

Getting Started with EDK

Summary

This document provides an introduction to the Xilinx Embedded Development Kit (EDK).

EDK Contents

The Embedded Development Kit is distributed as a single media installable CD image.

The components of the Xilinx EDK are:

- Hardware IP for the Xilinx embedded processors and its peripherals.
- Drivers, Libraries and a MicroKernel for Embedded Software Development.
- Embedded System Tools (EST).
- Documentation.

The Xilinx EDK 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 6.2i. Please see the “[Requirements](#)” section, and the “[Development Boards](#)” section for further details.

Requirements

Several other products are required in addition to the Xilinx EDK:

- Xilinx ISE 6.2i
 - ◆ The Xilinx FPGA design implementation tools ISE 6.2i are required to implement embedded designs generated with the tools of the EDK
 - ◆ Several EST applications from the Xilinx EDK invoke functionality delivered with tools in ISE 6.2i
 - ◆ Updates to ISE 6.2i including service packs are available at http://support.xilinx.com/support/techsup/sw_updates
- Development Board
 - ◆ To test your MicroBlaze or PowerPC system on an FPGA, you must have access to a development board which contains a Xilinx FPGA and several other components as well as standard download, configuration and debug connectors

Operating system specific requirements:

- Solaris and Linux
 - ◆ Bash shell

Supported Platforms

Operating Systems

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

- Windows 2000 (Service Pack 2)
- Windows XP
- Solaris 2.8/2.9
- Redhat Linux 7.3/8.0

Xilinx FPGA Families

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

- Xilinx Spartan-II FPGAs (XC2S50 or larger devices)
- Xilinx Spartan-IIE FPGAs
- Xilinx Spartan-III FPGAs
- Xilinx Virtex/E FPGAs (XCV50 or larger devices)
- Xilinx Virtex-II FPGAs (XC2V250 or larger devices)

The Xilinx EDK also supports designing MicroBlaze and PowerPC embedded processor systems for

- Xilinx Virtex-II Pro FPGAs

Development Boards

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

- Avnet Spartan-II Evaluation Kit
- Avnet Virtex-E Evaluation Kit
- Avnet Virtex-II Pro Evaluation Kit
- Digilent Spartan-IIE Board
- Memec Design Virtex-E Demo Board
- Memec Design Spartan-II Demo Board
- Memec Design Virtex-II MicroBlaze Board
- Memec Design Virtex-II Pro Board
- Xilinx ML300 Board
- Xilinx AFX Board

Please contact your local Avnet, Memec or any other authorized distributor to obtain any of these development boards.

Installation on Windows

This section provides a summary of the Xilinx EDK installation process on the Windows platform. Please refer to `<edk_install_dir>\doc\installation.htm` after installing the Xilinx EDK for detailed installation and setup instructions.

Registration

A software registration ID is required for installation. It can be obtained from <http://www.xilinx.com/ise/embedded/register.htm>. This requires logging in and providing Software Product Information (including Product ID). The Software Registration ID will then be e-mailed to the address provided during login.

Installing Xilinx EDK

- Insert the EDK Installation CD in your PC. The installer should automatically pop up.
- If the installation process does not start on its own, open the windows explorer and double click on **setup.exe** on the CD.
- The installation process will prompt you to obtain the registration ID.
- Once you have the registration ID, please continue to install the product.
- The default EDK installation directory is `c:\EDK` and can be changed to any other directory.
- The installation of EDK 6.2 requires uninstallation of all previous versions of EDK. The installer will uninstall all the components of previous installations before proceeding with the installation of EDK 6.2. This is a requirement only on Windows.

Note: Destination Directory can not have spaces in its name.

Environment Variables

EDK installer creates/modifies the following variables on the users machine. These variables are added to the system settings.

- ◆ **XILINX_EDK:** Set the value of this variable to the installation direction.
- ◆ **PATH:** Prefixes the PATH environment variable with
 - `%XILINX_EDK%\bin\nt`

In addition to these variable, the registry is updated with the following entries:

- ◆ `My Computer\HKEY_CURRENT_USER\SOFTWARE\Xilinx\EDK62`
- ◆ `My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Xilinx\EDK62`

Installation on Solaris

This section provides a summary of the Xilinx EDK installation process on the Solaris platform. Please refer to `<edk_install_dir>/doc/installation.htm` after the Xilinx EDK installer has finished for detailed installation and setup instructions.

