cadence®

Virtuoso Technology Database Checker User Guide

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Contents

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Using the Technology Database Checker

This manual provides information on the Cadence Virtuoso® Technology Database Checker (TechDB Checker). TechDB Checker lets you inspect an OpenAccess (OA) technology database and provides comprehensive reports. It queries an OA technology database for the required and optional data needed to function with Cadence tools and provides detailed reports.

This guide is intended for the following audience:

- Technology file developers who can use TechDB Checker to verify that their technology database accurately represents the semiconductor process they are using to implement intellectual property and verify tool enablement. They can obtain detailed information about the content of the technology database, including missing or duplicated information.

Circuit and layout designers who can use TechDB Checker to verify that their designs created using intellectual property from other foundries or providers support Virtuoso physical design tools. Using TechDB Checker, they can check if their technology file, which they may receive from other sources, supports their intended use of the Cadence tools.

This chapter provides information on running Cadence Virtuoso® Technology Database Checker (TechDB Checker). It includes the following topics.

For information on how to review the results of a run, see Chapter 2, “Analyzing Results.”

Overview

This section provides information on the following topics:

- OpenAccess Technology Database
- TechDB Checker Features
- TechDB Checker Flow

OpenAccess Technology Database

An OpenAccess (OA) technology database is an integral part of a process design kit (PDK). It defines process data like layer definitions and attributes, design constraints, and via definitions, and device definitions that are used throughout the design flow.

Important

In this guide, the term technology database refers to an OpenAccess technology database. The term constraint refers to physical constraints in the technology database to represent the process design rules.

Typically, Virtuoso design technology data is initially defined in an ASCII technology file. This technology file is compiled into a binary OA technology database.

You can create and edit the ASCII technology file and compile it into a technology database. You can use Virtuoso Technology File Manager to compile a technology file into a technology database. For details, see *Virtuoso Technology Data User Guide*.

TechDB Checker Features

TechDB Checker queries an OA technology database for the required and optional data needed to function with Cadence tools.

TechDB Checker:

- Inspects the technology database for compliance with:
  - Tools in the Virtuoso Layout Suite (VLS) XL and higher product tiers
  - Physical Verification System (PVS)
  - Design Exchange Format (DEF) files
  - Library Exchange Format (LEF) files

- Highlights missing required and optional sections in the technology database
- Highlights missing, duplicate, and mutually exclusive constraints
- Supports incremental technology database (ITDB) structure
- Provides summarized, detailed, and structured reports
- Provides options to view technology file content and tool requirements
- Provides options to choose the tools and layers for which inspection of technology data must be conducted

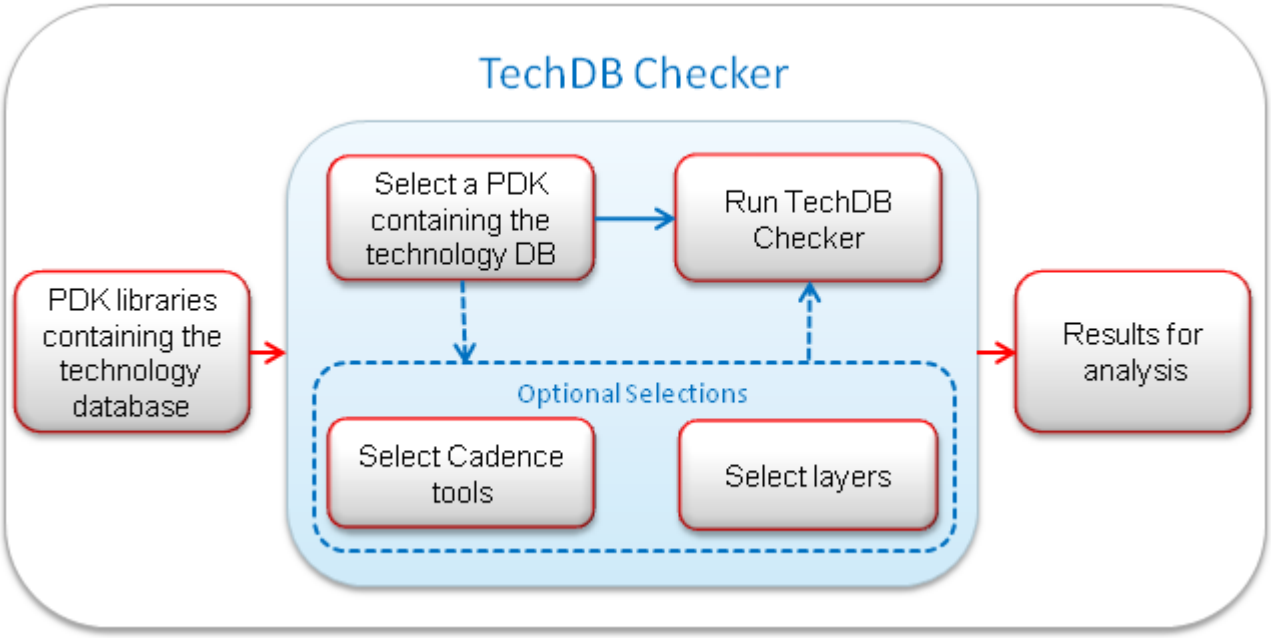
Important Notes

- TechDB Checker does not verify if a technology database accurately represents a specific process technology. It queries the technology database for the required and optional data needed to function with Cadence tools.
- This guide uses Virtuoso technology file terms instead of OpenAccess terms when referring to specific technology content. For example, this guide uses the term `functions` instead of `oaMaterialTypes`.
- TechDB Checker can identify the following types of constraints.

