

A stylized world map with a vibrant, multi-colored color scheme (purple, blue, green, yellow, red) against a dark blue background, showing the curvature of the Earth.

Getting Started with Synphony Model Compiler and Simulink for Microsemi FPGA Design

Microsemi and Synopsys Inc.

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Installation Prerequisites and Overview

For Synopsys Symphony Model Compiler (SMC)

Prerequisites: Install the recommended tools used in this documents:

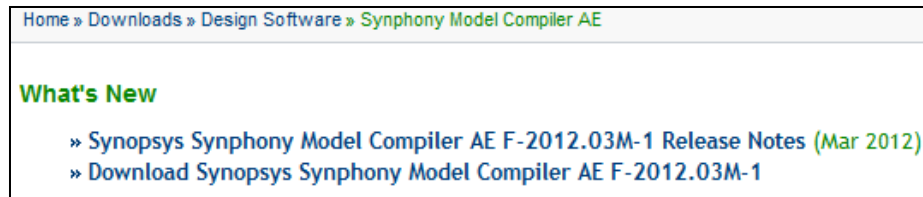
- a) Windows 7, 64-bit (other OS are supported, see SMC release notes)
- b) Libero
- c) Simulink (see prerequisites for version and configuration)

Overview of installation steps:

1. Download SMC
2. Install/Update MATLAB/Simulink to correct configuration
3. Install Visual Studio C++ (free download from MSFT)
4. Install license server and SMC license (from Microsemi)
5. Install SMC into Simulink
6. Verify installation & online documentation

1. Download SMC

- Download SMC from MicroSemi DSP download page
 - <http://www.actel.com/download/software/dsp/default.aspx>
- Optionally download release notes or user manual (these are also included in the SMC installation)



- Key features of Actel/Microsemi edition listed below

Features / Release	SMC AE 2012.03 (Actel Edition)	SMC 2012.03
Target Support	Microsemi-only All families	ASIC & Other FPGA
High-Level Signal Processing IP Library	Yes	Yes
C-Output	Yes	Yes
HLS Subsystem	Yes	Yes
RTL Encapsulation	Yes	Yes

2. Simulink Prerequisites

- Install MATLAB/Simulink 2011B 64-bit version
 - Required modules :
 - MATLAB
 - Simulink
 - Fixed-Point Toolbox
 - Signal Processing Toolbox
 - Simulink Fixed-Point
 - DSP System Toolbox
- Versions other than 2011b will work (including 32-bit). See SMC release notes for details.

The following table lists the recommended versions of other tools that you can use with the Symphony Model Compiler software. The terms are explained below:

- Recommended
Tested with this version combination; feature development synchronized with features in these versions.
- Supported
Some tests run with this version combination; some features may not be supported.
- Compatible
Minimal or no testing with this version, but should be generally compatible; may require minor workarounds. Some features might not be supported.

	Recommended	Supported	Compatible
The Mathworks Tools	7.12 (2011A) 7.11 (2010B)	7.13 (2011B)	7.10 (2010A) 7.9 (2009B)
FPGA Logic Synthesis	E-2012.03	E-2011.09	Older and newer versions

3. Install Visual C++ w/64-bit Libraries

- Download and install VC++ 2010 Express (required for 32-bit & 64-bit OS)
 - <http://www.microsoft.com/visualstudio/en-us/products/2010-editions/visual-cpp-express>
- Download and install MSFT Windows 7 SDK (required only for 64-bit OS)
 - <http://www.microsoft.com/en-us/download/details.aspx?id=8279>
- See MathWorks website for details (example below)

Windows (64-bit)

For the 64-bit Windows platform, a C compiler is not supplied with MATLAB. Free downloads are available that are suitable for most users. To get a C compiler and support libraries, install the following downloads in order:

 **Download 1: Microsoft Visual C++ 2010 Express**

 **Download 2: Microsoft Windows SDK 7.1**

4. Obtain and Install SMC License

- Obtain SMC license from Microsemi
 - <https://www.actel.com/portal/default.aspx?r=1>.
 - You will receive results in a license.dat file with SMC license features
- Download license daemons from Microsemi
 - <http://www.actel.com/products/software/libero/licensing.aspx#daemons>

- Follow instructions on p17 in Libero Install Guide
- http://www.actel.com/documents/install_ug.pdf
- The license.dat file also includes instruction on how to setup the license server and set environment variables

Installing a Server-Based Node-Locked License for Symphony Model Compiler AE, Symphony HLS AE or Synplify DSP AE

Note: Installation and setup of this license is different from other Microsemi licenses.

