cādence®

Cadence Application Infrastructure User Guide

Product Version ICADVM20.1
October 2020

Contents

Preface

The *Cadence Application Infrastructure User Guide* describes a set of mechanisms common to Cadence® applications. These mechanisms support consistent operations between applications. Therefore, this guide is appropriate for all users working with Cadence applications in any design domain.

However, the details of how each application uses the mechanisms described in this guide are documented in the application's user guide and might be different for each application. Therefore, you should refer to the user guide for the application you are using before you refer to this guide.

This user guide is aimed at developers and designers of integrated circuits and assumes that you are familiar with:

- The Virtuoso design environment and application infrastructure mechanisms designed to support consistent operations between all Cadence® tools.
- The applications used to design and develop integrated circuits in the Virtuoso design environment, notably, the Virtuoso Layout Suite, and Virtuoso Schematic Editor.
- The Virtuoso design environment technology file.

This preface contains the following topics:

- Scope
- Licensing Requirements
- Related Documentation
- Additional Learning Resources
- Customer Support
- Feedback about Documentation
- Typographic and Syntax Conventions

Scope

Unless otherwise noted, the functionality described in this guide can be used in both mature node (for example, IC6.1.8) and advanced node and methodologies (for example, ICADVM20.1) releases.

Label	Meaning
(ICADVM20.1 Only)	Features supported only in ICADVM20.1 advanced nodes and advanced methodologies releases.
(IC6.1.8 Only)	Features supported only in mature node releases.

Licensing Requirements

For information on licensing in the Virtuoso design environment, see the *Virtuoso Software Licensing and Configuration Guide*.

Related Documentation

What's New and KPNS

- *Cadence Application Infrastructure What's New*
- *Cadence Application Infrastructure Known Problems and Solutions*

Installation, Environment, and Infrastructure

- *Cadence Application Infrastructure User Guide*
- *Cadence Library Manager User Guide*
- *Plotter Configuration User Guide*

Virtuoso Tools

- *SKILL Language Programming Introduction*

- *SKILL Language Programming*
- *Advanced SKILL Language Programming*

Additional Learning Resources

Video Library

The Video Library on the Cadence Online Support website provides a comprehensive list of videos on various Cadence products.

To view a list of videos related to a specific product, you can use the *Filter Results* feature available in the pane on the left. For example, click the *Virtuoso Layout Suite* product link to view a list of videos available for the product.

You can also save your product preferences in the Product Selection form, which opens when you click the *Edit* icon located next to *My Products*.

Virtuoso Videos Book

You can access certain videos directly from Cadence Help. To learn more about this feature and to access the list of available videos, see Virtuoso Videos.

Rapid Adoption Kits

Cadence provides a number of Rapid Adoption Kits that demonstrate how to use Virtuoso applications in your design flows. These kits contain design databases and instructions on how to run the design flow.

To explore the full range of training courses provided by Cadence in your region, visit Cadence Training or write to training_enroll@cadence.com.

Note: The links in this section open in a separate web browser window when clicked in Cadence Help.

Help and Support Facilities

Virtuoso offers several built-in features to let you access help and support directly from the software.

- The Virtuoso *Help* menu provides consistent help system access across Virtuoso tools and applications. The standard Virtuoso *Help* menu lets you access the most useful help and support resources from the Cadence support and corporate websites directly from the CIW or any Virtuoso application.
- The Virtuoso Welcome Page is a self-help launch pad offering access to a host of useful knowledge resources, including quick links to content available within the Virtuoso installation as well as to other popular online content.

  The Welcome Page is displayed by default when you open Cadence Help in standalone mode from a Virtuoso installation. You can also access it at any time by selecting *Help – Virtuoso Documentation Library* from any application window, or by clicking the *Home* button on the Cadence Help toolbar (provided you have not set a custom home page).

For more information, see Getting Help in *Virtuoso Design Environment User Guide.*

Customer Support

For assistance with Cadence products:

- Contact Cadence Customer Support

  Cadence is committed to keeping your design teams productive by providing answers to technical questions and to any queries about the latest software updates and training needs. For more information, visit https://www.cadence.com/support.
- Log on to Cadence Online Support

  Customers with a maintenance contract with Cadence can obtain the latest information about various tools at https://support.cadence.com.

Feedback about Documentation

You can contact Cadence Customer Support to open a service request if you:

- Find erroneous information in a product manual
- Cannot find in a product manual the information you are looking for
- Face an issue while accessing documentation by using Cadence Help

You can also submit feedback by using the following methods:

- In the Cadence Help window, click the *Feedback* button and follow instructions.

- On the Cadence Online Support Product Manuals page, select the required product and submit your feedback by using the *Provide Feedback* box.

Typographic and Syntax Conventions

The following typographic and syntax conventions are used in this manual.

text	Indicates names of manuals, menu commands, buttons, and fields.
`text`	Indicates text that you must type exactly as presented. Typically used to denote command, function, routine, or argument names that must be typed literally.
`z_argument`	Indicates text that you must replace with an appropriate argument value. The prefix (in this example, *`z_`*) indicates the data type the argument can accept and must not be typed.
|	Separates a choice of options.
`{ }`	Encloses a list of choices, separated by vertical bars, from which you **must** choose one.
`[ ]`	Encloses an optional argument or a list of choices separated by vertical bars, from which you **may** choose one.
`[ ?argName` *`t_arg`* `]`	Denotes a *key argument*. The question mark and argument name must be typed as they appear in the syntax and must be followed by the required value for that argument.
`...`	Indicates that you can repeat the previous argument. Used with brackets to indicate that you can specify zero or more arguments. Used without brackets to indicate that you must specify at least one argument.
`,...`	Indicates that multiple arguments must be separated by commas.
`=>`	Indicates the values returned by a Cadence® SKILL® language function.
`/`	Separates the values that can be returned by a Cadence SKILL language function.

If a command-line or SKILL expression is too long to fit within the paragraph margins of this document, the remainder of the expression is moved to the next line and indented. In code excerpts, a backslash (\ ) indicates that the current line continues on to the next line.

1

Introduction to the Cadence Infrastructure

This chapter describes the following:

Overview

The *Cadence Application Infrastructure User Guide* describes a set of mechanisms common to Cadence® applications. These mechanisms support consistent operations between applications.

This document describes

- The Cadence library structure used by most Cadence applications to organize design data
- Several common file formats and their use models

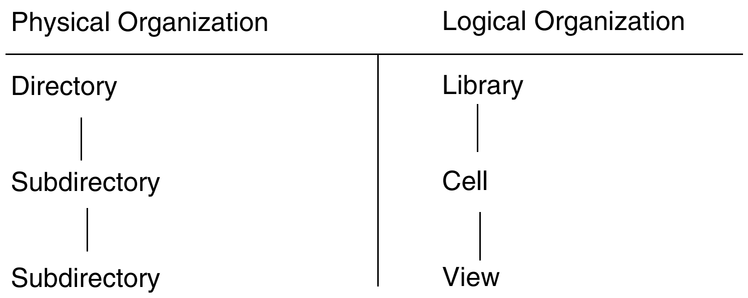
  Cadence supplies utilities for administering these file formats. Cadence applications use the files in searching for design libraries and configuration information.
- The Cadence approach to name mapping, applied when applications use data from other applications with non-compatible naming conventions
- The Generic Design Management facility (GDM), an interface between Cadence applications and any design management system
- The Cadence Locking System used by Cadence applications to lock files
- The cdsCopy System used for copying libraries
- The occurrence property dictionary used by some applications to register simulation-control properties

The *Cadence Application Infrastructure User Guide* complements the user guides for individual applications. Refer to the user guide for the application you are using for specific information about how the application uses the mechanisms described in this manual.

Cadence Library Structure

Most Cadence applications use the same library model. The library structure provides data interoperability and consistent behavior among applications—a common library model using common file-naming conventions.

The Cadence library structure uses your computer's directory structure to organize data. Data is stored in files in a directory hierarchy.



For more information on the file structure, refer to Chapter 2, "Cadence Library Structure."

Cadence Application Infrastructure Files

The following configuration mechanisms are controlled by specific file formats and associated utilities.

- The Cadence Setup Search File (`setup.loc`)
- The Cadence System Information File (`cdsinfo.tag`)
- The Cadence Library Definition File (`cds.lib`)
- The Cadence Data Registry File (`*.reg`)

The Cadence Setup Search File

This file supports a configuration to locate other mechanisms described in this document and general application configuration information. The mechanism and the associated `setup.loc` file format are described in Chapter 3, "Cadence Setup Search File: setup.loc."

The Cadence System Information File

This file supports configuration of several key capabilities, including the type of design management system used to manage a library and whether a more strict library checking mechanism should be used to identify Cadence libraries. This mechanism and the associated `cdsinfo.tag` file format are described in Chapter 4, "Cadence System Information File: cdsinfo.tag."

The Cadence Library Definition File

This file supports defining the locations of Cadence libraries and models related to organizing library definition files so that teams of users can consistently share such definitions. This mechanism and the associated `cds.lib` file format are described in Chapter 5, "Cadence Library Definition File."

The Cadence Data Registry File

This file supports defining various data types (especially views), associating default editors with data, and is also a general registry facility. This mechanism and the associated `data.reg` file format are described in Chapter 6, "Cadence Data Registry File: data.reg."

Name Mapping Between Applications

Cadence has developed a consistent strategy for dealing with naming problems between applications—name mapping. Each Cadence application interprets names according to a consistent set of rules. Data is interoperable across many applications and data formats. Also, data is interoperable between UNIX and NT operating systems. Name mapping is described in Chapter 7, "Name Mapping."

Generic Design Management Facility

Cadence provides a facility known as Generic Design Management (GDM). This facility implements an interface that CAD applications (which make direct DM system calls) can use so that they can work with many different design management systems without having any special knowledge of those systems.

Part of the GDM facility is a set of shell commands that can be used in performing design management operations. These commands are also used by some Cadence applications that perform these operations from shell scripts. GDM commands are described in Chapter 8, "Generic Design Management (GDM) Commands."

Copying Libraries

Cadence provides the cdsCopy system to help you copy, merge, or rename libraries. A cdsCopyShell, a set of SKILL functions, and a cross-reference updater system are part of cdsCopy. cdsCopy is described in Chapter 9, "cdsCopy."

Cadence Locking System

The Cadence Locking System (CLS) is the mechanism used by Cadence applications to lock files on all platforms. A Lock-Stake file (`*fileName*.cdslck`) in the same directory as a file indicates that the file is locked. Applications release locks when they no longer need them. CLS also provides an administrative tool that lets you view and release any locks. The locking system is described in Chapter 10, "Cadence Locking System."

Occurrence Property Dictionary

An occurrence property dictionary is a central repository for simulation-control property definitions. The dictionary is described in Chapter 12, "Occurrence Property Dictionary."

Cadence Application Infrastructure Applications

The following applications are useful in configuring data files, debugging files, and in reporting the status of the Cadence application infrastructure.

cdswhich	A command available as a test, debug, and administration tool for use in managing the search mechanism.
cdsinfo	A command used as a test, debug, and administration tool for the system information file mechanism.
nmp	A command that assists you in determining the difference in a name as it is mapped to different name spaces.
cds_root	A utility, typically used in startup scripts, for identifying the location of Cadence installation hierarchies.
dregprint	A command that displays the contents of the data registry.
cdsLibDebug	A command that helps you to test and debug your library definition files. **Note:** cdsLibDebug is only available with Virtuoso design environment applications.
clsAdminTool	An administrative tool for viewing and releasing file locks.

2

Cadence Library Structure

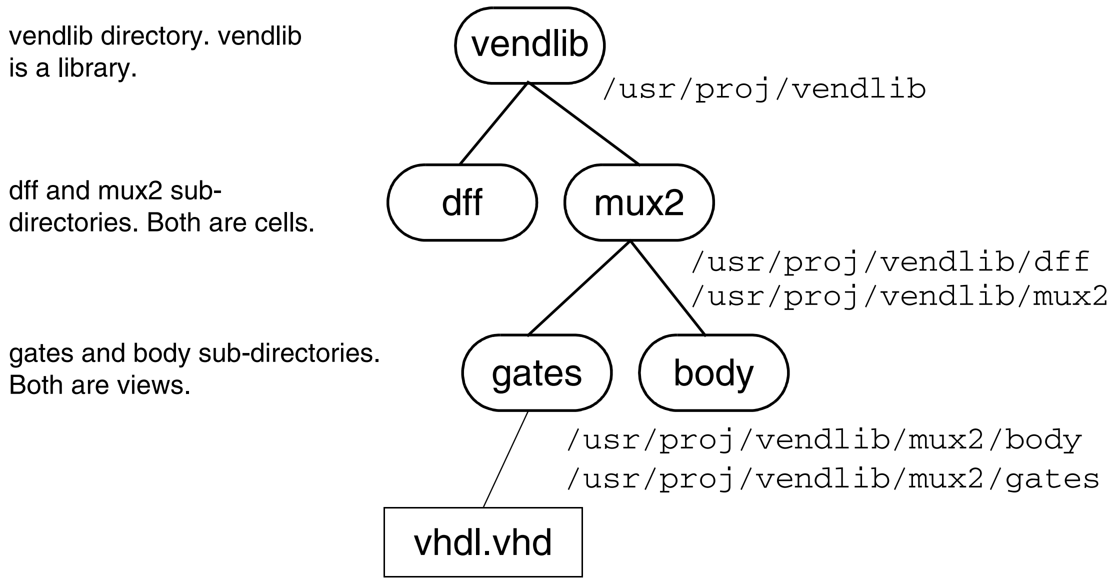
This chapter describes the following:

Overview

The Cadence library structure is used by most Cadence® applications to organize design data. The structure stores data in directories based on the UNIX file system.

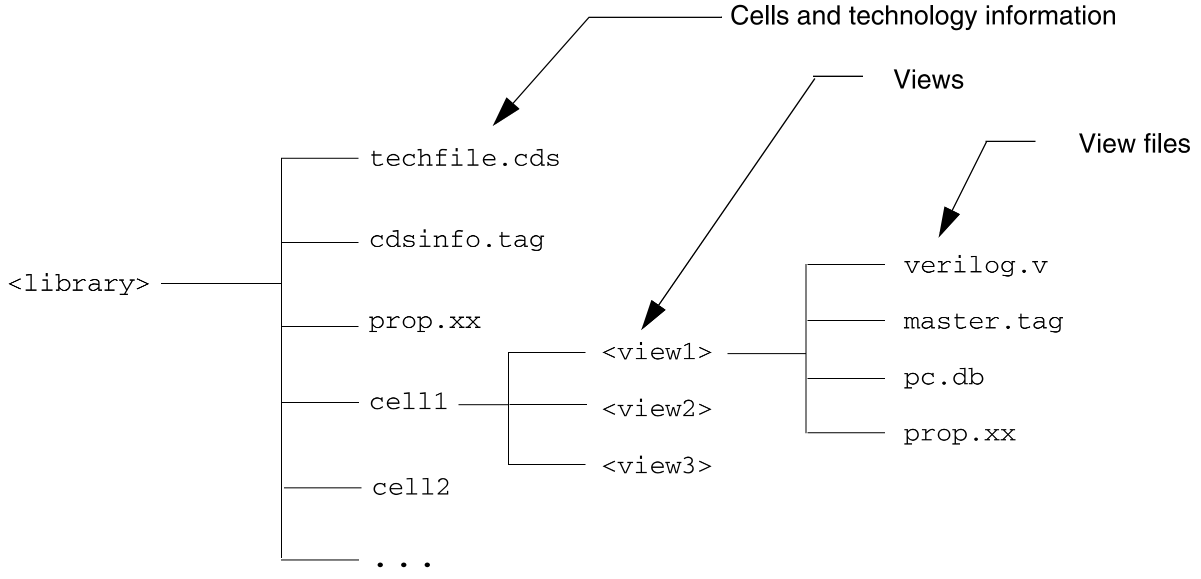
- A library is a directory that contains both files and other directories.
- These subdirectories are cells. Cells in turn also contain files or other directories.
- These subdirectories of cells are views of the cell.

Files are not hidden. You can find the UNIX or NT file that contains the data you need as follows:


vendlib directory. vendlib is a library.
vendlib
/usr/proj/vendlib
dff and mux2 sub-directories. Both are cells.
dff
mux2
/usr/proj/vendlib/dff
/usr/proj/vendlib/mux2
gates and body sub-directories. Both are views.
gates
body
/usr/proj/vendlib/mux2/body
/usr/proj/vendlib/mux2/gates
vhdl.vhd

Libraries

A library consists of cells, views, and technology information.



A library is a logical collection of design data implemented as a physical collection of directories and files that can reside anywhere in the file system. A library can be shared by all users or controlled by a single person.

Reference libraries store data used by many designs. Design libraries, or working libraries, store data of a single design and derived data about that design.

Reference libraries have read-only access to avoid accidental modification of the master building blocks. Design libraries have read and write access so you can edit and save designs.

A library can have a temporary directory associated with it. See “Temporary Directory for a Library” on page 29 for more information.

In the Cadence infrastructure, each library must have an entry in the `cds.lib` file. You can find the `cds.lib` file by using the setup search mechanism. Refer to Chapter 3, “Cadence Setup Search File: setup.loc.” The search mechanism has a verification option. Refer to Chapter 4, “Cadence System Information File: cdsinfo.tag.”

Cells and Views

Each library has associated data called cells, and each cell has associated data called views.

- A cell is a collection of views that describe an individual building block of a chip or system, such as a `nand2` gate. Each cell within a library is a separate file system directory with a unique name.
- A view is a collection of files that are related. Each view within a cell is a separate file system directory in which Cadence locates all of the files pertaining to a particular view of a given cell.

You might use different views to represent different levels of abstraction of a design (behavior, gate) or different stages in the design process (rtl, postsynthesis). Views can also be used to contain different types of data about a cell (schematic, symbol, layout, vhdl).

Each view might contain a variety of files such as the master file specified by the `master.tag` file, the co-managed set of data specified in the data registry, and perhaps derived files and also-managed files.

View Files and the Co-Managed Set

The application you use determines the names of the files under the view directory. Files under view directories created by Cadence applications are controlled by the application, not by the user. View files are stored in a view directory. Some common view files are as follows:

- Master files
- Co-master files — Co-managed set
- Derived files
- master.tag file
- Also-managed file

Master Files

Master files contain the primary data, such as schematic database or the Verilog source for a view. See also the “The master.tag File” on page 28.

Co-Master Files

Co-master files contain information that is not the primary data, but which cannot be derived from the primary data, such as the view property files created by Virtuoso applications and stored in the `data.dm` file.

Derived Files

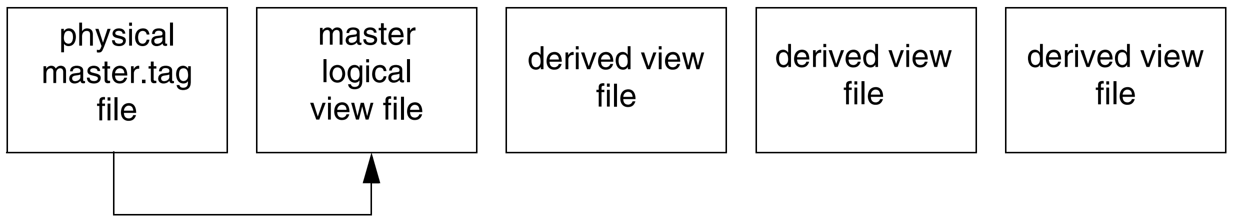
Derived files contain data derived from the source data, such as the `ast` file for Verilog or the `pc.db` file.

The Co-Managed Set

Together, the master file, co-master files, and derived files make up what is known as a co-managed set for the view. The members of a co-managed set are defined by creating data registry entries as described in Chapter 6, “Cadence Data Registry File: data.reg.” Many operations, especially design management operations, need to treat these files as a set.

The master.tag File

For certain operations, such as launching an editor on view data, the master file must be identifiable. This is done algorithmically based on the presence of various files in the view directory as described below.



The `master.tag` file, if present, defines which view file inside each cell directory is the master. It records which physical file is the master logical view file for any given view. A given view always has one master representation and zero or more derived representations. When derived representations exist for a view, some applications might need additional information in the library to indicate which data is master and which data is derived. See "Also-Managed Files" on page 28.

The following rules apply in the order listed to determine the master representation:

- If the `master.tag` file exists, the file specified by the `master.tag` file is the master representation.
- If there is only one file in the directory, it is the master.
- If a file named `vhdl.vhd` or `verilog.v` (but not both) is present in the directory, it is the master.

Also-Managed Files

In several cases, it is appropriate to create additional data that is stored in files located under the library, cell, or view directories. These files are not members of a co-managed set, but need to be considered for some design management operations. For example, these files should be checked in or out along with other library data when the entire library is checked in or out. This checkout procedure is handled by identifying these files to the data registry as also-managed files. For further details, see Chapter 6, "Cadence Data Registry File: data.reg."

Temporary Directory for a Library

A library can have a temporary directory associated with it to store derived data. This is useful if you want to create derived data for a read-only reference library in another directory. Applications reading a library that has a temporary directory assume that the library contains the combined contents of the library and the temporary directory. If there are any files in common, the files in the temporary directory have precedence.

A temporary directory can contain only derived data; it cannot contain source data. If a library has a temporary directory, applications write derived data to the temporary directory and source data (master files and co-master files) to the library.

Files in a temporary directory are not managed; if you want to check in a derived file that is in a temporary directory, you must copy it to the library and then check it in.

Temporary directories have the same directory structure (library/cell/view) as libraries. While writing derived data to a temporary directory, applications create cell and view directories in the temporary directory as needed.

Each library can have only one temporary directory associated with it.

You can specify a temporary directory for a single library or a global temporary directory for all libraries.

To specify a temporary directory for a library,

➤ Add the following statement to your `cds.lib` file:

```
ASSIGN libName TMP TempDirPath
```

where *`libName`* is the library to which you want to assign a temporary directory and *`TempDirPath`* is the path to the temporary directory.

For example:

```
ASSIGN LSTTL TMP /tmp/lsttl_tmp
```

Note: The library must already be defined. The `ASSIGN` statement does not have to be in the same `cds.lib` file as the library definition.

You can remove a `TMP` attribute with the `UNASSIGN` statement.

To specify a global temporary directory for all libraries,

➤ Add the following statement to your `cds.lib` file:

```
ASSIGN AllLibs TmpRootDir path
```

where *`path`* is the path to the root of the temporary directory.

For example:

```
ASSIGN AllLibs TmpRootDir $HOME/myTempLibs
```

In this case, if you have a library `LSTTL`, its temporary directory will be `$HOME/myTempLibs/LSTTL`.

The `AllLibs` directive is overriden by the `TMP` directive for libraries that have a `TMP` assigned.

See Chapter 5, "Cadence Library Definition File" for more information about `cds.lib` files and the `ASSIGN` and `UNASSIGN` statements.

File Naming Conventions

Directories and files stored in Cadence library directories follow a naming convention. This lets you consistently identify library and directory types without having to examine their contents.

The dot character (.) is not allowed in a cell or view name.

Library files (any file in a library that is not a cell) and cell files (any file in a cell that is not a view) should have a `.`*`fileExtension`* to distinguish them from cells or views. For example, if you want to keep a text file `myfile` in a library, name it `myfile.txt` to distinguish it from the cells contained in the library. If you have files without extensions at the cell or view level, applications such as the Cadence® library manager will treat them as cells or views, leading to confusing error messages.

View names are not reserved. It is possible to have a state diagram whose view name is `schematic`. However, many applications follow conventions for view names.

Because files can be written to both case-sensitive and case-insensitive file systems, lowercase alphanumeric names starting with a letter are recommended. Name length restrictions are only those enforced by the underlying file system.

3

Cadence Setup Search File: setup.loc

This chapter describes the following:

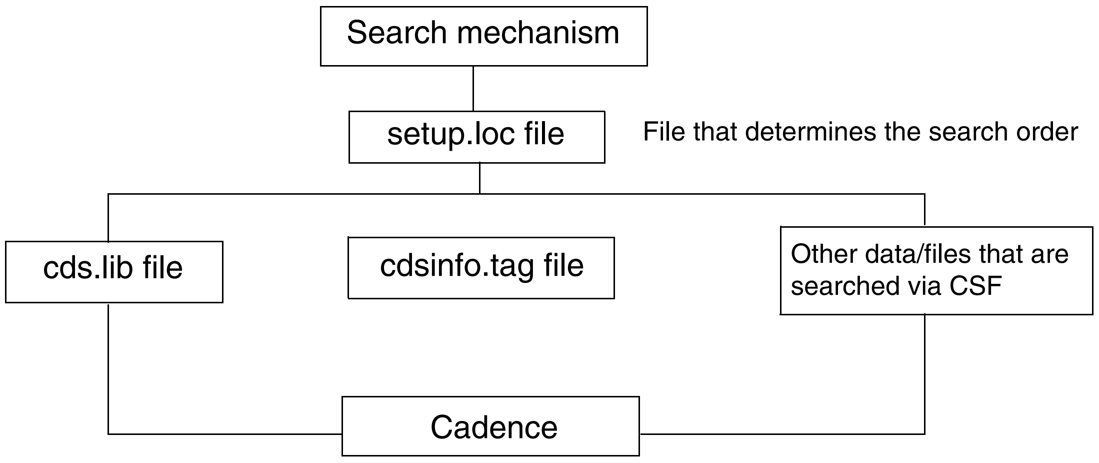
Overview

Cadence provides the Cadence Setup Search File mechanism (CSF) to search for application setup and configuration information such as the following:

- `cds.lib` files, which define the design libraries that you use
- `cdsinfo.tag` files, which contain information such as the `DMTYPE` for a library
- `.cdsplotinit` files, which contain plotting configuration

Note: The `.cdsplotinit` file can be found using the CSF mechanism if this file name is specified in the `csfLookupConfig` file.

To find this information, CSF uses the `setup.loc` file. The `setup.loc` file is an ASCII file that specifies the locations to be searched and the order in which they should be searched.


Search mechanism
setup.loc file
File that determines the search order
cds.lib file
cdsinfo.tag file
Other data/files that are searched via CSF
Cadence

The setup.loc File Location

To find the `setup.loc` file (or to search for setup and configuration information if no `setup.loc` file is found), CSF uses the following search order. It uses the first `setup.loc` file that is found.

`.`

`@LIBRARY`

`$CDS_WORKAREA` (if defined)

`$CDS_SEARCHDIR` (if defined)

`$HOME`

`$CDS_PROJECT` (if defined)

`$CDS_SITE` (if not defined, defaults to *`your_install_dir`*`/share/local)`

`$(compute:THIS_TOOL_INST_ROOT)/share`

For each of these locations, CSF looks in the following directories, in this order:

- *`location`*`/.cadence`
- *`location`*
- *`location`*`/cdssetup`

Cadence provides a default `setup.loc` file in the *`your_install_dir`*`/share/cdssetup` directory.

Search Mechanism

To find setup and configuration information, CSF searches the locations specified in the `setup.loc` file, in the order in which they are listed, until a match is found.

For each location specified in the `setup.loc` file, except `@LIBRARY`, CSF looks in the following directories, in this order:

- In a subdirectory named `.cadence`
- In the same location specified in the `setup.loc` file
- In a subdirectory named `cdssetup`

If the file being searched for is found in *`location`*`/.cadence`, the other directories are not searched. If the file is not found in *`location`*`/.cadence`, the location specified in the `setup.loc` file is searched. If the file is not found, then *`location`*`/cdssetup` is searched. If the file is not found there either, CSF looks at the next entry in the `setup.loc` file. It continues to search each entry in the `setup.loc` file in the same way until a match is found.

For an `@LIBRARY` entry in a `setup.loc` file, CSF searches design libraries listed in the library definition file, in the order in which they are listed. The `@LIBRARY` entry is ignored if the file being searched for is not a library file. For more information, see `@LIBRARY`.

With this search mechanism, you do not have to store your customized Cadence application configuration information directly in `$HOME`. Instead, these files can be stored under a `cdssetup` or `.cadence` subdirectory so that they can be accessed without overcrowding your home directory. Similarly, site information can be stored in a `$CDS_SITE` directory.

Default Search Order

Cadence provides a default `setup.loc` file in *`your_install_dir`*`/share/cdssetup`. This file specifies the following default search order, which includes commonly-used storage locations:

`.`	current directory
`@LIBRARY`	libraries listed in the library definition file
`$CDS_WORKAREA*`	user workarea
`$CDS_SEARCHDIR*`	no longer set by applications
`$HOME`	home directory

`$CDS_PROJECT*`	project storage area
`$CDS_SITE**`	site setup information
`$(compute:THIS_TOOL_INST_ROOT)/share`	Cadence default setup information

* Ignored if undefined

** Defaults to `your_install_dir/share/local`

Note: If the value of `CDS_LOAD_ENV` (see also Specifying Environment Settings in the *Virtuoso Design Environment User Guide*) is set to CSF, then the first directory found in `setup.loc` will be the default directory to which `.cdsenv` will be saved.

You can customize this search order. See "Customizing the Search Mechanism" on page 39 for more information.

Commonly-Used Search Locations

Commonly-used storage locations for setup and configuration files, and their suggested use, are described below. Most of these locations are present in the default `setup.loc` file.

`.` The current directory.

`$CDS_WORKAREA`

A workarea stores your project-specific customizations. If `$CDS_WORKAREA` is not defined, CSF ignores it.

Important

You should not to set the `$CDS_WORKAREA` environment variable in `.cdsinit`. It is always recommended to set the `$CDS_WORKAREA` shell environment variable before starting Virtuoso. The value of `$CDS_WORKAREA` is a path to the workarea directory.

`$CDS_SEARCHDIR`

`$CDS_SEARCHDIR` is no longer set by Cadence applications. Do not set this variable yourself. If `$CDS_SEARCHDIR` is not defined, CSF ignores it.

`$HOME`

The home directory is the primary location for user-specific customization.

`$CDS_PROJECT`

A project contains information that is specific to the project and is not likely to change over the life of the project. If `$CDS_PROJECT` is not defined, CSF ignores it.

`$CDS_SITE`

Your site configuration is the primary location for you to customize the software for your site. Customization at this level is independent of any project and can be overridden by individual projects. You can also install default methodologies in this location. Other environment variable values are overwritten at startup with the computed values of this configuration.

`$CDS_SITE` is the only environment variable that you use without setting it explicitly in your `.cshrc` or `.login` files. If `$CDS_SITE` is not defined, it defaults to *`your_install_dir`*`/share/local`.

`$(compute:THIS_TOOL_INST_ROOT)/share`

This directory contains the application's default setup information.

`@LIBRARY`

When the reserved keyword `@LIBRARY` is specified in a `setup.loc` file, CSF searches design libraries listed in the library definition file, in the order in which they are listed.