Constraint Type	Description
Required constraints	Constraints that a Cadence tool requires for its functioning.
Optional constraints	Constraints that a Cadence tool does not require for proper functioning, but can use.
Duplicate constraints	Same constraint defined multiple times for the same layer.
Exclusive constraints	Potentially conflicting constraints, when two or more constraints are defined for the same layer or pair of layers.
Mutually exclusive constraints	Constraints that have different names, with potentially identical operation with same layers.
Advanced constraints	Constraints applicable to all process nodes smaller than 45nm.
Mature constraints	Constraints applicable to all process nodes.

TechDB Checker Flow

The following figure illustrates the flow in which you use TechDB Checker.



To check a technology database:

1. Start TechDB Checker and select the PDK library that contains the technology database.
2. If required, limit the scope of tools being checked.

   By default, all tools are selected.
3. If required, limit the scope of layers in the technology database being checked.

   By default, all layers are selected.
4. Run TechDB Checker.

   For details on step 1 to step 4, see “Running TechDB Checker” on page 9.
5. View results of the technology database investigation.

   For details, see Chapter 2, “Analyzing Results.”.

You can view the technology database content and tool requirements that TechDB Checker uses as a basis for its analysis. TechDB Checker also logs the details of a technology database analysis in a file, which you can view.

Prerequisites for Using TechDB Checker

The Cadence library definition file `cds.lib` must have a reference to the PDK library that contains the technology database you want to check.

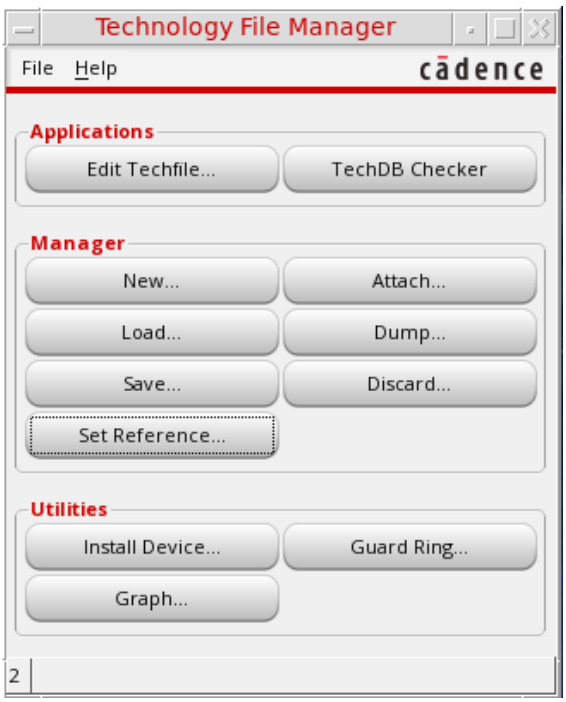
Running TechDB Checker

This section illustrates how you run TechDB Checker to check the OA technology database in the sample Cadence 45nm generic PDK (`gpdk045`) library.

To start inspect a technology database:

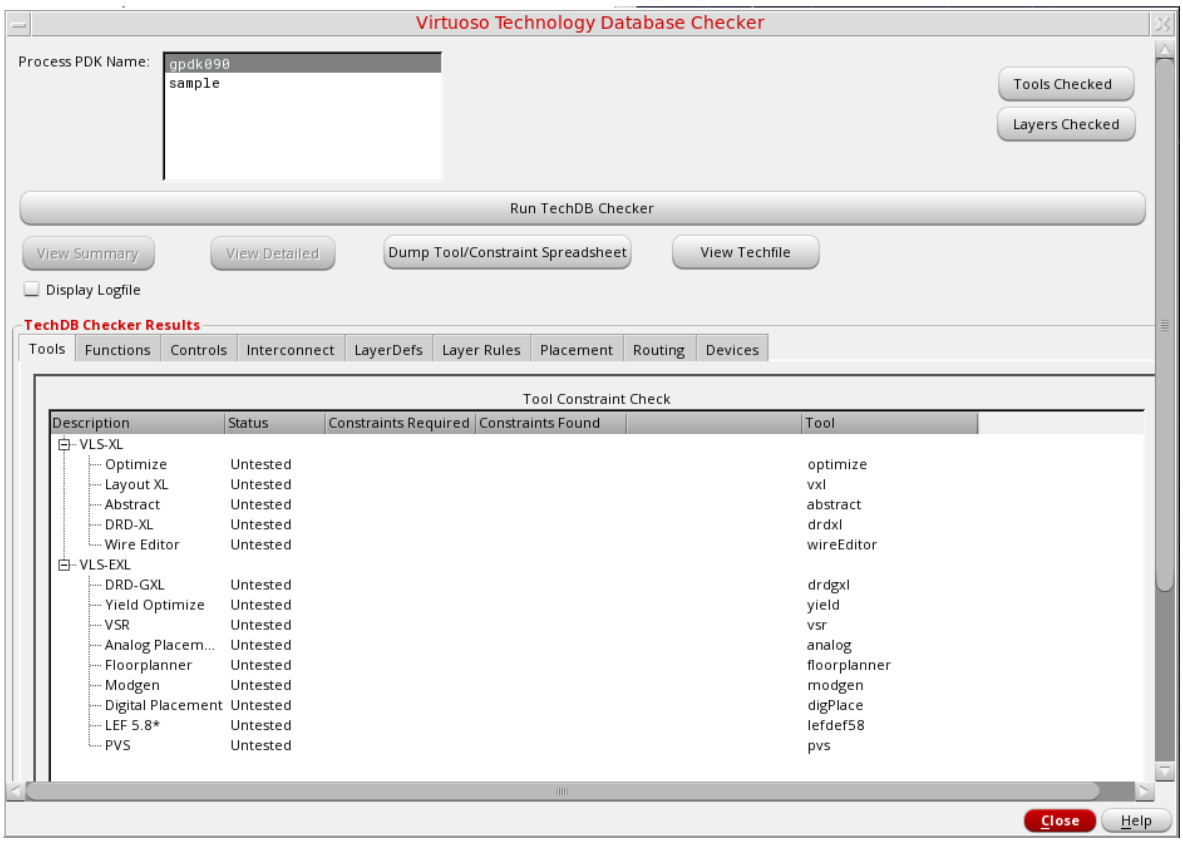
1. Choose *Tools — Technology File Manager* from the Virtuoso CIW menu bar.