Install Symphony Model Compiler AE software before installing this license file.

A Symphony Model Compiler AE license is a "server based node locked" license. If your PC has a license manager running, it is important to turn off the license manager before proceeding. Visit <http://www.flexerasoftware.com/support.htm#acresso> and consult the FLEXnet Publisher Lmgrd and Utilities Manual for installation instructions.

INSTALLING AND MANAGING LICENSE SERVER (Requires Administrator Access)

1. On the SERVER machine, create a folder for the license file and executables and save the license.dat to this folder. Microsemi recommends **c:\flexlm**.
You can save license.dat with another name if one already exists (such as symphony_license.dat).
2. Download the required license manager daemons for your server platform from <http://www.actel.com/products/software/libero/licensing.aspx#daemons>. In the License Server Daemons section, select the Windows daemon. Microsemi recommends placing these files into the same location as the license.dat file.
3. Open license.dat using any editor. SERVER & VENDOR lines must be edited.
4. Edit the SERVER line by replacing <put.hostname.here> with your machine Hostname. To find computer name: Start > Control Panel > Performance and Maintenance > System > Computer Name tab.
5. Edit the port number(1702) in the SERVER line, if necessary, to an unused port.

5. SMC Installation (page 1)

1. Run the smc executable (from step 1) and follow the instructions and finish the installation.



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Application

78,277 KB

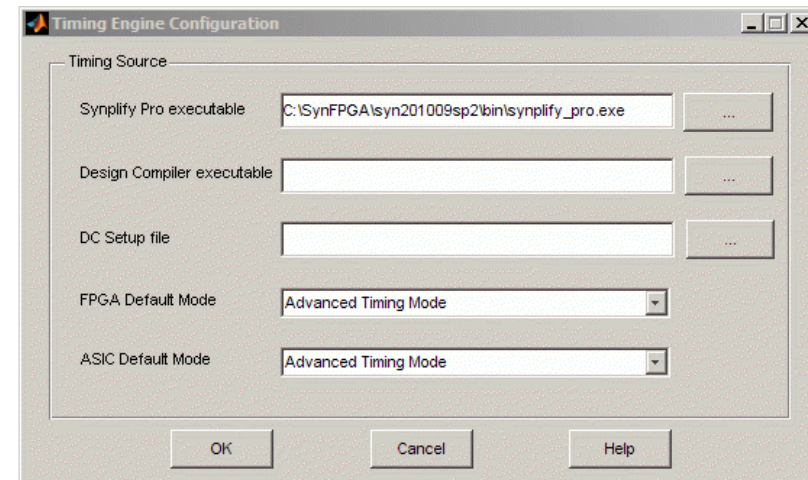
1. Start MATLAB and at command prompt:
 - a) CD to the install directory created by the previous step (default: C:\Synopsys\synphony_XXX)
 - b) Run the setup script in the mathworks subdirectory: >> setup

```
>> cd synphony_ae_201203M1/mathworks/  
>> ls  
help  setup.m  setup.p  toolbox  
  
>> setup
```

3. Enter parameters in the **Timing Engine Configuration** dialog box:

- Only need to specify Synplify Pro executable (ignore Design Compiler and DC Setup file)
- Recommend setting “FPGA Default Mode” to “Estimation Mode”
- You can it modify later using “syn_set_atm” at MATLAB command line

4. Click OK



5b. SMC Installation (page 2)

5. MATLAB will ask about setting up a MEX compiler. Answer yes.
6. You should see Visual C++ in the list of available compilers (see step #3). Select this option.
7. Confirm the selection.

```
...
Setting up mex compilation flow for the system.
Please follow the instructions and choose one of the C
compilers supported by Synphony Model Compiler.
Compilers supported by Synphony Model Compiler are listed
below; see the release notes for version numbers supported
and for additional information
  - Linux: GCC
  - Windows: Microsoft Visual Studio
...

Would you like mex to locate installed compilers [y]/n? y

Select a compiler:
[1] Lcc-win32 C 2.4.1 in C:\PROGRA~1\MATLAB\R2011b\sys\lcc
[2] Microsoft Visual C++ 2010 Express in C:\Program
Files\Microsoft Visual Studio 10.0

[0] None

Compiler: 2

Please verify your choices:

Compiler: Microsoft Visual C++ 2010 Express
Location: C:\Program Files\Microsoft Visual Studio 10.0

Are these correct [y]/n? y

...
...Done!
>>
```


6a. Verify Installation

The `shlsver` command will check and report the Synphony MC version and license status.