Registration

A software registration ID is required for installation. It can be obtained from <http://www.xilinx.com/ise/embedded/register.htm>. This requires logging in and

providing Software Product Information (including Product ID). The Software Registration ID will then be e-mailed to the address provided during login.

Installing Xilinx EDK

- Insert the CD in your solaris machine.
- Change directory to the CD home.
- Execute *install_solaris.csh* to install the EDK on solaris
- The installer prompts for the Registration ID, which you should have obtained from web-site indicated above.
- The default directory for installation is *\$(HOME)/EDK*, but can be changed during installation.

Environment Variables

EDK installer creates a *setup.csh* file in the installation directory. This file setups the environment for using the EDK tools.

- ◆ **\$XILINX_EDK**: Set the value of this variable to the installation direction.
- ◆ **\$PATH**: Prefixes the \$PATH environment variable with
 - *\$XILINX_EDK/bin/sol*
 - *\$XILINX_EDK/gnu/microblaze/sol/bin*
 - *\$XILINX_EDK/gnu/powerpc-eabi/sol/bin*
- ◆ **\$LD_LIBRARY_PATH**: Prefixes the \$LD_LIBRARY_PATH environment variable with
 - *\$XILINX_EDK/bin/sol*

Note: While executing the script, the user has to make sure that the *\$XILINX_EDK/bin/sol* appears before *\$XILINX/bin/sol* in the *\$LD_LIBRARY_PATH* variable.

Installation on Linux

This section provides a summary of the Xilinx EDK installation process on the Linux platform. Please refer to *<edk_install_dir>/doc/installation.htm* after the Xilinx EDK installer has finished for detailed installation and setup instructions.

Registration

A software registration ID is required for installation. It can be obtained from <http://www.xilinx.com/ise/embedded/register.htm>. This requires logging in and providing Software Product Information (including Product ID). The Software Registration ID will then be e-mailed to the address provided during login.

Installing Xilinx EDK

- Insert the CD in your linux machine.
- Change directory to the CD home.
- Execute *install_linux.csh* to install the EDK on solaris
- The installer prompts for the Registration ID, which you should have obtained from web-site indicated above.

- The default directory for installation is $\${HOME}/EDK$, but can be changed during installation.
- Xilinx Microprocessor Debugger (XMD) (*debug tool provided in EDK*) requires the installation of the parallel port driver provided with EDK. This requires the installation to be done as **root**. The EDK installer will prompt the user for installation of the parallel port driver.
- Installation of the parallel port driver can be done at a later stage. For more information read $\${CDHOME}/lin/xilinx_pp/readme.txt$.

Environment Variables

EDK installer creates a **setup.csh** file in the installation directory. This file setups the environment for using the EDK tools.

- ◆ **\$XILINX_EDK**: Set the value of this variable to the installation direction.
- ◆ **\$SPATH**: Prefixes the \$SPATH environment variable with
 - $\$XILINX_EDK/bin/lin$
 - $\$XILINX_EDK/gnu/microblaze/lin/bin$
 - $\$XILINX_EDK/gnu/powerpc-eabi/lin/bin/$
- ◆ **\$LD_LIBRARY_PATH**: Prefixes the \$LD_LIBRARY environment variable with
 - $\$XILINX_EDK/bin/lin$

While executing the script, the user has to make sure that the $\$XILINX_EDK/bin/lin$ appears before $\$XILINX/bin/lin$ in the $\$LD_LIBRARY_PATH$ variable.

Third Party Tools

The Xilinx EDK is designed to work with some third party tools that you can separately obtain and set up. This section provides some information on these tools.

WindRiver XE

The EDK is designed to work with the WindRiver XE toolset. These tools may be obtained from http://www.xilinx.com/xlnx/xil_entry2.jsp?sMode=login&group=windriver

IBM(R) CoreConnect(TM) Toolkit

The EDK is designed to integrate seamlessly with the IBM(R) CoreConnect(TM) Toolkit. This toolkit is not included with the EDK, but is required if bus functional simulation is desired.

The toolkit provides a number of features which enhance design productivity. To obtain the toolkit, a license for the IBM CoreConnect Bus Architecture must be obtained. Licensing CoreConnect provides access to a wealth of documentation, Bus Functional Models, Hardware IP and the toolkit.