   The Technology File Manager form appears.



2. Click *TechDB Checker*.

   The Virtuoso Technology Database Checker form appears.



3. Select the PDK library containing the technology database from the *Process PDK Name* list.

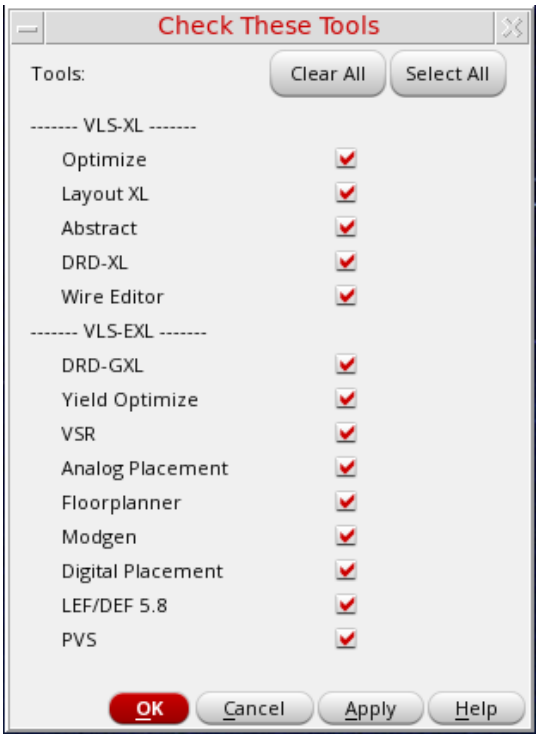
   Note: You can view the technology database content and the technology database requirements for a specific tool.

4. If required, select the tools for which TechDB Checker must inspect the technology database. All tools are selected by default.

   To select tools, click *Tools Checked* to open the Check These Tools form, select the tools, and click *OK* to confirm your selection.

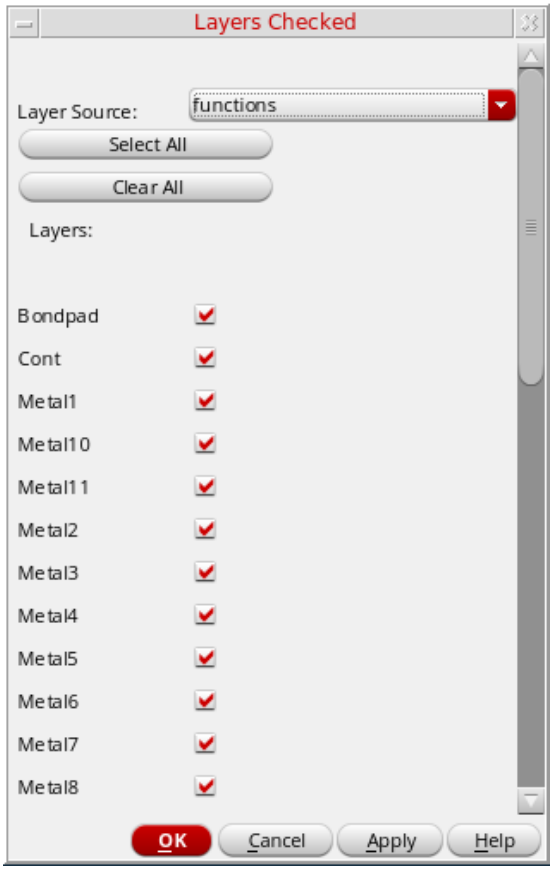
   Note: The tools available for selection depend on the tools available in the Virtuoso

version.