Matlab Version and License Info

Synphony MC Licenses will report valid. (or report no license available)

If the report lists valid licenses similar to the figure, then SMC installation and license are working correctly.

Synphony MC version and release date

```
MATLAB 7.9.0 (R2009b)
File Edit Debug Desktop Window Help
Current Folder: C:\Program Files\MATLAB\R2009b

Command Window

>> shlsver

-----
MATLAB Version 7.11.1.866 (R2010b) Service Pack 1
MATLAB License Number: xxxxxx
Operating System: ...
-----

Synphony Model Compiler
Version F-2012.03    PRODUCTION
Simulation License
-----

Your license file is valid until 02-jan-2013
License      : synphonysl
-----

Synthesis License

Your license file is valid until 02-jan-2013
Vendor       : ACTEL
License      : synplifydsp_actel
Your license file is valid until 02-jan-2013
License      : synphony
Your license file is valid until 02-jan-2013
License      : synphony_cout
Your license file is valid until 02-jan-2013
License      : synphony_coutsl
-----

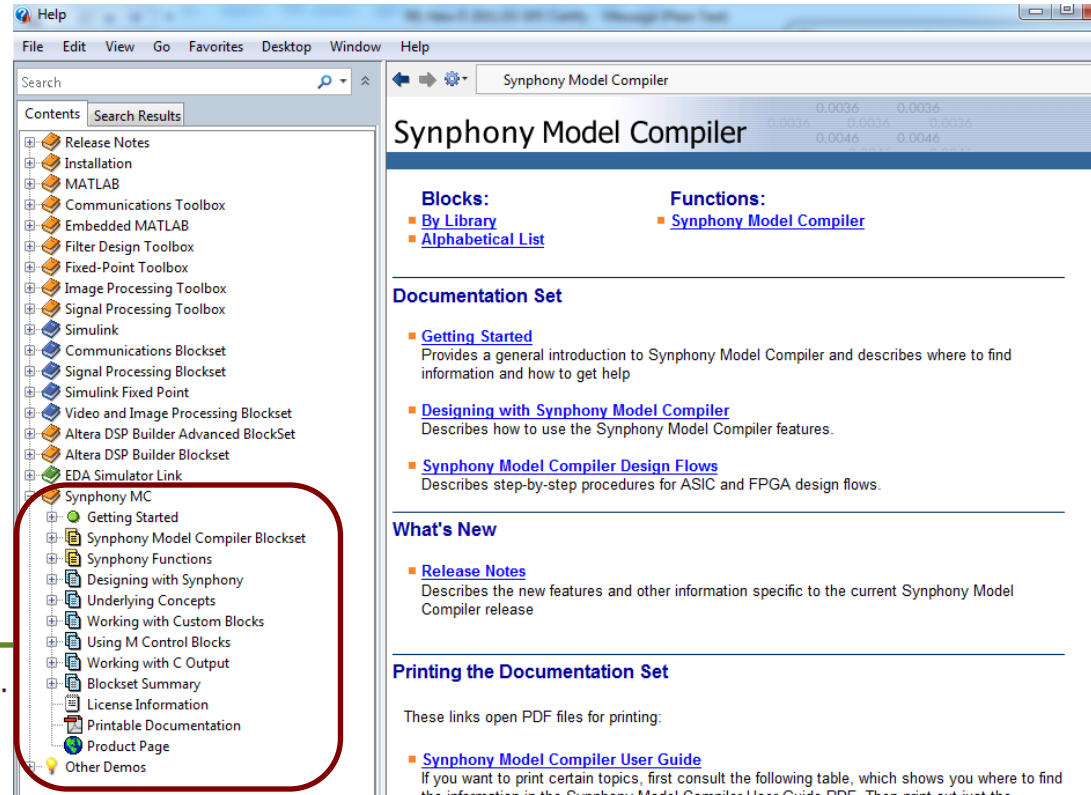
synphony_hls.exe                               Feb 24 2012 09:12:39

ans =
      Name: 'Synphony Model Compiler'
      Version: 'F-2012.03'
      Release: 'PRODUCTION'
      Date: '23-Feb-2012'

>>
```