Only the library directory is searched. Unlike for other entries in the `setup.loc` file, CSF does not look for the subdirectories `.cadence` and `cdssetup` in libraries.

Note: Libraries are searched only if the file being looked for contains library information, for example, a Virtuoso XL mapping file. Otherwise, the `@LIBRARY` entry is ignored.

Customizing the Search Mechanism

You can customize the search order by creating your own `setup.loc` file that specifies the locations to be searched and the order in which they should be searched.

Important

Do not modify the default `setup.loc` file provided by Cadence.

To create a `setup.loc` file, do the following:

1. Create a file named `setup.loc` in any directory that CSF searches for the `setup.loc` file (see "The setup.loc File Location" on page 34 for details). You can do this by:

   ❑ Copying the default `setup.loc` file: *`your_install_dir`*`/share/cdssetup/setup.loc`.

   – or –

   ❑ Creating a new ASCII file named `setup.loc` with a text editor.

2. Edit the file. You can

   ❑ Change the order of the default search locations. See "Default Search Order" on page 36 for a list of default locations and their suggested use.

   ❑ Delete any locations that you do not want CSF to search.

   ❑ Add new locations that you want CSF to search.

   Specify the paths in the order in which you want them searched. Separate paths with newlines. Paths can contain environment variables, ~, and installation root expressions. For more information, see "Syntax and File Format" on page 41.

   Note: CSF searches the locations in the `setup.loc` file in the order in which they are listed. Also, for each location, CSF searches `location/.cadence`, `location`, and `location/cdssetup`.

CDS_LOAD_ENV

The `CDS_LOAD_ENV` shell environment variable is used to specify a custom search order for .cdsenv. This variable does not affect how other setup files, such as `cds.lib`, `cdsinfo.tag`, `setup.loc`, and `csfLookupConfig` should be found.

Some setup files are searched for the first match found, while others are searched for all matches found.

Here is a partial list of setup files.

First Match Found	All Matches Found
`cds.lib`	`.cdsenv`
`cdsinfo.tag`	
`setup.loc`	
`csfLookupConfig`	

Syntax and File Format

The `setup.loc` file consist of a set of lines with a simple syntax:

- A line is either empty, a comment, or a search location.
- There is one entry per line. Everything after the first blank space or tab is a comment.
- A comment line begins with a pound sign (`#`) or double hyphen (`--`). For example:

  ```
  # this is a single line comment
  -- this is a single line comment
  ```
- A search location is a path that ends with a blank space or new line. If a search location path ends with a blank space, additional comment characters can follow it on the same line.
- A search location path is a relative path or a fully qualified path. A relative path is processed relative to your current working directory.
- A search location path can include environment variables in the following form: `$envvar` or `${envvar}`. It can include `~` and `~*username*`, which are expanded as needed. It can also include installation root expressions such as `$(compute:THIS_TOOL_INST_ROOT)`. See "Installation Root Expressions" on page 41 for a complete list of installation root expressions.

See also "Commonly-Used Search Locations" on page 37.

Installation Root Expressions

You can use the following expressions in any path you specify in the `setup.loc` file to refer to the installation root of Cadence hierarchies.

Note: These are not environment variables; you do not need to set them in your `.cshrc` or `.login` files.

`$(compute:THIS_TOOL_INST_ROOT)`

Interpreted as the root of the installation hierarchy of the application that is reading the `setup.loc` file. If the application is not in a Cadence installation hierarchy, you will get an error.

`$(csf_search:somePathlette)`

Specifies that a search for a path fragment is to be performed in each location specified in `setup.loc`. The path being resolved to the first match found.

`$(compute:THIS_FILE_INST_ROOT)`

Interpreted as the root of the installation hierarchy of the `setup.loc` file that is being read. If the `setup.loc` file is not in an installation hierarchy, you will get an error.

`$(inst_root_with:`*`pathRelativeToRoot`*`)`

where *`pathRelativeToRoot`* is the path (relative to the root of the installation hierarchy) to a file or directory.

This expression is interpreted as the root of the first installation hierarchy found in `$PATH` that contains *`pathRelativeToRoot`*. If you are using applications in the Stream Manager environment, this expression is interpreted as the root of the first installation hierarchy found in `$CDS_STRM_DIR_LIST` that contains *`pathRelativeToRoot`*. If *`pathRelativeToRoot`* is not found, you will get an error.

Note: Beginning with the IC 5.0.33 release, the preferred way of referring to an application's installation root in a `setup.loc` file is `$(compute:THIS_TOOL_INST_ROOT)`. However, `$CDS_INST_DIR` is still supported and you can use it if you share a `setup.loc` file between IC 5.0.33 applications and applications from older releases. See "$CDS_INST_DIR" on page 42 for more information.

$CDS_INST_DIR

Cadence applications do not use the `$CDS_INST_DIR` environment variable anymore. The following rules apply to existing `$CDS_INST_DIR` settings:

- `$CDS_INST_DIR` environment variables are ignored by Cadence applications.
- Any reference to `$CDS_INST_DIR` in `setup.loc` or `cds.lib` files is translated to the installation root of the application you are running.

  However, beginning with the IC 5.0.33 release, the preferred way of referring to the application's installation root in `cds.lib` or `setup.loc` files is to use `$(compute:THIS_TOOL_INST_ROOT)`.

  `$CDS_INST_DIR` is still supported and you can use it if you share a `cds.lib` file or `setup.loc` file between IC 5.0.33 applications and applications from older releases. Releases before IC 5.0.33 do not use the new expressions `$(compute:THIS_TOOL_INST_ROOT)`, `$(compute:THIS_FILE_INST_ROOT)`, or `$(inst_root_with:`*`pathRelativeToRoot`*`)`.

Specifying CSF Search for Additional Files

Some configuration files, such as `cds.lib` and `cdsinfo.tag`, are always found through a CSF search. You can specify that Cadence applications also locate other configuration files, such as `.cdsinit` or `.cdsenv`, through CSF. This enables you to customize the search order for these files.

To specify files that should be found through CSF,

1. Create an ASCII file named `csfLookupConfig` in any directory that is listed in your `setup.loc` file, for example `$CDS_SITE` or `$HOME`. (The `csfLookupConfig` file itself will be found through CSF.)
2. In the `csfLookupConfig` file, specify the files that you want found through CSF. Use the keywords and syntax described in csfLookupConfig File Format.

Tip

A sample file, `csfLookupConfig.sample`, is located in *`your_install_dir`*`/share/cdssetup`. You can copy this file and modify it for your needs.

csfLookupConfig File Format

Use the following keywords in your `csfLookupConfig` file to specify the files to be found through CSF:

`ALL`	Use CSF search for all configuration files
`NONE`	Do not use CSF search for any configuration file
`INCLUDE` *`fileName`*	Use CSF search to find *`fileName`*
`fileName`	Use CSF search to find *`fileName`*
`EXCLUDE` *`fileName`*	Do not use CSF search to find *`fileName`*

`LOAD` *`fileName`*	Use to specify that a file that containing `csfLookupConfig` statements should be loaded. If a relative filepath is specified it will be resolved relative to the location of the file that contains the `LOAD/SOFTLOAD` statement. The filepath can be specified as a string or an expression using either: ■ `$(csf_search:somePathlette)` or ■ `$(compute:THIS_TOOL_INST_ROOT)` **Note:** An error will be displayed if the specified file is not found.
`SOFTLOAD` *`fileName`*	As above (`LOAD`), but no error will be displayed if the specified file is not found.

The following rules apply to the `csfLookupConfig` file:

- You can specify only one *`fileName`* per line.
- Comment lines begin with a pound sign (#).
- Keywords are case-insensitive.
- Commands listed later in the file override any previous commands. For instance, if an `ALL` command is followed by a `NONE` command, the `ALL` command will be ignored and CSF search will not be applied to any configuration files.

Caution

Do not use the csfLookupConfig file to modify search for files that are always found through CSF, such as cds.lib or cdsinfo.tag.

Checking Files

You can find out if a specific file is found through CSF by using the `cdswhich` command:

```
cdswhich -lookupconfig fileName ...
```

If a `csfLookupConfig` file specifies that *`fileName`* be found through CSF, then the path of the file found is returned, for example:

```
Info (cdswhich): ’.cdsinit’ found at:
./.cdsinit
```

If a `csfLookupConfig` file is not found or does not specify that *`fileName`* be found through CSF, then the following message is returned:

```
Info (cdswhich): Cadence software is not configured to locate file ’.cdsinit’ via
Cadence File Search mechanism
```

CSF Support For Third-Party Simulators

This section contains sample information, for both end-users and EDA vendors, regarding the integration of third-party tools using CSF.

Customer Use Models

If, for example, your `csfLookupConfig` contained:

```
SOFTLOAD $(csf_search:mentor.conf)
SOFTLOAD $(csf_search:agilent.conf)
SOFTLOAD $(csf_search:bda.conf)
SOFTLOAD $(csf_search:silvaco.conf)
```

Then, third-party vendors will be able to maintain their own files, and it will always be possible to pick up the latest versions.

The `data.reg` command can also be used to perform something similar:

```
SOFTINCLUDE $(csf_search:mentor.reg);
SOFTINCLUDE $(csf_search:agilent.reg);
SOFTINCLUDE $(csf_search:bda.reg);
SOFTINCLUDE $(csf_search:silvaco.reg);
```

- The idea in both of these example scenarios is that `$(csf_search:…)` would look for the correct file using the CSF mechanism, and consequently complete control over the specified locations could be performed using the `setup.loc` file.
- The `setup.loc` file could also either use hard paths, or environment variables to indicate a search order.
- Because `SOFT` versions of these commands have been used in the examples, the `data.reg` and `csfLookupConfig` files could remain unchanged, even if specific software was not enabled within your environment (for example, if a module had not been loaded).

Integration Recommendations for EDA Vendors

The following guidelines contain recommendations from Cadence to third-party EDA vendors, for the integration of their tools using `SOFTLOAD` and `SOFTINCLUDE`:

- The correct structure should be provided, for example:
  - `.cdsenv` default files

    For each tool, you require a `cdsenv` file named “`<tool>.cdsenv`” (for example, `eldoD.cdsenv` or `adit.cdsenv`). These are the same registration files that were previously included in `<instdir>/tools/dfII/etc/tools/<tool>/.cdsenv`.
  - `hierEditor/templates`

    This directory contains the hierarchy editor templates that would previously have been placed in `<instdir>/share/cdssetup/hierEditor/templates`.
  - `menus`

    This directory contains any menu customisation files (previously stored in `<instdir>/tools/dfII/etc/tools/menus`).
  - `hnl` and `si/caplib`

    This directory contains the netlister "`ile`" files that were previously stored in `<instdir>/tools/dfII/etc/skill/hnl` and `<instdir>/tools/dfII/etc/skill/si/caplib`.
  - `cdssetup/registry/{data,tools}`

    This directory contains data and tools information that was previously held in `<instdir>/share/cdssetup/registry/{data,tools}`.
  - `data.reg`

    This contains `INCLUDE` statements used to reference the registry files mentioned above.
  - `csfLookupConfig`

    This containts statements that inform of the use of CSF mechanisms for `hnl` and `si/caplib` files - all of which are listed. It also instructs to use CSF for `.cdsenv lookup`.
- Create a unique symbolic link to the `data.reg` file called (for example, `mentor.reg`).

- Create a unique symbolic link to the `csfLookupConfig` file (for example, `mentor.conf`).

Example of Vendor Site Directory

- The following is an example vendor site directory as referenced from `setup.loc`:

```
-andrewb_14> ls -lG mentor_site
total 300
-rw-r--r-- 1 andrewb 59659 Nov 19 13:24 ADVance_MS.cdsenv
-rw-r--r-- 1 andrewb 5528 Nov 19 13:24 adit.cdsenv
-rw-r--r-- 1 andrewb 6024 Nov 19 13:24 adit_sp.cdsenv
-rw-r--r-- 1 andrewb 10763 Nov 19 13:24 artist_link.cdsenv
-rw-r--r-- 1 andrewb 2111 Nov 19 13:24 auCore.cdsenv
drwxr-xr-x 4 andrewb 4096 Nov 19 12:20 cdssetup/
-rw-r--r-- 1 andrewb 1757 Nov 19 13:25 csfLookupConfig
-rw-r--r-- 1 andrewb 277 Nov 19 13:31 data.reg
-rw-r--r-- 1 andrewb 49261 Nov 19 13:24 eldoD.cdsenv
-rw-r--r-- 1 andrewb 53148 Nov 19 13:24 eldoD_sp.cdsenv
drwxr-xr-x 3 andrewb 4096 Nov 19 12:10 hierEditor/
drwxr-xr-x 2 andrewb 4096 Nov 19 12:34 hnl/
lrwxrwxrwx 1 andrewb 15 Mar 18 16:19 mentor.conf -> csfLookupConfig
lrwxrwxrwx 1 andrewb 8 Nov 19 16:53 mentor.reg -> data.reg
drwxr-xr-x 2 andrewb 4096 Nov 19 13:25 menus/
drwxr-xr-x 3 andrewb 4096 Nov 19 12:34 si/
-rw-r--r-- 1 andrewb 59537 Nov 19 13:24 spectre2eldoD.cdsenv
```

- Example structure of `csfLookupConfig`:

```
INCLUDE hnl/eldoD.ile
INCLUDE hnl/ADVance_MS.ile
INCLUDE hnl/adit.ile
INCLUDE hnl/eldoD_sp.ile
INCLUDE hnl/adit_sp.ile
INCLUDE si/caplib/eldoD.ile
INCLUDE si/caplib/ADVance_MS.ile
INCLUDE si/caplib/adit.ile
INCLUDE si/caplib/eldoD_sp.ile
INCLUDE si/caplib/adit_sp.ile
INCLUDE .cdsenv
```

- Example structure of `data.reg`:

```
INCLUDE cdssetup/registry/data/advance_ms.reg;
INCLUDE cdssetup/registry/data/netlist.reg;
INCLUDE cdssetup/registry/data/verilogAe.reg;
INCLUDE cdssetup/registry/tools/advance_ms.reg;
INCLUDE cdssetup/registry/tools/netlist.reg;
INCLUDE cdssetup/registry/tools/verilogAe.reg;
```

The cdswhich Command

The `cdswhich` command is a test, debug, and administration tool for managing the CSF search mechanism. It is located in *`your_install_dir`*`/tools/bin`.

`cdswhich` has the following syntax:

```
cdswhich [-debug] [-all] filename
cdswhich [-debug] [-where path] [-formaldir path] filename
cdswhich [-debug] -lookupconfig filename ...
cdswhich [-debug] -findsetuploc
```

Command Options

`-debug`

Outputs information about the file paths that are examined when searching for files.

`-all`

Lists all occurrences of *`filename`* in all search locations, not only the first found.

The search locations are the locations listed in the `setup.loc` file found by CSF. `cdssetup` and `.cadence` subdirectories are also searched.

`-where` *`path`*

Searches a specific location for *`filename`*. Only the same path specified is searched; `cdssetup` and `.cadence` subdirectories are not searched.

For example:

```
cdswhich -where mnt3/RunTools myFile
```

`-formaldir` *`path`*

Searches for *`filename`* in the */`path`* subdirectories of search locations if *`filename`* is not found in the search locations themselves.

`path` must be a subdirectory path. The search locations are the locations specified in the `setup.loc` file found by CSF. `cdssetup` and `.cadence` subdirectories are not searched by default.

For example:

```
cdswhich -formaldir cdssetup myFile
```

searches for `myFile` in the `cdssetup` subdirectory of each search location listed in the `setup.loc` file, if the file is not found in the search location directory itself.

`-lookupconfig` *`fileName`*

Checks whether *`fileName`* will be found through CSF search, by looking for a `csfLookupConfig` file and checking if it includes *`fileName`*.

See "Specifying CSF Search for Additional Files" on page 43 for more information.

`-findsetuploc`	Writes *`filepath`* to the `setup.loc` file that specifies the CSF search locations. CSF uses the default search order to locate `setup.loc`, and a customized setup.loc file can result in % cdswhich `setup.loc`, which can write a different filepath.

If you do not specify any options with the `cdswhich` command, only the first file found is reported.

Examples

```
cdswhich cds.lib
cdswhich -all cds.lib
cdswhich -where /usr1/mnt3/ns/Examples testFile
cdswhich -formaldir Examples testFile
cdswhich -lookupconfig .cdsinit
```

4

Cadence System Information File: cdsinfo.tag

This chapter describes the following:

Overview

The Cadence system information file, `cdsinfo.tag`, supports a configuration of several key capabilities, including

- The type of design management system used to manage a library
- Whether a strict library checking mechanism should be used to identify Cadence libraries
- The case sensitivity of the file system that contains the library

The `cdsinfo.tag` file is an ASCII file that contains entries for various Cadence application, library, design management system, and file system properties.

Properties in `cdsinfo.tag` files are found using a search mechanism, which is described in "The cdsinfo.tag Search Mechanism" on page 55.

Example cdsinfo.tag File

```
CDSLIBRARY
CDSLIBCHECK ON
DMTYPE TDM
NAMESPACE LIBRARYUNIX
```

The cdsinfo.tag File Location

You might have more than one `cdsinfo.tag` file in your Cadence environment. The search mechanism looks for the file in the following order and uses the settings found last in the search order.

1. The default site-wide and user-wide `cdsinfo.tag` file in *`your_install_dir/`*`share/cdssetup` (where *`your_install_dir`* is the location of the Cadence software installation). Entries in this file are the default, for example, the default `DMTYPE` for newly created libraries.
2. A `cdsinfo.tag` file in a directory referenced by the `$CDS_SITE` environment variable. It applies to all directories on your site.
3. A library-specific `cdsinfo.tag` file with settings for the library (such as the `DMTYPE` used for the library, whether the directory should be treated as a library, and so on).

For information about the Cadence search mechanism, see Chapter 3, "Cadence Setup Search File: setup.loc." For specific information about the search mechanism for `cdsinfo.tag`, see The cdsinfo.tag Search Mechanism.

The cdsinfo.tag Search Mechanism

The data contained in `cdsinfo.tag` files is accessed by Cadence applications, such as the Virtuoso Design Environment. These applications always look for system information about an object (a file or directory) in the context of the path of that object. For example, an application provides a file location when it needs to know which design management system is managing the file.

The `cdsinfo.tag` search mechanism uses a combination of that path and the Cadence search mechanism to locate the `cdsinfo.tag` file that contains the information requested by the application.

It first looks for a `cdsinfo.tag` file in the directory that is provided by the application or the directory that contains the file that is provided by the application. If a `cdsinfo.tag` file is found and it contains the property that the application requested, then the value of that property is used. But if a `cdsinfo.tag` file is not found in the directory or if the file does not contain the property that the application requested, then the parent directory is searched. The mechanism continues to look for a `cdsinfo.tag` file with the required property upwards through the path, up to the root of the file system. If it is still not found, then the Cadence search mechanism (CSF) is used to search other locations for the `cdsinfo.tag` file. The Cadence search mechanism is determined by the `setup.loc` file. For details about the search mechanism, see Chapter 3, "Cadence Setup Search File: setup.loc."

If the property is not found in any `cdsinfo.tag` file, default values are used. The default value for each property is described in "Entry Types" on page 56.

To find out which `cdsinfo.tag` file is being used to obtain the value of a property, use the following command:

```
cdsinfo -lookup propertyname
```

Note: An exception to the search order described above is the `CDSLIBRARY` property. When an application requests the value of the `CDSLIBRARY` property, only the current directory (provided by the application) is searched for the `cdsinfo.tag` file.

Entry Types

The `cdsinfo.tag` file contains Cadence application, library, design management system, and file system properties. For example, the library identification entry is the property `CDSLIBRARY`.

The first word of any entry is the property name. It is followed by the value of the property. The following properties can be in a `cdsinfo.tag` file:

- Library identification: `CDSLIBRARY`
- Library check selection: `CDSLIBCHECK {ON | OFF}`
- Design management system identification: `DMTYPE` *`dmtypename`*
- File system name space identification: `NAMESPACE {LibraryNT | LibraryUnix}`

`CDSLIBRARY`	Identifies a directory as being a `CDS` (Cadence) library. When `CDSLIBCHECK` is `ON`, this entry must exist in a `cdsinfo.tag` file in the library directory for the library to be considered a valid Cadence library. If no `CDSLIBRARY` entry is found, its value is assumed to be `NO`. When an application requests `CDSLIBRARY` information for a directory, only that directory is searched for a `cdsinfo.tag` file.
`CDSLIBCHECK`	Turns on a mechanism that provides tighter control over the definition of libraries. By default, libraries are defined as being libraries by their presence in a `cds.lib` file. By adding a `CDSLIBCHECK ON` entry to a `cdsinfo.tag` file, a site CAD administrator might want to stipulate that library certification be done by enforcing that a `cdsinfo.tag` file exists in each library directory with a `CDSLIBRARY` entry in it. If `CDSLIBCHECK` is off (the default), `cdsinfo.tag` files need not exist and are not checked for `CDSLIBRARY` entries. The expected use model for `CDSLIBCHECK` is that it be set globally in the site `cdsinfo.tag` file. If no `CDSLIBCHECK` entry is found, its value is assumed to be `OFF`.

`DMTYPE`	Identifies the native design management system in use, if any). Generic Design Management (GDM) requests that cannot identify a design management system will fail. A value of `none` means that the directory is not managed. You can set up the site `cdsinfo.tag` file to set a default for your site. Examples:
	`DMTYPE tdm`
	`DMTYPE crcs`
	`DMTYPE none`
	If no `DMTYPE` entry is found, its value is assumed to be `none`.

`NAMESPACE`	Identifies the native file system so that proper name space handling can be done by application programs. `NAMESPACE` entries have a single additional meaningful word, which is either `LibraryNT` or `LibraryUnix`. If no name space entry is found, the default is the architecture of the machine on which the application is running.

The `CDSLIBRARY` and `CDSLIBCHECK` entry types together provide an alternative to the current library identification mechanism, which consists entirely of the presence of a `DEFINE` entry in a `cds.lib` file. The system reports as errors those libraries that are defined but that do not have `cdsinfo.tag` files with the `CDSLIBRARY` entry. The default (no `CDSLIBCHECK` entry type) acts as if a `CDSLIBCHECK OFF` entry was found, prevents damage of a site configuration upon installation of new software including this mechanism, and maintains the current behavior.

Syntax and File Format

File syntax for entries in `cdsinfo.tag` files consist of a set of lines with a simple syntax:

- When running on Windows, the backslash (\ ) and the forward slash (/) are treated synonymously.
- When running on Windows, *`<letter>:`* is a legal path, but not when running on UNIX.
- A comment line is any line whose first nonwhitespace character is a double hyphen (--) or a pound sign (#). Examples are as follows:

  ```
  -- this is a single line comment
  # this is a single line comment
  ```
- Whitespace is any blank or tab character. Blank lines are acceptable.
- An entry consists of a keyword followed by zero or more words, terminated by a new line character or a pound sign (#).
- Keywords are case insensitive.

Sample Site and Library Files

The pound sign (#) denotes a comment. Remove the leading pound signs from the entries to activate them.

Sample site cdsinfo.tag file

```
# This is a sample cdsinfo.tag file as it might be set for a
# site. Place this file in the directory referenced by the shell
# environment variable CDS_SITE, and have all Cadence users share
# the same setting for CDS_SITE.
#
# Select a site-wide DM system.
# Use ‘none’ to turn off use of DM for the site.
dmtype tdm
#
# Select (enable) the strict library checking mechanism
#
# ALL Cadence libraries must has a local cdsinfo.tag
# file with a CDSLIBRARY entry if this is used.
cdslibcheck ON
```

Sample library cdsinfo.tag file

```
# This is a sample cdsinfo.tag file as it might be set for a
# Cadence Library. This file needs to be located in the library
# directory (not under a cell or view).
#
# Override the site DM selection - mark this library as unmanaged;
# it is used for experimental work only.
dmtype none
#
# Indicate that this directory is a Cadence library.
cdslibrary
```

The cdsinfo command

The `cdsinfo` command is used as a test, debug, and administration tool for the `cdsinfo.tag` file mechanism. It is located in *`your_install_dir`*`/tools/bin`.

The command syntax is as follows:

cdsinfo [-verbose | -v] [-path *`filepath`*] [-configurelibrary | -checklibrary | -lookup *`entryname`*... | -show | -addentry *`entryname value`* | -clearentry *`entryname`*]

`-verbose | -v`	Gives detailed information about the command's progress and where it finds information. When used with the `-configurelibrary` argument, the `-verbose` option lists the path to your `cds.lib` file and a list of library directories selected for configuring.
`-path` *`filepath`*	Path to the file to use for the other arguments.
`-configurelibrary`	Examines your `cds.lib` file and validates all the entries including those brought in by `INCLUDE` and `SOFTINCLUDE` statements. It examines every library directory defined in the `cds.lib` file and attempts to create a `cdsinfo.tag` with a `CDSLIBRARY` entry. The system issues a warning message if it cannot write to a library directory. Library directories that already contain a `cdsinfo.tag` file with a `CDSLIBRARY` entry are not changed. Those with a `cdsinfo.tag` file without a `CDSLIBRARY` entry have one added to the `cdsinfo.tag` file, if possible.
`-checklibrary`	Does the following: 1. Finds a `cds.lib` file. 2. Checks libraries defined by the `cds.lib` file and the other `cds.lib` files it includes to find `cdsinfo.tag` files with `CDSLIBRARY` entries in them. Prints the names of the libraries and the paths to the `cdsinfo.tag` files. 3. Checks all subdirectories of the library directories identified by the `cds.lib` file to find `cdsinfo.tag` files. Issues a warning for any sublibrary `cdsinfo.tag` files found that indicate an incorrect configuration. For a large library, this process could take some time.

	4. Checks all `cdsinfo.tag` files that are found in step 2 for correct syntax and reports any syntax errors.
`-lookup` *`entryname`* `...`	Looks for a `cdsinfo.tag` file that contains an entry with the given name and prints the appropriate search rules for the given entry type. This command also gives the location of the `cdsinfo.tag` file that is used.
`-show`	Displays the path and contents of the `cdsinfo.tag` file in the current directory or in the directory specified with `-path`. If there is no `cdsinfo.tag` file in that directory, searches for it in the parent directory, continuing up to the root of the path.
`-addentry` *`entryName value`*	Adds the entry to the `cdsinfo.tag` file specified by`-path`. If the path is not specified, adds the entry to the `cdsinfo.tag` file that is in the current working directory. If the current working directory does not contain a `cdsinfo.tag` file, this command creates one.
`-clearentry` *`entryName`*	Removes the entry from the `cdsinfo.tag` file specified by `-path` or, if the path is not specified, from the `cdsinfo.tag` file that is in the current working directory.

Note: You can also use the `ddSetLibUnmanaged` and `ddClearLibUnmanaged` SKILL functions to set or remove the `DMTYPE` entry from `cdsinfo.tag` files. See the *Virtuoso Design Environment SKILL Functions Reference* for more information.

5 Cadence Library Definition File

This chapter describes the following:

Important

From IC614, `lib.defs` library definition files are no longer supported in Virtuoso. The only supported format now being `cds.lib`. A new CdsLib plugin (release 31.09) allows for OpenAccess applications to read `cds.lib` files, where previously they required to use `lib.defs`.

Overview

Cadence uses a library definition file to define libraries. The library definition file maps library names to physical directory paths. Applications read this file to identify the libraries that they can use.

Virtuoso uses cds.lib File as its library definition file.

cds.lib File

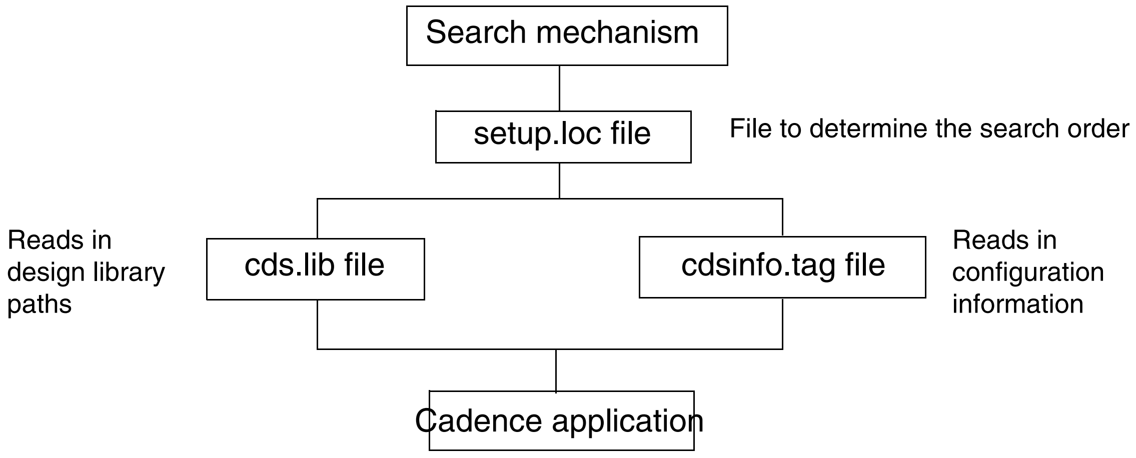
It covers the following sections.

cds.lib File Overview

The `cds.lib` file is an ASCII file used to define libraries. The file maps user library names to physical directory paths.

Applications read the `cds.lib` file to identify the libraries they can use. Usually, one `cds.lib` file, which might reference other files, determines which libraries are available to your application. Other `cds.lib` files can be included in the `cds.lib` file with the `INCLUDE` and `SOFTINCLUDE` statements. This allows you to customize `cds.lib` files for specific projects or at different levels such as the site, group, or user level.

The Cadence search mechanism (CSF) is used to find the correct `cds.lib` file for your software. The first `cds.lib` file that is found is used.


Search mechanism
setup.loc file
File to determine the search order
Reads in design library paths
cds.lib file
cdsinfo.tag file
Reads in configuration information
Cadence application

Example cds.lib File

```
# The DEFINE statement defines library references.
DEFINE ttl /users/$USER/ttl
# The SOFTDEFINE statement is similar to DEFINE but doesn’t print errors.
SOFTDEFINE myDesign /users/$USER/parts
# The INCLUDE statement reads a file.
INCLUDE /users/$USER/cds.lib
# The SOFTINCLUDE statement is similar to INCLUDE but doesn’t print errors.
SOFTINCLUDE $GOLDEN/cds.lib
# The UNDEFINE statement undefines the iclib library.
UNDEFINE iclib
DEFINE iclib ./ic_lib
```

The cds.lib File Location

Cadence provides a default `cds.lib` file in the *`your_install_dir`*`/share/cdssetup` directory. In addition, applications might create a `cds.lib` file in other directories such as your current working directory when you create a new library. You can also create a `cds.lib` file in any directory listed in the `setup.loc` file.