5. If required, select the layers in the technology database. By default, all layers are selected.

To select layers, click *Layers Checked* to open the Layers Checked form. Select the section from the *Layer Source* drop-down list, and select the layers. Repeat to select more layers from other sections. Then click *OK*.



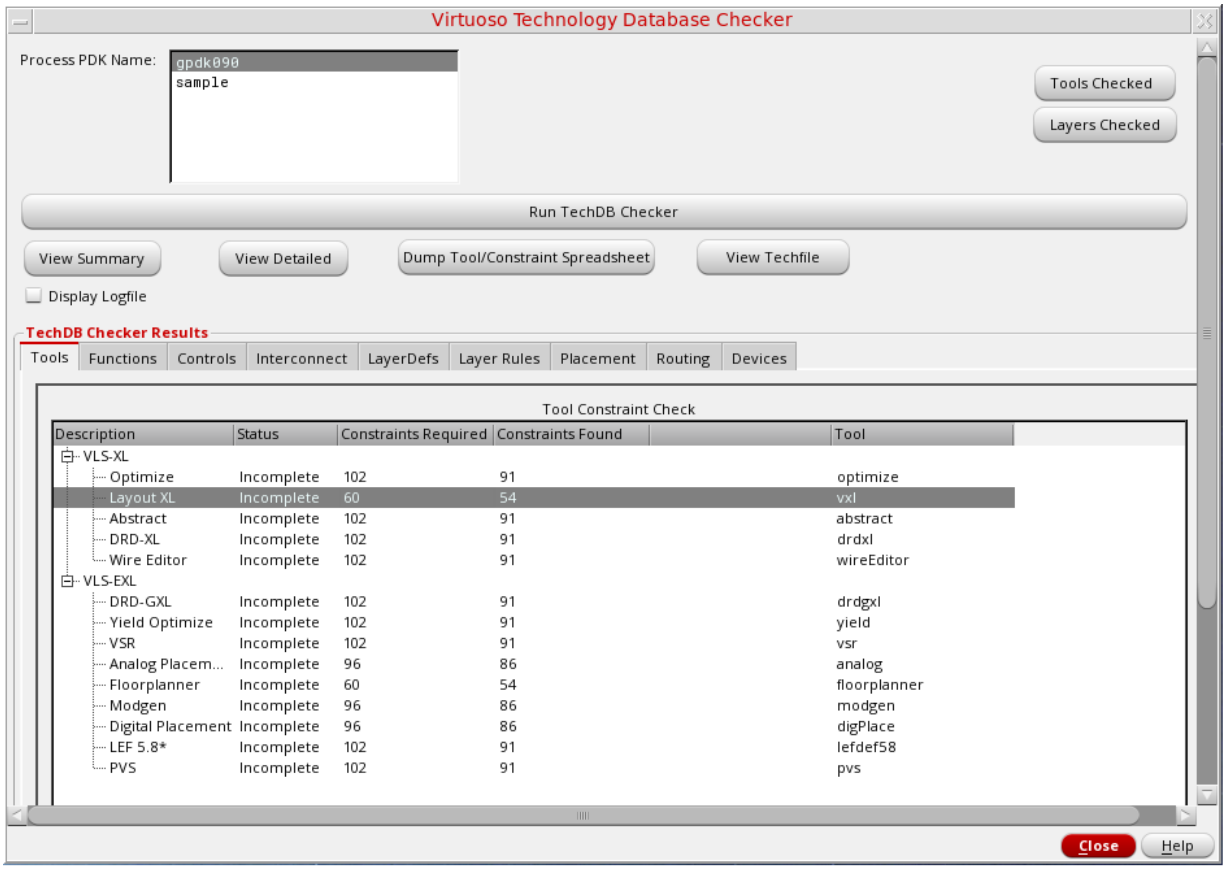
6. Select the *Display Logfile* checkbox if you want to automatically display the log file immediately after TechDB Checker completes investigating the technology database.

   The log file contains information that TechDB Checker stores for reference.

7. Click *Run TechDB Checker*.

   TechDB Checker starts investigating the technology database.

After completing the investigation, TechDB Checker displays the results in various tab sections. It also enables the *View Summary* and *View Detailed* buttons.



