



# Getting Started with EDK

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## 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
- Platform Studio tools
- Software Development Kit (Eclipse Based IDE)
- GNU Compiler and Debugger for C development for MicroBlaze™ and PowerPC™
- Documentation
- Sample projects

The Xilinx® EDK does not include printed documentation material. 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 package ISE™ 7.1i. Refer to the [“Requirements”](#) section and the [“Development Boards”](#) section for further details.

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## Requirements

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

- Xilinx® ISE 7.1i Service Pack 1
  - ◆ The Xilinx® FPGA design implementation tools ISE 7.1i (BaseX or Foundation) are required to implement embedded designs generated with the Platform Studio tools of the EDK.
  - ◆ Several tools from the Xilinx® EDK invoke functionality delivered with tools in ISE 7.1i.

**Note:** Updates to ISE 7.1i including service packs are available at [http://support.xilinx.com/support/techsup/sw\\_updates](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 Enterprise Linux 3.0

**Note:** Environment LD\_ASSUME\_KERNEL=2.4.1 should be set for tools to work under Redhat Enterprise Linux 3.0

### 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® Spartan-3e 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
- Xilinx® Virtex4 FPGAs

## Development Boards

Several development boards are available from Xilinx partners. Xilinx boards that are currently available include:

- Xilinx® ML300 Board
- Xilinx® ML310 Board
- Xilinx® ML401 Board
- Xilinx® Spartan 3 Starter Kit
- Xilinx® AFX Board

Contact your local Xilinx® FAE for more information about the boards mentioned above.

Contact your local Avnet, Memec, Nu Horizons or other authorized distributor to obtain any partner board.

## Installation on Windows

This section provides a summary of the Xilinx® EDK installation process on the Windows platform.

### Registration

You must have a software registration ID to install EDK. You can get one online at <http://www.xilinx.com/ise/embedded/register.htm>. You must log in and provide Software Product Information (including Product ID). The Software Registration ID is then e-mailed to the address you provided during login.

### Installing Xilinx EDK

1. Insert the EDK Installation CD in your PC. The installer opens automatically.  
If the installation process does not start on its own, open Windows Explorer and double-click `setup.exe` on the CD.

The installation process prompts you to obtain the registration ID.

2. Once you have the registration ID, continue to install the product.

If the environment variable `XILINX_EDK` is set, the default directory for installation is the value of the variable `%XILINX_EDK%`. Otherwise, the default EDK installation directory is `c:\EDK`. You can change this to any other directory.

**Note:** The destination directory cannot have spaces in its name.

### Environment Variables

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

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

Xilinx® EDK tools require the Cygwin tools distributed by Red Hat. A copy of these tools is distributed with Xilinx® EDK installation. When you run Xilinx® Platform Studio (XPS), Xilinx® Platform Studio Software IDE, or Xilinx® Shell, your registry is checked for the entry `My Computer\HKEY_CURRENT_USER\SOFTWARE\Cygnus Solutions\Cygwin`. If a compatible version of Cygwin is found pre-installed on your machine, it is used by the Xilinx® EDK tools. Otherwise the registry is set up to point to the Cygwin tools distributed in the Xilinx® EDK installation area.

## Installation on Solaris

This section provides a summary of the Xilinx® EDK installation process on the Solaris platform.

### Registration

You must have a software registration ID to install EDK. You can get one online at <http://www.xilinx.com/ise/embedded/register.htm>. You must log in and provide Software Product Information (including Product ID). The Software Registration ID is then e-mailed to the address you provided during login.

### Installing Xilinx EDK

1. Insert the CD in your Solaris machine.
2. Change the directory to the CD home.
3. Run `setup` to install EDK.

The installer prompts for the Registration ID that you obtained from the web site indicated above.

**Note:** If the variable `$XILINX_EDK` is set, its value is used as the default directory for installation. If the value of the variable is not set, the default directory for installation is `$HOME/EDK`. You can change the destination directory during installation.

### Environment Variables

The EDK installer creates `settings.csh` and `settings.sh` files in the installation directory. These files set up 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, 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.

### Registration

You must have a software registration ID to install EDK. You can get one online at <http://www.xilinx.com/ise/embedded/register.htm>. You must log in and provide Software Product Information (including Product ID). The Software Registration ID is then e-mailed to the address you provided during login.

### Installing Xilinx EDK

1. Insert the CD in your Linux machine.
2. Change the directory to the CD home.
3. Run `setup` to install EDK.

The installer prompts for the Registration ID that you obtained from the web site indicated above.

**Note:** If the variable `$XILINX_EDK` is set, its value is used as the default directory for installation. If the value of the variable is not set, the default directory for installation is `$HOME/EDK`. You can change the destination directory during installation.

### Environment Variables

EDK installer creates `settings.csh` and `settings.sh` files in the installation directory. These files set up 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/lin`
  - `$XILINX_EDK/gnu/microblaze/lin/bin`
  - `$XILINX_EDK/gnu/powerpc-eabi/lin/bin/`
- ◆ **`$LD_LIBRARY_PATH`:** Prefixes the `$LD_LIBRARY_PATH` environment variable with `$XILINX_EDK/bin/lin`

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

## Third Party Tools

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.

### IBM(R) CoreConnect(TM) Toolkit

EDK is designed to integrate seamlessly with the IBM® CoreConnect™ 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 that enhance design productivity. To obtain the toolkit, you must have a license for the IBM CoreConnect Bus Architecture. 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 CoreConnect from the Xilinx website. You can license CoreConnect online at [http://www.xilinx.com/ipcenter/processor\\_central/register\\_coreconnect.htm](http://www.xilinx.com/ipcenter/processor_central/register_coreconnect.htm).