The Cadence search mechanism described in Chapter 3, "Cadence Setup Search File: setup.loc" is used to find the correct `cds.lib` file for your application. The first `cds.lib` file that is found is used.

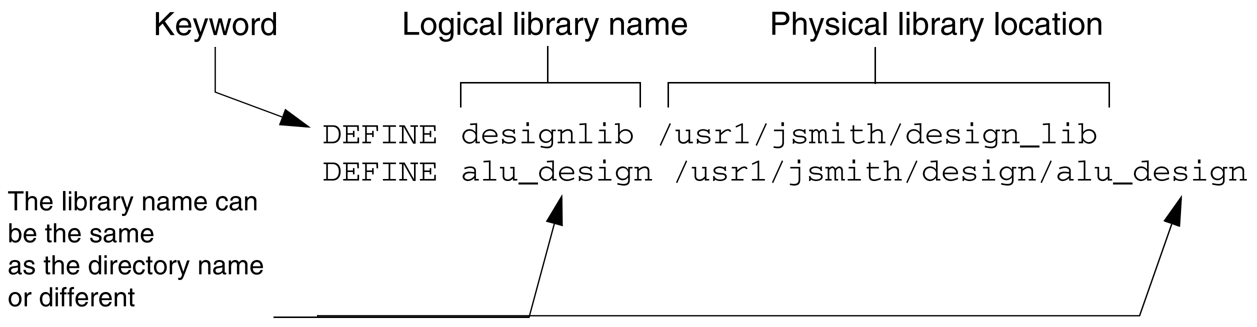
Using Multiple cds.lib Files

You can have multiple `cds.lib` files and use the `INCLUDE` statement to include them in the primary `cds.lib` file. The primary file must be named `cds.lib` because that is the name the system searches for by default. Included files do not need to be named `cds.lib`.

You can have a user `cds.lib` file that contains library settings used to support all your projects. You can also have project-wide or local `cds.lib` files located in specific design directories that contain library settings specific to each project, such as technology or cell libraries. These can be combined in many ways with the `INCLUDE` statement.

For information on how to create `cds.lib` files, see "Creating or Editing a cds.lib File" on page 75.

Statements


Keyword
Logical library name
Physical library location
DEFINE designlib /usr1/jsmith/design_lib
DEFINE alu_design /usr1/jsmith/design/alu_design
The library name can be the same as the directory name or different

Use the following statements in a `cds.lib` file:

`DEFINE` *`lib pathToLib`*

Defines *`lib`* as the logical reference to the directory specified as *`pathToLib`*. The same directory cannot be contained in multiple library definitions. An error message is printed if *`pathToLib`* does not exist.

For example:

```
DEFINE ttl_lib /usr1/libraries/ttl_lib

DEFINE ttl ./libraries/ttl

DEFINE designabc ~user/designABC

DEFINE companyabc $HOME/companyABC
```

See "Installation Root Expressions" on page 71 for the expressions that you can use in a `DEFINE` statement.

`SOFTDEFINE` *`lib pathToLib`*

Same as the `DEFINE` statement, except that no error message is printed if *`pathToLib`* does not exist.

For example:

```
SOFTDEFINE myLib /usr1/libraries/parts_lib
```

See "Installation Root Expressions" on page 71 for the expressions that you can use in a `SOFTDEFINE` statement.

`UNDEFINE` *`lib`*

Undefines the specified library. This command is useful for removing any libraries that were defined in other files. It is not an error if *`lib`* was not previously defined.

For example, `UNDEFINE ttl`

`INCLUDE` *`file`*

Reads the specified file as a `cds.lib` file. Using `INCLUDE` is the same as incorporating the contents of *`file`* within the `cds.lib` file, except that file paths in the included file are relative to the directory containing the included file. An error message is printed if *`file`* is not found or if recursion is detected. *`file`* does not have to be named `cds.lib`.

The following example reads the `cds.lib` file from `/users/$USER`:

```
INCLUDE /users/$USER/cds.lib
```

See "Installation Root Expressions" on page 71 for the expressions that you can use in an `INCLUDE` statement.

`SOFTINCLUDE` *`file`*

Same as the `INCLUDE` statement, except that no error message is printed if the file does not exist.

The following example reads the `cds.lib` from the `$GOLDEN` directory if it exists:

```
SOFTINCLUDE $GOLDEN/cds.lib
```

See "Installation Root Expressions" on page 71 for the expressions that you can use in a `SOFTINCLUDE` statement.

`ASSIGN` *`libName attribute value`*

Assigns the specified attribute to a library. The library must already be defined; an error message is printed if the library has not been defined when the `ASSIGN` statement is read. An `ASSIGN` statement for a library does not have to be in the same file as the library definition.

Currently, you can use the attributes listed below with an `ASSIGN` statement; the first two define the temporary directory for libraries while `DISPLAY` and `COMBINE` let you customize the display of libraries in the Library Manager.

`ASSIGN` *`libName`* **`TMP`** *`TempDirPath`*

It defines the temporary directory for a library. *`libName`* is the library to which you want to assign a temporary directory and *`TempDirPath`* is the path to the temporary directory.

For example:

```
ASSIGN LSTTL TMP /tmp/lsttl_tmp
```

`ASSIGN AllLibs TmpRootDir` *`TmpRootDirPath`*

It defines the global temporary directory for all libraries. *`TmpRootDirPath`* is the path to the root of the temporary directory.

For example:

```
ASSIGN AllLibs TmpRootDir $HOME/myTempLibs
```

In this case, if you have a library `LSTTL`, its temporary directory will be `$HOME/myTempLibs/LSTTL`.

Note: The `AllLibs` directive is overridden by the `TMP` directive for libraries that have a `TMP` assigned.

A library can have only one temporary directory. Temporary directories contain only derived data; they cannot contain source data. Applications read both the library and its temporary directory to get library data; if there are any files in common, the files in the temporary directory have precedence. Applications write source data to the library and derived data to the temporary directory. For more information about temporary directories, see Chapter 2, “Cadence Library Structure.”

`ASSIGN` *`libName`* **`DISPLAY`** *`displayAttributeName`*

It sets the specified attribute on the library. The `DISPLAY` attribute, which is only read by the Library Manager, is used to customize the display of libraries. For example, you can set:

```
ASSIGN LSTTL DISPLAY RefLibs
```

in your `cds.lib` file, and in the Library Manager define that all libraries tagged with the `RefLibs` attribute be displayed in blue. For more information about the `DISPLAY` attribute, see Chapter 2 of the *Cadence Library Manager User Guide*.

`ASSIGN` *`combinedLibName`* **`COMBINE`** *`libA libB`* **`...`**

It defines a combined library, which is a set of libraries that are displayed together as a composite library in the Library Manager. *`combinedLibName`* is the name of the combined library and *`libA`* and *`libB`* are the libraries that comprise the combined library.

All the libraries specified in the statement must exist, otherwise the statement is ignored. This means that *`combinedLibName`* must have a physical representation, even if it is an empty directory.

Note: All the libraries in the statement must already be defined with a `DEFINE` statement earlier in the file, otherwise the statement is ignored.

A library can be placed in more than one combined library.

For more information about combined libraries, see Chapter 2 of the *Cadence Library Manager User Guide*.

Note: The `COMBINE` attribute is only read by the Library Manager.

Use the `UNASSIGN` statement to remove attributes from a library. You can also assign new values to attributes without having to unassign the attributes first.

`UNASSIGN` *`libName attribute`*

Removes the specified attribute from the library. The library must already be defined. No error message is printed if the attribute does not exist on the library.

For example:

```
UNASSIGN LSTTL TMP
```

Note: `UNASSIGN` is not supported for the `AllLibs` directive.

Installation Root Expressions

You can use the following expressions in `cds.lib` file statements to refer to the root of Cadence installation hierarchies. (These are not environment variables; you do not need to set them in your `.cshrc` or `.login` files.)

`$(compute:THIS_TOOL_INST_ROOT)`

Interpreted as the root of the installation hierarchy of the application that is reading the `cds.lib` file. If the application is not in a Cadence installation hierarchy, you will get an error.

For example:

```
DEFINE mixSigLib $(compute:THIS_TOOL_INST_ROOT)/
libraries/mixSigLib
```

However, when using the same `cds.lib` in the NC-Verilog environment, “`THIS_TOOL`” proves to be a wrong specification. Therefore, you can use the following variant if you want the hierarchy with virtuoso in it:

```
$(inst_root_with:tools/dfII/bin/virtuoso)/tools/dfII/etc/
cdsDefTechLib
```

Moreover, using this variant you are sure to point to the right installation root, which is independent of the tool flow/environment that you are using.

`$(compute:THIS_FILE_INST_ROOT)`

Interpreted as the root of the installation hierarchy of the `cds.lib` file that is being read. If the `cds.lib` file is not in an installation hierarchy, you will get an error.

For example:

DEFINE myLib $(compute:THIS_FILE_INST_ROOT)/libraries/partsLib

`$(inst_root_with:`*`pathRelativeToRoot`*`)`

where *`pathRelativeToRoot`* is the path (relative to the root of the installation hierarchy) to a file or directory.

This expression is interpreted as the root of the first installation hierarchy found in `$PATH` that contains *`pathRelativeToRoot`*. If you are using applications in the Stream Manager environment, this expression is interpreted as the root of the first installation hierarchy found in `$CDS_STRM_DIR_LIST` that contains *`pathRelativeToRoot`*. If *`pathRelativeToRoot`* is not found, you will get an error.

Note: Beginning with the IC 5.0.33 release, the recommended way of referring to an application's installation root in a `cds.lib` file is `$(compute:THIS_TOOL_INST_ROOT)`. However, `$CDS_INST_DIR` is still supported and you can use it if you share a `cds.lib` file between IC 5.0.33 applications and applications from older releases. See "$CDS_INST_DIR" on page 72 for more information.

$CDS_INST_DIR

Cadence applications do not use the `$CDS_INST_DIR` environment variable any longer. The following rules apply to existing `$CDS_INST_DIR` settings:

- `$CDS_INST_DIR` environment variables are ignored by Cadence applications.
- Any reference to `$CDS_INST_DIR` in `setup.loc` or `cds.lib` files is translated to the installation root of the application you are running.

However, beginning with the IC 5.0.33 release, the preferred way of referring to the application's installation root in `cds.lib` or `setup.loc` files is to use `$(compute:THIS_TOOL_INST_ROOT).`

`$CDS_INST_DIR` is still supported and you can use it if you share a `cds.lib` file or `setup.loc` file between IC 5.0.33 applications and applications from older releases. Releases before IC 5.0.33 do not use the new expressions listed in "Installation Root Expressions" on page 71.

Syntax and File Format

The following rules apply to the `cds.lib` file:

- Only one statement is allowed per line.
- Blank lines are allowed.
- Use the pound sign (`#`) or the double hyphen (`--`) to begin a comment. For example:

  ```
  # this is a single line comment
  -- this is a single line comment
  ```

  You must precede and end the comment character with a blank space, a tab, or a new line.
- Keywords are identified as the first non-whitespace string on a line.
- Keywords are case insensitive.
- Directory and file names cannot contain shell wildcards, such as an asterisk (*) or a question mark (?).
- You can include environment variables such as `$HOME` or shell-style home directory references such as `~` and `~user`. Symbolic variables and library paths are in the file system name space.
- You can enter absolute or relative file paths.

  Note: Relative paths are relative to the location of the current `cds.lib` file being read. Use of absolute paths with design management systems might cause problems in large team environments.
- Logical library names are always in the LibraryUnix name space and are case sensitive both on UNIX and Windows.
- Any reference to `.` means the directory that was represented by the path used to find the `cds.lib` file. If you are in a work area that has a symbolic link to a `cds.lib` file, `.` will refer to the directory that the original `cds.lib` file is in. For example:

work area			repository
`file`	`cds.lib`	`->`	`cds.lib.6`
`contents`	`INCLUDE ./foo.lib`	`->`	`foo.lib.4`

Creating or Editing a cds.lib File

You can create and update the `cds.lib` file with one of the following:

- Cadence Library Path Editor

  Many Cadence applications include the Library Path Editor.

- Any text editor
- New Library form from the Command Interpreter Window or the Cadence Library Manager (Virtuoso users only)

  When you create a new library, a new `cds.lib` file is created or the existing file is updated.

  Note: Creating a new, or temporary, library inside of an existing library is not allowed as any directories found inside of a library will be treated as cells.

Using the Cadence Library Path Editor to Create or Edit the cds.lib File

To start the Cadence Library Path Editor,

In a shell window, type the following command:

➤ `cdsLibEditor`

  To use a namespace other than the default CDBA namespace, use the `-namespace` option with the command. For example:

```
cdsLibEditor -namespace VHDL
```

  For a list of Cadence name spaces, see Chapter 7, “Name Mapping.”

For information on how to use the Library Path Editor, see the *Cadence Library Path Editor User Guide* or click the *Help* button in the application.

Using a Text Editor to Create or Edit the cds.lib File

To create a new `cds.lib` file or to edit your `cds.lib` file to add libraries or include other `cds.lib` files,

1. Do one of the following:
   - ❑ To create a new `cds.lib` file, create an ASCII file named `cds.lib` in any directory that is listed in your `setup.loc` file, for example, `$HOME`.

Note: The search order specified in the `setup.loc` file determines which `cds.lib` file will be used.

- ❑ To edit a `cds.lib` file, open the file in a text editor.

2. To add a library, add the following statement:

```
DEFINE logicalNameForLib pathToLib
```

For example:

```
DEFINE myLib ../libs/designLib
```

3. To include another `cds.lib` file in your file, add the following statement:

```
INCLUDE path_to_file
```

For example:

```
INCLUDE /net/cds/user/libs/samples/cds.lib
```

For more information about the statements you can use in a `cds.lib`, see "Statements" on page 67.

4. Save the `cds.lib` file.

Important

You must specify library names in the `cds.lib` file in the LibraryUnix name space. See "Name Mapping Library Names" on page 77 and Chapter 7, "Name Mapping" for information on how to map names to the LibraryUnix name space.

Name Mapping Library Names

Library names in a `cds.lib` file are in the LibraryUnix name space. Applications map these names to their own name space. This enables all applications to share library definitions because they always interpret the library names in a `cds.lib` file in the LibraryUnix name space.

If you add a library definition to the `cds.lib` file with a text editor (instead of through an application), you must specify the logical library name in the LibraryUnix name space. You can use the `nmp` command to determine the name to include in the `cds.lib` file.

To use the `nmp` command,

➤ Type the following in a UNIX shell:

```
nmp mapName appNamespace LibraryUnix libName
```

When you specify *`libName`*, you need to escape names that contain special characters. For example, to use the library named `!Lib!` in Verilog, you need to escape the exclamation mark (!) with a backslash, because the exclamation mark requires an escaped names So, you would use the escaped name `\!Lib!␣`.

You also need to enclose names with special characters in single quotes so that the shell does not delete the special characters. Also, in some shells, you might need to escape the backslash that is part of the escaped name with another backslash.

For example, to determine the mapped LibraryUnix name for Verilog `\!Lib!␣`,

➤ In a sh shell, type:

```
nmp mapName Verilog LibraryUnix '\!Lib!␣'
```

– or –

In a csh shell, type:

```
nmp mapName Verilog LibraryUnix '\\!Lib!␣'
```

The `nmp` program returns

```
#21Lib#21
```

Use the mapped name (`#21Lib#21`) in the `cds.lib` file.

Note: You can avoid name mapping issues by always choosing names that use only lowercase letters and digits. For more information about name spaces, refer to Chapter 7, "Name Mapping."

The cdsLibDebug Command

The `cdsLibDebug` command is a testing and debugging tool for `cds.lib` files. It is located in *`your_install_dir`*`/tools/bin`.

> **Note:** The `cdsLibDebug` command is only available with Virtuoso applications.

You can use `cdsLibDebug` to

- Get a list of `cds.lib` files that are found by the search mechanism

  `cdsLibDebug` lists the `cds.lib` file found, as well as any other `cds.lib` files that are included (with the `INCLUDE` statement) in that `cds.lib` file.

  These are the `cds.lib` files that your Cadence application will read.

  If `cdsLibDebug` cannot find any `cds.lib` file, it displays the following error:

  ```
  *WARNING* ddUpdateLibList: Did not find any 'cds.lib' file.
  ```

- Get a list of library definitions that have been set in the `cds.lib` files

  `cdsLibDebug` lists the logical name and physical path of each library and identifies the `cds.lib` file in which it was found.

  These are the libraries that your Cadence application will access.

- Find syntax errors in `cds.lib` files

  `cdsLibDebug` reports errors such as an undefined variable or an invalid library path. It also reports a warning if the same library name is mapped to different paths.

Syntax

```
cdsLibDebug [-cdslib cdslib] [-cla] [-help]
```

`-cdslib` *`cdslib`*	Overrides the default search order for `cds.lib` files and reads the `cds.lib` that you specify.

`-cla`	Uses Cadence Library Access (CLA) semantics to read the `cds.lib` files. CLA is a procedural interface used to parse `cds.lib` files and access the library structure. It is typically used by non-Virtuoso applications. If you do not specify the `-cla` option, `cdsLibDebug` uses Design Data Procedural Interface (DDPI) semantics by default. DDPI is another procedural interface used to access the library structure and is typically used by Virtuoso applications. For more information about DDPI, see Chapter 3, “Design Management,” of the *Virtuoso Design Environment SKILL Reference*. If you want to see how a non-Virtuoso application will parse your `cds.lib` files, use the `-cla` option. Otherwise, use the default DDPI semantics mode. **Note:** In the default DDPI semantics mode, you will see `cdsDefTechLib` in the list of libraries and an `internal_implicit` file in the list of `cds.lib` files. This is because DDPI adds `cdsDefTechLib` to your library list by default.

`-help`	Displays information about the syntax of the `cdsLibDebug` command.
	
	For example:
	
	`cdsLibDebug`
	`cdsLibDebug -cdslib ~/design/cds.lib`
	`cdsLibDebug -cdslib ~/design/cds.lib -cla`

Example

In the following example, `cdsLibDebug` finds the `cds.lib` file in the current working directory `(/mnt3/WorkDir`), which includes another `cds.lib` file (`/mnt3/WorkDir/HierEditor/cds.lib`), which in turn includes another file (`/mnt3/WorkDir/Test/liblist`). `cdsLibDebug` lists all the libraries that are defined in these `cds.lib` files. It also prints warnings for an undefined environment variable, `$VAR`, as well as for an invalid library path for the library `MonitorTestLib`.

Output of cdsLibDebug with the -cla option

```
% cdsLibDebug -cla
Parsing cdslib file ./cds.lib.
```

```
Warning: Invalid environment variable $VAR on line 5 of /mnt3/WorkDir/cds.lib
Warning: Invalid path /mnt3/WorkDir/MonitorTestLib on line 7 of /mnt3/WorkDir/
cds.lib
cds.lib files:
1:  /mnt3/WorkDir/cds.lib
2:  /mnt3/WorkDir/HierEditor/cds.lib
    included on line 2 of /mnt3/WorkDir/cds.lib
3:  /mnt3/WorkDir/Test/liblist
    included on line 1 of /mnt3/WorkDir/HierEditor/cds.lib
Libraries defined:
Defined in /mnt3/WorkDir/Test/liblist:
Line #  Filesys    Path
------  ----       ----
1    NEW        /mnt3/WorkDir/Test/NEW
Defined in /mnt3/WorkDir/HierEditor/cds.lib:
Line #  Filesys    Path
------  ----       ----
2    mixSigLib  /mnt3/WorkDir/HierEditor/mixSigLib
3    myTempLib  /mnt3/WorkDir/HierEditor/myTempLib
4    myDestLib  /mnt3/WorkDir/HierEditor/myDestLib
5    SourceLib  /mnt3/WorkDir/HierEditor/SourceLib
Defined in /mnt3/WorkDir/cds.lib:
Line #  Filesys    Path
------  ----       ----
3    mylib      /mnt3/WorkDir/mylib
4    myTestLib  /mnt3/WorkDir/myTestLib
6    myLibCopy  /mnt3/WorkDir/myLibCopy
```

Output of `cdsLibDebug` *without the* `-cla` *option:*

```
% cdsLibDebug
*WARNING* The directory: '/mnt3/WorkDir/$VAR/Lib2' does not exist but was defined
in libFile '/mnt3/WorkDir/cds.lib' for Lib 'LIB2'.
*WARNING* The directory: '/mnt3/WorkDir/MonitorTestLib' does not exist but was
defined in libFile '/mnt3/WorkDir/cds.lib' for Lib 'MonitorTestLib'.
Lib Files:
1: /mnt3/WorkDir/cds.lib
2: /mnt3/WorkDir/HierEditor/cds.lib
3: /mnt3/WorkDir/Test/liblist
4: internal_implicit
Libraries defined:
1: mylib from file /mnt3/WorkDir/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/mylib
2: NEW from file /mnt3/WorkDir/Test/liblist (refCount 1).
    Path: /mnt3/WorkDir/Test/NEW
3: SourceLib from file /mnt3/WorkDir/HierEditor/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/HierEditor/SourceLib
4: mixSigLib from file /mnt3/WorkDir/HierEditor/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/HierEditor/mixSigLib
5: myLibCopy from file /mnt3/WorkDir/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/myLibCopy
6: cdsDefTechLib from file internal_implicit  (refCount 1).
    Path: /net/machine111/usr1/cadence/tools/dfII/etc/cdsDefTechLib
7: myTempLib from file /mnt3/WorkDir/HierEditor/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/HierEditor/myTempLib
```

```
8: myTestLib from file /mnt3/WorkDir/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/myTestLib
9: myDestLib from file /mnt3/WorkDir/HierEditor/cds.lib  (refCount 1).
    Path: /mnt3/WorkDir/HierEditor/myDestLib
```

Note: `refCount` is the number of `cds.lib` files that contain that library definition.

How Virtuoso Applications Handle cds.lib Files

Important

From IC614, Virtuoso no longer supports the use of `lib.def` files.

Virtuoso applications on OpenAccess support the use of `cds.lib` files for library definition.

If you create or edit a `cds.lib` file manually, you must keep it synchronized. You can use the Cadence Library Path Editor to synchronize library definition files (see the *Cadence Library Path Editor User Guide* for more information).

If a cds.lib file is not found, Virtuoso applications issue a warning.

Virtuoso Applications and cds.lib Files

Virtuoso applications support `cds.lib` files in the following way:

- When you create a library with a Virtuoso application or a `dd` function (`dd` functions are part of the DDPI interface that is used to access the library structure and that is described in the *Virtuoso Design Environment SKILL Reference*), a `DEFINE` statement is added to the `cds.lib` file:

  If the `cds.lib` found by the Cadence search mechanism is not in the current working directory, a new `cds.lib` file is created in the current working directory, with an `INCLUDE` statement that includes the `cds.lib` that was found and a `DEFINE` statement for the new library.

- When you delete a library with a Virtuoso application or a `dd` function, and the library is defined only once in a `cds.lib` file, it is deleted from the file and removed from disk.

  Note: Multiple definitions of a `cds.lib` can be found because a library can be defined multiple times in a `cds.lib` file as well as in files that are included in the `cds.lib` file.

- If Virtuoso applications do not find a `cds.lib` file, they issue a warning.

Note: Specify absolute path from the working directory to avoid any issues. Specifying relative path from the working directory can result in an error.

6

Cadence Data Registry File: data.reg

This chapter describes the following:

Overview

The Cadence® data registry file mechanism supports defining various data types (especially views), associating default editors with data, as well as being a general registry facility.

The Cadence data registry maps design data formats to specific applications, view names, and related files. The data formats and mapping can apply to any design or design project. The registry consists of files that

- Define the data format for each available view name
- Define the default editor for each data format
- Define sets of file types, called co-managed sets, that design management operations treat as single entities
- Specify global properties for libraries and cells
- Provide view aliases and Virtuoso viewtype support
- Define the icon used to represent a view in various browsers

The database contains data format definitions that list the available types of views and tool definitions that list the editors for the data formats. The data is not design or project specific. Cadence supplies the data registry for each Cadence application; however, you might want to integrate your own applications. In this case, you need to add that application's data information to the registry.

Note: Not all Cadence applications use the data registry as it is documented in this chapter. Refer to the documentation for the application you are using for specific information about how that application uses the data registry. This chapter contains general information about the data registry.

The data.reg File Location

By default, registry files are located in two directories:

`your_install_dir``/share/cdssetup/registry/data`

`your_install_dir``/share/cdssetup/registry/tools`

where *`your_install_dir`* is the location of the Cadence software installation.

Each directory contains several files with a application name and a `.reg` extension, such as `composer.reg`, where that application's relationships are defined. These directories build the base set of tool and data definitions. If you do not use the default *`your_install_dir/`*

`share/local` location for `$CDS_SITE`, you need to set the value of the environment variable `$CDS_SITE` to the path to the site configuration area.

Example of the Data Directory

A typical set of data registry definitions is this one for the Virtuoso® schematic editor located in *`your_install_dir`*`/share/cdssetup/registry/data/composer.reg`:

```
DataFormat ComposerSchematic { // Define Composer Schematics
    Pattern            = sch.oa;
    Preferred_Editor      = schematic;
    dfII_ViewType      = schematic;
    Co_Managed         = sch.oa master.tag data.dm pc.db verilog.v
                    verilog.vams ams_direct.dat amsAPT.apt;
}
/* Map the DataFormat names to the DFII view names*/
ViewAlias {
    schematic = ComposerSchematic;
}
```

`Pattern`	The name of the master file, which might include wildcards, such as the question mark (?), which matches any one character, and the asterisk (*), which matches any character zero or more times.
`Preferred_Editor`	The descriptor of the application used to create or modify views of this data format, which then searches the tools registry.
`dfII_ViewType`	The viewtype (view name) string used in release 4.3, retained for backward compatibility for DFII applications.
`Co_Managed`	A space-separated list of files to be checked in or out when the master file is checked in or out using a design management system. The list must include the `Pattern`, the `master.tag` (which contains the name of the master file), and the names of the other files you want to have checked in and out as a set.
`ViewAlias`	Shows the viewtype (view name) that are used to name the directory containing the co-managed group. The system uses the `ViewAlias` section to identify the data format name associated with a view name, and then uses the `DataFormat` section to find information about that view.

Example of the Tool Directory

A tool registry definition for the Virtuoso schematic editor located in *`your_install_dir`*`/share/cdssetup/registry/tool/composer.reg` looks like this:

```
    Tool schematic{
    }
```

Creating a data.reg File

To add extra definitions for your own needs, you can also create a `data.reg` file in your current, home, or `$CDS_SITE` directory. If you need to create it for a CDS site, then set the value of the environment variable `$CDS_SITE` to the path to the site configuration area.

Syntax and File Format

Path syntax for entries in `data.reg` files are as follows:

- When running on Windows, the backslash (\ ) and the forward slash (/) are treated synonymously.
- When running on Windows, *`<letter>`*`:` is a legal path; when running on UNIX, *`<letter>`*`:` is not a legal path.
- A comment line is any line whose first nonwhitespace character is a pound sign (#). Other examples are as follows:

```
/* this is a
   multiline comment */
-- this is a single line comment
# this is a single line comment
// this is a single line comment
```

- Whitespace is any blank or tab character. Blank lines are acceptable.
- An entry consists of a keyword followed by zero or more words and ends with a new line character or a pound sign (#).
- Keywords are case insensitive.
- Identifiers and property names are case sensitive.

Data Declarations

Generically, a declaration is as follows (variables that you have to change are in italics):

```
declaration
       : Tool  identifier '{' toolProperties '}'
       | DataFormat identifier '{' dataFormatProperties  '}'
       | +DataFormat identifier '{' dataFormatProperties '}'
       | Library '{'  libraryProperties  '}'
       | Cell '{'  cellProperties  '}'
       | ViewAlias identifier dataFormatType ';'
       | ViewAlias '{' viewAliasProperties '}'
       | Preferred Editor '{' preferredEditorProperties '}'
       | Include filename;
       | SoftInclude filename;
```

And a property assignment has the form

```
propertyAssignment
       : identifier '=' propertyValue ';'
```

For each of the relevant types in the registry, you define the set of properties that must exist. You can also provide optional properties.

Tool Identifier

A tool description is denoted by the `Tool` keyword followed by a unique identifier.

The syntax for a `Tool` definition is as follows:

```
Tool
       : 'Tool' identifier '{' toolProperties '}'
```

All tool properties are optional. These properties are

```
       tool_License
       toolKnows_LCV
       tool_Icon
```

`tool_License`	A property that checks to see if a tool is available or not
`toolKnows_LCV`	A property that denotes that the tool understands the library structure
`tool_Icon`	A property that denotes what icon should be used to display a tool

Examples of Tool Identifiers

```
Tool vi {
        Tool_License = NONE;    // Not licensed
        Start_With = Exec -Program "vi" -Args "%FullPath";
        toolKnows_LCV = FALSE;
};
Tool "Daves-AI-Editor" {
        Tool_License = DAVE_AI_EDIT;
        toolKnows_LCV = TRUE;
        Icon = Large share/cdssetup/toolIcons/bigHall
               Small share/cdssetup/toolIcons/smallHall.xpm;
};
```

Data Formats

In addition to tool identifiers, the system needs to know about the available data formats.

A data format is the type or representation for a view. For example, a view inside a library can be a schematic, VHDL text, or any other type. The `master.tag` file in the view directory contains the name of the master tool file in that view.

The `+DataFormat` construct lets you specify additional or overriding properties for an already declared `DataFormat` definition. If the `DataFormat` has not been declared previously, then the construct is ignored.

You can use the `+=` operator append items to the list of values previously assigned to a `DataFormat` property.

`DataFormat` properties fall into two categories: those that are required, and those that are not.

Required	`Pattern`, `Preferred_Editor`, and `Co_Managed`
Not required	`Other_Editors`

Note: A property value in the `data.reg` file retains the first 62 patterns only and the rest are discarded.

Library Properties

A library data definition lets you specify properties that are generic to all libraries. The syntax for this definition is as follows:

```
library
    : 'Library' '{' libraryProperties '}'
```

The default definition is as follows:

```
Library {
    //cdsinfo.tag is the file that indicates that this directory
    //is a Cadence library if the associated strict lib checking
    //facility is turned on.
    //
    // *.Cat and *.TopCat describe cell categories
    // techfile.cds is the binary tech file representation
    // *.tf is an ASCII tech file representation
    // display.drf is the display resource file
    // prop.xx is the library property file
    // *.att is a translated 'attach' file from DFII 4.3.x
    // *.cfg is a DFII 4.3.x config file converted to a DM checkpoint
    Also_Managed = cdsinfo.tag display.drf prop.xx techfile.cds
        *.Cat *.TopCat *.att *.cfg *.rul *.tf;
}
```

Cell Properties

A cell data definition lets you specify properties that are generic to all cells inside libraries.

