Getting Started with the MDK

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Summary

This document provides an introduction to the MicroBlaze Development Kit (MDK).

MDK Contents

The MicroBlaze Development Kit is distributed as a single media installable CD image. You may have obtained the CD image in form of an actual physical media carrier or you may have obtained it as a file downloaded from Xilinx.com.

The components of the Xilinx MDK are:

- Hardware IP for the MicroBlaze processor and its peripherals
- Microprocessor Development Tools (MDT)
- Documentation
- Design Examples

The Xilinx MDK does not include printed documentation material. Please refer to the **Documentation** section for the included electronic documents. Also not included, but available as separate products are an FPGA development board and the Xilinx FPGA implementation tools ISE 4.1i. Please see the **Requirements** section, and the **Development Boards** section for further details.

Requirements

Other products are required in addition to the Xilinx MDK:

- Xilinx ISE 4.2i
    - The Xilinx FPGA design implementation tools ISE 4.2i is required to implement embedded designs generated with the tools in the MDK.
    - Several MDT applications from the Xilinx MDK invoke functionality delivered with ISE4.2i
    - Updates to ISE4.2i including service packs are available at **http://support.xilinx.com/support/techsup/sw_updates**
- Development Board
    - To test MicroBlaze on an FPGA, a development board is required. It must contain a Xilinx FPGA and several other components as well as standard download, configuration and debug connectors

Supported Platforms

Operating Systems

The Xilinx MDK is available for the following operating system platforms:

- Windows NT4.0, 2000, 98SE, ME
- Solaris 2.7 (with patches), 2.8

Xilinx FPGA Families

The Xilinx MDK supports designing MicroBlaze embedded processor systems for several FPGA families

- Xilinx Spartan II FPGAs (XC2S50 or larger devices)

- Xilinx Virtex/E FPGAs (XCV50 or larger devices)
- Xilinx Virtex II FPGAs (XC2V250 or larger devices)

Installation on Windows

This section provides an abbreviated summary of the installation process of the Xilinx MDK on the Windows platform. Please refer to ***<microblaze_install_dir>\doc\installation.htm*** after installing the Xilinx MDK for detailed installation and setup instructions.

Required Files

The following files are required to install the MDK on the Windows platform. Please copy them to a temporary directory on your PC's file system:

- ***mdk_2_2_win.exe*** (MDK install image)

Installing Xilinx MDK

- Run the Xilinx MDK installer by executing ***mdk_2_2_win.exe***
- The MDK installer will guide you through the installation and setup process
- The default MicroBlaze installation directory is ***c:\MicroBlaze***

Notes: For Users of MDK version 1.9

1. Cygwin is no longer required. The MDK 2.2 includes its own portability layer.
2. Before installing version 2.2, the previous version must be uninstalled.
3. Please note that uninstallation of the previous version will not remove directories or files that have been changed. Moreover, installation of the new version will not overwrite any of these changed files with the new versions. Hence, it is the user's responsibility to remove these directories before the new installation. For e.g., if any of the board design examples were run in the old version, files would have been created in the examples directory. Hence the examples directory will not be removed when uninstalled. The user must physically remove these directories if the new version of the examples need to be installed.

Installation on Solaris

This section provides an abbreviated summary of the installation process of the Xilinx MDK on the Solaris platform. Please refer to ***<microblaze_install_dir>/doc/installation.htm*** after the Xilinx MDK installer has finished for detailed installation and setup instructions.

Required Files

The following files are required to install the MDK on the Solaris platform. Please copy them to a temporary directory on your workstation's file system:

- ***mdk_2_2_sol.zip***(MDK install image)
- ***install.sh*** (Script for installing MicroBlaze)

Installing Xilinx MDK

- From within the temporary directory execute ***install.sh <microblaze_install_dir>*** where <microblaze_install_dir> is an optional argument
- By default ***install.sh*** installs MicroBlaze in ***$HOME/MicroBlaze***

Directory Structure

The installed image of the Xilinx MDK is organized into the following directories. It is assumed that the root of the MDK image is located at

> **<microblaze_install_dir>** (installed MDK root)
>> **bin** (MDT executable applications)
>> **data** (option files)
>> **doc** (MDK documentation)
>> **drivers** (device drivers for MicroBlaze peripherals)
>> **examples** (design examples including Makefiles for automatic implementation)
>> **hw** (MicroBlaze processor and peripheral hardware components)
>> **include** (Header files for C function libraries)
>> **lib** (libc and libm C function libraries; system function libraries)
>> **xygwin** (only on Windows platform)

The MDK installer has already set up your environment variables to include the MDT executable tools that reside in the **bin** directory.

