Getting Started
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Getting Started:

Running PLS In Graphics Mode

The graphical interface allows access to the full power of PLS conveniently presented in a single easy-to-use environment.

To run PLS in graphics mode on an HP/Sun workstation, the following command should be used

```
xpls
```

The value $ASYLDIR/bin must be included in users’ PATH environment variable. The colors used may be modified either on the command line

```
xpls -bg grey -fg black
```

or in users’ .Xdefaults file:

```
*xsyl*background:  grey
*xsyl*foreground:  black
```

To run PLS on an IBM-PC compatible, double click on the "New Wave PL Synthesizer" icon in the program manager "New Wave PL Synthesize" window.

A permanent log of each session is automatically created in the current working directory by the "-trace" option.

Note that this option is included by default in the PC installation. The option may be removed, or the filename modified, as required by selecting File.. Properties.. in the Program Manager, then modifying the Command Line field as required.

Note that the trace name is automatically truncated to four characters and a four digit index and .log extension .log appended.
1. Main Window

Invoking PLS creates a window with three principal regions: top menu bar, center text field and lower comment windows, as shown below in figure 1.

![Main window](image)

Figure 1: Main window

1.1. Menu Bar (top line in window)

The menu bar allows execution of all PLS commands via a standard pull-down menu system. To access a command in a menu, move the pointer to the menu title (e.g. File), the press the left mouse button. In UNIX systems hold the left button down and move the pointer to the desired command and then release the button. In PC Windows systems, click (press and release) the button to select the menu items.

1.2. Text Window (center field)

The text window displays textual messages concerning the current synthesis (results, warnings or errors). Note that it is not possible to enter PLS commands by simply typing them in this window. The contents of the text window can be cleared or saved using the "Clear Trace" and "Trace Name" options from the "File" menu, or scrolled using the scroll bar placed to the right of the window.

1.3. Comment Window (bottom line)

The comment window displays a brief description of the currently selected menu or sub-window item. The text in this window may of help when the user is unsure of the use of a specific item.
2. Entering Parameter Values in Sub-Windows

All PLS commands available from the menu bar require supplementary parameters before execution.

The user is prompted for parameter values to be entered in appropriate entry fields in sub-windows with the value required message, as shown below. Inappropriate parameter entry fields are visually grayed out and are not available for user entry.

To simplify usage and help ensure correct entry, parameter values are entered according to the type of value expected:

**Integer** or **string** values are entered directly from the keyboard. Click on the relevant field using the left mouse button, then type the required value. There is no need to press return.

“**One from many**” choices are made using option menus. Clicking on the current selection using the right mouse button displays a list of valid choices.

**Filenames** are entered using the standard “file selection” system window. Click on the current selection using the left mouse button to open the file selection window.

3. Warning and Error Windows

Errors and warnings concerning the use of the graphical interface are displayed in separate windows. Errors are considered fatal, hence the error window presents the option of immediate termination of the PLS session. The user must acknowledge errors or warnings (by clicking on the exit or cancel) before continuing with the PLS session.

The most common warning which the user is likely to encounter takes the form

**Value required for parameter in sub-window**

indicating that a parameter value has not been correctly defined. The user should acknowledge the warning, then open the relevant window and complete the parameter before attempting synthesis again.

![Image of error message](Figure 2: Example of error message)
4. Executing Commands

All commands are executed via the menu bar displayed at the top of the PLS window. To access a command in a menu, move the pointer to the menu title (e.g. File), the press the left mouse button. Holding the left mouse button down, move the pointer to the desired command and then release the button. The result of selecting each menu option is described below.

4.1. The "File" Menu

The "File" menu performs global actions on the current PLS session, including interruption of the current operation and termination of the current session. To help avoid accidents, potentially "dangerous" commands (such as "terminate session") require user verification before execution.

Abort:
Immediately stops any current synthesis.

Save Configuration:
Saves a personal copy of the current interface configuration to be restored on the next execution of PLS.

Version Information (SUN only):
Gives information about the version of the product.

Trace Name:
Allows the user to change the name of the PLS log file. After changing the name, all further output will be sent to the new file.

Exit:
Terminates any current synthesis and quits the current PLS session.

Clear Trace (SUN only):
Allows the contents of the trace window to be cleared. Note that this has no effect on the log file.
4.2. The "Command" Menu

The Command menu allows access to the primary functionality of PLS. To perform a synthesis, the source and target parameters, as well as the general options are specified using options from the Synthesis Parameter menu. After all the appropriate fields (initially displaying value required) and options are selected, the user selects the Ok button. There is no need to close the windows before starting the synthesis; if there are no errors, the windows are close automatically.

The Synthesis Parameter menu provides access to all common synthesis functions, namely:

If the input is a language, a so-called synthesis from a high-level language is performed.

If the input is a netlist in a given technology and the output is in the same technology, a netlist optimization is performed. The netlist optimization has to be performed after each synthesis from a higher level language.