The syntax for this definition is as follows:

```
cell
    : 'Cell' '{' cellProperties '}'
```

The default definition is as follows:

```
Cell {
    // prop.xx is the cell property file
    // *.att is an attached file at the cell level
    Also_Managed = prop.xx *.att;
}
```

View Aliases

You can create new view names of any type (`DataFormat`) using a view aliasing capability. When the system needs to perform an operation on a non-existent view, it queries you for the type (`DataFormat`) of the view, or it tries to guess the type. The `ViewAlias` list essentially is a list of default view names.

For example, if you want to edit a view named `schematic` for the cell `alu`, and the view `schematic` did not exist for `alu`, then the system looks at the list of `ViewAliases` for a definition of `schematic`.

Note: The `ViewAlias` list contains view names in the CDBA namespace. Any application using this information maps it, as appropriate, from this name space. Refer to Chapter 7, "Name Mapping."

Preferred Editor

When you edit or view a particular data format, you can specify which editor you want to use. The following construct lets you specify a preferred editor:

```
preferredEditor
        : 'Preferred_Editor' DataFormatName ToolName ';'
        | 'Preferred_Editor' '{' preferredEditorList '}' ';'
preferredEditorList
        : DataFormatName '=' ToolName ';'
        | ' ' preferredEditorList
```

Include

```
        | Include filename;
```

The property *`filename`* is interpreted relative to the location of the file it occurs in if it is not rooted in the same way as in your `cds.lib` file.

Specify *`filename`* (to either Include or SoftInclude) as an expression using:

- `$(csf_search:somePathlette)`

or

- `$(compute:THIS_TOOL_INST_ROOT)`

Note: `$(csf_search:somePathlette`) specifies that a search for a path fragment is to be performed in each location specified in `setup.loc`. The path being resolved to the first match found.

SoftInclude

```
        | SoftInclude filename;
```

As `Include` above, but no error is displayed if the specified file is not found.

Adding a New viewtype in the DFII Environment

To create a new viewType in the DFII environment (including Virtuoso applications), you need to perform the following steps:

1. Create registry files in the Virtuoso/DFII installation hierarchy (*your_install_dir/share/cdssetup/registry/*) or use the default *your_install_dir/share/local* location for `$CDS_SITE`, you need to set the value of the environment variable `$CDS_SITE` to the path to the site configuration area or put the '`data.reg`' file in your working directory.
2. Load a SKILL file (or files) that defines the actions or triggers to be performed when opening up a given viewtype.

Searching Rules

The system reads tool and data registry information in the following order:

1. All the `.reg` files in *`your_install_dir`*`/share/cdssetup/registry/data` and *`your_install_dir`*`/share/cdssetup/registry/tools` are read. This builds the base set of tool and data definitions. To add data formats, add files into the `data` directory. To add tools, add files into the `tools` directory.

   `.reg` files in a `tools` or `data` directory are read in random order. When the same definition is found in more than one `.reg` file, the value from the last file that is read is used. No error is reported. Therefore, do not include the same definition in more than one file.

   Note: If you do any design management tasks (from an application that uses GDM or directly through `gdm` commands), the data registry is reinitialized to look for registry information in all available hierarchies. That is, all the `.reg` files in *`install_dir`*`/share/cdssetup/registry/data` and *`install_dir`*`/share/cdssetup/registry/tools` directories of all Cadence hierarchies that are defined in your environment are read. If you are running applications under the Stream Manager environment, `$CDS_STRM_DIR_LIST` is used to find the hierarchies; otherwise, `$PATH` is used to find the hierarchies. For each definition, the hierarchy of the application that is reading the registry information has the highest priority, followed by the first hierarchy defined by `$CDS_STRM_DIR_LIST` (or `$PATH`), followed by the second hierarchy defined by `$CDS_STRM_DIR_LIST` (or `$PATH`), and so on. If there are duplicate definitions, then the definition from the hierarchy that has the higher priority is used. (You will not get an error for duplicate definitions.)

2. The default search mechanism, through the `setup.loc` file, searches for a `data.reg` file. If one is found, it is read on top of the definitions already read in. In other words, after reading the base set of definitions, a `data.reg` file is searched for in the same way as a `cds.lib` file.

   Other `data.reg` files can be read in by including them in the first `data.reg` file that was found. To add extra definitions, create a `data.reg` file named `./data.reg` or `$HOME/data.reg`. If you do not use the default *`your_install_dir`*`/share/local` location for `$CDS_SITE`, you need to set the value of the environment variable `$CDS_SITE` to the path to the site configuration area; for example,

   ```
   INCLUDE $CDS_SITE/data.reg;
   ```

Using the Registry for Third-Party Views

If your Cadence libraries contain views that were created in third-party applications and then encapsulated or integrated, you can use the registry to make them available to other applications.

1. Create a site-wide `data.reg` file at `$CDS_SITE` using a text editor, for example,

   ```
   vi your_install_dir/share/local
   ```

2. Create a new data format.

Customizing Predefined Data Formats

You can add new properties or modify existing properties of the current data format definition using the `+DataFormat` construct. This construct adds the new definition to the existing definitions. If the `+DataFormat` construct contains a property that already exists, it will be overridden.

Note for Virtuoso users: You need to register the tool using Cadence SKILL language commands.

This is the format of an original definition:

```
DataFormat ComposerSchematic {
    Pattern = sch.oa;
    Preferred_Editor = schematic;
    dfII_ViewType = schematic;
    Co_Managed = sch.oa master.tag data.dm pc.db verilog.v verilog.vams
               ams_direct.dat amsAPT.apt;
}
```

This is the format of an addition in the `data.reg` file:

```
+DataFormat ComposerSchematic {
    # Add "*.vhd" to the Co_Managed set

    #

    Co_Managed += *.vhd;#
    # Add another property
    My_Property = "The user is ME";
}
```

Converting Custom Views

If your 4.3 Cadence libraries contain views that were created in third-party applications and then encapsulated or integrated, you can use the registry to make them available in 4.4 or higher versions.

1. Create a site-wide `data.reg` file using any text editor. For example

   ```
   vi data.reg
   ```

2. Create a new data format.

The dregprint Command

The `dregprint` unix command is typically used to examine the registry entries, which are visible to the Cadence tool. The `dregprint` command should run from the same directory where the Cadence tool is executed because files in the current working directory can effect the registry entries. This command also identifies which `data.reg` file is being used for each data registry entry.

Use the following syntax for the `dregprint` command:

```
dregprint
     [-origin | -o]
     [-help | -h]
     [-i index_file]
     [-tool | -t [identifier]]
     [-dataFormat | -f [identifier]]
     [-library | -l]
     [-cell | -c]
     [-alias | -a [identifier]]
     [-pattern | -p filename]
```

Options

`-origin`	Displays the origin (filename and line number) of each data registry entry.
`-help`	Displays information about the `dregprint` command.
`-i` *`index_file`*	The index file to use. An index file is a file with a `.idx` suffix that contains definitions and specifies other `data.reg` files to include. This option is used only for testing.
`-tool [`*`identifier`*`]`	Displays all `Tool` entries in the data registry. Specify *`identifier`* if you want to see the properties for that identifier.
`-dataFormat [`*`identifier`*`]`	Displays all `DataFormat` entries in the data registry. Specify *`identifier`* if you want to see the properties for that identifier.
`-library`	Displays all `Library` entries in the data registry.

`-cell`	Displays all `Cell` entries in the data registry.
`-alias [`*`identifier`*`]`	Displays all `DataFormat` aliases. Specify *`identifier`* if you want to see aliases for that identifier.
`-pattern` *`filename`*	Displays `DataFormat` entries matching the pattern you specify.

7 Name Mapping

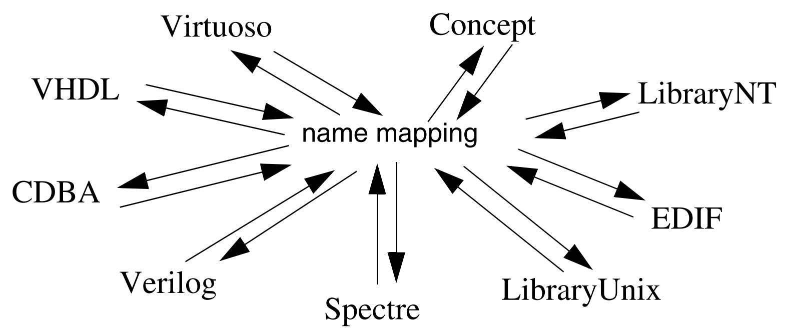
This chapter describes the following:

- ❑ LEF and DEF Name Spaces on page 127
- ❑ Library Name Space on page 133
- ❑ LibraryUnix Name Space on page 133
- ❑ LibraryNT Name Space on page 133
- ❑ Print Name Space on page 134
- ❑ SDF Name Space on page 134
- ❑ SPF Name Space on page 135
- ❑ SPEF Name Space on page 136
- ❑ Spectre Name Space on page 136
- ❑ SpectreHDL Name Space on page 138
- ❑ Spice Name Space on page 141

Overview

To make data interoperable among Cadence® applications, Cadence developed a common naming convention called name mapping.

The rules for creating legal names within an application define what is called a name space. Data between Cadence applications is interoperable, as shown below, because Cadence maps names from one name space to another. Name mapping is consistent and predictable.



The Cadence name mapping system maps names when applications use data from other applications with noncompatible naming conventions.

Sets of Cadence applications can create names in different ways. Therefore, names used for the same design objects (such as nets, ports, instances, libraries, cells, views, and properties) vary across applications.

Why You Need to Know About Name Mapping

If the Cadence system maps names between products automatically for you, why do you need to know about it? You need to recognize that some design data appears differently when you use the data in other applications. In other applications, you see the mapped name. The system changes the names to fit each application as a design description moves through a design flow.

When you have to enter names in multiple places of a design flow where the names must match each other, you need to know how to form the corresponding name in multiple name spaces. For example,

- If you are working with a library name that is used in Leapfrog, you use the VHDL name space.
- If you subsequently use the ncvlog, you use the Verilog name space

- The library definition in the `cds.lib` file is in the LibraryUnix name space.

In other words, a library used in Leapfrog with `-work MYLIB` is subsequently used in the ncvlog with `-lib mylib`. This library must be defined in the `cds.lib` file with a statement such as:

```
    DEFINE mylib /usr/libs/mylibdir
```

An example of VHDL mapping to Verilog, then to LibraryUnix, and back to VHDL looks as follows:

VHDL →	**Verilog** →	**LibraryUnix** →	**VHDL**
`myName1`	`myname1`	`myname1`	`myname1`

Note: Case-insensitive names mapped into a case-sensitive name space and back out again do not preserve case.

You also need to be aware that names in applications and names in the file system are in different name spaces. Names in the file system are in the Library name space. Therefore, a name that you see in the file system might not always be the same as the name that you typed into the application. This usually happens when the original name contains special characters, such as a period, which are changed when the name is mapped to the Library name space. For example, if you name a view `layout.placed`, the directory name in your file system is `layout#2eplaced`.

When you need to use the name in your application (in user interface forms, command-line options, the Command Interpreter Window, or code), do not use the mapped file system name; specify the original name instead.

You can use the `nmp` command to get the original name for a mapped file system name.

Type the following in a UNIX shell:

```
nmp mapName Library yourAppNameSpace mappedFileSystemName
```

For example, if you type the following command:

```
nmp mapName Library CDBA layout#2eplaced
```

the `nmp` command returns the following:

```
layout.placed
```

For more information about the `nmp` command, see "The nmp Command" on page 106.

Note: You can avoid name mapping issues by always choosing names that use only lowercase letters and digits.

How Name Mapping Works in General

To properly handle the variety of names in Cadence applications, each software product applies the correct name space for each identifier (explained below). A port or pin of an instance might be called `i1/addr<3:0>` on a Virtuoso® schematic editor or Concept schematic. In Verilog, this name becomes `i1.addr[3:0]` and in VHDL it becomes `i1:addr(3 downto 0)`. The parts of these names are as follows:

Name Item	Explanation
i1	An identifier (an instance name in this case)
slash (/), period (.), colon (:)	A hierarchy delimiter
addr	An identifier (a port/pin name in this case)
<3:0>, [3:0], (3 down to 0)	An index expression

Recognizing Identifiers

Identifiers are the atomic strings your application chooses to identify a design object uniquely. Identifiers are present in the names of many kinds of design objects. Names of nets, ports, instances, libraries, cells, views, and properties contain identifiers. To handle these names properly as they are referenced in different steps of a design flow, Cadence applications consistently apply the correct name space for each identifier and follow the name mapping rules wherever names from different name spaces are compared.

The CDBA view specification `/chip/core/ALU` contains three identifiers: `chip`, `core`, and `ALU`. When you subsequently use this information in another application, the algorithm modifies these identifiers into legal identifiers in the target name space. For example, in the

VHDL name space these identifiers look like `chip`, `core`, and `\ALU\`. Mapping goes both ways.

$$\begin{tikzcd}
\text{CDBA Name Space} & \text{VHDL Name Space} \\
\texttt{chip} \arrow[r, leftrightarrow] & \texttt{chip} \\
\texttt{core} \arrow[r, leftrightarrow] & \texttt{core} \\
\texttt{ALU} \arrow[r, leftrightarrow] & \texttt{\textbackslash ALU\textbackslash}
\end{tikzcd}$$

Understanding Case Sensitivity

Most Cadence applications are case sensitive. However, some name spaces, such as VHDL, Concept, and LibraryNT, are case-insensitive.

To provide a one-to-one map between, for example, Verilog and VHDL, name mapping must provide normal alphabetic names. The Verilog name `StopGap` becomes `StopGap` in VHDL and the Verilog name `stopgap` becomes `stopgap` in VHDL, so, because VHDL is case insensitive, two different Verilog names become a single VHDL name.

To handle this situation, the name mapping rules map all case-insensitive letters as lowercase case-sensitive letters and vice-versa. Case-sensitive uppercase letters map to escaped names where these are available (VHDL and Concept). In the LibraryNT name space, the algorithm precedes them with a percent sign (%) so that the Verilog name GORP becomes %G%O%R%P.

Note: You can avoid name mapping issues by always choosing names that use only lowercase letters and digits.

Handling Illegal Characters

$$\begin{tikzcd}
\texttt{a*b} \arrow[r, leftrightarrow] & \texttt{a\#2ab}
\end{tikzcd}$$

If an escaped name space is not available for the target name space, or if the identifier contains characters that are illegal, the algorithm uses character encoding. Characters that are illegal in the target name space are replaced with a pound sign (#) followed by the character value encoded as two hexadecimal digits (0–9 or a–f); for example, `#2a`. The identifier `a*b` is represented as `a#2ab` in a name space that does not support the asterisk (*).

Understanding Rules for the Name Mapping Algorithm

Cadence uses algorithmic name mapping to map identifiers between different name spaces.

- Names can be mapped from one name space to another using the legal identifier and the source and destination name spaces. The algorithm does not need auxiliary information such as design-specific mapping tables. The algorithm is designed to be context free so that no information about the design is necessary to perform the mapping.
- Every identifier that is legal in one name space maps to a legal identifier in every other.
- Every pair of identifiers that are different names in one name space map to different names in every other name space.
- All mappings are reversible. Mapping an identifier from one name space to another and then back to the original name space always results in the original identifier, with the possible exception of a loss of case if the original name space is case insensitive.

Algorithmic name mapping does not solve certain problems, such as mapping names to another representation where the design has been modified.

The Differences Between Name Spaces

Examples of differences between name spaces are as follows:

Differences	**Examples of Name Space Rules**
Keywords	The string `and` is a keyword in Verilog and VHDL, while `process` is a keyword in VHDL but not in Verilog. Many name spaces, such as CDBA and LibraryUnix, have no keywords.
Case Sensitivity	In Concept and VHDL, the identifier `aaa` refers to the same object as `AAA`. In CDBA and LibraryUnix, these names are different.
Syntax and Characters	Many name spaces have an alternative way to include characters in names that would otherwise be illegal. In VHDL, `\a+b*\` is a legal identifier because the backslashes (\ ) escape the characters that are otherwise illegal.
	A normal Verilog name can contain a dollar sign ($), but a VHDL name cannot unless it is escaped.

For details, see Table 7-1 on page 109.

The nmp Command

Cadence provides a command called `nmp` to help you understand name mapping. You can use this command, located in *`your_install_dir`*`/tools/bin`, to see how a name maps from one name space to another, to check if a name is legal in a particular name space, or to get a list of all the name spaces that Cadence applications use.

Use the following syntax for the `nmp` command:

```
nmp { getSpaceNames | isLegalName nameSpace identifier | mapName fromNameSpace
toNameSpace identifier | -v[ersion] | -help }
```

`getSpaceNames`	Lists all the name spaces that Cadence applications use.
`isLegalName` *`nameSpace identifier`*	Checks if *`identifier`* is a legal name in the name space you specify. If you are specifying an escaped name or a name with special characters that the shell might delete, such as a backslash, enclose the name in single quotes. Also, in some shells, you might need to escape the backslash that is part of an escaped name with another backslash.
`mapName` *`fromNameSpace toNameSpace identifier`*	Maps a name (*`identifier`*) from one name space to another. If you are specifying an escaped name or a name with special characters that the shell might delete, such as a backslash, enclose the name in single quotes. Also, in some shells, you might need to escape the backslash that is part of an escaped name with another backslash.
`-v[ersion]`	Displays the version of the `nmp` command.
`-help`	Displays the syntax and usage of the `nmp` command.

Examples:

```
% nmp isLegalName Verilog buf_addr0
legal
```

```
% nmp mapName Concept VHDL procedure
\procedure\
```

Warning: When you enter names with backslashes, the shell might delete a backslash so that it is not seen by the `nmp` program. To avoid this, include all names in single quotes, such as *`'name'`*. For example:

```
% nmp mapName VHDL Concept \procedure\
**procedure is not a legal VHDL identifier**
```

```
% nmp mapName VHDL Concept ’\procedure\’
procedure
```

Warning: Verilog requires escaped names to end in a space. This space might not be visible in the output. For example:

```
% nmp mapName VHDL Verilog ’\2+2=4\’
\2+2=4
```

```
% nmp mapName Verilog VHDL ’\2+2=4␣’
\2+2=4\
```

Warning: In some shells, you need to escape the backslash that is part of an escaped name with another backslash. For example:

```
sh% nmp mapName Verilog LibraryUnix ’\!Lib!␣’
#21Lib#21
```

```
csh% nmp mapName Verilog LibraryUnix ’\\!Lib!␣’
#21Lib#21
```

Avoiding Name Mapping Issues

Use these strategies for name handling:

- Choose names that use only lowercase letters, digits, and underscores.
- Use identifiers that start with an alphabetic character.
- Do not use identifiers that are keywords in any of the name spaces.
- Do not use characters that are not allowed in any of the namespaces.

Name Mapping Rules

Cadence applications adhere to the following name mapping rules:

- As much as possible, names are not modified. For example, the identifier *`abc`* is left the same in every supported name space.

- When an identifier contains a character that is illegal in the name space to which it is being mapped (even using escaping), the algorithm uses the hex value for the character, such as a character with the hex value of `2d` (a minus sign) becomes `#2d`.
- When case-insensitive names are converted to case-sensitive name spaces, the letters are set to lowercase.
- When case-sensitive names are mapped to a case-insensitive name space, they are left alone if they are lowercase. If they are uppercase, the algorithm creates escaped names if the name space has a case-sensitive escaped form, such as in VHDL and Concept.
- If an escaped name that is legal and is a different name when the escape characters are left off is mapped to a name space where there is not a similar escaped form, then the algorithm prepends the characters `ESC_` to the mapped name. For example, in VHDL, `\aaa\` is a different name from `aaa`, so they cannot both map to `aaa` in Verilog. The name mapping rules map a VHDL `\aaa\` to `ESC_aaa` in Verilog.
- Length restrictions are not handled by these name mapping rules. The mapping routines can handle names up to 2,000 characters long.

Note: See also “ALT_NMP Name Space” on page 124.

Table 7-1 Examples of Name Mapping

Type	**VHDL**	**Verilog**	**CDBA**	**Concept**	**Library Unix**	**LibraryNT**
lowercase or case insensitive	bigchip BIGCHIP	bigchip	bigchip	bigchip BIGCHIP	bigchip	bigchip BIGCHIP
case-sensitive mixed case	\BigChip\	BigChip	BigChip	\BigChip\	BigChip	%Big%Chip
keyword	\and\	\and ␣	and	and	and	and
unneeded escape	\trash\	ESC_trash	ESC_trash	\trash\	ESC_trash	ESC_trash
embedded space	\foo bar\	\foo#20bar ␣	a#20b	foo bar	foo#20bar	foo#20bar
device names	aux	aux	aux	aux	aux	%%aux
back-slash	\\\a\\b\	\\a\b ␣	#5ca#5cb	‘\a\b’	#5ca#5cb	#5ca#5cb
forward slash	\/a/b\	\/a/b ␣	#2fa#2fb	/a/b	#2fa#2f	#2fa#2fb
special charac-ters*	\a<1:2>\	\a<1:2> ␣	a#3c1:2#3e	“a<1:2>”	a#3c1#3a2#3e	a#3c1#3a2#3e

* Although the special characters look similar to a name with an index expression, this row shows an identifier, with special characters, that is being used as an atomic identifier. The ␣ character indicates a blank space.

Checking the Names in your cds.lib File

Many Cadence applications include the `cdsLibEditor` tool.

To check the name (for example, for VHDL) in your `cds.lib` file,

➤ Type the following command in a shell window:

```
cdsLibEditor -namespace VHDL
```

The Library Path Editor opens, showing you library names in the VHDL name space. In VHDL, the system maps the library name `TEST` as `test` because the library name stored in the `cds.lib` file is case sensitive.

Name Spaces for Different Data Types

Cadence applications use the following name spaces:

- VHDL
- VHDLAMS
- VHDL87
- Verilog
- VerilogA
- VerilogAMS
- ALT_NMP
- CDBA
- CDBAFlat
- Concept
- General Constraint Format (GCF)
- Genesis
- Library Exchange Format (LEF)
- Design Exchange Format (DEF)
- Library
- LibraryUnix
- LibraryNT
- Print
- Standard Delay Format (SDF)
- Standard Parasitic Format (SPF)
- Standard Parasitic Exchange Format (SPEF)
- Spectre
- SpectreHDL
- Spice

VHDL, VHDLAMS, and VHDL87 Name Spaces

Each VHDL identifier is either in the normal form, such as `ABC`, or the escaped form, such as `\ABC\`. Most identifiers in a VHDL design are VHDL normal identifiers.

The VHDLAMS name space is used in the AMS environment. VHDLAMS is identical to the VHDL name space except that it has additional reserved keywords.

The VHDL87 name space is used by some VHDL simulators such as NC-VHDL. VHDL87 is identical to the VHDL name space except that some keywords that are reserved in VHDL are allowed as normal identifiers in VHDL87.

VHDL Normal Names

VHDL normal identifiers are case insensitive. This means that the identifier `AbC` and the identifier `abc` are equivalent and refer to the same object. VHDL normal identifiers can contain alphabetical characters, digits, or the underscore character. The first letter must be an alphabetical character. The only symbol that is allowed is the underscore. Spaces are not allowed.

VHDL Escaped Names

VHDL escaped identifiers are case sensitive, unlike normal VHDL names. Escaped identifiers always begin and end with a backslash (`\`). This means that the identifier `\AbC\` and the identifier `\aBc\` refer to two different objects.

An identifier in the VHDL normal name space and the same identifier in the VHDL escaped name space do not represent the same object. For example, the VHDL identifiers `abc` and `\abc\` refer to two different objects. To embed a backslash in an escaped identifier, use double backslashes.

If the original identifier was in the VHDL escaped form even though it was legal in the VHDL normal form, it needs to be returned to the escaped form, not the normal form. For example, `\abc\` maps to CDBA `ESC_abc`, and it maps back to `\abc\` in VHDL.

All alphanumeric characters and symbols, as well as spaces, are allowed as VHDL escaped identifiers.

Reserved VHDL Keywords

The following keywords are reserved and cannot be used as VHDL identifiers.

Table 7-2 Keywords Not Allowed as VHDL Normal Identifiers

abs	component	guarded	nor	record	then
access	configuration	if	not	register	to
after	constant	impure	null	reject	transport
alias	disconnect	in	of	rem	type
all	downto	inertial	on	report	unaffected
allow	element	inout	open	return	units
and	else	is	or	rol	until
architecture	elseif	label	others	ror	use
array	end	library	out	select	variable
assert	entity	linkage	package	severity	wait
attribute	exit	literal	port	signal	when
begin	file	loop	postponed	shared	while
block	for	map	private	sla	with
body	function	mod	procedure	sll	xnor
buffer	generate	nand	process	sra	xor
bus	generic	new	pure	srl	
case	group	next	range	subtype	

Reserved VHDLAMS Keywords

Reserved VHDL keywords (listed in Table 7-2 on page 113) are also reserved in VHDLAMS. In addition, the following keywords are also reserved in VHDLAMS and cannot be used as VHDLAMS identifiers.

Table 7-3 Additional Keywords Not Allowed as VHDLAMS Identifiers

across	procedural	terminal
break	quantity	through

Table 7-3 Additional Keywords Not Allowed as VHDLAMS Identifiers, *continued*

limit	reference	tolerance
nature	spectrum	
noise	subnature	

Reserved VHDL87 Keywords

The following keywords are reserved and cannot be used as VHDL87 identifiers.

Table 7-4 Keywords Not Allowed as VHDL87 Identifiers

abs	access	after	alias	all	allow
and	architecture	array	assert	attribute	begin
block	body	buffer	bus	case	component
configuration	constant	disconnect	downto	element	else
elseif	end	entity	exit	file	for
function	generate	generic	guarded	if	in
inout	is	label	library	linkage	loop
map	mod	nand	new	next	nor
not	null	of	on	open	or
others	out	package	port	private	procedure
process	range	record	register	rem	report
return	select	severity	signal	subtype	then
to	transport	type	units	until	use
variable	wait	when	while	with	xor

Verilog, VerilogA, and VerilogAMS Name Spaces

Each Verilog identifier is either in the normal form `ABC` or the escaped form `\ABC`␣. Most identifiers in a Verilog design are Verilog normal identifiers. If you need to represent identifiers that are illegal as a Verilog normal identifier, use the Verilog escaped name space. For example, the identifier `and` in the CDBA name space maps to the Verilog escaped `\and`␣ because `and` is a Verilog keyword.

The VerilogA analog simulator uses the VerilogA name space. The name space is the same as the Verilog name space, except that it has additional reserved keywords.

The AMS environment uses the VerilogAMS namespace. The VerilogAMS namespace is the same as the Verilog name space, except that it has additional reserved keywords.

Note: The ␣ character in Verilog names is used to clearly document a blank space.

Verilog Normal Names

Verilog normal identifiers are case sensitive. This means that the identifier *`AbC`* and the identifier *`abc`* refer to two different objects. Verilog normal identifiers might contain letters, digits, the underscore character, and the dollar sign ($). The first character cannot be a digit or a dollar sign ($). All letters and digits are allowed as Verilog normal identifiers. The space is not allowed.

Verilog Escaped Names

Verilog escaped identifiers always begin with a backslash (`\`) and terminate with a space. Verilog escaped identifiers are case sensitive. This means that the identifier `\AbC`␣ and the identifier `\aBc`␣ refer to two different objects.

Although any identifier can be escaped, only those identifiers that might not be represented in the Verilog normal name space due to character restrictions or because they are keywords need to be escaped. An identifier in the Verilog normal name space and the identifier in the Verilog escaped name space represent the same object. For example, the Verilog identifiers `abc` and `\abc`␣ refer to the same object.

All alphanumeric characters and symbols are allowed in Verilog escaped identifiers. Blanks or nonprinting characters are not allowed.

Reserved Verilog Keywords

The following keywords are reserved in Verilog and cannot be used as Verilog identifiers.

Table 7-5 Keywords Not Allowed as Verilog Identifiers

always	end	ifnone	output	rtranif0	tri
and	endattribute	initial	package	rtranif1	tri0
assign	endcase	inout	parameter	scalared	tri1
attribute	endfunction	input	pmos	signed	triand
begin	endmodule	integer	posedge	small	trior
buf	endpackage	join	primitive	specify	trireg
bufif0	endprimitive	large	pull0	specparam	use
bufif1	endspecify	macromodule	pull1	strength	vectored
case	endtable	medium	pulldown	string	wait
casex	endtask	module	pullup	strong0	wand
casez	event	name	rcmos	strong1	weak0
class	for	nand	real	supply0	weak1
cmos	force	negedge	realtime	supply1	when
deassign	forever	nmos	reg	table	while
default	fork	nor	release	task	wire
defparam	function	not	repeat	time	wor
disable	highz0	notif0	rnmos	tran	xnor
edge	highz1	notif1	rpmos	tranif0	
else	if	or	rtran	tranif1	

Reserved VerilogA Keywords

The following keywords are reserved in VerilogA and cannot be used as VerilogA identifiers.

Table 7-6 Keywords Not Allowed as VerilogA Identifiers

above	ddt	final_step	limexp	pullup	tran
abs	ddt_nature	flicker_noise	ln	real	tranif0

Table 7-6 Keywords Not Allowed as VerilogA Identifiers, *continued*

absdelay	cosh	flow	localparam	realtime	tranif1
abstol	cross	for	log	reg	transition
access	ddx	force	max	release	tri
acos	deassign	fork	medium	repeat	tri0
acosh	default	from	micromodule	rnmos	tri1
ac_stim	defparam	function	min	rpmos	triand
aliasparam	delay	generate	module	rtran	trior
always	disable	genvar	nand	rtranif0	trireg
analog	discipline	ground	nature	rtranif1	units
analysis	discontinuity	highz0	negedge	scalared	vectored
and	driver_update	highz1	net_resolution	sin	vt
asin	edge	hypot	nmos	sinh	wait
asinh	else	idt	noise_table	slew	wand
assign	end	idtmod	nor	small	weak0
atan	endcase	idt_nature	not	specify	weak1
atan2	endconnectrules	if	notif0	specparam	while
atanh	enddiscipline	ifnone	notif1	sqrt	white_noise
begin	endfunction	inf	or	strobe	wire
bound_step	endmodule	initial	output	strong0	wor
branch	endnature	initial_step	parameter	strong1	wreal
buf	endparamset	inout	pmos	supply0	xnor
bufif0	endprimitive	input	posedge	supply1	xor
bufif1	endspecify	integer	potential	table	zi_nd
case	endtable	join	pow	table_model	zi_np
casex	endtask	laplace_nd	primitive	tan	zi_zd
casez	event	laplace_np	pull0	tanh	
ceil	exclude	laplace_zd	pull1	task	
cmos	exp	laplace_zp	pulldown	temperature	

Table 7-6 Keywords Not Allowed as VerilogA Identifiers, *continued*

connectrules	floor	large	pwr	time
cos	forever	last_crossing	rcmos	timer

Reserved VerilogAMS Keywords

Reserved Verilog keywords (listed in the Table 7-5 on page 116) are also reserved in VerilogAMS. In addition, the following keywords are also reserved in VerilogAMS and cannot be used as VerilogAMS identifiers.