The **data** directory contains option files for XMF.

All MDK related documentation resides in the **doc** directory. Please see the **Documentation** section for an overview.

Design examples of sample MicroBlaze processor systems and programs reside in **examples**. Please refer to the **Design Examples** section for further details.

The **hw** directory contains the untailored sources of the hardware IP of the MicroBlaze processor and its peripheral components.

System program functions and other library functions reside in the **include** and the **lib** directories.

xygwin is a portability layer that gets automatically installed on all Windows platforms.

Design Examples

The Xilinx MDK includes design examples of several MicroBlaze processor systems and programs that can run on the given MicroBlaze designs. The design examples can be used in their original, unmodified form to quickly implement a MicroBlaze system using the provided **Makefiles** or they can be used as a starting point from which users can implement modifications to arrive at user defined MicroBlaze systems.

Organization

Design examples are all located in **<microblaze_install_dir>/examples**. The actual design examples are organized into directories according to the target development board they are designed for (e.g. **<microblaze_install_dir>/examples/Avnet_VirtexE100**). Each target board directory contains a **data** directory with board specific information.

For each target board there may be one or more different MicroBlaze reference systems available, each assigned to its own project directory (e.g. **<microblaze_install_dir>/examples/Avnet_VirtexE100/hello_world**).

Each project directory (specific system for a specific board), provides a **Makefile** with different implementation targets.

Documentation

Please refer to the **readme.htm** document available in every project directory for a detailed description of each MicroBlaze system, an overview of the provided sample programs, and their implementation, download and debug process.

Implementation

To implement any given design example, invoke the *Makefile* by running *make* from within any design example project directory:

```
cd <microblaze_install_dir>/examples/<board_directory>/<project_directory>
make
```

The default make target (no arguments given to *make*) on the provided Makefiles is set up to provide a list of available targets.

Please note that on Windows the *make* application is provided through the portability utilities and that you may need to use a xygwin shell application (window) to run it. This can be brought up through **Start->Programs->Xilinx MicroBlaze 2.2->Xygwin Shell.**

Documentation

The Xilinx MDK documentation is organized into several individual components all of which are accessible from the MDK documentation directory (*<microblaze_install_dir>/doc*).

Release Notes Page (readme.htm)

Important information applicable only to one specific release of the MDK or amendments to the general MDK documentation are covered in the release notes.

Product Home Page (microblaze.htm)

The installed product home page serves as a starting point from where the contents of the MDK can be explored.

Documents Page (documents.htm)

The product user manuals are the most detailed documents included in the MDK. They are organized as follows:

- Getting Started with the Xilinx MDK (*getstarted.pdf*)
- MicroBlaze Hardware Reference Guide (*hwref.pdf*)
- MicroBlaze Software Reference Guide (*swref.pdf*)

The Hardware Reference Guide covers the MicroBlaze architecture, the MicroBlaze bus interfaces, the MicroBlaze peripherals, as well as the creation of MicroBlaze processor systems. The Software Reference Guide covers the MicroBlaze development tools (MDT). It provides an overview of the MDT design flow and describes the functionality and invocation options provided by every MDT tool.

Examples Page (examples.htm)

The **Design Examples** included with the Xilinx MDK serve as quick start complete MicroBlaze processor systems and sample programs. Each design example directory comes with a document that describes the design details of each MicroBlaze system, explains how to build each system, and covers how to compile and run sample programs on each sample system. Please refer to the *readme.htm* documents in each of the design examples located at *<microblaze_install_dir>/examples*.

Support Page (support.htm)

Please refer to the information provided on the support page to learn about the technical product support available for MicroBlaze.

Development Boards

Several development boards are available from Xilinx partners. Current available boards include:

- Avnet Spartan-II Evaluation Kit (Part #: ADS-XLX-SP2-EVL)
- Avnet Virtex-E Evaluation Kit (Part#: ADS-XLX-VE-EVL)
- Memec Design Virtex-E Demo Board
- Memec Design Spartan-II Demo Board
- Memec Design Virtex-II MicroBlaze Board
- Digilent Spartan-IIE Board

Please contact your local authorized distributor to obtain any of these development boards.