6b. SMC Simulink Documentation

- MATLAB command completion
 - All SMC commands and variables start with syn... or shls...
 - shls<tab>
- Help command
- Lookfor('Synphony')
- MATLAB Help Tab
 - User's Guide, Reference, Datasheets
- Examples
 - Other Demos/ Symphony Model Compiler / Examples



```
>> help shlsroot
SHLSROOT returns the location where Symphony HLS was installed.

SYNOPSIS
    shlsroot

DESCRIPTION
    The shlsroot function stores the location of the
    dir shlsdemo
    use shlsdoc
    shslslib
    EXAMP shslslibv1
    shl shlsroot
    shlstool
    Copyr shlstool_about
    All r shlstool_options

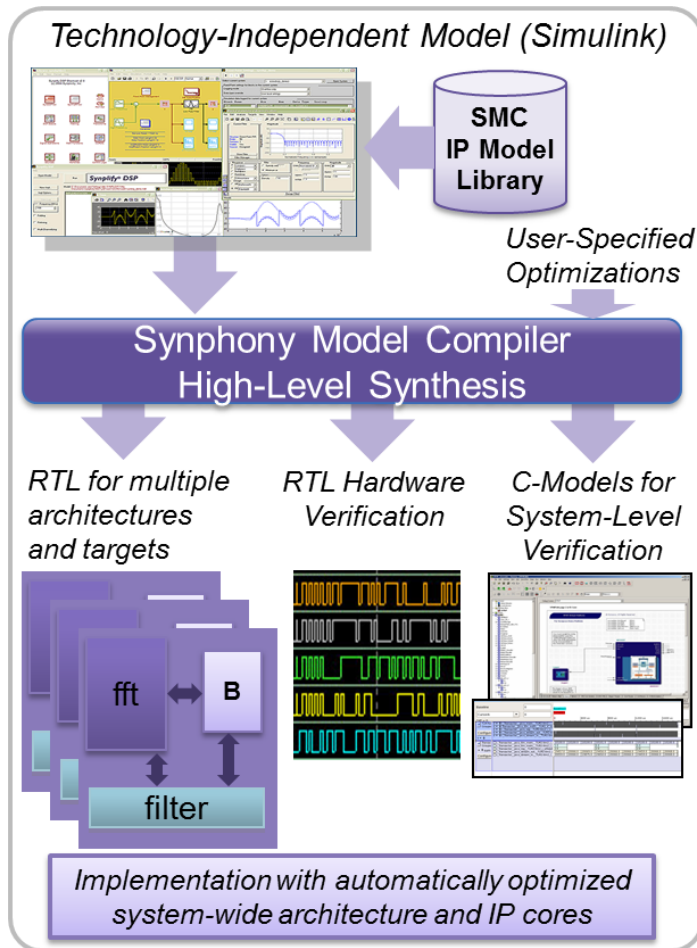
>> shls
```

```
>> lookfor('Synphony')
setup
shls_list_all_used
synd_find_system
Readme
shlsdemo
shslslib
shlsroot
shlstool
shlsver
slblocks
syn_get_coefs
syn_get_datatype
syn_set_atm
syn_unlink
```

- Symphony Model Compiler installation function
- produces a list of all the Symphony HLS blocks used
- SYND_FIND_BLOCKS finds all the Symphony HLS blocks in a Simulink system
- Symphony Model Compiler Release Notes
- runs the Symphony HLS demos
- manages the Symphony HLS Blockset library.
- returns the location where Symphony HLS was installed.
- manages the Symphony HLS application.
- displays version information for the current MATLAB, Simulink and Symphony
- defines the Symphony HLS Blockset.
- gets the filter coefficients from a Symphony HLS FDATool instance
- converts a Simulink Datatype into Symphony HLS information.
- allows the user to set Symphony HLS timing mode configuration.
- unlinks any instance of a Symphony HLS custom block

Summary: Symphony Model Compiler

Fast Path from Algorithm to Optimized Hardware



Superior quality and capacity FPGA & ASIC design flow from Simulink

High-level signal processing IP library for easy capture of multirate, fixed-point algorithms

Rapidly explore hardware architecture tradeoffs in performance, power, and area

High-level synthesis creates highly optimized and reusable hardware

Save months in verifying and validating your hardware