full stops.

Kernel

This is the most basic level or core of a computer operating system, which is responsible for resource allocation, file management and security.

Linux

The term "Linux" basically refers to an operating system "kernel". The kernel is a key component of a complete operating system.

Most of us use the name "Linux" to refer to a complete operating system. This one contains the kernel and a lot of other programs required for a useful operating system.

Linux is similar to the operating system UNIX and has all features you would expect in a modern fully-fledged UNIX, including true multitasking, virtual memory, shared libraries, demand loading, shared copy-on-write executables, proper memory management, and multistack networking including IPv4 and IPv6.

Although originally developed for 32-bit x86-based PCs (386 or higher), today Linux also runs on different architectures, for example Motorola 68000, PowerPC, ARM, and MIPS.

SOAP

= Simple Object Process Protocol

SOAP is a protocol for exchanging XML-based messages over a computer network, normally using HTTP. SOAP forms the foundation layer of the Web services stack, providing a basic messaging framework that more abstract layers can build on.

There are several different types of messaging patterns in SOAP, but by far the most common is the Remote Procedure Call (RPC) pattern, in which one network node (the "client") sends a request message to another node (the "server") and the server immediately sends a response message to the client. Indeed, SOAP is the successor of XML, RPC, though it borrows its transport and interaction neutrality and the envelope/header/body structure elsewhere, probably WDDX.

TCP/IP

= Transmission Control Protocol/
Internet Protocol

TCP/IP is a family of network protocols and therefore often just referred to as Internet protocol. The computers that are part of the network are identified via their IP addresses. UDP is another transport protocol that belongs to the core group of this protocol family.

6.2 Index

autostart 46
broadcast address 28
configuration file 30
default gateway address 28
Development Mode 7
development tools 33
DHCP 26
ECLIPSE 34
Embedded Linux
 root rights 10
Ethernet 25
glossary 47
IP address 25
Kernel mode 8
levels 8
Linux console 32
MSX-E Live DVD 14, 21
 quitting the DVD 22
 starting the DVD 22
name server address 29
network mask 27
programming steps 10
samples 36
saving data
 hard drive 42
 USB stick 44
system requirements 14, 19
TCP/IP 25
TELNET 31
User mode 8

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