Table 7-7 Additional Keywords Not Allowed as VerilogAMS Identifiers

above	abs	abstol	ac_stim
access	acos	acosh	a2d
analog	aliasparam	analysis	asin
asinh	atan	atan2	atanh
attribute	bound_step	branch	ceil
class	connect	connectmodule	connectrules
cross	continuous	cos	cosh
delay	ddt	ddt	ddt_nature
domain	discipline	discontinuity	discrete
driver_local	driver_active	driver_count	driver_delay
driver_strength	driver_next_state	driver_next_strength	driver_state
endattripute	driver_update	dynamicparam	endconnectrules
endnature	enddiscipline	endparamset	endpackage
flicker_noise	exclude	exp	final_step
generate	floor	flow	from
idt	genvar	ground	hypot
initial_step	idt_nature	idtmod	inf
laplace_zp	laplace_nd	laplace_np	laplace_zd
localparam	last_crossing	log	limexp
ln	max	merged	min

Table 7-7 Additional Keywords Not Allowed as VerilogAMS Identifiers

nature	net_resolution	noise_table	noshowcancelled
paramset	pathdelay_controlsi gnal	pathdelay_max0	pathdelay_max1
pathdelay_min0	pathdelay_min1	pathdelay_sense	potential
pow	pragma	pulsestyle_ondetect	pulsestyle_onevent
real2int	resolveto	showcancelled	signed
sin	sinh	slew	split
strength	sqrt	tan	tanh
timer	to	transition	use
using	units	when	white_noise
with	wreal	zi_nd	zi_np
zi_zd	zi_zp		

SystemVerilog Name Space

SystemVerilog has eight name spaces for identifiers, which includes:

1. **Definitions name space**: Merges all the non-nested module, macromodule, primitive, program, and interface identifiers defined outside of all other declarations.
2. **Package name space**: Merges all the package identifiers defined among all compilation units. Once a name is used to define a package within one compilation unit the name shall not be used again to declare another package within any compilation unit.
3. **Compilation-unit scope name space**: Exists outside the module, macromodule, interface, package, program, and primitive constructs. It merges the definitions of the functions, tasks, parameters, named events, net declarations, variable declarations and user defined types within the compilation-unit scope.
4. **Text macro name space**: Is global within the compilation unit. Since text macro names are introduced and used with a leading ‘ character, they remain unambiguous with any other name space. The text macronames are defined in the linear order of appearance in the set of input files that make up the compilation unit.
5. **Module name space**: Merges the definition of modules, macromodules, interfaces, programs, functions, tasks, named blocks, instance names, parameters, named events, net declarations, variable declarations and user defined types within the enclosing construct.
6. **Block name space**: Merges the definitions of the named blocks, functions, tasks, parameters, named events, variable type of declaration and user defined types within the enclosing construct.
7. **Port name space**: Provides a means of structurally defining connections between two objects that are in two different name spaces.
8. **Attribute name space**: Is enclosed by the (* and *) constructs attached to a language element. An attribute name can be defined and used only in the attribute name space. Any other type of name cannot be defined in this name space.

Table 7-8 Keywords Supported in SystemVerilog

implements	interconnect
nettype	soft

Table 7-9 Keywords Not Allowed as SystemVerilog Identifiers

accept_on	alias	always

Table 7-9 Keywords Not Allowed as SystemVerilog Identifiers, *continued*

always_comb	always_ff	always_latch
and	assert	assign
assume	automatic	before
begin	bind	bins
binsof	bit	break
buf	bufif0	bufif1
byte	case	casex
casez	cell	chandle
class	clocking	cmos
config	const	constraint
context	continue	cover
covergroup	coverpoint	cross*
deassign	default	defparam
design	disable	dist
do	edge	else
end	endcase	endchecker
endclass	endclocking	endconfig
endfunction	endgenerate	endgroup
endinterface	endmodule	endpackage
endprimitive	endprogram	endproperty
endspecify	endsequence	endtable
endtask	enum	event
expect	export	extends
extern	implies	final
first_match	for	force
foreach	forever	fork
forkjoin	function	generate
genvar	highz0	highz1

Table 7-9 Keywords Not Allowed as SystemVerilog Identifiers, *continued*

if	iff	ifnone
ignore_bins	illegal_bins	import
incdir	include	initial
inout	input	inside
instance	int	integer
interface	intersect	join
join_any	join_none	large
liblist	library	local
localparam	logic	longint
macromodule	matches	medium
modport	module	nand
negedge	new	nmos
nor	noshowcancelled	not
notif0	notif1	null
or	output	package
packed	parameter	pmos
posedge	primitive	priority
program	property	protected
pull0	pull1	pulldown
pullup	pulsestyle_onevent	pulsestyle_ondetect
pure	rand	randc
randcase	randsequence	rcmos
real	realtime	ref
reg	release	repeat
return	rnmos	rpmos
rtran	rtranif0	rtranif1
scalared	sequence	shortint
shortreal	showcancelled	signed

Table 7-9 Keywords Not Allowed as SystemVerilog Identifiers, *continued*

small	solve	specify
specparam	static	string
strong0	strong1	struct
super	supply0	supply1
table	tagged	task
this	throughout	time
timeprecision	timeunit	tran
tranif0	tranif1	tri
tri0	tri1	triand
trior	trireg	type
typedef	union	unique
unsigned	use	var
vectored	virtual	void
wait	wait_order	wand
weak0	weak1	while
wildcard	wire	with
within	wor	xnor
xor		

ALT_NMP Name Space

The ALT_NMP name space is an alternative method for name-space mapping in a mixed VHDL and Verilog environment. It deals with inconsistencies between the VHDL and Verilog name spaces.

The ALT_NMP name space is set with the following environment variable:

```
CDS_ALT_NMP = MATCH
```

In the ALT_NMP name space, you cannot have two names that vary only in case. For example, do not name a library `MyLib` when you already have a library `mylib`.

The ALT_NMP name space has the following name mapping rules:

- When case-sensitive and case-insensitive name spaces interact, the case-sensitive name space is treated as case-insensitive. However, escaped names from the case-insensitive name space are not changed. The mapping of escaped names in this case is irreversible. For example, `\AbC\` in the VHDL name space is irreversibly mapped to `AbC` in the Verilog name space.
- When names in case-insensitive name spaces are mapped to the LibraryUnix name space, they are treated as lower case. When names in case-sensitive name spaces are mapped to the LibraryUnix name space, they are not changed.

CDBA Name Space

CDBA normal identifiers are case-sensitive. This means that the identifier *`AbC`* and the identifier *`abc`* refer to two different objects.

All alphanumeric characters and symbols are allowed in CDBA normal identifiers except the comma (,), backslash (\ ), forward slash (/), and the opening (<) and closing angle brackets (>). Spaces are not allowed. Opening and closing parentheses are allowed with an identifier only if they enclose digits.

Note: CDBA does not use escaped names.

CDBAFlat Name Space

The CDBAFlat name space is used by applications. CDBAFlat is identical to the CDBA name space except for the following:

- The pipe character (|) is used as the hierarchy delimiter character instead of the forward slash character (`/`)

- Bus bit characters are enclosed in parentheses (`()`) instead of angle brackets (`< >`)

Concept Name Space

The Concept name space has many similarities to the VHDL name space. It has both a normal and an escaped form. The normal form is case insensitive; the escaped form is used only to provide case sensitivity. The escaped form starts and ends with a backslash (\ ), and double backslashes (\\ ) can be used to include a backslash in the identifier. Escaped identifiers and normal identifiers that are otherwise identical denote different objects.

The normal form also allows quoting. You can use either a quotation mark (") or an apostrophe ('), and you can start the quoting anywhere in the identifier. You must match an opening quotation mark or apostrophe with a closing one of the same type (" or '). You can use a quotation mark to include an apostrophe, and use an apostrophe as part of the identifier. Hence `"ab'cd"` and `'ab''cd'` are equivalent identifiers that contain an apostrophe.

The Concept name space has no keywords. Spaces are allowed except at the beginning and ends of a normal identifier.

All printable ASCII characters might be used in a normal identifier except for the apostrophe ('), the quotation mark ("), the angle bracket (<) and the colon (:). These four characters can be used in quoted names where the quotation mark is different from the included quotation mark or else where the included apostrophe is doubled. Spaces can also be used if they are not the first or last character. If quoted, this means the first or last character other than the quotation mark.

Escaped identifiers can contain any of the above characters (all printable graphic ASCII characters). Only the backslash (\ ) needs to be doubled to be included. Blank spaces are legal anywhere in an escaped name.

GCF Name Space

The General Constraint Format (GCF) name space is case sensitive. Names cannot be longer than 1024 characters.

GCF Normal Names

GCF normal names can contain only alphanumeric characters (`a-z`, `A-Z`, `0-9`) and the underscore character (_). In addition, the following special characters are allowed if they are specified as delimiters in the header section of the GCF file:

- The hierarchy divider character

  If the hierarchy divider character is not defined in the header section of the GCF file, the default hierarchy divider is the period (`.`).

- The bus bit index characters—usually the left and right square brackets, parentheses, or angle brackets (`[] () <>`). The index characters can enclose one positive integer to represent a single object, a pair of positive integers separated by a colon to represent a range, or an asterisk to represent all objects in the array. For example: `pipe[4]`, `pipe[1:3]`, or `pipe[*]`

  If the bus bit index characters are not specified in the header section of the GCF file, the default index characters are the left and right angle brackets (`<>`).

Normal names cannot include any other characters unless they are escaped. White space characters, such as tabs, spaces, or newlines are not allowed.

GCF Escaped Names

You can use characters that are not allowed in GCF normal names by escaping them. A character is escaped when it is preceded by a backslash character (`\`).

The following characters can be used in GCF names if they are escaped:

```
! “ # $ % & ‘ ( ) * + , - . / : ; < = > ? @ [ \ ] ^ ‛ { | } ~
```

The following examples show how escaped characters can be used in GCF names:

```
AMUX\+BMUX
pipe4\-done\&enb[3]
```

Genesis Name Space

The Genesis name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

Genesis Normal Names

Genesis normal names can contain any printable ASCII characters—which include alphanumeric characters (`a-z`, `A-Z`, `0-9`), the underscore character (_), and control characters— except the following special characters:

|	Hierarchy delimiter character

`[ ]`	Bus bit characters

Genesis Escaped Names

You can use characters that are not allowed in Genesis normal names by escaping them. A character is escaped when it is preceded by a backslash character (`\`).

LEF and DEF Name Spaces

The Library Exchange Format (LEF) and Design Exchange Format (DEF) name spaces are case sensitive.

LEF and DEF Normal Names

LEF and DEF names can contain any ASCII characters except the semicolon (`;`), pound sign (`#`), newline (`\n`), or space characters.

In addition, the following special characters can be used in LEF and DEF names:

- Characters that denote regular expressions:

`*`	Matches any sequence of characters
`-`	Matches any sequence of characters up to the next period (`.`)
`%`	Matches a single character

- Bus bit index characters, as defined in the `BUSBITCHARS` statement

  The default index characters are the left and right square brackets (`[]`).
- Hierarchy divider character, as defined in the `DIVIDERCHAR` statement

  The default hierarchy divider character is the forward slash (`/`).

LEF and DEF Escaped Names

You can use characters that are not allowed in LEF and DEF normal names by escaping them. A character is escaped when it is preceded by a backslash character (`\`).

Note: You cannot escape the pound sign (`#`).

Reserved LEF Keywords

The following keywords are reserved in the LEF name space and cannot be used as LEF identifiers.

Table 7-10 Keywords Not Allowed as LEF Identifiers

abut	abutment	accurrentdensity
active	analog	and
antennaareafactor	antennalengthfactor	antennametalarea
antennametallength	antennasize	anyedge
array	average	beginext
block	bottomleft	bottomright
buffer	busbitchars	by
cannotoccupy	canplace	capacitance
capmultiplier	class	clock
clocktype	columnmajor	componentpin
components	core	corner
correctionfactor	correctiontable	cover
cpersqdist current	currentden	currentsource
cut	cutarea	data
database	dccurrentdensity	default
defaultcap	delay	dielectric
direction	dividerchar	do
edgecapacitance	edgerate	edgeratescalefactor
edgeratethreshold1	edgeratethreshold2	eeq
else	end	endcap
endext	extension	fall
fallcs	fallrs	fallsatcur
fallsatt1	fallslewlimit	fallt0
fallthresh	fallvoltagethreshold	false
fe	feedthru	fixed

Table 7-10 Keywords Not Allowed as LEF Identifiers, *continued*

floorplan	fn	foreign
frequency	frompin	fs
function	fw	gcellgrid
generate	generator	ground
height	history	hold
horizontal	if	inout
inoutpinantennasize	input	inputnoisemargin
inputpinantennasize	integer	intrinsic
invert	inverter	irdrop
iterate	iv_tables	layer
leakage	lengththreshold	leq
library	macro	masterslice
match	maxdelay	maxload
megahertz	metaloverhang	milliamps
milliwatts	minfeature	minpins
mpwh	mpwl	mustjoin
mx	mxr90	my
myr90	namemapstring	namescasesensitive
nanoseconds	negedge	nets
new	noisetable	nondefaultrule
noninvert	nonunate	nowireextensionatpin
obs	off	offset
ohms	on	or
orientation	origin	output
outputnoisemargin	outputpinantennasize	outputresistance
outputresistance	overhang	overlap
overlaps	pad	path
pattern	peak	period

Table 7-10 Keywords Not Allowed as LEF Identifiers, *continued*

picofarads	pin	pitch
placed	polygon	port
posedge	post	power
pre	property	propertydefinitions
pulldownres	pwl	r0
r180	r270	r90
range	real	recovery
rect	resistance	resistive
ring	rise	risecs
risers	risesatcur	risesatt1
riseslewlimit	riset0	risethresh
risevoltagethreshold	rms	routing
rowmajor	rpersq	samenet
scanuse	sdfcond	sdfcondend
sdfcondstart	setup	shape
shrinkage	signal	site
size	skew	source
spacer	spacing	specialnets
stable	stack	start
step	stop	string
structure	symmetry	table
tableaxis	tabledimension	tabledimension
tableentries	taperrule	then
thickness	tiehigh	tielow
tieoffr	time	timing
to	topin	topleft
topofstackonly	topright	tracks
transitiontime	tristate	true

Table 7-10 Keywords Not Allowed as LEF Identifiers, *continued*

type	unateness	units
universalnoisemargin	use	uselengththreshold
user	variable	version
vertical	vhi	via
viarule	victimlength	victimnoise
virtual	vlo	voltage
volts	w	width
wirecap	wireextension	x
y		

Reserved DEF Keywords

The following keywords are reserved in the DEF name space and cannot be used as DEF identifiers.

Table 7-11 Keywords Not Allowed as DEF Identifiers

align	array	assertions
beginext	bottomleft	busbitchars
by	cannotoccupy	canplace
capacitance	commonscanpins	component
componentpin	components	constraints
cover	defaultcap	design
diearea	diff	direction
distance	dividerchar	do
drivecell	e	eeqmaster
end	endext	equal
estcap	fall	fallmax
fallmin	fe	fixed
floating	floorplan	floorplanconstraints
fn	foreign	fromclockpin

Table 7-11 Keywords Not Allowed as DEF Identifiers, *continued*

fromcomppin	fromiopin	frompin
fs	fw	gcellgrid
generate	group	groups
history	holdfall	holdrise
horizontal	in	integer
iotimings	layer	max
maxdist	maxhalfperimeter	maxx
maxy	microns	min
minpins	mustjoin	n
namemapstring	namescasesensitive	net
nets	new	nondefaultrule
noshield	ordered	original
out	parallel	partitions
path	pattern	patternname
pin	pinproperties	pins
placed	property	propertydefinitions
range	real	rect
reentrantpaths	region	regions
rise	risemax	risemin
routed	row	rows
s	scanchains	setupfall
setuprise	shape	shield
shieldnet	site	slewrate
soft	source	spacing
special	specialnet	specialnets
start	step	stop
string	style	subnet
sum	synthesized	taper

Table 7-11 Keywords Not Allowed as DEF Identifiers, *continued*

taperrule	technology	timingdisables
toclockpin	tocomppin	toiopin
topin	topright	tracks
turnoff	units	unplaced
use	variable	version
vertical	vias	voltage
vpin	w	weight
width	wirecap	wiredlogic
xtalk		

Library Name Space

The name mapping software supports a Library name space that maps to either the LibraryUnix or the LibraryNT name space, depending on which operating system the software is running. For programs running on UNIX, it is the same as the LibraryUnix name space. For programs running on Windows, it is the same as the LibraryNT name space.

LibraryUnix Name Space

LibraryUnix is used for library names in `cds.lib` files. It is also used for cell and view directory names in libraries that are stored on UNIX systems. LibraryUnix is designed to follow the rules for creating directory names on UNIX systems, except that it is more restrictive. Many characters, such as the period (.) and the comma (,), which are legal in the file system, are not allowed in LibraryUnix.

LibraryUnix is a case-sensitive name space; for example, the filenames `abc` and `AbC` refer to different directories.

All alphanumeric characters plus the underscore (_), at sign (@), and pound sign (#) are allowed in LibraryUnix identifiers.

LibraryNT Name Space

The LibraryNT name space is used for cell and view subdirectories in Windows libraries. LibraryNT is a case-insensitive, but case-preserving, name space. This means the filenames `abc` and `AbC` are the same file, and only one of them can exist in any given directory. Digits, the underscore character (_), the at sign (@), the percent sign (%), and the pound sign (#) are allowed. Several names are reserved by Windows. These might be thought of as keywords that are illegal names. The keywords are `aux`, `con`, `com0` through `com9`, `lpt0` through `lpt9`, `nul`, and `prn`.

LibraryNT uses the pound sign (#) followed by two hex digits to map characters that are otherwise illegal.

LibraryNT uses the percent sign (%) to map case-sensitive uppercase letters. An `X` in Verilog becomes `%X` in LibraryNT.

LibraryNT also uses the percent sign (%) to map names that would otherwise look like reserved names. For example, a cell named `lpt4` in a UNIX library is called `%%lpt4` in a Windows library.

Print Name Space

The Print name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

Names in the Print name space can contain any printable ASCII characters, which include alphanumeric characters (`a-z`, `A-Z`, `0-9`) and control characters.

There is no escaping mechanism in the Print name space.

SDF Name Space

The Standard Delay Format (SDF) name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

SDF names cannot be longer than 1024 characters.

SDF Normal Names

SDF normal names can contain only alphanumeric characters (`a-z`, `A-Z`, `0-9`) and the underscore character (_). In addition, the following special characters are allowed:

- The hierarchy divider character

  If the hierarchy divider character is not specified in the header section of the SDF file, the default hierarchy divider is the forward slash (`/`).

- Bus bit index characters—square brackets that enclose a positive integer to represent a single object or a pair of positive integers separated by a colon to represent a range. For example: `pipe4[3]` or `pipe4[0:2]`. The default index characters are the left and right square brackets (`[]`).

SDF normal names cannot include any other characters unless they are escaped. White space characters, such as tabs, spaces, or newlines, are not allowed.

SDF Escaped Names

You can use characters that are not allowed in SDF normal names by escaping them. A character is escaped when it is preceded by a backslash character (\).

The following characters can be used in SDF names if they are escaped:

```
! “ # $ % & ‘ ( ) * + , - . / : ; < = > ? @ [ \ ] ^ ` { | } ~
```

The following examples show how escaped characters can be used in SDF names:

```
AMUX\+BMUX
pipe4\-done\&enb[3]
```

SPF Name Space

The Standard Parasitic Format (SPF) name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

SPF Normal Names

SPF normal names can contain any ASCII character except white space characters such as space or tab. The following special characters are allowed:

- The hierarchy divider character, as defined in the header section of the SPF file. If the hierarchy divider character is not defined, the default hierarchy divider is the forward slash (`/`).
- Bus bit index characters, as defined in the header section of the SPF file. The index characters can enclose only one positive integer; a range is not allowed. If the bus bit index characters are not defined in the header section of the SPF file, the default index characters are the left and right square brackets (`[]`).

SPF Escaped Names

You can use characters that are not allowed in SDF normal names by escaping them. A character is escaped when it is preceded by a backslash character (\).

SPEF Name Space

The Standard Parasitic Exchange Format (SPEF) name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

SPEF Normal Names

SPEF normal names can contain only alphanumeric characters (`a-z`, `A-Z`, `0-9`) and the underscore character (_). In addition, the hierarchy divider character and the bus bit index characters are allowed. The default hierarchy divider character is the forward slash (/); the default index characters are the left and right square brackets (`[]`).

White space characters, such as space or tab, and control characters, such as newline, are not allowed.

SPEF Escaped Names

You can use characters that are not allowed in SPEF normal names by escaping them. A character is escaped when it is preceded by a backslash character (`\`).

The following characters can be used in SDF names if they are escaped:

```
! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [ \ ] ^ ` { | } ~
```

Spectre Name Space

The Spectre name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

Spectre Normal Names

Spectre normal identifiers must be in one of the following forms:

- The identifier must begin with an alphabetical character (`a-z`, `A-Z`) or an underscore (_) and can only be followed by zero or more of the following characters: alphanumeric characters (`a-z`, `A-Z`, `0-9`), the underscore character (_), and the exclamation mark (`!`).

For example:

```
abc8
Abc!
_ABC
```

- The identifier must begin with one or more digits (`0-9`), followed by one or more alphabetical or underscore characters (`a-z`, `A-Z`, _), followed by a digit, and end with zero or more alphanumeric, underscore, or exclamation characters (`a-z`, `A-Z`, `0-9`, _, `!`).

  For example:

  ```
  1a2abc
  11a45
  1asdfasdf4
  6adfsa324!
  ```

- The identifier must consist of one or more digits (0-9).

  For example:

  ```
  1
  135
  ```

Spaces are not allowed in Spectre identifiers.

Spectre Escaped Names

Characters are escaped in the Spectre name space if they are preceded by a backslash (`\`). For example, the escaped form of `a>=` is `a\>\=`

The following characters are allowed in Spectre identifiers if they are escaped:

```
- ! " # $ % & ' () * + , . / \ 0-9 : ; < > = ? @ A-Z a-z [ ] ^ _ ` { } | ~
```

The `TAB` character is also allowed if it is escaped.

The following examples show how escaped characters can be used in Spectre identifiers:

```
ab\@c
\@aBc
1\$2abc8
1\23
1\\2!
```

Reserved Spectre Keywords

The following keywords are reserved in the Spectre name space and cannot be used as Spectre identifiers.

Table 7-12 Keywords Not Allowed as Spectre Identifiers

abs	acos	acosh	altergroup
asin	asinh	atan	atan2
atanh	ceil	correlate	cos
cosh	else	end	ends
exp	export	floor	for
function	global	hypot	ic
if	inline	int	library
local	log	log10	M_1_PI
M_2_PI	M_2_SQRTPI	M_DEGPERRAD	M_E
M_LN10	M_LN2	M_LOG10E	M_LOG2E
M_PI	M_PI_2	M_PI_4	M_SQRT1_2
M_SQRT2	M_TWO_PI	march	max
min	model	nodeset	P_C
P_CELSIUS0	P_EPS0	P_H	P_K
P_Q	P_U0	parameters	paramset
plot	pow	print	real
return	save	sens	sin
sinh	sqrt	statistics	subckt
tan	tanh	to	truncate
vary			

SpectreHDL Name Space

The SpectreHDL name space is case sensitive. This means that the identifier `AbC` and the identifier `abc` refer to two different objects.

SpectreHDL Normal Names

SpectreHDL normal identifiers can contain only alphabetical characters (`a-z`, `A-Z`), digits (`0-9`), and underscores (_). The identifiers must begin with an alphabetical character or an underscore.

SpectreHDL Escaped Names

Escaped identifiers in the SpectreHDL name space must begin with a backslash character (`\`) and end with a space (space, tab, or newline character). Escaped names can contain any printable ASCII character.

Reserved SpectreHDL Keywords

The following keywords are reserved in the SpectreHDL name space and cannot be used as SpectreHDL identifiers.

Table 7-13 Keywords Not Allowed as SpectreHDL Identifiers

abs	abstol	ac_stim	acos
acosh	always	analog	analysis
ascii	asin	asinh	assert
assign	atan	atan2	atanh
bound_step	branch	break	break_point
build_string	build_table	bus	case
ceil	complex	const	continue
cos	cosh	cross	debug
default	do	domain	dot
else	enum	error	event
exclude	exp	export	fatal
fclose	fdebug	fflush	final
finish	flicker_noise	floor	flow
fopen	for	fread	fread_table
freq	from	fstrobe	fwrite
fwrite_table	generate	global	halt

Table 7-13 Keywords Not Allowed as SpectreHDL Identifiers, *continued*

hypot	idtmod	if	inf
initial	inout	input	integ
integer	interpolate	laplace_nd	laplace_np
laplace_zd	laplace_zp	last_crossing	limexp
ln	log	mag	max
min	model	module	negedge
net	netlist_node_alias	node	noise_table
notice	output	param_given	parameter
pclose	phase	popen	posedge
pow	pwl	pwr	quantity
random	read	real	reg
reject_step	reltol	return	sin
sinh	slew	sqrt	state
step	stop	str	strcat
strchr	strcmp	strcpy	strcspn
stream	string	strlen	strobe
strrchr	strspn	strstr	strtoint
strtoreal	substr	switch	system
table	tan	tanh	tdelay
temp	terminal	threshold	time
transition	unit	val	void
vt	wait	warning	when
while	white_noise	wire	write
zdelay	zi_nd	zi_np	zi_zd
zi_zp			

Spice Name Space

The Spice name space is case insensitive. This means that the identifier `AbC` and the identifier `abc` refer to the same object.

Spice Normal Names

Spice identifiers must begin with an alphabetical character. Identifiers can contain alphabetical characters (`a-z`, `A-Z`), digits (`0-9`), and the following characters: `# % * - < > [ ] _ $ ! + /`

Spice Escaped Names

Any character that is preceded by a backslash (`\`) is escaped in the Spice name space.

Reserved Spice Keywords

The following keywords are reserved in the Spice name space and cannot be used as Spice identifiers.

Table 7-14 Keywords Not Allowed as Spice Identifiers

ac	aci	agauss	all
am	at	aunif	avg
bart	beta	bisection	black
brief	cross	current	data
dc	debug	dec	deriv
derivative	dtemp	enddata	err1
exp	fall	fil	find
freelib	freq	from	fs
gauss	goal	hamm	hann
harris	ic	ignor	integ
integral	kaiser	lam	last
limit	lin	max	maxfld
mer	min	minval	model

Table 7-14 Keywords Not Allowed as Spice Identifiers, *continued*

monte	nodeset	none	norm
numf	oct	opt	optimize
par	passfail	pe	pl
plot	poi	power	pp
pu	pulse	pwl	r
rd	rect	results	rin
rise	rms	rout	sffm
sin	start	sweep	targ
td	temp	to	tol
top	trig	uic	unif
unorm	voltage	weight	when
yin	ymax	ymin	yout
zin	zout		

For information on nmp SKILL APIs, refer to Name Mapping SKILL Functions in the *Cadence Application Infrastructure SKILL Reference*.

8
Generic Design Management (GDM) Commands

This chapter describes the following:

- ❑ gdmsetdefver on page 167
- ❑ gdmsetname on page 168
- ❑ gdmstatus on page 169
- ❑ gdmsubmit on page 172
- ❑ gdmupdate on page 173

Overview

Cadence provides a facility known as Generic Design Management (GDM). This facility implements an interface that CAD applications, which make direct DM system calls, can use so that they can work with many different design management systems without having any special knowledge of those systems.

Part of the GDM facility is a set of shell commands that can be used to perform design management operations. These commands are also used by some Cadence® applications that perform these operations from shell scripts.

GDM is designed to support data stored in Cadence Library Structure libraries, including properly handling co-managed sets and other data that must be accessed in a synchronized fashion. By using GDM, you avoid the need to understand the Cadence library structure when using any design management system.

GDM recognizes data formats defined in multiple installation hierarchies.

GDM Concepts

GDM is based on a simple DM system model, which defines 12 operations (or commands) and which is based on the following concepts:
S

`workarea`	A directory hierarchy in the file system, where a related set of designs and other data including Cadence design libraries are stored.
`version`	A design management system–specific identifier of an instance of a file, which GDM handles in an opaque manner, expecting the users and underlying design management systems to understand the meaning of the identifier.
`repository`	Is associated with each design management system installation. The repository knows what files are managed, where they are stored, and what versions of those files exist and are accessible by users.
`wrapping`	Is what you provide to integrate your chosen design management system into GDM. It consists of a shared library that is dynamically loaded and a set of design management–specific commands that GDM executes. The Cadence Services organization offers a service for implementing a wrapping of a specific design management system.

Using Third-Party GDM Integrations

If you are using a third-party GDM integration (or wrapping), such as Synchronicity, Inc.'s DesignSync, and you cannot copy the shared libraries into the Cadence installation hierarchy, do the following:

1. Set the following environment variable that enables GDM to look for third-party shared libraries outside the Cadence installation hierarchy:

   ```
   setenv GDM_USE_SHLIB_ENVVAR yes
   ```

   Note: You can also use the `CDS_GDM_SHLIB_LOCATION` environment variable to set the path to where the DM library can be found. Multiple paths can be set and GDM will investigate each of them until the DM shared library is found. For example:

   ```
   CDS_GDM_SHLIB_LOCATION=/tools/icmanage/gdm/lib64:/tools/
   icmanage/gdm/lib
   ```

2. Add the location of the shared libraries to the platform-specific library path environment variable. The library path environment variable is

`LD_LIBRARY_PATH`	on Sun
`LIBPATH`	on IBM RS
`LD_LIBRARY_PATH`	on Linux

Note: If both 32-bit and 64-bit program versions are used, both library locations should be specified. The 32-bit directories are located in `<path>/lib`, while the 64-bit libraries can be found in `<path>/lib/64bit`.

GDM then looks for shared libraries in the locations specified by the platform-specific library path environment variable.