Xilinx provides a Web-based licensing mechanism that allows you to obtain the CoreConnect from the Xilinx website. To license CoreConnect, use an internet browser to access: http://www.xilinx.com/ipcenter/processor_central/register_coreconnect.htm Once the request has been approved (Typically takes 24 hours), an email granting access to the protected web site will be sent out. The toolkit may then be downloaded.

For further documentation on the CoreConnect Bus Architecture, refer to IBM's CoreConnect website: <http://www.ibm.com/chips/products/coreconnect>

The CoreConnect license may also be obtained directly from IBM.

There are some differences between the IBM CoreConnect and the Xilinx implementation of CoreConnect. These are described in the Embedded Processors IP HandBook. Refer to the *On-Chip Peripheral Bus V2.0 with OPB Arbiter* for differences in the OPB bus, the *Processor Local Bus (PLB) V3.4* for differences in the PLB bus, and *Device Control Register Bus (DCR) V2.9* for differences in the DCR bus.

Directory Structure

The installed image of the Xilinx EDK is organized into the following directories. It is assumed that the root of the EDK image is located at `<edk_install_dir>`.

<code><edk_install_dir>/</code>	(installed EDK root)
<code>bin/</code>	(EST application executables)
<code>boards/</code>	(Consist of the board description files)
<code>doc/</code>	(EDK documentation)
<code>data/</code>	(Contains the default option files required by ISE tools)
<code>gnu/</code>	(EST GNU Tools)
<code>hw/</code>	(MicroBlaze processor and peripheral hardware components)
<code>sw/</code>	(Drivers, BSP's and software services [Xilinx microkernel])
<code>systems/</code>	(Contains Reference systems [user templates in EDK 3.2])
<code>xygwin/</code>	(only on Windows platform. Emulation of unix shell.)

The EDK installer has already set up your environment variables to include the executables of the EST tools that reside in the **bin** directory.

The **boards** directory provides some sample board files, which are required by the Base System Builder for creating embedded systems.

All EDK related documentation resides in the doc directory. Please see the "[Documentation](#)" section for an overview.

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

The **sw** directory contains the drivers required by the IP installed in the **hw** directory, the board support packages. It also contains the source for various modules of the Xilinx microkernel, such as the Networking library and the file system. Software libraries and initialization files are also contained in the **sw** directory.

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

Documentation

The Xilinx EDK documentation is organized into several individual components, all of which are accessible from the EDK documentation directory (`<edk_install_dir>/doc`):

HTML Documentation

Product Home Page ([index.htm](#))

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

What's New Page ([whatsnew.htm](#))

Information about the new features available in EDK 6.2i

Installation Page ([installation.htm](#))

Instructions to install, uninstall and perform required EDK environment setup for the supported operating systems.

Documents Page ([documents.htm](#))

The product user manuals are the most detailed documents included in the EDK. They include information about:

- *Getting Started with the Xilinx EDK*
- *Platform Studio User Guide*
- *Tools and Processor IP Reference Guides*
- *Processor Reference Guides*

Support Page ([support.htm](#))

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

EDK Documentation (Acrobat files)

The EDK Documentation is classified into four categories:

- Getting Started with the Xilinx EDK
- Platform Studio User Guide
- Tools and Processor IP Reference Guides
- Processor Reference Guides

The information in the documents has been arranged in such a way as to help out all the customers right from those who are new to Xilinx EDK and to embedded systems right upto experienced EDK developers, looking for specific information.

Getting Started with Xilinx EDK

The Getting Started Guide (i.e the current document) achieves the following :

1. Describes all the required steps for installation for various platforms
2. Indicates the third party tools, which could be used along with Xilinx EDK to increase customer productivity.
3. Information about the documentation available in the EDK package.

4. Provides some miscellaneous information, which quite a few customers should be aware of before using the EDK.

Platform Studio User Guide

The EDK provides documentation, which can be used by customers to help design/debug their hardware/software systems. The Platform Studio User Guide covers wide variety of topics including :

- Creating a basic system using MicroBlaze Processor (Both hardware as well as software)
- Creating a basic system using PowerPC Processor (Both hardware as well as software)
- Detailed information on usage of various components of the Xilinx MicroKernel such as the XilKernel, XilNet, XilFile and XiMFS. These are libraries provided as a part of EDK, which the customers can use for their software systems.
- Discussion on various software flows available through the EDK
- An important part of user design is debugging and profiling of their system. The various techniques used for downloading, debugging and profiling an embedded system are described in the EDK Profiling/Debugging chapter in the Platform Studio User Guide.
- EDK also provides techniques for tying in simulators for simulation of EDK systems. To setup the simulation for your designs, read the chapter on Simulation Techniques from the Platform Studio User Guide.