Once the request is approved, which typically takes 24 hours, you will receive an email granting access to the protected web site. You can then download the toolkit.

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

You can also get the CoreConnect license 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, where <edk\_install\_dir> is the location of the root of the EDK image.

Table 1: EDK directories

Directory	Description
<edk_install_dir>/	The installed EDK root.
bin/	EST application executables. The EDK installer has already set up your environment variables to include the executables of the EST tools that reside in the bin directory.
boards/	Board description files. The boards directory provides board files for Xilinx boards, which are required by the Base System Builder for creating embedded systems.
doc/	EDK documentation. All EDK-related documentation resides in the doc directory. Refer to “Documentation” on page 7 for an overview.
data/	Default option files required by ISE tools.
eclipse/	Platform Studio Software Development Kit [Eclipse based].
gnu/	EST GNU Tools.

Table 1: EDK directories (Continued)

Directory	Description
hw/	MicroBlaze processor and peripheral hardware components. The hw directory contains the untailed sources of the hardware IP of the MicroBlaze processor and its peripheral components.
java/	Java Runtime 1.4.2 required by SDK.
sw/	Drivers, BSP's and software services [Xilinx® MicroKernel]. 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.
third_party/	IBM Instruction Set Simulator.
cygwin/	Emulation of UNIX shell. Only on Windows platforms. cygwin is a portability layer that is installed on all Windows platforms automatically.
EDKexamples/	Sample projects.

## 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.

### EDK Documentation PDF 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 assist all users, from those who are new to Xilinx® EDK and embedded systems to 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

You can use the EDK documentation to help design/debug your hardware/software systems. The *Platform Studio User Guide* covers a wide variety of topics, including:

- Creating basic hardware and software projects.
- Detailed information on use of various components of the Xilinx® MicroKernel such as the XilKernel, XilNet, XilFile and XiMFS. These libraries are provided as a part of EDK, which you can use for your software systems.
- Discussion on various software flows available with EDK
- Techniques used for downloading, debugging and profiling an embedded system, as described in the EDK Profiling/Debugging chapter in the Platform Studio User Guide. An important part of user design is debugging and profiling of their system.
- Techniques for tying in simulators for simulation of EDK systems. To set up the simulation for your designs, refer to the “**Simulation in EDK**” chapter in the *Platform Studio User Guide*.
- Advanced topics such as Address and Interrupt Management, discussed in the *Platform Studio User Guide*.

First time users of EDK should read the chapters concerning creation of basic systems. For detailed information about options and capabilities of individual tools, IPs, and drivers, refer to the [Tools and IP References](#).

## Tools and IP References

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

### Tools Reference Manuals

- *Embedded Software Tools Reference Manual*  
This manual provides detailed information about all the tools available in the EDK suite, including Xilinx® Platform Studio (XPS), Xilinx® Microprocessor Debugger (XMD), Libgen, Simgen, Platgen, GNU compiler (GCC) and debuggers
- *IBM PowerPC ISS Reference Guide*  
EDK also provides a third party tool for simulation of PowerPC systems. The documentation for this is included in a separate guide, the *IBM PowerPC ISS Reference Guide*.

## Libraries and Drivers Reference Manuals

- *OS and Libraries Reference Manual*

This manual details all the information about the libraries shipped as a part of the EDK. It details the API and is required for customers who intend to use the provided libraries. The document also discusses the Standalone BSP in detail, and includes an introduction to driver documentation.

- *Driver Reference Guide*

This guide provides detailed API and other information for each driver provided in the EDK installation. It is arranged as a set of HTML documentation.

## IP Reference Guide

- *Processor IP Reference Guide*

Processor IP is an important part of the Xilinx® EDK distribution. Its documentation 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, refer to the *Processor IP Reference Guide*.

## Processor References

### PowerPC

- *PowerPC Processor 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 405 Processor Block Reference Guide*

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

- *PowerPC 405 Processor ISA Extensions for Virtex-4*

This is an addendum documentation listing the new instructions provided for the Fabric Co-processor Module interface in Virtex-4 FX FPGAs.

### MicroBlaze

- *MicroBlaze Processor 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 are also described in this document.

## Other Information

### Example User Constraint Files (UCFs)

There are certain IPs such as the PLB RapidIO LVDS and the OPB PCI, which need certain example UCF to be available in your project area. When such IPs are used in an EDK project, tools give out the following 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 set up your simulation environment. This is required every time you install a new release or a service pack of EDK. For information about setting up simulation environments, refer to the “**Simulation in EDK**” chapter of the *Platform Studio User Guide*.

### Third Party Tool Requirements

EDK tools support ModelSim PE/SE & NCSim LDV/IUS versions as supported by ISE 7.1i tools. The verification of EDK tools and Processor IP is done using the following:

- Modelsim 6.0
- NCSim IUS5.3 (for Windows Platforms)
- NCSim IUS5.4 (for Solaris and Linux Platforms)

### 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
- chipscope\_ila

In order to instantiate these cores in an EDK design, you must have a valid Chipscope Pro Installation. A 60-day evaluation version of Chipscope Pro for Windows platforms is provided on the EDK CD. The evaluation version of Chipscope uses the same registration ID as the EDK installer. After the evaluation period is over, you can continue to instantiate the Chipscope Cores and create designs, but in order to use the Chipscope Analyzer GUI after the evaluation period, you must obtain a full license of Chipscope Pro from Xilinx or Xilinx distributors.

For more information, refer to <http://www.xilinx.com/chipscope>.