Viewing the Technology File

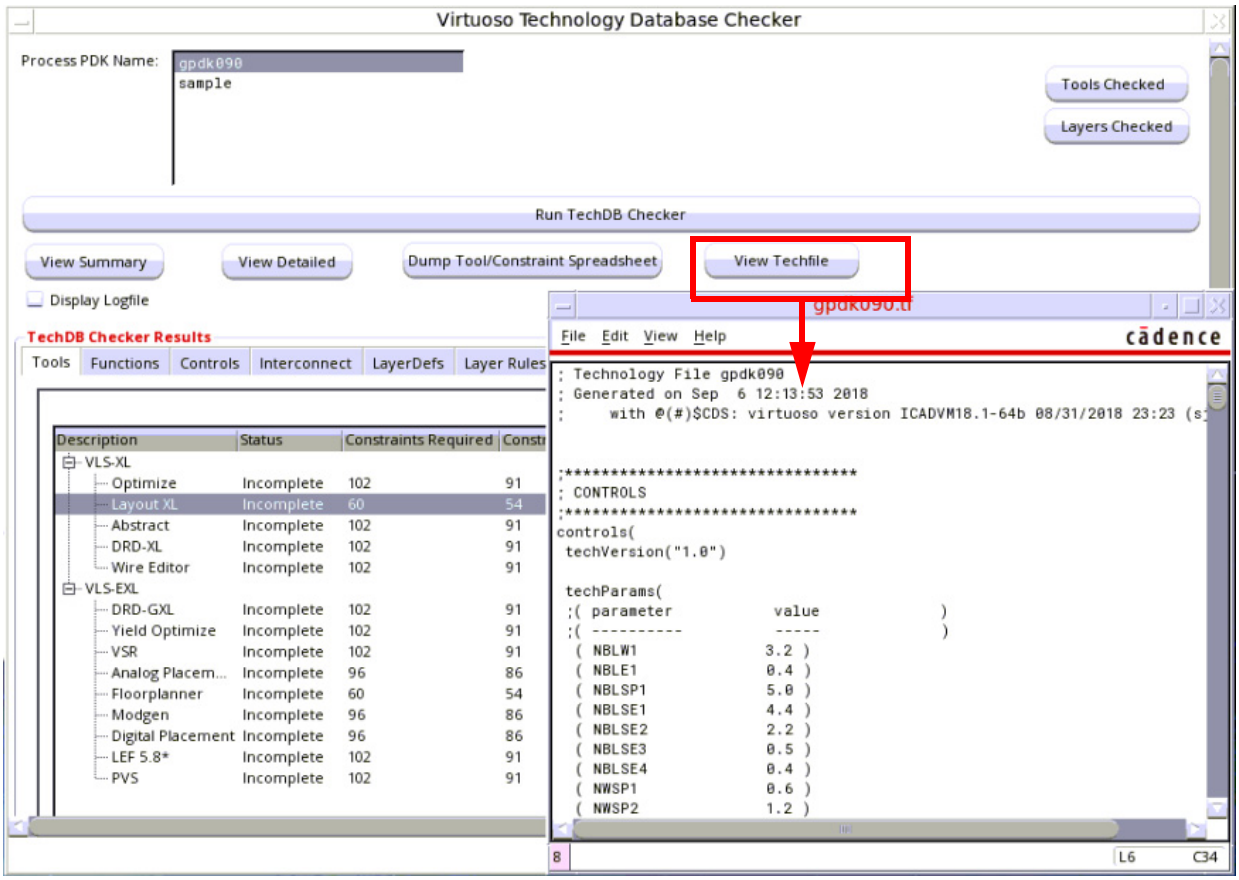
TechDB Checker lets you create an ASCII dump of the technology database and store it as a technology file in the run directory. The technology filename matches the PDK library name and has a `.tf` file extension.

To view the technology file:

1. Select the PDK library containing the technology database from the *Process PDK Name* list.

2. Click *View Techfile*.

   TechDB Checker runs the Virtuoso Technology File Dumper utility to create the technology file. It then displays the technology file.



Viewing Tool Requirements

You can view the required and optional constraints in a technology database for each Cadence tool that TechDB Checker supports. This information helps you identify the technology database sections that TechDB Checker uses as a base for reports.

To view technology database requirements for a Cadence tool:

1. Select the PDK library containing the technology database from the *Process PDK Name* list.
2. Select the Cadence tool from the *Tools* tab section.
3. Click *Dump Tool/Constraint Spreadsheet*.

TechDB Checker displays the TOOL - *ToolName* form with details about the required and optional information in various sections of the technology database for the selected tool.

The text `required` indicates that the technology file must include this information for the selected tool. The text `supported` indicates that the tool can use this technology file content.

4. To save displayed information, scroll down to the end of the report and click *Save To File*.

Viewing Logs

TechDB Checker logs useful information while checking a technology database, which you can refer.