First time users of EDK should definitely read the chapters concerning creation of basic systems. For detailed information about options and capabilities of individual tools/IPs/drivers, users are expected to refer to the Reference Guides.

Tools and IP Reference Guides

EDK provides reference guides for Tools, which cover the basic usage of the various tools provided in EDK

Tools Reference Guides

- Embedded Software Tools Reference Guide
This guide provides detailed information about all the tools available in the EDK suite, including Xilinx Platform Studio, Xilinx Microprocessor Debugger, Library Generator, Simulation Generator, Platform Generator, GNU compiler and debuggers etc. This guide also details the Address and Interrupt management techniques.
- IBM PowerPC ISS Reference Guide
EDK also provides a third party tool for simulation of PowerPC systems. The documentation for the same is included in a separate reference guide ([iss_ug.pdf](#))

Libraries and Drivers Reference Guide

- Libraries Reference Guide
The libraries reference guide details all the information about the libraries shipped as a part of the EDK. This guide details the API and hence will be required by customers who intend to use the libraries provided. The document also discusses the Standalone BSP in details. There is an introduction to driver documentation available in the Libraries Reference Guide.

- Drivers Reference Guide

The drivers reference guide provides detailed API and other information for each driver provided in the EDK installation.

IP Reference Guides

- Processor IP Reference Guide

Processor IP is an important part of the Xilinx EDK distribution. The documentation for the same consists of individual datasheets with important information about parameters and port connections for each IP. This information is required by hardware designers for designing their system. For systems created through the Base System Builder, some of the basic connections are done by the Wizard, but for advanced connections and other peripherals, user needs to refer to the Processor IP Reference Guide.

- User Core templates Reference Guide

This document deals primarily with the creation and use of a user core that is intended to be included as part of the embedded processor subsystem. Using the CreateIP wizard, some of the peripheral IPs can be created.

Processor Reference Guide

PowerPC

- PowerPC Reference Guide

This document is intended to serve as a stand-alone reference for application and system programmers of the PowerPC® 405D5 processor. The document also contains the ABI and the instruction set architecture of PowerPC405.

- PowerPC Block Manual

This manual details the Xilinx implementation of PowerPC. It is targeted towards hardware and system designers.

MicroBlaze

- MicroBlaze Reference Guide

This document is intended to serve as a stand-alone reference for application and system programmers of the MicroBlaze processor. The detailed ISA and the ABI for the MicroBlaze processor is also described in this document.

Other Information

Example UCFs (User Constraint Files)

There are certain IPs such as the PLB RapidIO LVDS and the OPB PCI , which need certain example UCF to be available in the user's project area. When such IPs are used in an EDK project, tools will give out an ALERT message :

```
An example UCF is available for this core and must be modified for use
in the system. Please refer to the EDK Getting Started guide for the
location of this file.
```

The UCF file for the IP can be found at

```
$XILINX_EDK/hw/XilinxProcessorIPLib/pcores/<peripheral_name>/data/
```

where \$XILINX_EDK is the installation area.

Setting Up Simulation Environment

For simulation of embedded designs, it is required that you setup your simulation environment. This is required to be done every time you install a new release or a service pack of EDK. For information about setting up simulation environments, refer to the Chapter on Simulation Techniques in the Platform Studio User Guide.

Using EDK with Chipscope Pro

EDK enables hardware designers to create processor systems rapidly, using the Chipscope Pro CoreConnect Bus Analyzer cores and the Virtual IO (VIO) core. EDK supports the following Chipscope Pro cores :

- chipscope_icon
- chipscope_opb_iba
- chipscope_plb_iba
- chipscope_vio

In order to instantiate these cores in an EDK design, users must have a valid Chipscope Pro Installation. An Eval version (60 days) of Chipscope Pro is provided on the EDK CD to make this easy. After the Eval period is over, users can continue to instantiate the Chipscope Cores and create designs. But in order to use the Chipscope Analyzer GUI after the Eval period, users have to obtain a full license of Chipscope Pro from Xilinx or Xilinx distributors.

For more information please visit : <http://www.xilinx.com/chipscope>. Chipscope Pro (Eval version) is available on the EDK CD.