GDM Environment Variables

The following environment variables are used by GDM:

`GDMNOTLOADLIB`	Specifies that no design management system be used. When this variable is set, no DM operation will be executed and no shared library will be loaded.
`GDM_USE_SHLIB_ENVVAR`	Enables GDM to look for shared libraries outside the Cadence installation hierarchy. If you set this variable, you must also add the location of the shared libraries to the platform-specific library path environment variable (such as `LD_LIBRARY_PATH)`. Also see “Using Third-Party GDM Integrations” on page 146.

Common Arguments for GDM Commands

All `gdm` commands, except `gdmimport`, support the following arguments:

- `-lib` and `-file`
- `-recurse`
- `-cdslib`
- `-xtra`
- `-help`

Note: If you use a `gdm`*`xxx`* command that the specific design management wrapping does not support, the system generates an error message. All `gdm`*`xxx`* commands have a nonzero exit status if the command fails or if any file operated on generates an error.

The -lib and -file Arguments

Specify items in libraries by using the argument `-lib` followed by a library name, using the following syntax:

```
lib.cell:view/file
```

Library, cell, and view names in this syntax are always in the library name space (LibraryNT or LibraryUnix), which means that cell and view names appear just as an `ls` command shows them. The `-lib` argument need appear only once to determine how the system parses multiple specifications.

For example, everything in the cell `MUX2` in library `gates` is identified as:

```
-lib gates.MUX2
```

The Verilog source file in the `hdl` view of cell `cpu` in the `system` library is identified as:

```
-lib system.cpu:hdl/verilog.v
```

When you use the library syntax, all items appropriate to the level being used must be present. To specify a file in a view, you must specify all four items `lib.cell:view/file`. If a file is named, the forward slash (/) must be present. The remaining punctuation is optional if there is no name following these items. The following example specifies a cell-level file, `delay.tla` in cell `aoi3`, and a library level-file, `template.usr`.

```
-lib asic.aoi3/delay.tla asic/template.usr
```

You can give file specifications, which are not library references, with no arguments. If there is a need to specify both files and library references to a single command, use `-file` to change back to file specifications from library specifications. The following example refers to the entire contents of two cells, `mpeg` and `frame`, in library `video`, and the nonlibrary file `synth.cmd`, where `-lib` applies to all the arguments after the `-lib` argument until any following the `-file` argument. If `-file` is present, it applies to all the arguments until any following the `-lib` argument. No other arguments are positional. They have the same effect no matter where they appear in the command line.

```
% gdmcmd -lib 'video.mp*g'  video.frame  'video/index.htm*' -file ../synth.*
```

For GDM (Unix shell) commands, you can use wildcard characters, `*` and `?`, and letter range characters, `[ ]`, while specifying library, cell, view, and file names.

- The `*` character matches zero or more characters of the library, cell, or cellview name. For example, if you specify `-lib 'S7E100A_*.*:s*'`, it extracts all the elements where the library name starts with `S7E100A_`, such as `S7E100A_XU`, and the view name starts with `s`, such as `schematic` or `symbol`.
- The `?` character matches one character in the library, cell, or cellview name. For example, if you specify `-lib 'S7E100?.Cell??:layout'`, it extracts all the elements where the library name starts with `S7E100` and matches one character following it, such as `S7E100X` or `S7E100Y`; and extracts all the elements where the cell name starts with `Cell` and matches two characters following it, such as `Cell01` or `Cell02`, and the view name is `layout`.
- The letter range `[a-z]` matches one character in the given range in the library, cell, or cellview name. For example, if you specify `-lib 'S7E100[A-C].*:symbol'`, it extracts all the elements where the library names are `S7E100A`, `S7E100B`, and `S7E100C`, and the view name is `symbol`.

Important Points to Note

- The wildcard characters do not work when specified for the filenames starting with a dot (`.`). For example, if you specify `-lib 'lib/*'`, it will not extract the elements, such as `lib/.oalib`. In such cases, you need to specify the pattern as `-lib 'lib/.*'`.
- When you run the `gdmDelete` command, a prompt is displayed for confirmation before deleting the library elements only if wildcard characters are specified in the `-lib` argument.
- When using wildcard characters for the values specified for the `-lib` argument, ensure that those values are enclosed within single quotes. However, do not enclose values with single quotes when using the `-file` argument because the operating system shell needs to process those wildcard characters.

The -recurse Argument

If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.

The -cdslib Argument

This argument specifies the library definition file to be used for mapping library names to library directories. If this argument is not specified, `gdm` looks for `cds.lib` files.

The -xtra Argument

GDM commands that run design management–specific commands take an argument of `-xtra`. This enables the GDM command to take additional arguments that are specific to the design management command so that it can pass them to the design management command.

The -help Argument

This argument prints out a brief message that describes the available arguments.

Common Arguments for DM Commands

GDM commands call the design management–specific commands that constitute the wrapping of a design management system. For example, `gdmexport` calls *`xxxexport`*, where *`xxxexport`* is the wrap around the design management system's export command. These design management-specific wraps must accept the following arguments, which are passed to them by the corresponding GDM commands:

`-gdm`	Forces the command to follow GDM requirements.
`-u` *`file`*	Precedes files in the file list that are not managed but exist in the file system.
`-setstart` *`file1 file2`* `... -setend`	`-setstart` marks the beginning of a list of files that are to be treated as a set. `-setend` marks the end of the set.
`-xtra` *`arguments`*	Precedes arguments specific to the design management system.

GDM Commands

Designers can use Generic Design Management (GDM) shell commands to perform operations without using a graphical user interface. These commands are as follows:

- gdmcancel
- gdmci
- gdmco
- gdmdelete
- gdmexport
- gdmhistory
- gdmimport
- gdmsetdefver
- gdmsetname
- gdmstatus
- gdmsubmit
- gdmupdate

Note: If you use a `gdm` command that the specific design management wrapping does not support, the system generates an error message. All `gdm` commands have a nonzero exit status if the command fails or if any file operated on generates an error.

Case Sensitivity

All arguments are case insensitive. Therefore, `-lib`, `-Lib`, and `-LIB` are equal. The variables that follow the arguments are case sensitive; for example, `gdmci lib ABCLibrary` is not the same as `gdmci -lib abcLibrary`.

gdmcancel

```
gdmcancel [-cdslib file] [-recurse] [-xtra str] [-optimize] [-help]
     [-lib lib.cell:view/file] [-file file] ...
```

Description

Cancels the checked-out status of files in the workarea. Co-managed files are always canceled as a group. Co-managed set behavior applies only to views when the view is specified as a library entry, such as `-lib lib.cell:view.`

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-xtra` *`str`*	Allows additional arguments, specific to the design management cancel command, to be passed through `gdmcancel` to that command.
`-optimize`	Skips some calls to the design management system to improve performance. Specifically, when you cancel a checkout, GDM first obtains the status of the files from the design managment system and removes any files that are not checked out from the file list. With the `-optimize` argument, GDM will skip the extra call to get status and just provide the list of files to the DM system. The DM system will then issue an error if a file has not been checked out.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell`*`:`*`view`*`/`*`file`*	Library elements for which the cancel checkout task needs to be performed. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) for which to cancel checkout. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmci

```
gdmci [-cdslib file] [-recurse] [-xtra str] [-initial] [-description des_str]
     [-dfile file] [-optimize] [-help] [-lib lib.cell:view/file] [-file file]
     ...
```

Description

Checks in specified files and registers files that were previously unmanaged. Gives checked-out and previously unmanaged files to the repository so the files can be shared. Co-managed files in a view are always checked in as a group. Co-managed set behavior applies only when directories or files are specified as library elements; that is, with the `-lib` argument.

Note: When you specify a library or cell, all the managed files in the library or cell are checked in, but only the co-managed files in the views are checked in.

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-xtra` *`str`*	Allows additional arguments, specific to the design management checkin command, to be passed through `gdmci` to that command.
`-initial`	Checks in all specified files and registers files that were previously unmanaged. If it is not used, new or unmanaged files that are members of a registered co-managed set will be checked in. All arguments are case insensitive and can be shortened to any abbreviation that is unique across all `gdm` command arguments. Hence, `-initial` can be specified as `-Ini`.
`-description` *`des_str`*	Cannot be used with `-dfile.` The string `"str"` is used as the description for the `checkin` operation.

`-dfile` *`file`*	Cannot be used with `-description`. Use `-dfile` to enter a multiline description. The contents of the file named are used as the description for the `checkin` operation.
`-optimize`	Skips some calls to the design management system to improve performance. Specifically, when you check in library elements or files, GDM first obtains the status of the files from the design managment system and removes any files that have already been checked in from the file list. With the `-optimize` argument, GDM will skip the extra call to get status and just provide the list of files to the DM system. The DM system will then issue an error if a file has already been checked in.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell:view/file`*	Library elements to check in. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) to check in. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmco

```
gdmco [-cdslib file] [-recurse] [-xtra str] [-version version] [-name <tagname>]
     [-optimize] [-help] [-lib lib.cell:view/file] [-file file] ...
```

Description

Checks out specified files. Makes files in the workarea available for editing. Co-managed files are checked out in the same grouping in which they were checked in. Co-managed set behavior applies only when directories or files are specified as library elements; that is, with the `-lib` argument.

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-xtra` *`str`*	Allows additional arguments, specific to the design management checkout command, to be passed through `gdmco` to that command.
`-version` *`version`*	Value is a specific design management string representing the version from which this file is derived.
`-name` *`<tagname>`*	Allows you to check out the file from the *`version`* with the given tagname.
`-optimize`	Skips some calls to the design management system to improve performance. Specifically, when you check out library elements or files, GDM first asks the DM system to expand the library element or directory and return the status of the files to the server. With the `-optimize` argument, GDM expands the library element or directory on the client side and sends the list to the server, thus skipping the extra call to the DM system.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell:view/file`*	Library elements to check out. Names listed without `-lib` or `-file` are treated as `-file` arguments.

`-file` *`file`*	Files and directories (nonlibrary elements) to check out. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmdelete

```
gdmdelete [-cdslib file] [-xtra str] [-local] [-help][-recurse]
     [-lib lib.cell:view/file] [-file file] ...
```

Description

Deletes files both from the work area and from the default configuration. If deleted from the default configuration, `gdmupdate` does not place the file in your workarea. The file is hidden from future use.

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-xtra` *`str`*	Allows additional arguments, specific to the design management delete command, to be passed through `gdmdelete` to that command.
`-local`	Deletes files from your work area. Files in the repository are not deleted.
`-help`	Displays information about this command and its arguments.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-lib` *`lib.cell:view/file`*	Library elements to delete. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) to delete. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmexport

```
gdmexport [-cdslib file] [-recurse] [-xtra str]
     [-lib lib.cell:view/file | -file file] ... -destination path
     [-version identifier] [-complete] [-exportpaths] [-help]
```

Description

Exports files from the design management system data repository to the destination you specify. The destination can be a directory or a file; it can be a filename only if the file already exists and if you are exporting only one file.

When you export a library or cell directory, all the managed files in the library or cell are exported. When you export a view directory, only the co-managed files in the view are exported. Co-managed files are exported in the same grouping in which they were checked in. To export all the managed files in a view directory, use the `-complete` argument.

Note: When you a export a directory that is not a Cadence library element, only the files in the directory are exported. Files in subdirectories are not exported unless you use the `-recurse` argument.

The `gdmexport` command does not affect the data in the design management system.

The `gdmexport` command calls the `xxxexport` command, which implements your design management system's export of data. The `xxxexport` command should take the following arguments:

```
xxxexport -destination path [-version identifier] [-exportpaths]
```

Note: See also "Common Arguments for DM Commands" on page 151.

Arguments

`-cdslib` *`file`*	The library definition file to be used for mapping library names to library directories.
`-recurse`	Exports the entire tree of files under the source directory. The files are copied to the destination directory. The source directory's tree structure is not created in the destination directory unless you also specify the `-exportpaths` argument. If you do not use the `-recurse` argument, only the files in the top directory are exported; files in subdirectories are not exported. Note: When you export a Cadence library element (such as a library or cell), the entire tree of files under the directory is exported, even if you do not use the `-recurse` argument.
`-xtra` *`str`*	Allows additional arguments, specific to the *`xxx`*`export` command, to be passed through `gdmexport` to that command.

`-lib` *`lib.cell:view/file`* `|` `-file` *`file`*

`-lib`: Library elements to export. All names that follow `-lib` and are before the next `-`*`argument`* are assumed to be library elements.

`-file`: Files and directories (nonlibrary elements) to export. All names that follow `-file` and are before the next `-`*`argument`* are assumed to be files.

All the files in the directory you specify are exported. Files in subdirectories are not exported unless you specify the `-recurse` option. The source directory's tree structure is not created in the destination directory unless you also specify the `-exportpaths` argument.

For details about how to use the `-lib` and `-file` arguments, see "The -lib and -file Arguments" on page 148.

`-destination` *`path`*	The location to which you want to export the files. You must specify this argument. If the path you specify does not exist, GDM creates the missing directories. You can specify a directory or a file as the destination. The destination can be a file only if it already exists and if you are exporting only one file. If the destination is an existing file, `gdmexport` overwrites its contents.

`-version` *`identifier`*

	A string representing the version of the files to be exported. The value of `version` depends on the design management system you are using. For example, if you use Team Design Manager, the value of `version` would be one of the following: a version number, the string `current`, or the string `local`. If a file does not have the version you specify, it is not exported.
`-complete`	Specifies that all managed files in view directories should be exported, instead of only the co-managed set of files.
`-exportpaths`	Creates the directory tree structure of the source directory in the destination directory. If you do not use `-exportpaths`, all the files are copied in the destination directory but subdirectories are not created. See also the descriptions for `-recurse` and
`-lib | -file.`	
`-help`	Displays information about this command and its arguments.

Examples

```
gdmexport -lib LIB1.cell1:schematic -destination /tmp/tmplib/cell1/schematic
```

Exports the current version of the schematic to the directory `/tmp/tmplib/cell1/schematic`.

```
gdmexport -file myfile -version 3 -destination /tmp/
```

Exports version 3 of `myfile` to `/tmp/`.

```
gdmexport -lib LIB1.cell1 -version 7 -destination /tmp/tmplib/
          -exportpaths -recurse
```

Exports all the files in `cell1`, including the files in subdirectories under `cell1`, that have a version 7.

gdmhistory

```
gdmhistory [-cdslib <filename>] [-lib lib.cell:view/file] [-file <file>] [-xtra
     <str>] [-full] [-author] [-size] [-last nn|-all] [-header] [-status]
     [-parent] [-long] [-labels]
```

Description

Returns information about the version history of a file. The library and file arguments must specify only one file.

Arguments

`-cdslib <filename>`	Specifies the library definition file to be used for mapping library names to library directories.
`-lib lib.cell:view/file`	Library elements for which to get their histories. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file <file>`	Files and directories (nonlibrary elements) for which to get their histories. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-xtra <str>`	Allows additional arguments, specific to the design management history command, to be passed through `gdmhistory` to that command.
`-full`	Full description is printed on separate lines from the other information.
`-author`	Name of the author of the file.
`-size`	Size of the file.
`-last nn|-all`	Takes a numeric option. Prints each version number and date and the first several characters of the history up to the given number of versions.
`-header`	Header of the history output.
`-status`	Status of the file.
`-parent`	Returns the version from where the current version is derived from. For example, if the current version is 1.5 and it is derived from 1.4, then `-parent` will display the version as 1.4 in the `gdmhistory` command line. The `-parent` argument is always *on* by defaul, so that the returned data of *version*, *date*, and *description* will be displayed.
`-long`	Ignores any given options, but will returrn all the options on the list.
`-labels`	Will return any labels/names attached to the version by calling the `gdmsetname` API.

Examples

```
gdmhistory -file my_lib/my_cell/schematic/sch.oa -author -header
=> ${CWD}/my_lib/my_cell/schematic/sch.oa
Derived       Version    From Date                        Author      Desc
1.2           1.1        Mon Nov 11 14:30:32 GMT 2019 userA   [NO_COMMENT]
```

The output shows information about version 1.2, which is derived from version 1.1 (for example, the checked out version), created by user `userA` on the listed date, with no checkin comment. This information is according to the example's indicated command output, the information availability is dependent upon the DM system's support of GDM features.

Note the example here uses GDM argument form "-file" [with path] which

examines the data as a (relatively located) file, independent of any

5X library's inclusion (ignores cds.lib's libraries). This distinction

is important for GDM arguments of the target specification format used

for finding the file. Contrast using gdmhistory's "-lib" arguments

versus "-file" for the syntax of the location.

When using "-file", the originally listed argument pair "-cdslib" and

"./cds.lib" isn't going to assist gdmhistory's output, but as was

listed it can become a potential failure point for gdmhistory if the

indicated cds.lib file isn't present.

Additionally consider that general parsing of the text from gdmhistory can

be tricky since dates, and all versions listed, etc. are formatted and

provided (or not), by the specific DM system used. The columns' output

separations are also being done with regular space chars. Using the

SKILL API for gdmhistory instead can yield output with partitioned fields without needing to figure out how to separate and identify them as output

by the shell command. For example "1.1" may have no value for where

it's derived from.

gdmimport

```
gdmimport srcLib targetPath [-help]
```

Description

Copies a Cadence library (*`srcLib`*) into the current workarea (*`targetPath`*).

Arguments

`srcLib`	The source library.
`targetPath`	The workarea path to which you want to copy the library.
`-help`	Displays information about this command and its arguments.

gdmsetdefver

```
gdmsetdefver -version version [-cdslib file] [-xtra str] [-name tag] [-help]
     [-lib lib.cell:view/file] [-file file] ...
```

Description

Associates the given version to the specified set of files currently in the workarea. Action is DM system specific. For TDM, this command sets the specified version as the default version.

Arguments

`-version` *`version`*	Gives the version of the file. Value is a specific design management version identifier. The file list must be a single file or a single co-managed set.
`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-xtra` *`str`*	Allows additional arguments, specific to the design management command, to be passed through `gdmsetdefver` to that command.
`-name` *`tag`*	Corresponds to a tag specification in RCS wraps, or a release name in TDM.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell:view/file`*	Library elements for which to set the default version. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) for which to set the default version. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmsetname

```
gdmsetname -name tag [-cdslib file] [-xtra str] [-recurse] [-version version]
     [-help] [-lib lib.cell:view/file] [-file file] ...
```

Description

Associates the given name to the specified set of files currently in the workarea.

Arguments

`-name` *`tag`*	Corresponds to a tag specification in RCS wraps. DM-specific symbolic name string.
`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-xtra` *`str`*	Allows additional arguments, specific to the design management command, to be passed through `gdmsetname` to that command.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-version` *`version`*	Value is a specific design management version identifier. For some design management systems, a missing file list is legal if `-name` is used. The file list must be a single file or a single co-managed set.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell:view/file`*	Library elements for which to set name. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) for which to set `name`. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmstatus

```
gdmstatus [-cdslib file] [-lib lib.cell:view/file] [-file file] [-xtra str]
     [-workarea] [-repository] [-civersion] [-coversion] [-updateversion]
     [-needupdate] [-cachedok] [-status] [-header] [-absolute] [-modified]
     [-where] [-recurse] [-help]
```

Description

Returns the design management status of files. If no file is present, the command operates on the current directory with `-recurse`.

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-lib` *`lib.cell:view/file`*	Specifies the library elements. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Specifies the files and directories (non-library elements) that need have their check out canceled. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-xtra` *`str`*	Allows additional arguments, specific to the design management status command, to be passed through `gdmstatus` to that command.
`-workarea`	Shows the specifications of the files present in the specified location.
`-repository`	Shows information, such as the files to be managed, where they are stored, and which views are accessible.
`-civersion`	Shows the `checkin` version.
`-coversion`	Shows the `checkout` version.
`-updateversion`	Shows the update version.
`-needupdate`	Indicates if the file needs to be updated. Returns one of the following: ■ `outOfDate`: The file is out-of-date and an update is required in the cellview. ■ `upToDate`: The file is up-to-date and no update is required in the cellview. ■ <blank space>: DM does not support this feature.
`-cachedok`	Indicates to the DM to accept the cached status value information when querying the files. This option is recommended only when the speed for querying the files has the highest priority.
`-status`	Shows the status.
`-header`	Shows the header.

`-absolute`	Shows the absolute name from the slash (/). Otherwise, the output is relative to the current directory or as a library specification.
`-modified`	Displays the filename followed by an asterisk (*) if it is modified, or the filename followed by a question mark (?) if its modification status is unknown.
`-where`	Asks GDM for both the `COLOC` and `COWHO` status. If `COLOC` is returned, it is displayed; otherwise, the `COWHO` string is displayed.
`-recurse`	Refers only to the files immediately below the directory, if the non-library specification is a directory name. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-help`	Displays information about this command and its arguments.

Example

```
gdmstatus -lib rodTrLib.Design:layout/master.tag –needupdate
=> outOfDate
```

Returns `outOfDate`. The `master.tag` file needs to be updated in the <`rodTrLib | Design | layout`> cellview.

gdmsubmit

```
gdmsubmit [-cdslib file] [-recurse] [-xtra str] [-description des_str]
     [-dfile file] [-name name] [-includeco] [-initial] [-help]
     [-lib lib.cell:view/file] [-file file] ...
```

Description

Submits files for a release; DM specific.

Arguments

`-cdslib` *file*	Specifies the library definition file to be used for mapping library names to library directories.
`-recurse`	If a nonlibrary specification is a directory name, by default it refers only to the files immediately below that directory. If the argument `-recurse` is present anywhere on the command line, it refers to the entire tree of files under that directory.
`-xtra` *str*	Allows additional arguments, specific to the design management submit command, to be passed through `gdmsubmit` to that command.
`-description` *des_str*	
	Cannot be used with `-dfile`. The string `"str"` is used as the description for the `submit` operation.
`-dfile` *file*	Cannot be used with `-description`. Use `-dfile` to enter a multiline description. The contents of the file named are used as the description for the `submit` operation. Co-managed files in a view are always submitted as a group. Co-managed set behavior applies only to views when the view is specified as a library entry, such as `-lib lib.cell:view.`
`-name` *name*	Integration request name for TDM.
`-includeco`	Includes checked out files in the submission.
`-help`	Displays information about the command and its arguments.
`-lib`	Library elements for which to submit. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file`	Files and directories (nonlibrary elements) for which to submit. Names listed without `-lib` or `-file` are treated as `-file` arguments.

gdmupdate

```
gdmupdate [-cdslib file] [-recurse] [-xtra str] -name relName [-byname]
     [-version fileversion] [-force] [-help] [-lib lib.cell:view/file]
     [-file file] ...
```

Description

Makes files in the workarea available for reading. Updates co-managed files in the same grouping they were checked in with. Cancels the checked-out status of files in the workarea only if `-force` is used.

Arguments

`-cdslib` *`file`*	Specifies the library definition file to be used for mapping library names to library directories.
`-recurse`	If no file list is present, the command operates on the current directory with `-recurse` unless `-byname` is used.
`-xtra` *`str`*	Allows additional arguments, specific to the design management update command, to be passed through `gdmupdate` to that command.
`-name` *`relName`*	Corresponds to a tag specification in RCS wraps or a release name in TDM. This is a required field. Do not use `-name` if the name request is non-NULL but an empty string.
`-byname`	Can only be used with `-name`, and only with some design management systems. It specifies use of the complete set of files indicated by `-name`.
`-version` *`fileversion`*	
	Value is a specific design management version identifier. For some design management identifier systems, a missing file list is legal if `-name` is used. File list must only be a single file or view. A single file can be specified with a path, or as an explicit file in a library, cell, or view.

`-force`	Performs the update even if it overwrites modified files. GDM deletes modified files and makes sure that none are checked out. Receives the `-force` argument because TDM uses it to affect version selection for the update. Most design management wraps ignore it. Tells GDM to update files even if modifications are overwritten by doing so. If `-force` is not present and any modified files are present, the command gives an error.
`-help`	Displays information about this command and its arguments.
`-lib` *`lib.cell:view/file`*	
	Library elements for which to update. Names listed without `-lib` or `-file` are treated as `-file` arguments.
`-file` *`file`*	Files and directories (nonlibrary elements) for which to update. Names listed without `-lib` or `-file` are treated as `-file` arguments.

For information on gdm SKILL APIs, refer to Generic Design Management (GDM) SKILL Functions in the *Cadence Application Infrastructure SKILL Reference*.

9

cdsCopy

This chapter describes the following:

Using cdsCopy

You can use the cdsCopy system to

- Merge libraries to make a new release library
- Back up a library by copying it to a new location

  All the co-managed cellview files, except derived cellview files, are copied.
- Rename a library, updating references to it from a number of “client” libraries
- Move a library by copying and deleting the library without updating cross-references

The cdsCopy system can be used in either batch or interactive mode.

Batch Mode

In batch mode (using SKILL access or from a user interface), you invoke cdsCopy on an object and the system

- Performs the expansion, depending on the options provided
- Copies the data
- Invokes all cross-reference updaters that are registered

You can run cdsCopy in batch mode from a cdsCopyShell, Virtuoso design environment Command Interpreter Window (CIW), or customized Virtuoso application.

This chapter discusses batch mode and what you need to understand to customize cdsCopy .

Interactive Mode

In interactive mode, you can do one of the following:

- Set up the copy and then perform a copy operation without further interaction.
- Perform the expansion first, making any desired changes to the expanded list, and then do a copy and update.

You can call cdsCopy functions in interactive mode from a Virtuoso Command Interpreter Window (CIW), customized Virtuoso application, or cdsCopyShell.

Guidelines for Using cdsCopy

Before you copy or rename a library, you should stabilize and verify your design. Similarly, you need to perform certain tasks after you copy or rename the library. The following process shows you how to use cdsCopy with a design management system:

1. Stabilize and verify your design.
2. Check in all the files in the design so that the current state of the design files is saved.
3. Copy or rename the design with cdsCopy. cdsCopy checks out managed files if it needs to but does not check them back in.
4. Verify the copied or renamed design.
5. Check in the files that cdsCopy checked out. The cdsCopy system does not check in the files; you have the option of checking in the files if you want to keep the changes made by cdsCopy's cross-reference updaters or canceling the checkout if you do not want the changes.

How cdsCopy Works

The copy process is broken up into the following small steps for quick customization:

- Expansion
- Filtering
- Copy
- Cross-reference updating

There are three types of expansion—directory expansion, design expansion, and configuration expansion. Directory expansion expands a directory such as a library directory into all the files in that directory and its subdirectories. Design expansion follows the hierarchical structure of the design (even into other libraries) and usually does not include all the files in any library. Configuration expansion is similar to design expansion except that a configuration file is used to select the items to expand (such as views).

The next step in the process is filtering. There is some built-in filtering in the expansion step that is controlled by options to the expansion functions. However, it is also possible to do customized additional filtering after expansion. For example, you could add documentation files that your design methodology requires.

Once a list of files to copy has been created, copy can proceed. There is only one option for copy—whether to overwrite existing files. After the files are copied, the update process is initiated.

Cross-reference updating is needed whenever design files contain references to other design files that were moved or copied. The cross-reference update process splits the list of files that need to be updated into lists that contain files of the same data registry type, such as CDBA or Verilog. Each list is then handed to the updater program that is registered for that type in the data registry. Custom updaters are registered in the data registry just like Cadence updaters.

Customizing cdsCopy

The cdsCopy system provides two levels of customization:

- Simple customization, controlled by a set of options, covers most needs.
- Full customization provides complete control over what gets copied and how cross-references are updated.

You implement copy customization by writing SKILL functions that run in Virtuoso applications or a cdsCopyShell and by providing custom cross-reference updaters for non-Cadence data types.

Simple Customization

The options for simple customization are:

Overwrite	If true, overwrites existing files.
Expansion Mode	*Don't Expand*, *Expand Comanaged*, or *Expand All*. *Expand All* copies all the files in a view, while *Expand Comanaged* copies only the files that are part of the co-managed set of the view. (See "View Files and the Co-Managed Set" on page 27 for more information about co-managed sets.)
View Type List	Copies only views of this type. Ignored if you use *Don't Expand*.
View Name List	Copies only views with these names. Ignored if you use *Don't Expand*.
What to Cross-Reference Update	*Update the Copied Data, Update the Destination Library,* `or` *Update a Provided List of Libraries.*

The options used in simple customization are also used in full customization (as arguments in cdsCopy SKILL functions).

Full Customization

Full customization includes copy customization, which lets you add or remove files from the list to copy, and cross-reference customization, which lets you update file types that Cadence does not support.

Copy Customization

To implement copy customization, you write functions that run in Virtuoso applications (in a Command Interpreter Window or from a customized user interface) or a cdsCopyShell. cdsCopyShell is a standalone application with a SKILL interpreter and cdsCopy SKILL functions. These functions are described in the cdsCopy SKILL Functions chapter of the *Cadence Application Infrastructure SKILL Reference*.

Your custom SKILL function does the following:

1. (Optional) Displays a SKILL graphical user interface form to gather information.
2. Calls one of the cdsCopy expansion functions to get the starting list of items to copy.
3. Adds or deletes items from this list.
4. Calls the `ccpCopy` function with the *Don't Expand* option to copy the data.

Cross-Reference Updating

Many design files contain references to other design files. In many cases, when you copy design files, you would like the internal references to point to the new copies of the files rather than to the old files. The cdsCopy cross-reference updating system, which consists of cross-reference updater programs and data registry entries, does this. For details about the cross-reference updating system, see "Cross-Reference Updater System" on page 182.

Starting the cdsCopyShell

cdsCopyShell is a standalone application with a SKILL interpreter and cdsCopy SKILL functions. You can run your copy programs in a cdsCopyShell.

To start a cdsCopyShell,

➤ In a UNIX shell, type

```
cdsCopyShell
```

This gives you a SKILL prompt, where you can enter SKILL input.

To exit the SKILL prompt, type `exit`.

To start a copy program directly,

➤ In a UNIX shell, type

```
cdsCopyShell myprogram.il
```

where *`myprogram`*`.il` is your SKILL program.

Cross-Reference Updater System

Design files often contain references to other design files. Typically, when you copy design files, you would like internal references to point to the new copies of the files rather than to the old files. The cdsCopy cross-reference updating system, which consists of cross-reference updater programs and entries in data registry files, does this.

Cadence provides cross-reference updaters for many types of design files. Currently, these include CDBA, category (both *`Cat` and `.ctf` files), `prop.xx`, and configuration (`expand.cfg`) files. You can add custom cross-reference updaters for other types of files. Entries in the data registry determine which updater is run.

To add a custom cross-reference updater,

1. Write a program to do cross-reference updating.
2. Associate the cross-reference updater with the data type in the data registry.

Creating a Cross-Reference Updater

Follow the guidelines described in this section while creating cross-reference updaters.