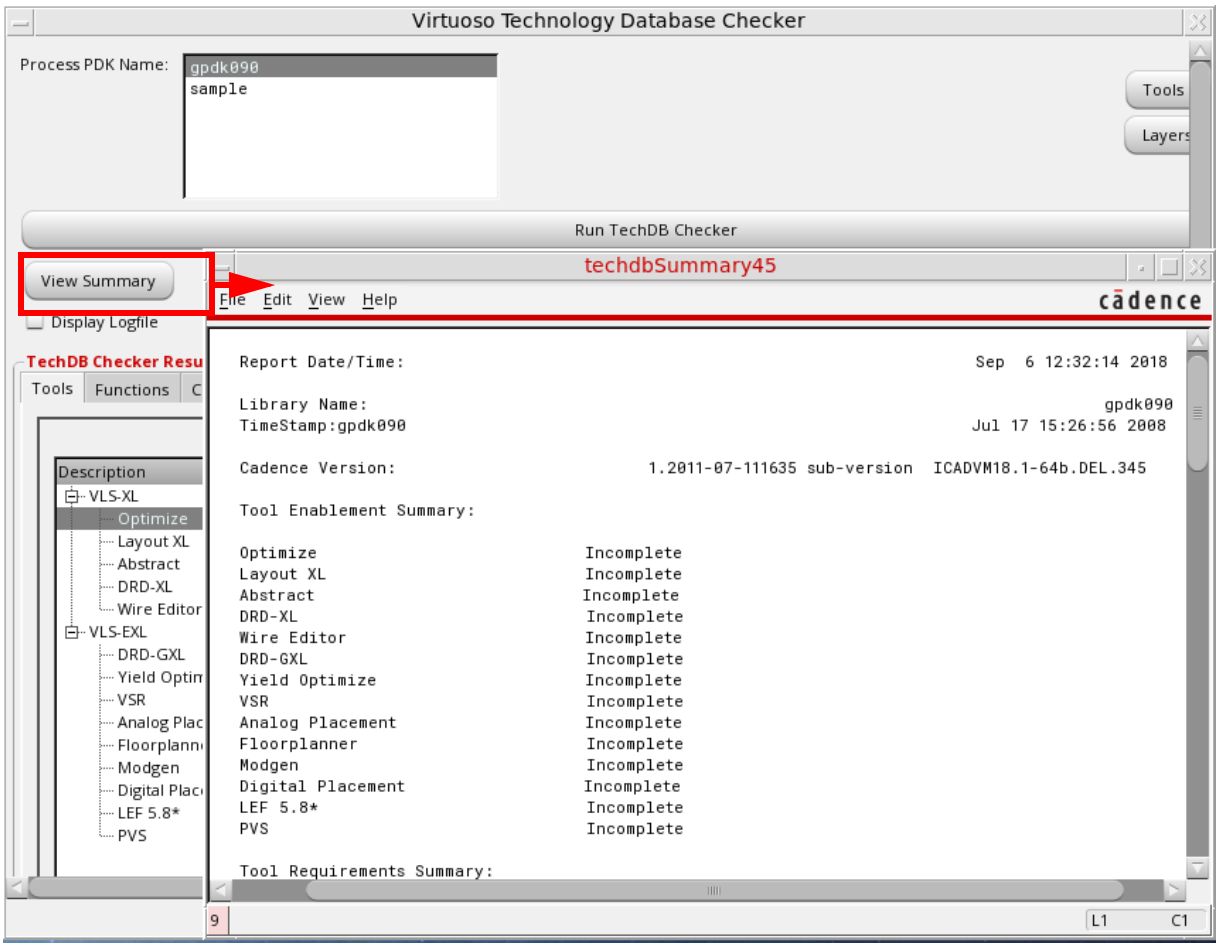
To display the log file automatically immediately after TechDB Checker finishes investigating a technology database:

1. Select the PDK library containing the technology database.
2. Select the *Display Logfile* checkbox.
3. Click *Run TechDB Checker*.

   TechDB Checker starts investigating the technology database and stores details in a log file. After completing the investigation, it displays the log file.

To view the log file at any time after the technology database investigation is complete:

➡ Select the *Display Logfile* check box.



2

Analyzing Results

This chapter provides information about interpreting the summarized, detailed, and structured reports that TechDB Checker provides after it completes checking a technology database. It includes the following topics:

Reporting Features

After inspecting a technology database, TechDB Checker lets you:

- View summarized and detailed reports and identify information using categories in the reports
- View results using various tabs that are structured according to:
  - Tools
  - Functions
  - Control section
  - Interconnect sections
  - Layer definitions
  - Layer rules
  - Placement grids
  - Routing grids
  - Devices
- Navigate from a high-level report, such as the number of missing constraints, to detailed results, such as the name, group, and other details on the missing constraints
- Print and save reports for later use

Viewing the Summary Report

This section provides information on the following topics.