If the input and output are both netlist but in different technologies, a migration is performed. It is recommended to perform an optimization after a migration. Note that migration is the most difficult process as the correspondence between elements is never guaranteed between two distinct technologies. MINC France will be pleased to help with any problems encountered.

4.2.1. "SetUp"

The SetUp menu allows the definition of the global PLS environment.

4.2.2. "On Line Command"

The On Line Command menu allows the entry of an PLS command. Refer to the relevant sections for details on the command parameters.
4.2.3. "Script"

The Script menu allows execution of a script composed of PLS commands. Refer to the relevant sections for details on the command parameters.

![Figure 5: Script menu](image)

4.2.4. The "VHDL Elaborate" menu (only for PLS VHDL)

The VHDL Elaborate menu allows compilation of single VHDL files or entire VHDL projects. For more information, refer to the "Using VHDL" section. Note that this menu is only available in the PLS product with full VHDL.

![Figure 6: VHDL Elaborate menu](image)
4.2.5. The "Execute" menu

The sub-window is split into three distinct sections: source parameters, target parameters and general options.

![Synthesis Parameters menu](image)

**Figure 7: Synthesis Parameters menu**

### 4.2.5.1. Source Parameters

**Input/Project File Name.**
Selecting this field displays a sub-window directory for locating the directory and file for the input. The user can either type the file name or search through the directories and select the file name with the mouse.

**Input Format.**
Selecting this field displays a list of supported input formats: VHDL, EDIF, XNF, ADL etc., as shown below.

**Source Technology.**
Selecting this field displays a list of supported source CPLD/FPGA and ASIC technologies: Xilinx_3000, Xilinx_4000, ACTEL_ACT1 etc. as shown below.

**Source Library File Name.**
Selecting this field displays a sub-window directory for locating the file of the source ASIC library. This parameter is activated only if the source technology is set to ASIC_lib. It allows the migration from ASIC technologies to FPGA/CPLD technologies.
Figure 8: Input format selection for source parameters

Figure 9: Source technology selection for source parameters
4.2.5.2. Target Parameters

**Output File Name.**
Selecting this field displays a sub-window directory for locating the directory and file for the output. The user can either type the file name or search through the directories and select the file name with the mouse.

**Target Technology.**
Selecting this field displays a list of supported target CPLD/FPGA technologies: Xilinx_3000, Xilinx_4000, ACTEL_ACT1 etc. as shown below.

**Output Format.**
Selecting this field displays a list of supported output formats: EDIF, XNF, ADL etc.

**HDL Output Format.**
Selecting this field displays a list of supported output HDL formats: VHDL or Verilog. This parameter allows the generation of a HDL structural description in addition to the chosen output format netlist file. For example, for the same synthesized design, an EDIF netlist and a VHDL structural description can be generated at the same time.

![Synthesis Parameters](image)

Figure 10: Option selection for target technology
4.2.5.3. General Parameters

**Optimization for.**
The user selects the optimization criterion (speed, area or speed/area trade-off) as shown below. Certain target technologies may restrict the choice of optimization criterion.

**Optimization Effort.**
The user selects optimization efforts ranging from 0 (low) to 4 (high), with high being the most CPU intensive. Certain target technologies may restrict the choice of optimization effort.

**Optional Pass (A-E).**
This parameter is activated only for Actel and Quicklogic technologies. Refer to the Actel and Quicklogic specific parameters in the FPGA mappers chapter.

**Timing Constraints**
Timing constraints may be specified globally for all the design or specifically using a separate constraint file. If no timing constraint is specified, the longest path between two successive barriers or clocked memory elements will be minimized. This menu is activated only in the case of speednetlist optimization and for some target technologies.

![Figure 11: Speed/area option selection](image)

4.2.5.4. Extended Options

**Source Options.**
Selecting this field displays a sub-window containing parameters relevant to the selected input format.

**Target Options.**
Selecting this field displays a sub-window containing parameters relevant to the selected output format. For more details about these options, please refer to the specific FPGA or CPLD target options in the last part of this manual.

**HDL Output Options.**
Selecting this field displays a sub-window containing parameters relevant
4.3. Information on design complexity

During PLS execution, the user will notice that the following lines are displayed regularly in the text window:

\[
\begin{align*}
\text{IOs} &= \langle \text{Value} \rangle \\
\text{INodes} &= \langle \text{Value} \rangle \\
\text{Depth} &= \langle \text{Value} \rangle \\
\text{Complexity} &= \langle \text{Value} \rangle
\end{align*}
\]

These figures provide the user with some information on the internal representation of the design. In order to understand these figures, it must be known that all designs are represented by a set of equations. An equation may either depend on primary design inputs or on other equations corresponding to internal nodes.

IOs represents the current number of I/Os in the design.

INodes represents the number of internal nodes. This number is 0 for a flat representation of the design.

Depth represents the equation overlapping level. For example, a depth of 1 means that any equation is expressed either using primary inputs or internal nodes but an internal node equation depends only on primary inputs.

Complexity represents an estimated measure of the design complexity. For synthesis experts, this corresponds to the number of literals required to represent the design equations.