Cross-Reference Updater Arguments

All cdsCopy cross-reference updater programs provided by Cadence accept the command line arguments described below. Any custom cross-reference updater program you write must also accept these arguments.

`-fromToList` *`file`*	File, generated by the cdsCopy system, containing a list of all files copied in the copy or rename operation. This file has copied/renamed `from` and `to` file pairs, one per line, with library, cell, and view names written in the LibraryNT name space. Each word in these pairs can be one of the following:

`Lib/File`

`Lib.Cell/File`

`Lib.Cell:View/File`

`Lib.Cell:View/Dir/File`

For example:

```
mylib/myfile newlib/myfile
lib1.mycell:myview/mydir/myfile lib2.mycell:myview/
mydir/myfile
```

See also “Properties of fromToList” on page 184.

`-updateFileList` *`file`*

List of files in one of the above forms, one per line. If the file is the master for a cellview, `master` is the second word on the line. The cdsCopy system ensures that this list contains only files that the updater can handle, based on information in the data registry.

For example:

`mylib.mycell/prop.xx`

or

`lsttl.ls04:logic/vhdl.vhd master`

`-cdslib` *`file`* The `cds.lib` file that the updater should use to interpret the library, cell, and view names.

`-reason` *`operation`* One of the following strings, which indicates the reason for running the cross-reference updater:

`"copy"`

`"rename"`

`"renameRef"`

`[-renameRefOldToNew` *`fromLib toLib`*`]`

The old and new library names, in the LibraryNT name space, which are used by the cross-reference updater for a rename reference operation (see `ccpRenameReferenceLib` for details). This argument is optional and is used only during a rename reference operation.

`[-renameRefAllow` *`option`*`]`

One of the following strings, which specifies the references to change during a rename reference operation:

- `"all"` Changes all occurrences.
- `"to"` Changes references only if the `"to"` library exists.
- `"from"` Changes references only if the `"from"` library exists.
- `"both"` Changes references only if both the `"from"` and `"to"` libraries exist.

This argument is optional and is used only during rename reference operation (see `ccpRenameReferenceLib` for details).

Basic Updater Program Algorithm

1. Read in a file from `updateFileList`.
2. Find all external references.
3. For each external reference, see if it is one of the files in the `from` (word one) list in the `fromToList` file. If so, replace it with the `to` file (word two).
4. Save the file.

Properties of fromToList

The entries in the `fromToList` file can be applied in any sequence to the files listed in the `updateFileList`. This is because the `fromToList` does not have any order dependencies.

The `fromToList` has the following properties, which ensure that it is free of the ambiguities of an unordered list:

- A `to` entry never appears in any of the `from` entries. This means that you are never asked to update a file when the copy system has copied a file to one location and then copied it to another location.
- A `from` entry never appears more than once in the `from` entries. This means that you are never asked to update a file when the copy system has copied one file to two different places.

- A `to` entry never appears more than once in the `to` list. This means that two objects are never copied to the same place.

Error Messages

Your cross-reference updater should return error messages to cdsCopy by writing to `stderr` in a special format. Use the following format for error messages:

`{#`*`nn L msg`*`}`

nn	The number of the file in the list of files to update that is handed to the cross-reference updater. The first file in the list is `1`. Use `0` for errors that are not related to a specific file to be updated.
L	The message level. One of the following: `I` Information `W` Warning `E` Error `F` Fatal
msg	The message to be returned. If you need to include a `}` character in the message, enclose the message in double quotes (`"  "`). If you need to include a `"` character in the message, use two quotation marks (`""`) instead, and enclose the message in quotation marks. Messages can be of any length and can have multiple lines.

For example:

```
{#1 I Updating file}
{#17 E File system full}
{#0 W "Cannot update ""mylogfile.log"""}
```

Adding a Cross-Reference Updater

After you create a cross-reference updater, you need to associate it with a data type in the data registry. The `updaterProg` property determines which cross-reference updater is run for a data type.

The following sections describe how to add cross-reference updaters for new data types as well as for data types that are already defined in the data registry.

Adding a Cross-Reference Updater for an Existing Data Type

To add a cross-reference updater for a data type that is already defined in the data registry, you either modify the original `DataFormat` definition for the data type or add a `+DataFormat` entry to your site or personal `data.reg` file.

While you are developing and testing your cross-reference updater, you might find it convenient to add it just to your site or personal `data.reg` file. When the cross-reference updater is ready, you can modify the original `DataFormat` definition.

To add a cross-reference updater to your site or personal `data.reg` file,

➤ Add the following to the `data.reg` file:

```
+DataFormat datatype{
    updaterProg = updater;
}
```

For example, if you have the following `DataFormat` entry for `myDataType` in a `.reg` file in the `/share/cdssetup/registry/data` directory:

```
DataFormat myDataType{
    Pattern = mydata.kanth;
    Preferred_Editor = mydata-Editor;
    dfII_ViewType = mydataType;
    Co_Managed = master.tag prop.xx pc.db;
}
```

and you want to add the cross-reference updater `mydataUpdater`, add the following to your site or personal `data.reg` file:

```
+DataFormat myDataType{
    updaterProg = mydataUpdater;
}
```

(See "Creating a data.reg File" on page 86 and "Searching Rules" on page 93 for more information about `data.reg` files.)

To modify the original data format definition in the data registry,

1. Add the following property to the `DataFormat` entry (which is in a `.reg` file in the `/share/cdssetup/registry/data` directory):

```
    updaterProg = updater;
```

The following example shows a `DataFormat` definition that includes the `updaterProg` property.

```
DataFormat myDataType{
    Pattern = mydata.kanth;
    updaterProg = mydataUpdater;
```

```
        Preferred_Editor = mydata-Editor;
        dfII_ViewType = mydataType;
        Co_Managed = master.tag prop.xx pc.db;
    }
```

2. Remove any `+DataFormat` entries for the cross-reference updater that you might have added to your site or personal `data.reg` files.

Adding a Cross-Reference Updater for a New Data Type

To add a cross-reference updater for a data type that is not defined in the data registry,

1. Add a new `DataFormat` entry to the `.reg` file in `share/cdssetup/registry/data` that contains your data formats. Or create a new *`datatype`*`.reg` file containing a `DataFormat` entry in the `share/cdssetup/registry/data` directory. (For more information about data formats and registry files, see Chapter 6, "Cadence Data Registry File: data.reg.")
2. Include the following property in the `DataFormat` entry:

   ```
   updaterProg = updater;
   ```

   The `updaterProg` property determines which cross-reference updater is run for that data type.

For example, to add a cross-reference updater for the new data type `myDataType`, create a `myDataType.reg` file in the `share/cdssetup/registry/data/` directory with the following `DataFormat` entry:

```
DataFormat myDataType{ //Define new data type
    Pattern = mydata.kanth;
    updaterProg = mydataUpdater;
    Preferred_Editor = mydata-Editor;
    dfII_ViewType = mydataType;
    Co_Managed = master.tag prop.xx pc.db;
}
```

For more information about the data registry, see Chapter 6, "Cadence Data Registry File: data.reg."

For information on cdsCopy SKILL APIs, refer to cdsCopy SKILL Functions in the *Cadence Application Infrastructure SKILL Reference*.

10

Cadence Locking System

This chapter describes the following:

Overview

The Cadence® locking system (CLS) is the mechanism used by many Cadence applications to lock files.

CLS creates a lock file, called Lock-Stake file, when it locks a file for editing. The Lock-Stake file contains information about the application that has locked the file.

CLS allows applications to steal locks from active processes; however, few applications support this feature. CLS automatically recovers locks that are stranded if an application exits without releasing the locks.

In addition, CLS provides a user interface for administrative tasks such as releasing all locks in a directory hierarchy.

Applications on OpenAccess

Cadence applications on the OpenAccess 2.2 database use OpenAccess locking instead of CLS. OpenAccess locking is compatible with CLS—the lock file has the same format and file name extension as the file created by CLS, and the same rules are followed while getting locks.

Virtuoso applications on OpenAccess use both CLS and OpenAccess locking; they use OpenAccess locking to lock database files and CLS to lock other files such as `CDS.log`. Since the two systems are compatible and they lock different files, conflicts should not arise.

OpenAccess locking uses a different daemon, `oaFSLockD`, instead of the CLS boolean daemon `clsbd` to recover locks. `oaFSLockD` is run automatically whenever a library is opened. Virtuoso applications on OpenAccess start both daemons.

You can use the `clsAdminTool` to search for and release locks created by either system.

Note: A lock set by a host that runs only non-OpenAccess applications (which start only `clsbd`) cannot be recovered by a native OpenAccess application and vice versa. This is because each locking system needs to talk to its own boolean daemon to recover locks. In such a case, remove stranded locks manually or with `clsAdminTool`.

Installation

CLS is automatically installed when you install Cadence applications; you do not need to install it separately.

However, on Windows NT, you should manually set up the Boolean daemon (a component of CLS) as a service after you install Cadence applications. See "Setting Up the Boolean Daemon on Windows NT" on page 191 for information on how you can set up the daemon as a service.

You can also customize how the Boolean daemon is started. The daemon must run on every system that runs Cadence applications. You can set up your system to run the Boolean daemon every time the system is started; for details, see "Adding the Boolean Daemon to System Startup Files" on page 197. This procedure is optional; applications that use CLS start the Boolean daemon if it is not already running on the system.

Setting Up the Boolean Daemon on Windows NT

After you install Cadence applications on Windows NT, you should manually set up the Boolean daemon as a service so that Cadence applications can start it.

Note: You must have administrator privileges for the following procedure.

To list the Boolean daemon as a service,

1. Log on to the Windows NT system as a user with administrator privileges.
2. From the *Start* menu, choose *Programs – Command Prompt*.

   The MS DOS Command Prompt window appears.
3. In the MS DOS Command Prompt window, type

   ```
   clsbd.exe -install
   ```

   The following message appears:

   ```
   CDS Boolean Daemon Installed.
   ```
4. Close the MS DOS Command Prompt window by typing `exit`.
5. From the *Start* menu, choose *Settings – Control Panel*.
6. In the Control Panel window, double-click *Services*.

   The Services dialog box appears.
7. Confirm that *CDS Boolean Daemon* is listed as a service.

8. In the Services dialog box, click *Close*.

Edit Locks

CLS locks files with Edit locks. An Edit lock on a file signifies that a process is editing the file and prevents other processes from getting an Edit lock simultaneously on the file. However, a process can steal an Edit lock from another process (see "Stealing Edit Locks" on page 194 for more information).

Files remain locked even if the network, or the client or server computer, fails. If the process that holds the lock exits without releasing the lock, the lock is considered stranded. See "Recovering Stranded Locks" on page 203 for information about how CLS handles stranded locks.

Note: A file can be locked only if its parent directory has `write` permissions.

Lock-Stake File

Edit locks are implemented using Lock-Stake files. The existence of a corresponding Lock-Stake file in the same directory as a file indicates that the file is locked.

When an application gets an Edit lock on a file, CLS creates the following Lock-Stake file in the same directory as the file:

```
filename.cdslck
```

where *`filename`* is the name of the file that is locked.

The Lock-Stake file, an ASCII file, contains information about the lock and the process that holds the lock. The Lock-Stake file has the following information:

- Lock-Stake version
- Login name of the user who locked the file
- Host name (including domain name) of the process that locked the file
- Process ID of the process that locked the file
- Time and date when the process was created

  There are two entries for the time:

  - `ProcessCreationTime_UTC`, the time in Coordinated Universal Time format
  - `ProcessCreationTime_Readable`, the time in a readable format
- Application that holds the Edit lock
- Type of operating system

- Reason for the Edit lock on the file
- File path used to lock the file
- Time and date when the file was locked

The following is a sample `.cdslck` file:

```
# Edit Lock-Stake file. CAUTION: Do not change.
# Information about current Edit Lock Owner.
#
LockStakeVersion                1.0
LoginName                       ns
HostName                        cds111.cadence.com
ProcessIdentifier               11503
ProcessCreationTime_UTC         928949249
ProcessCreationTime_Readable    Wed Jun 09 10:27:29 1999 PDT
OSType                          sun4v
ReasonForPlacingEditLock        XXopen upgrade lock
TimeEditLocked                  Wed Jun 09 10:29:21 1999 PDT
```

A file cannot have more than one Edit lock, so it can have only one corresponding Lock-Stake file.

The Lock-Stake file is automatically deleted by the process that owns it when it releases the Edit lock on the file. You can also delete the Lock-Stake file using the CLS administrative interface (see "Using the CLS Administrative Tool" on page 204 for details).

Stealing Edit Locks

Applications can steal Edit locks from another process. When a lock is stolen, information about the new owner is added to the Lock-Stake file (`*filename*.cdslock`). Information about previous owners is retained at the end of the file.

A few Cadence applications provide this option of stealing locks. See your application’s documentation for information.

Note: Applications cannot steal locks in compatibility mode.

Boolean Daemon (clsbd)

The Boolean daemon, called `clsbd`, is a daemon that runs on all systems on which any Cadence application using CLS is running. The daemon responds to requests from remote systems to determine the status of processes that own Edit locks.

Note: There is a default timeout of 20 seconds in respect of `clsbd` connections. This is also the same time period used for Open Access connections.

When an application wants to lock a file and finds that it is already locked by a process on another system, CLS queries the Boolean daemon running on that system about the status of the process that locked the file. Whether the application can obtain the lock depends on the information CLS receives from the Boolean daemon.

- If the Boolean daemon indicates that the process that locked the file has exited, the application gets the lock. The Lock-Stake file (*`filename`*`.cdslck`) is overwritten with information about the new process.
- If the Boolean daemon indicates that the process that locked the file is still active, the application cannot get a lock on the file.
- If the application cannot connect to the Boolean daemon, the process that owns the lock is assumed to be active and the application cannot get a lock on the file.

If you do not want CLS to query Boolean daemons on remote hosts (you may not want to query remote hosts if you have firewall access issues, for example), set the following environment variable:

```
CLS_DONT_QUERY_REMOTE_HOSTS [listOfRemoteHosts]
```

where *`listOfRemoteHosts`* is an optional list of patterns (typically host or domain names), separated by blank spaces, that you do not want CLS to query. For example, if you specify

```
setenv CLS_DONT_QUERY_REMOTE_HOSTS cds00 cadence.com ns.com
```

CLS will not query hosts that match `cds00` or any hosts from the domains `cadence.com` or `ns.com`.

If you do not specify *`listOfRemoteHosts`*, CLS will not query any remote hosts.

When the `CLS_DONT_QUERY_REMOTE_HOSTS` environment variable is set, if CLS comes across a file locked by a remote host, it always assumes that the process that locked the file is still active. Therefore, CLS cannot get a new lock on the file. In such a case, if you want to lock the file, you need to remove the old lock with the CLS administrative tool. (See "Using the CLS Administrative Tool" on page 204 for more information.)

Note: When an application wants to lock a file that is locked by a process on its own host, CLS determines the status of the process directly without sending a query to a Boolean daemon.

Location of the Boolean Daemon

The Boolean daemon is automatically installed when you install Cadence applications (on Windows NT, you should define the daemon as a service after it is installed; see "Setting Up the Boolean Daemon on Windows NT" on page 191 for details).

The Boolean daemon program, `clsbd`, is located in the following directory:

`application_install_dir``/tools/bin/`

where *`application_install_dir`* is the directory in which your Cadence application is installed.

Starting the Boolean Daemon

The Boolean daemon must run on all systems that run Cadence applications. It is started in several ways.

- You can modify your system's startup files so that the daemon is run automatically when your system is started. See "Adding the Boolean Daemon to System Startup Files" on page 197 for details.
- Cadence applications that use CLS start the daemon if it is not already running.
- You can start the Boolean daemon directly from the application's installation hierarchy, if it is not already running. See "Starting the CLS Boolean Daemon from the Installation Directory" on page 199 for details.

Adding the Boolean Daemon to System Startup Files

To add the Boolean daemon to a system's startup files, do one of the following:

- For SunOS 5.x, create a `/etc/rc2.d/S98clsbd` file that contains the following:

```
#!/bin/sh
# Start-up Cadence locking system boolean daemon (clsbd).
#
INSTALL_DIR='hierarchyPath'
if [ -x ${INSTALL_DIR}/tools/bin/clsbd ] ; then
    ${INSTALL_DIR}/tools/bin/clsbd
    echo "Starting Cadence locking system boolean daemon (clsbd)."
else
```

```
    echo “Cadence locking system boolean daemon not started.”
fi
```

where `hierarchyPath` is the path to your Cadence installation directory.

- For IBM AIX, add the following to the `/etc/inittab` file:

```
INSTALL_DIR='hierarchyPath'
if [ -x ${INSTALL_DIR}/tools/bin/clsbd ] ; then
    ${INSTALL_DIR}/tools/bin/clsbd
    echo “Starting Cadence locking system boolean daemon (clsbd).”
else
    echo “Cadence locking system boolean daemon not started.”
fi
```

where `hierarchyPath` is the path to your Cadence installation directory.

- For HPUX, add the following to the `localrc` function definition to the `/etc/rc` file:

```
localrc()
{
    ...
    INSTALL_DIR='hierarchyPath'
    if [ -x ${INSTALL_DIR}/tools/bin/clsbd ] ; then
        ${INSTALL_DIR}/tools/bin/clsbd
        echo “Starting Cadence locking system boolean daemon (clsbd).”
    else
        echo “Cadence locking system boolean daemon not started.”
    fi
}
```

where `hierarchyPath` is the path to your Cadence installation directory.

- For Linux, create a `/etc/rc.d/rc3.d/S98clsbd` file that contains the following:

```
#!/bin/sh
# Start-up Cadence locking system boolean daemon (clsbd).
#
INSTALL_DIR='hierarchyPath'
if [ -x ${INSTALL_DIR}/tools/bin/clsbd ] ; then
    ${INSTALL_DIR}/tools/bin/clsbd
    echo "Starting Cadence locking system boolean daemon (clsbd).
else
    echo "Cadence locking system boolean daemon not started."
fi
```

where `hierarchyPath` is the path to your Cadence installation directory.

- For Windows NT, do the following:

  a. Log in to your system as a user with administrator privileges.

  b. From the *Start* menu, choose *Settings – Control Panel*.

  c. In the *Control Panel* window, double-click *Services*.

  The Services dialog box appears.

d. In the *Service* list, select *CDS Boolean Daemon*.

e. Click *Startup*.

The Service dialog box appears.

f. In the *Startup Type* field, select *Automatic*.

g. Click *OK*.

h. Click *Close* to close the Services window.

Starting the CLS Boolean Daemon from the Installation Directory

To start the CLS Boolean daemon from the application's installation directory,

➤ In a UNIX or MS DOS window, type

```
application_install_dir/tools/bin/clsbd
```

where `application_install_dir` is the directory in which your Cadence application is installed.

You can use the following command-line options when you start clsbd:

`-fg`	Runs clsbd in the foreground, instead of in the background.
`-debug`	Turns on clsbd debug messages that are written to the log file.
`-logfile fileName`	Writes debug messages to the file you specify. The default log file is `/tmp/clsbd.userId.processID`.
`-portnum portNumber`	Specifies the port number on which to run clsbd. By default, clsbd uses port 16723 on every system on which it runs. You can use this option if another application is using port 16723 or if a clsbd is already running on that port and you want to run another clsbd. If the `CLS_PORTNUM` environment variable is set, clsbd will use the port number that the variable is set to, regardless of whether you specify the `-portnum` option. See "Changing the CLS Boolean Daemon's Port Number" on page 200 for more information.

`-setuid` *`login`*	Changes the user ID of the clsbd process to the login you specify, after clsbd is started. You may need to start clsbd with super-user privileges so that it can change the user ID. This option uses the UNIX `setuid` command. You can also use this option with the `-portnum` option to run a non-root clsbd process on a privileged port. The `-setuid` option is not available on Windows NT.
`-install`	Installs the Boolean daemon as a service on Windows NT. See "Setting Up the Boolean Daemon on Windows NT" on page 191 for more information. This option is only available on Windows NT.
`-remove`	Removes the Boolean daemon as a service from Windows NT. See "Setting Up the Boolean Daemon on Windows NT" on page 191 for more information. This option is only available on Windows NT.
`-version`	Displays the version number of the Boolean daemon.

Changing the CLS Boolean Daemon's Port Number

If the default port number used by the Boolean daemon is consistently used by another application, you might have to change the Boolean daemon's port number. This situation is uncommon.

`clsbd` uses port number 16723 on every system on which it runs. When `clsbd` is started, if it finds that this port number is already being used, it checks if another `clsbd` is running on the system. If another `clsbd` is running, the new `clsbd` exits. If another `clsbd` is not running, the new `clsbd` exits and displays the following error:

```
"Fatal (clsbd): port number xxx is in use by a program that is not clsbd. Exiting."
```

If you get this error, close and restart the Cadence application. However, if you get this error repeatedly, you have to set a different port number for the Boolean daemon or for the application that is using the Boolean daemon's port number.

Important

Because the Boolean daemon is run on all systems that run Cadence applications, if you change the Boolean daemon's port number you must change it on every system, regardless of the platform.

To change the Boolean daemon's port number,

1. Exit all Cadence applications.
2. Stop all `clsbd` processes on all systems.
3. Set the following environment variable on every system that runs Cadence applications:

   ```
   CLS_PORTNUM portNumber
   ```

   where *`portNumber`* is a port that is not being used.
4. Restart Cadence applications.

Note: The value of `CLS_PORTNUM` must be the same on every system that runs Cadence applications on any platform.

Locking Links

Locking Symbolic Links

CLS handles symbolic links automatically. When an application tries to lock a symbolic link, CLS locks the file to which it is linked. The Lock-Stake file is created in the directory that contains the file. If the file does not exist, CLS displays an error.

Locking Hard Links

CLS does not lock hard links by default. However, you can set your environment to lock hard links.

When an application tries to lock a hard link, CLS creates a Lock-Stake file in the directory that contains the hard link, not in the directory that contains the file.

Note: Locking hard links is risky because you can get multiple Edit locks simultaneously on a file.

Setting Your Environment to Lock Hard Links

To force CLS to lock hard links,

➤ Set the following environment variable:

```
CLS_LOCK_HARD_LINKS YES
```

Important

If both the hard link and a file point to the same chunk of memory, then the hard link will be locked but the original file will remain intact. However, when an application tries to lock the hard link, CLS creates the Lock-Stake file in the directory associated with one of these file handles (hard link). All the other file handles (other hard links) to the same file space are not protected. Therefore, multiple Cadence locks via the other file handles are not prevented. So, resolving the links is always the better option.

Recovering Stranded Locks

Stranded locks are locks that remain after the process that owns them has exited. Locks can be stranded if the application or application host exits abnormally, or if the file server is inaccessible.

Stranded Edit locks are recovered in the following ways:

- The Cadence locking system recovers a stranded Edit lock when a process tries to lock the file that has the stranded Edit lock.

  When a process wants to lock a file that is already locked, CLS determines the status of the process that owns the Edit lock on the file (if the process is running on another system, CLS sends a query to a Boolean daemon running on that system). If the process that owns the lock has exited, the new process takes over the stranded lock—the Lock-Stake file (`*filename*.cdslck)` is overwritten with information about the new process. If the process is active or if its status cannot be determined, the old lock is not modified.

- You can search for and remove all (both “stranded” and “good”) Edit locks using the CLS administrative tool (`clsAdminTool`). See “Using the CLS Administrative Tool” on page 204 for details.

  Note: The `clsAdminTool` does not differentiate between stranded locks and non-stranded locks.

Using the CLS Administrative Tool

The CLS administrative tool lets you view and release locks in any directory hierarchy.

Note: The `clsAdminTool` does not differentiate between stranded locks and non-stranded locks.

With the CLS administrative tool, you can:

- Remove a specific Edit lock
- View all Edit locks in a directory hierarchy
- Remove all Edit locks in a directory hierarchy
- View all Edit locks belonging to a process in a directory hierarchy
- Remove all Edit locks belonging to a process in a directory hierarchy
- View and remove all locks that are in the CLS format and that have the `.cdslck` extension, regardless of whether they were set by CLS or OpenAccess locking

You can use the adminstrative tool interactively (as a shell interface) or in batch mode.

Note: There is little requirement to manually clean up lock stakes as the `clsAdminTool` will automatically recover any stranded locks. You can however use the `clsAdminTool` to clean up lock stakes from those libraries that have been, or will be, tarred for transfer (as the hosts that obtained these locks would not exist in the new environment).

clsAdminTool Commands

The CLS administrative tool consists of the following commands, which can be used in both interactive mode and batch mode:

ale

`ale` *`directoryHierarchy`*

Lists all Edit locks in the directory hierarchy you specify. For each edit lock, the following information is provided: the file path, host name, user name of the user who locked the file, process ID, and the time the process was created.

For a description of the arguments used with this command, see “Command Arguments” on page 206.

aple

```
aple directoryHierarchy hostName [processID [processCreationTime]]
```

Lists all Edit locks in the directory hierarchy that match the host name, process ID, and process-creation time that you specify. The `processID` and `processCreationTime` arguments are optional. However, if you need to specify `processCreationTime`, you must also specify `processID`. For a description of the arguments used with this command, see "Command Arguments" on page 206.

are

```
are directoryHierarchy
```

Releases all Edit locks in the directory hierarchy you specify and displays the list of released locks. For a description of the arguments used with this command, see "Command Arguments" on page 206.

apre

```
apre directoryHierarchy hostName processID processCreationTime
```

Releases all Edit locks in a directory hierarchy that match the host name, process ID and process-creation time you specify and displays the list of released locks. For a description of the arguments used with this command, see "Command Arguments" on page 206.

asre

```
asre filePath
```

Removes the Edit lock on the file you specify.

Command Arguments

`filePath`	Full path to the file.
`directoryHierarchy`	The path to the directory hierarchy you want to search for CLS Edit locks.
`hostName`	The host of the process that owns the locks. For example: `cds111.cadence.com.` If you do not provide the domain name, `clsAdminTool` takes the domain name from the system you are using. If you do not want `clsAdminTool` to add the domain name, use the `-force` command or the `-force` argument to `clsAdminTool`.
`processID`	The ID of the process that owns the locks.
`processCreationTime`	The time when the process was created. You can get this information from the Lock-Stake file, *`filename`*`.cdslck`, which is in the same directory as the locked file.

Using the CLS Administrative Tool in Interactive Mode

In interactive mode, the CLS administrative tool is a shell interface that lets you run one command at a time.

Starting the CLS Administrative Tool

To start the CLS administrative tool in interactive mode,

➤ In a UNIX shell, type

```
clsAdminTool [-noprompt] [-echo] [-force]
```

`-noprompt`	The > prompt is not displayed.
`-echo`	The input is echoed.

`-force`	Sets the force mode, which forces `clsAdminTool` to use a simple host name, that is, a host name without a domain. If `clsAdminTool` is not in force mode and you do not provide a domain name with the *`hostName`* argument of the `aple` and `apre` commands, `clsAdminTool` automatically adds the domain name of the system you are using. You can also set the force mode with the `force` command.

The shell displays the > prompt. You can type `clsAdminTool` commands at this prompt.

To display the version number of the CLS administrative tool,

➤ In a UNIX shell, type

```
clsAdminTool -version
```

Using the CLS Administrative Tool

After you start the administrative tool, at the > prompt,

➤ Type one of the following clsAdminTool commands: `ale`, `aple`, `are`, `apre`, `asre`. (See "clsAdminTool Commands" on page 204 for a description of these commands.)

In addition, you can use the following commands:

force

```
force
```

Sets the force mode, which forces `clsAdminTool` to use a simple host name, that is, a host name without a domain. For example, `cds111` is a simple host name, while `cds111.cadence.com` is not.

If `clsAdminTool` is not in force mode and you do not provide a domain name with the *`hostName`* argument of the `aple` and `apre` commands, `clsAdminTool` automatically adds the domain name of the system you are using.

You can also set the force mode with the `-force` argument to `clsAdminTool`.

help

```
help
```

Displays a description of `clsAdminTool` commands.

system

```
system commandName
```

Executes the shell command you specify.

quit

```
quit
```

Exits the `clsAdminTool` interface.

exit

```
exit
```

Exits the `clsAdminTool` interface with the return status of the last command used in `clsAdminTool`. This command is mainly used when `clsAdminTool` is run from scripts.

For example, if you have a file `myfile`, which contains the following:

```
ale mixSigLib/OpAmp
exit
```

and you use the following command:

```
clsAdminTool < myfile
```

`clsAdminTool` lists all the locks in the `mixSigLib/OpAmp` directory hierarchy and then exits.

Exiting the CLS Administrative Tool

To exit the CLS administrative tool

➤ At the > prompt, type

```
quit
```

The prompt changes from > to the default shell prompt.

Displaying the CLS Administrative Tool Options

To display the arguments you can use with the `clsAdminTool` command,

➤ At the UNIX command-line, type:

```
clsAdminTool -help
```

Using the CLS Administrative Tool in Batch Mode

In addition to using the CLS administrative tool interactively in a shell interface, you can run it in batch mode on a UNIX command-line.

In batch mode, you can use any of the clsAdminTool commands—`ale`, `aple`, `are`, `apre`, `asre`—as arguments to `clsAdminTool`.

To run the administrative tool in batch mode,

➤ At the command-line, type the following command:

```
clsAdminTool [-force] -Command commandOptions
```

where

-Command commandOptions is one of the following:

```
-ale aleOptions
-aple apleOptions
-are areOptions
-apre apreOptions
-asre asreOptions
```

(For a description of these commands and their options, see "clsAdminTool Commands" on page 204.)

`-force` sets the force mode, which forces `clsAdminTool` to use a simple host name, that is, a host name without a domain. For example, `cds111` is a simple host name, while `cds111.cadence.com` is not. If you do not use this argument and you do not provide a domain name with the *hostName* argument of the `aple` and `apre` commands, `clsAdminTool` automatically adds the domain name of the system you are using.

To display the arguments you can use with the `clsAdminTool` command,

➤ At the command-line, type:

```
clsAdminTool -help
```

You can also create aliases for clsAdminTool commands and use the alias to call the command. For example:

```
alias findLocks "clsAdminTool -ale ."
```

or

```
alias cleanLocks "clsAdminTool -are ."
```

To display the version number of clsAdminTool,

➤ At the command-line, type:

```
clsAdminTool -version
```

Troubleshooting

Problem: Application hangs on lock request to a remote system

Check whether the network lock daemons `lockd` and `statd` are running on the remote system. `lockd` and `statd` must always be running on every UNIX system that runs Cadence applications or stores data. Some applications that use read and write locks use the operating system's `fcntl` function, which relies on `lockd` and `statd` daemons. (CLS Edit locks no longer use `fcntl`.) If the daemons are running, but calls to them still hang, verify that you have the latest operating system patches.