- Generating the Summary Report
- Summary Report Content

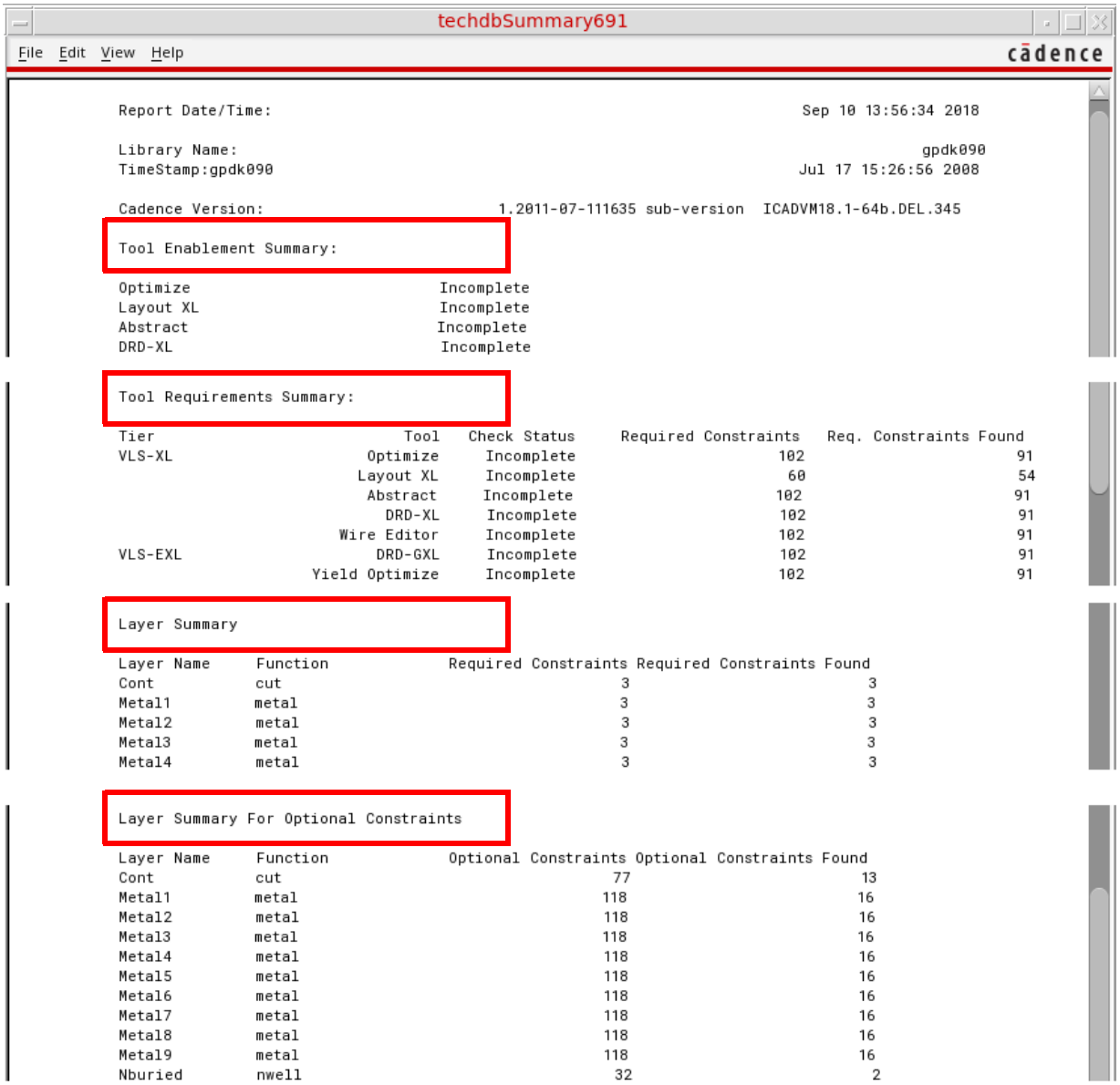
Generating the Summary Report

Using TechDB Checker, you can generate a summary report that includes high-level information on tool enablement in a technology database. TechDB Checker saves the summary report in the run directory.

To generate a summary report:

➡ Click *View Summary*.

TechDB Checker generates the summary report and displays it. The following figure illustrates a summary report.



Summary Report Content

A summary report contains the following sections:

- Report header information

  Includes the following details:

  - Report date and time
  - PDK library name and timestamp
  - Cadence Virtuoso version

- Tool Enablement Summary

  Lists the supported Cadence tools and their enablement status.

  - `Complete` indicates that all required constraints for the tool are available in the technology database.
  - `Incomplete` indicates that at least one required constraint for the tool is missing in the technology database.
  - `<waived>` indicates that the tool is not selected for investigation. For details on how to waive a tool, see step 4 in "Running TechDB Checker" on page 9.

- Tool Requirements Summary

  Provides the tool enablement status, the number of constraints required for tool enablement, and the number of required constraints found in the technology database.

- Layer Summary

  Lists layers, along with their functions, the number of required constraints, and how many of those constraints were found in the technology database.

  In the following example, the `cut` function of the layer `Cont` has two required constraints, which were also found in the technology database.

  Example:

```
Layer Summary
Layer Name  Function        Required Constraints Required Constraints Found
Bondpad     passivationCut                     2                           2
Cont        cut                                2                           2
```

- Layer Summary For Optional Constraints

Lists layers, along with their function, the number of optional constraints, and how many of those constraints were found in the technology database.

Example:

```
Layer Summary For Optional Constraints
Layer Name  Function        Optional Constraints Optional Constraints Found
Bondpad     passivationCut                    63                          3
Cont        cut                               63                          6
```

Viewing the Detailed Report

This section provides information on the following topics.

- Generating the Detailed Report
- Detailed Report Content

Generating the Detailed Report

Using TechDB Checker, you can generate detailed reports that include comprehensive information on tool enablement in a technology database. TechDB Checker saves the detailed report in the run directory.

To generate a detailed report:

➡ Click *View Detailed*.

TechDB Checker generates the detailed report and displays it.

Detailed Report Content

A detailed report includes all the Summary Report Content. Additionally, the detailed report contains the following information:

Important

The detailed report has all the information available in the tabs of the *TechDB Checker Results* area of the main TechDB Checker form.

- Technology File (Techfile) Section Summary

  Includes the number of errors, warnings, and notices on the following sections of the technology database based on result of the analysis that TechDB Checker performs.

- `controls`
- `layerDefinitions`
- `layerRules`
- `viaDefs`
- `devices`
- `constraintGroups`
- `routingGrids`
- `placementGrids`

Note: TechDB Checker does not report the `constraints` section of the technology database in the same format as the other sections. This section is reported by `constraintGroups`.

Example entry:

```
Techfile Section Summary:
Section          Errors  Warnings  Notices
controls              0         0        2
layerDefinitions      0         0        3
```

- Techfile Section Details

  Includes error messages, warning messages, and notices for sections in the technology database.