For Virtuoso applications, you can also try the following workaround:

➤ Set the following environment variable:

```
DD_DONT_DO_OS_LOCKS
```

Problem: Locking requests to a Linux machine fail with the following error:

```
"No locks available"
```

While CLS Edit locks no longer use `fcntl`, some applications that use read and write locks do use the operating system's `fcntl` function. Locking requests to a Linux machine will fail if the Linux NFS server does not support locking.

To solve this problem, upgrade your NFS software to a version that supports locking. For Virtuoso applications, you can also use the following workaround:

➤ Set the following environment variable:

```
DD_DONT_DO_OS_LOCKS
```

Problem: Lock requests fail for files locked by an application running on remote systems

Check whether the Boolean daemon (`clsbd`) is running on the remote system on which the application is running. The Boolean daemon must always be running on every system that runs Cadence applications. See "Starting the Boolean Daemon" on page 197 for information about how to start it.

Problem: You cannot start the Boolean daemon or you get the following error:

```
"Fatal (clsbd): port number xxx is in use by a program that is not clsbd. Exiting."
```

Check if another application is using the Boolean daemon's port number (16723). If another application is using the port number, you might need to change the Boolean daemon's default port number. See "Changing the CLS Boolean Daemon's Port Number" on page 200 for details.

Problem: Your Cadence application does not run and you get the following error:

```
*Warning* file /usr/xyz/CDS.log Malformed Lock-Stake file.
Failed to lock log file: /usr/xyz/CDS.log
```

This error message indicates that the Lock-Stake file is either empty or corrupted. A Lock-Stake file can be empty if it was created when the disk was full. A Lock-Stake file can be corrupted if it was manually edited or if the application or system exited abnormally.

Resolve the cause of the problem. If it is safe to remove the lock on the file, remove the Lock-Stake file (`*filename*.cdslck`) manually or with `clsAdminTool`. See "Using the CLS Administrative Tool" on page 204 for details.

Problem: If the machine that a cellview lock is registered to is no longer available, DFII will only inform that the cellview is still locked after a lengthy period of time:

This situation can arise after several minutes of DFII trying to access the cellview, via an exchange with `oaFSLockD`, only to inform that the cellview cannot be accessed, and remains locked.

You can however reduce the time that will be allowed for such an exchange, using the `CLS_CLSBD_CONNECT_TIMEOUT` environment variable. For example:

```
setenv CLS_CLSBD_CONNECT_TIMEOUT 5
```

Note: `5` = 5 seconds.

11

Miscellaneous Infrastructure Technologies

This chapter describes miscellaneous infrastructure technologies. It covers the following topics:

The cds_root Utility

`cds_root` is a utility that identifies the location of Cadence installation hierarchies. Startup scripts typically use `cds_root` to find the location of Cadence installation hierarchies before starting applications. `cds_root` requires one argument—an executable name.

Use the following syntax for `cds_root`:

```
cds_root executableName
```

where *`executableName`* is either an executable found in `$PATH` or is a full path to an executable.

`cds_root` uses the *`executableName`* argument to identify the installation hierarchy of the application and to check if it is a legal hierarchy. If you specify the full path to the executable, then `cds_root` checks only that location to see if it is a legal hierarchy.

If the executable is not found in `$PATH` or is not located in the hierarchy, `cds_root` displays the following error message:

- `Error! Can’t determine installation root from PATH`

Temporary Directory Standard

Cadence applications have a new standard for determining the location of temporary files. Note, however, that not all applications use this standard yet.

Unix and Linux Platforms

According to the new standard, applications running on UNIX and Linux platforms use the following order of precedence to determine the temporary directory:

- `$CDS_TMP_DIR`, if the variable is set and the directory has write permissions
- `$TMPDIR`, if the variable is set and the directory has write permissions
- `$TEMPDIR`, if the variable is set and the directory has write permissions
- `/tmp`

Microsoft Windows

According to the new standard, applications running on Microsoft Windows use the following order of precedence to determine the temporary directory:

- `$CDS_TMP_DIR`, if the variable is set and the directory has write permissions
- `$TMP`, if the variable is set and the directory has write permissions
- `$TEMP`, if the variable is set and the directory has write permissions
- `.` (current directory)

Compatibility with Old Behavior

If you want your application to continue to use the old way of determining the temporary directory, do the following:

➤ Set the following environment variable:

```
CDS_OLD_TMP_LOC
```

Your application will then use the old behavior. For some applications, the old behavior was the same as the new standard, while, for others, the old behavior was the following:

- For UNIX platforms, `$TEMP` was used as the temporary directory if it was set, otherwise `/tmp` was used.
- For NT platforms, the order of precedence was as follows:
  `$TMP`
  `$TEMP`
  the Windows directory

Log File Environment Variables

You can set environment variables to control log files that are created by Cadence applications. You can specify the location, the type of version, and the maximum number of log files.

Note: Not all Cadence applications use these variables; refer to the documentation of the application you are using for more information.

Specifying the Location of Log Files

To specify a location for log files,

➤ Set the following environment variable:

```
setenv CDS_LOG_PATH directoryList
```

where *`directoryList`* is a colon-separated list of directories.

Panic log files are created in the first directory in *`directoryList`* that has write permissions.

You can also specify the panic.log file path(s) using the `CDS_LOG_PATH` environment variable. For example, `setenv CDS_LOG_PATH my_directory_path_1:my_directory_path_2......"`

Note: The first writable directory in the list will be used.

The panic.log file name stored at the specified location will have a unique name. For example, `panic.log.sjfsb015.3081`. The panic.log file name has the extension of `hostName` and `processID` to make the name unique.

The output message on your shell window will also display the unique name i.e. `panic.log.sjfsb015.3081`.

The `panic.log.sjfsb015.3081` file will be in the user's home directory if the CDS_LOG_PATH environment variable is not specified.

Specifying the Type of Version

To specify the the type of version you want to use for log files,

➤ Set the following environment variable:

```
setenv CDS_LOG_VERSION pid | sequential
```

If you set `CDS_LOG_VERSION` to `pid`, the application creates (and locks) *`logFile.processId`*, where *`processId`* is the process ID of the application.

If you set `CDS_LOG_VERSION` to `sequential`, the application looks for the highest version of *`logFile.version`* in the directory and increments the version by 1. For example, if the directory has the log file `CDS.log.3`, the application creates (and locks) `CDS.log.4`. If, for some reason, the application cannot create the next version, it tries up to *`version`* +10.

If `CDS_LOG_VERSION` is not set or is set to an illegal value, the application tries to use (and lock) *`logFile`*. If that fails, the default behavior is `sequential`, that is, the application tries to create *`logFile`*`.1` through *`logFile`*`.10`.

(The name of the log file is determined by the application.)

Specifying the Maximum Number of Log Files

Note: The Virtuoso design environment does not use this variable.

To specify the maximum number of log files that can be created in a directory,

➤ Set the following environment variable:

```
setenv CDS_LOG_LIMIT maxNumber
```

where `maxNumber` is the maximum number of log files that can be present in the directory.

If `maxNumber` is reached, when the next log file is created, the oldest log file in the directory will be deleted. For example, if `CDS_LOG_LIMIT` is 4, and the directory has the following log files:

```
CDS.log.1
CDS.log.2
CDS.log.3
CDS.log.4
```

the next log file will `CDS.log.5` and the oldest log file, `CDS.log.1`, will be deleted. The directory will have the following files:

```
CDS.log.2
CDS.log.3
CDS.log.4
CDS.log.5
```

However, if the oldest log file is locked, it will not be deleted. Instead, the next unlocked file will be deleted. In the above example, if `CDS.log.1` is locked, then `CDS.log.2` will be deleted instead (if it is unlocked) and the directory will have the following files:

```
CDS.log.1
CDS.log.3
CDS.log.4
CDS.log.5
```

If all the existing log files are locked and `maxNumber` is reached, no new log files will be created and an error will be displayed.

If `CDS_LOG_LIMIT` is set to a lower number than the number of log files already present in the directory, the oldest log files will be deleted to bring the number of files down to the limit. For example, if a directory has `CDS.log.1...CDS.log.15` and you set `CDS_LOG_LIMIT` to 10, when `CDS.log.16` is created, `CDS.log.1...CDS.log.6` will be deleted.

Note: `CDS_LOG_LIMIT` only applies when `CDS_LOG_VERSION` is set to `sequential`. It is ignored when `CDS_LOG_VERSION` is `pid`.

cdsNameServer

The `cdsNameServer` program is used to establish communications between Cadence programs. It relies upon the TCP port number, 7325. In addition, whenever needed, the `cdsNameServer` program starts automatically and exits itself after being idle.

Support for IBM® Rational® ClearCase® Dynamic Views through the MultiVersion File System

For most databases, Virtuoso reads into memory only the data that is used by an application. This partial-read functionality is intended to minimize the virtual memory requirements of an application. For partially read databases opened in read mode, Virtuoso creates an additional hard link to the database file when the file is accessed across an NFS mount; this is done to ensure that the process has a handle to the original file in case the file is modified on the remote host.

There are known issues with ClearCase dynamic views and programs like Virtuoso that hold files open for an extended period of time —that is, multiple days— without accessing the file. In particular, the ClearCase VOB (Versioned Object Base) scrubber removes files from the VOB's cleartext cache that have not been accessed for a certain number of days (configurable by the ClearCase administrator) to reduce disk space usage on the VOB servers.

Note: Some Linux NFS client implementations do not update the last-access-time every time a file is accessed, increasing the odds of encountering a problem on Linux.

If Virtuoso holds a database open for a prolonged period of time without accessing it, it may become inaccessible due to the ClearCase VOB scrubber's configured behavior and this prevents reading any more data from the file. To address this issue, Virtuoso introduces and recognizes a new UNIX environment variable, `OA_USING_MVFS`.

ClearCase users who keep databases open for long periods of time and experience "stale NFS file handle" or 'file not found" errors can set the `OA_USING_MVFS` environment variable. Virtuoso will perform additional checking and if a database is in a library that is on an MVFS mount point, the database will be fully read into memory, therefore, avoiding the use of a hard-link and keeping the database open for an extended period of time.

12 Occurrence Property Dictionary

This chapter describes the following:

Overview

An occurrence property dictionary is a central repository for simulation-control property definitions. Applications such as UltraSim register properties in the property dictionary via application-specific property dictionary files. Other applications, such as the Cadence Hierarchy Editor, which do not necessarily know the semantics of the properties, can then be used to set the properties.

The use of a property dictionary enables the Hierarchy Editor to provide the right error checks when users set properties. It also prevents multiple applications from using the same property name for different purposes or with different property characteristics, such as a different default value.

The property dictionary only contains property definitions, which include information such as the default value of a property, the applications it applies to, and any restrictions on its use. The property dictionary does not store the values of these properties; property values are stored in the property file `prop.cfg`.

You can also customize the property dictionary by providing property definitions in a user property dictionary file (`propdict.def` file). You typically do this only for properties that you use frequently with an application but that have not been added to the dictionary by the application. The `propdict.def` file is typically placed in a site-level directory; however, you can also have user property dictionary files at the personal or group levels. The Cadence Setup Search File mechanism (CSF) is used to find the file.

Important

The occurrence property dictionary is only for simulation-control properties.

About the Property Dictionary File

The property dictionary comprises two types of files:

■ Application property dictionary files

  Each application that uses the property dictionary provides an application-specific property dictionary file named `appName.def`.

  Do not modify `appName.def` files. If you want to customize property definitions, create a user property dictionary file instead.

■ User property dictionary files

  User property dictionary files are named `propdict.def` and can be located in any directory that is found by the CSF search mechanism. You can have more than one `propdict.def` file. See Customizing the Property Dictionary for more information.

  User property dictionary files are read after the application files are read.

Both application and user property dictionary files have the same format.

Property Dictionary File Format

The property dictionary file has the following format:

```
/* Comment */

// Comment

occPropDef propName
{
    attribute;
    attribute;
    ...
}

occPropDef propName addAffectedApp "appName";

include path;
```

Statements

- Comments
- Property definitions (occPropDef statements)
- addAffectedApp statements
- include statements

Comments

Comments have the following syntax:

- Multiple-line comment:

  `/* comment */`

- One-line comment that continues till the end of the line:

  `// comment`

Property definitions (occPropDef statements)

Property definitions specify the default value of a property, the value type and value range that is allowed, a description, a tool tip, the applications the property applies to, and any restrictions on its use.

Property definitions have the following syntax:

```
occPropDef propName
{
    attribute;
    attribute;
    ...
}
```

where *propName* is the name of the property and *attribute* is one of the following:

`valueType = int | double | enum | string;`

Specifies the type of the property value. The following types are supported: integer, double, enumerated, and string.

Example:

```
valueType = int;
```

`valueDefault = default;`

Specifies the default value of the property. The type of the default value must correspond to the type specified by the `valueType` attribute.

Example:

```
valueDefault = 6;
```

`valueRange = `*`range`*`;`

Specifies the range of legal values. The syntax of *`range`* varies depending on the type of the value.

If `valueType = int`, then the syntax is:

```
valueRange = "integer <|<= value <|<= integer";
```

If `valueType = double`, then the syntax is:

```
valueRange = "double <|<= value <|<= double";
```

If `valueType = enum`, then the syntax is:

```
valueRange = "word word ...";
```

Examples:

```
valueRange = -6 <= value < 14;
valueRange = 1.54 < value <= 4.8;
valueRange = "standard accelerated fast";
```

`affectedApp: "`*`appName`*`";`

Specifies the application the property applies to. A property definition can have more than one `affectedApp` expression.

Example:

```
affectedApp: "AMSUltra";
```

`useRestrictions = `*`restriction`*`;`

Specifies any restrictions on the use of the property.

Syntax for one restriction:

```
useRestrictions = restriction;
```

Syntax for more than one restriction:

```
useRestrictions = “restriction restriction ...”;
```

where *`restriction`* is one of the following:

`cantBeOnOcc`	(cannot be placed on an occurrence)
`cantBeOnInst`	(cannot be placed on an instance)
`cantBeOnCell`	(cannot be placed on a cell)
`cantBeGlobal`	(cannot be a global property)
`cantInherit`	(cannot be inherited)

Example:

```
useRestrictions = “cantBeGlobal cantInherit”;
```

`description = “`*`description`*`”;`

Specifies a description of the property.

`description` is either a set of non-special characters that do not contain whitespace or a string of printable characters that is enclosed in double quotes. If *`description`* is in quotes and you want to include a double quote or a backslash in the string, escape it with a preceding backslash: `\”` or `\\`. To specify a newline, end the line with a backslash.

Example:

```
description = “Defines the simulation speed and accuracy\
within the chosen simulation mode.”;
```

`toolTip = “`*`tip`*`”;`

Specifies a tool tip for the property, that is, the descriptive text that will be displayed when the cursor is placed over the property.

`tip` is either a set of non-special characters that do not contain whitespace or a string of printable characters that is enclosed in double quotes. If *`tip`* is in quotes and you want to include a double quote or a backslash in the string, escape it with a preceding backslash: `\”` or `\\`.

If `valueType` is `enum`, `toolTip` has the following syntax:

```
toolTip = “General description; description for enum 1;
description for enum 2; ...”;
```

The following general rules apply to attributes:

- Each attribute expression ends with a semi-colon.
- Attributes that use a colon instead of an equals sign can be used multiple times in an `occPropDef` statement. Attributes that use an equals sign can only be used once.
- Whitespace is optional between *`attributeName`* and `=` and between `=` and *`attributeValue`*. Similarly, whitespace is optional between *`attributeName`* and `:` and `:` and *`attributeValue`*.
- A legal *`attributeValue`*, unless otherwise specified above, is either a set of non-special, non-whitespace characters or a string of printable characters that is enclosed in double quotes.
- If *`attributeValue`* is in quotes and you want to include a double quote or a backslash in the string, escape it with a preceding backslash: `\"` or `\\`. To specify a newline, end the line with a backslash.

addAffectedApp statements

The `addAffectedApp` statement adds an application to an existing property definition. It does not have to be in the same file as the property definition.

The `addAffectedApp` statement has the following syntax:

```
occPropDef propName addAffectedApp "affectedApp";
```

For example, the statement

```
occPropDef mos_method addAffectedApp "Hspice";
```

adds the application Hspice to the previously-defined property `mos_method`.

include statements

A property dictionary file can include other property dictionary files with the `include` statement.

The `include` statement has the following syntax:

```
include path;
```

where *`path`* is the path to the property dictionary file to be included. If the path is relative, it is interpreted as being relative to the file that contains the `include` statement. *`path`* can include environment variables such as `$HOME` and installation root expressions such as

`$(inst_root_with: path)`. (For a complete list of installation root expressions, see Installation Root Expressions in Chapter 5.)

Included files do not have to be named `propdict.def` or `appName.def`.

Customizing the Property Dictionary

If you want to add properties to the property dictionary, you can do so by customizing the dictionary.

In general, you do not need to customize the dictionary. However, if there are properties that you use frequently with an application, and you want the ability to set them through the Hierarchy Editor, you can add them to the dictionary. Any properties you add will be displayed in, and can be set through, the Hierarchy Editor. Also, since the Hierarchy Editor uses the property definitions to do appropriate error checks such as checking whether a specified value is of the right type or is within the legal range, adding frequently-used properties to the dictionary provides a way of minimizing errors when the properties are set.

To customize the property dictionary, you create a user property dictionary file called `propdict.def`.

A `propdict.def` file can include other `propdict.def` files. Therefore, you can have multiple `propdict.def` files. For example, if you have customized the property dictionary at different levels such as the personal, group and site levels, your personal `propdict.def` file can include the group and site `propdict.def` files.

The Cadence Setup Search mechanism (CSF) is used to find the `propdict.def` file to use. (See Chapter 3, "Cadence Setup Search File: setup.loc," for more information about CSF.)

To create a `propdict.def` file, do the following:

1. Create an ASCII file called `propdict.def` in any directory that is listed in your `setup.loc` file, for example, `$HOME`.
2. In the `propdict.def` file, specify the changes you want to make to the property dictionary. You can do the following:
   - ❑ Add property definitions

     Specify property definitions with the `occPropDef` statement.
   - ❑ Include other user property dictionary files

     Include files with the `include` statement. Included files do not have to be named `propdict.def`.

Use the file format described in Property Dictionary File Format.

Note: You should only add simulation-control properties that are understood by a Cadence application.

Sample Property Dictionary File

```
//----------------------
// Property definitions
//----------------------


occPropDef speed
{
    valueType = enum;
    valueRange = "1 2 3 4 5 6 7 8";
    valueDefault = "5";
    description = "Sets the speed/accuracy tradeoff for simulation.";
    tooltip = "Sets the speed/accuracy tradeoff for simulation.";
    affectedApp: "UltraSim";
}


occPropDef sim_mode
{
    valueType = enum;
    valueRange = "s a amr ms da df";
    valueDefault = "ms";
    toolTip = "Sets the simulation mode; SPICE mode; Analog mode; Analog \
                Multi-rate mode; Mixed signal mode; Digital accurate mode; \
                Digital fast mode";
    affectedApp: "UltraSim";
}
```

13

cdsDaemonStarter Configuration

This chapter describes the following:

cdsDaemonStarter Configuration

cdsDaemonStarter configuration enables you to launch a program without inheriting the control group of its parent. The following programs are started in Virtuoso using an optional cdsDaemonStarter script:

- `clsbd`
- `oaFSLockD`
- `cdsXvnc`
- `cdsNameServer`

Control Groups

When the Linux control group functionality is enabled, a job is considered to be running until all the processes in the control group exit. This causes a problem because some processes are intended to daemonize themselves and continue to run after the parent job has finished.

To solve this problem, a support for an optional wrapper script has been introduced, which is automatically invoked by the Cadence software to start daemonizing processes. The arguments to the wrapper script indicates which daemon program (and its arguments) should start.

This is illustrated by the following pass-through example:

```
#!/bin/ksh
exec "$@"
```

Note: The korn shell uses "`$@`" to denote the arguments provided to the wrapper script.

You can use the following wrapper script to launch the program in a specific control group:

```
#!/bin/ksh
cgexec -g someControlGroupInfo --sticky "$@"
```

If Load Sharing Facility (LSF, version 9) control group functionality is enabled, you can use the following wrapper script to launch the program:

```
#!/bin/ksh
# If it looks like an LSF environment, look for job-specific control group
if [ -n "${LSF_CGROUP_TOPDIR_KEY}" -a -n "${LSB_JOBID}" -a \
    -n "${LSF_BINDIR}" -a -r /proc/self/cgroup ]; then
    if grep ":/lsf/${LSF_CGROUP_TOPDIR_KEY}/job\.${LSB_JOBID}\." \
            /proc/self/cgroup >/dev/null; then
        exec ${LSF_BINDIR}/lsgrun -m $(uname -n) "$@" < /dev/null
        # only reached if above exec failed
    fi
fi
exec "$@"
```

As illustrated above, the `lsgrun` command starts the daemon in a different control group than the parent.

Note: You can also copy the LSF daemon starter sample script from the following location:

```
<cdsInstallDir>/cdssetup/daemon/starter.lsf.sample
```

Note: You can copy the OpenLava (OLV) daemon starter sample script from the following location:

```
<cdsInstallDir>/cdssetup/daemon/starter.olv.sample
```

Note: The `$HOME` variable must be set to ensure that these daemon processes are started.

Wrapper Installation

Normally, the wrapper is installed as `${CDS_SITE}/cdssetup/daemon/starter`, where the default value for `${CDS_SITE}` is `<cdsInstallDir>/share/local/`. You can also install the wrapper as `cdssetup/daemon/starter` into a directory that is searched by the Cadence Setup File (`csf`) package.

Important

It is recommended that you test the wrapper before wide-spread deployment by installing it into a local location, such as `~/cdssetup/daemon/starter`. You must also ensure that you have appropriate execute permissions. For more information, refer to Search Mechanism.

After installing the wrapper, you can use the following command to confirm that it is found by `csf`:

```
% cdswhich cdssetup/daemon/starter
```

Caution

As some programs change their working directory on startup, you should avoid installing the wrapper in the current working directory.

A
Common Design Files

Using the Cadence library structure, you can create files using a variety of different applications. The following table lists some of the more common filenames used by Cadence applications.

Filenames	Application	Information Stored in File
data.dm	OpenAccess	Properties (OpenAccess libraries only)
layout.oa	Custom Layout editors	IC layout
netlist.ahd	AHDL (Analog HDL)	ASCII source
netlist.oa	OpenAccess	Netlist
netlist.src	Verilog	ASCII source in HDL Composer
pc.db	Various applications	Parent-child database information
sch.oa	Virtuoso schematic editor	Schematic
symbol.oa	Virtuoso schematic editor	Symbol
symbol.cnc	Concept	Symbol
text.ahd	AHDL (Analog HDL)	ASCII source
verilog.src	Verilog	ASCII source in HDL Composer
verilog.v	Verilog	ASCII source
vhdl.vhd	VHDL	ASCII source
vhdl.ast.arch.rev	VHDL	Intermediate file produced by Leapfrog
vhdl.cod.arch.rev	VHDL	Intermediate file produced by Leapfrog

Filenames	Application	Information Stored in File
*.cdl	Various applications (for example, netlist, schematic, symbol).	Various applications (for example, netlist, schematic, symbol).
thumbnail_*.png	Various applications (for example, netlist, schematic, symbol).	Visual snapshot of the enclosing views.

Glossary

A

also-managed files

In several cases it is appropriate to create additional data that is stored in files located under the library, cell, or view directories. These files of additional data are not members of a co-managed set, but need to be considered for some design management operations.

argument

A value or reference passed to a function, procedure, subroutine, command, or program, by the caller. The command name and its arguments are usually separated by spaces or tabs. Arguments are used to direct the operation of a command.

ASCII

(American Standard Code for Information Interchange) The de facto worldwide standard for the code numbers used by computers to represent all the upper and lowercase Latin letters, numbers, punctuation, and so forth. There are 128 standard ASCII codes, each of which can be represented by a 7-digit binary number: 0000000 through 1111111.

autocheckin, autocheckout

The process of automatically checking in and checking out a set of related files when you check in or check out a library, cell, or view. *See also* checkin, checkout.

C

CDBA

(C-level database access) Database format used by many Virtuoso tools.

cdsinfo command

A command used as a test, debug, and administration tool for starting the search mechanism.

cdsinfo.tag file

An ASCII file that contains the identifier for each Cadence tool, library, design management system, lock host, lock path, and file system.

cdsLibEditor

The process name for the Library Path Editor, which is a graphic user interface editor for editing the `cds.lib` file.

cds.lib file

The file that contains the list of libraries and their physical locations.

cdswhich command

This command is intended as a test, debug, and administration tool for use in managing the search mechanism.

cells

A collection of views that describes an individual building block of a chip or system. Each cell within a library is a separate file system directory with a unique name.

checkin, checkout

The process of copying a file from a project directory to the workarea so it can be worked on exclusively by a single user (checkout), and then copying the completed changes back to the project directory (checkin). *See also* autocheckin, autocheckout. As files are being checked in and checked out, the repository keeps track of which files are managed, where they are stored, and which views are accessible by the user.

co-managed set

The master file, co-master files, and derived files make up what is known as a co-managed set for the view. The members of a co-managed set are defined by creating data registry entries.

co-master files

These files contain information that is not the primary data for the view, but which cannot be derived from the primary data, such as the view property files created by Virtuoso tools and stored in the `prop.xx` file.

D

data file

See data registry.

DataFormat

The type or representation for a view. For example, a view inside a library can be a schematic, or VHDL text, or any other type of view. The `master.tag` file inside the view directory contains the name of the master tool file in that view.

data.reg files

Each directory contains several files with a tool name and a `.reg` extension, such as `composer.reg`, where that tool's relationships are defined. These directories build the base set of tool and data definitions.

data registry

A file that contains information mapping design data to tools, views, and other files. There are two files, tools and data, located in `*install_dir*/share/cdssetup/registry`.

data registry file mechanism

This mechanism supports defining various data types (especially views), associating default editors with data, as well as being a general registry facility.

data repository

See repository.

derived files

Files you create from other files without entering any input. Derived files contain data derived from the source data, such as the `ast` file for verilog or the `pc.db` file.

design libraries or working libraries

Libraries that store data of a single design and derived data about that design. Design libraries have read and write access so you can edit and save designs.

design management (DM)

The process of managing simultaneous work on the same design by several designers. DM includes checkin, checkout, and other similar features.

E

entry types

The `cdsinfo.tag` file contains the identifier for each Cadence tool, library, design management system, lock host, lock path, and file system. The identifiers are listed as entry types in the `cdsinfo.tag` file. For example, the library identifier has the entry type `CDSLIBRARY`.

environment variables

Values in the UNIX operating system that you set in UNIX files, such as the `.cshrc` file to control how the shell works.

escaped names

Names that are proceeded by a backslash to let the character following the backslash be considered an alphanumeric character. For example, if an object was named `!Lib`, the exclamation point might not be recognized in some programs. To include it as part of the object name, use the backslash to “escape” that character, for example, `"\!Lib"`.

F

file mechanisms. See

system information file mechanism

library definition file mechanism

data registry file mechanism

G

Generic Design Management (GDM) system

A common interface between Cadence tools and any design management system.

H

host

Any computer on a network that is a repository for services available to other computers on the network. It is common to have one host machine provide several services.

K

keyword

A characteristic word, phrase, or code that is stored in a key field and used to conduct sorting or searching operations. Also, any of the dozens of words (also known as reserved words) that compose a given programming language or set of operating-system routines.

L

library

A logical collection of design data implemented as a physical collection of directories and files that can reside anywhere in the file system. A library is a directory that can be shared by all users or controlled by a single person.

library definition file mechanism

A mechanism that defines the locations of Cadence libraries and various models related to organizing library definition files. This mechanism lets teams of users consistently share such definitions.

Library Path Editor

A tool for editing the library definition file `cds.lib`.

M

master file

A file that contains the primary data, such as `cdba` schematic database or the verilog source for a view.

master.tag file

An ASCII file that defines which view file inside each cell directory is the master. It records which physical file is the master logical view file for any given view.

N

name mapping

To make data interoperable among Cadence tools, Cadence developed a common naming convention called name mapping. When tools use data from other applications with noncompatible naming conventions, the name mapping mechanism converts the names to a recognizable language that the tool understands.

name space

A set of rules, for example a VHDL name space, for creating legal names that a particular tool or language uses for determining the types of identifiers and keywords that are legal for that tool.

nmp command

A command that assists you in determining the difference in a name as it is mapped to different name spaces.

P

properties

A characteristic of a design object or cellview that affects the object and can be edited or deleted. Properties can be mandatory or optional.

R

repository

A collection of information about the Cadence system. The Cadence system needs to know which files are managed, where they are stored, and which views are accessible by the user. A repository is associated with each design management system installation.

reference libraries

These directories store data used by many designs. Reference libraries have read-only access to avoid accidental modification of the master building blocks.

reserved word

See keyword.

S

search mechanism

A mechanism that supports a configuration to locate files that support other mechanisms described in this document and general tool configuration information.

setup.loc file

A file that contains a list of places to search when searching for Cadence application configuration information.

site

A location (directory) on a network file system that contains common information shared by all the users on that network.

syntax

The structure of strings in a language or the rules governing the structure of a language.

system information file mechanism

This mechanism supports configuration of several key capabilities, including the type of design management system used to manage a library and whether a more strict library checking mechanism should be used to identify Cadence libraries.

T

Team Design Manager

(TDM) The directory structure, software, and use model for managing and releasing designs in a multiuser environment for Virtuoso tools.

U

UNIX

A computer operating system. The basic software running on a computer, underneath software packages such as word processors and spreadsheets. UNIX is designed to be used by many people at the same time.

V

variables

A word used to return a value when it is evaluated. For example, $HOME returns the name of your home directory.

Verilog-A

Verilog analog simulator.

version

A design management system specific identifier of an instance of a file, which GDM handles in an opaque manner, expecting the users and underlying design management systems to understand the meaning of the identifier.

vi editor

The standard UNIX screen editor.

views

A collection of files that are related in that they all contain information about one type of representation, such as schematic, symbolic, or layout data. Each view within a cell is a separate file system directory in which Cadence locates all of the files pertaining to a particular view of a given cell.

W

workarea

A configuration of project data directories or symbolic links where designers modify design data. In other words, a workarea is a directory hierarchy in the file system, beneath which are stored a related set of designs and other data including Cadence design libraries.

workarea directory

A directory that contains private work areas for all project members.

working libraries or design libraries

These directories store data of a single design and derived data about that design. Working libraries have read/write access so you can edit and save designs.

wrap

Code that a customer provides to integrate the chosen design management system into GDM. It consists of a shared library that is dynamically loaded and a set of design-management-specific commands that GDM processes.