  - `Errors`—Indicate issues in the technology database that must be corrected for proper operations.
  - `Warnings`—Indicate conditions that may become an issue, depending on how the technology database or the process technology is used. You should appropriately correct the technology database.
  - `Notices`—Indicate conditions that do not require any action. However, you should know about these conditions.

  Example entry:

```
Techfile Section Details:
Techfile Section:  controls
    Errors:  none
    Warnings:  none
    Notices:
       Default Grid Snap Resolution set to 0.005.
```

```
       Default Spacing measurements are in euclidian.
```

Note: For hierarchical member constraint groups, TechDB Checker displays details using appropriate entries and indentation, as illustrated in the following example:

```
Techfile Section: constraintGroups
         Group: virtuosoDefaultExtractorSetup
                  Errors:           none
                  Warnings:         none
                  Notices:
                      userDefined virtuosoDefaultExtractorSetup validLayers
does not contain 'diffusion in constraint Group.
```

- Constraints Report

  Includes the constraints and layer summary in the following formats:

  - Constraints by layers
  - Layers by constraints

  Both the constraints report formats include the following:

  - Layer name
  - Constraint name
  - Value of the constraint
  - Constraint group to which the constraint belongs
  - Operator note

  Examples:

  - Constraints by Layers

```
Techfile Constraints by Layer
Layer      Constraint    Value              Group      Op Note
Bondpad    minSpacing      8.0              foundry
Bondpad    minWidth       55.0              foundry
Cont       maxWidth       0.06              foundry
Cont       minSpacing     0.06              foundry     exclusive
                                            foundry  (viaSpacing)
Metal1     minSpacing     0.12              foundry     duplicate
                               virtuosoDefaultSetup   (minSpacing)
```

  - Layers by Constraint

```
Constraints Report
Techfile Layers by Constraint
```

```
    Constraint      Layer     Value                 Group    Op Note
    maxDensity     Metal1     table               foundry
                   Metal2     table               foundry
    ..
    minSpacing       Cont      0.14               foundry
               ont,Resdum       0.2               foundry
                   Metal1      0.12  virtuosoDefaultSetup
                   Metal1     table               foundry
                   Metal1      0.12               foundry     duplicate
                                        virtuosoDefaultSetup     (minSpacing)
```

The constraints reports help you identify duplicate and mutually exclusive constraints. Duplicate constraints have the same layer name and constraint name. Duplicate constraint definitions are reported in the operator note column.

Mutually exclusive constraints have different constraint names, with potentially identical operation with same layers. Such constraints are reported along with the name of the other constraints in the operator note column.

Note: TechDB Checker does not check the parameters of each constraint or account for the `and` and `or` constraint groups. This may lead to some reported duplicates that might be different definitions.

Note: The constraint value `table` indicates multiple values defined within a `spacingTable` constraint group.

- Trace of the boolean operations for each derived layer

  Example:

```
noOverlapLayer1
  and(
    Poly *
    Oxide *
;noOverlapLayer1
noOverlapLayer2
  and(
    Poly *
    Resdum *
;noOverlapLayer2
```

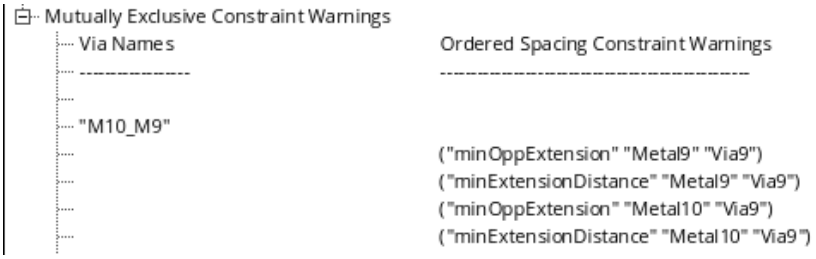
Viewing Tools Compliance Results

The *Tools* tab of the TechDB Checker form provides information on the missing and found constraints in the technology database for each supported Cadence tool. You can also save the tools compliance results.

Note the following when analyzing the tools compliance results:

- TechDB Checker highlights the following types of constraints:
  - Required mature constraints
  - Optional mature constraints
  - Optional advanced constraints

    Note: Mature constraints are those constraints that are applicable to all process nodes. Advanced constraints are those constraints that are applicable to all process nodes smaller than 45nm.
  - Duplicate constraints
  - Exclusive constraints
  - Mutually exclusive constraints
  - Layers purpose pairs
- Exclusive constraints are potentially conflicting constraints, when two or more constraints are defined for the same layer or pair of layers. Mutually exclusive constraints have different names with potentially identical operation with same layers. In the following image, `minOppExtension` and `minExtensionDistance` are defined for `Metal9` and `Via9`. This indicates a potential conflict.



  In the example, it is possible that the deprecation of certain constraints may be the reason for the conflict. The technology database may have two forms of a single constraint for backwards compatibility.

- The required constraints, which TechDB Checker reports, are based on how the tools are typically used.
- The technology database must contain all the required constraints for full tool enablement. However, tools may function correctly even when some required constraints are missing from the technology database.

To view tool compliance results:

1. Click the *Tools* tab.

   View the high-level tool compliance report. This report includes the compliance status, the number of constraints required, and the number of constraints found in the technology database.

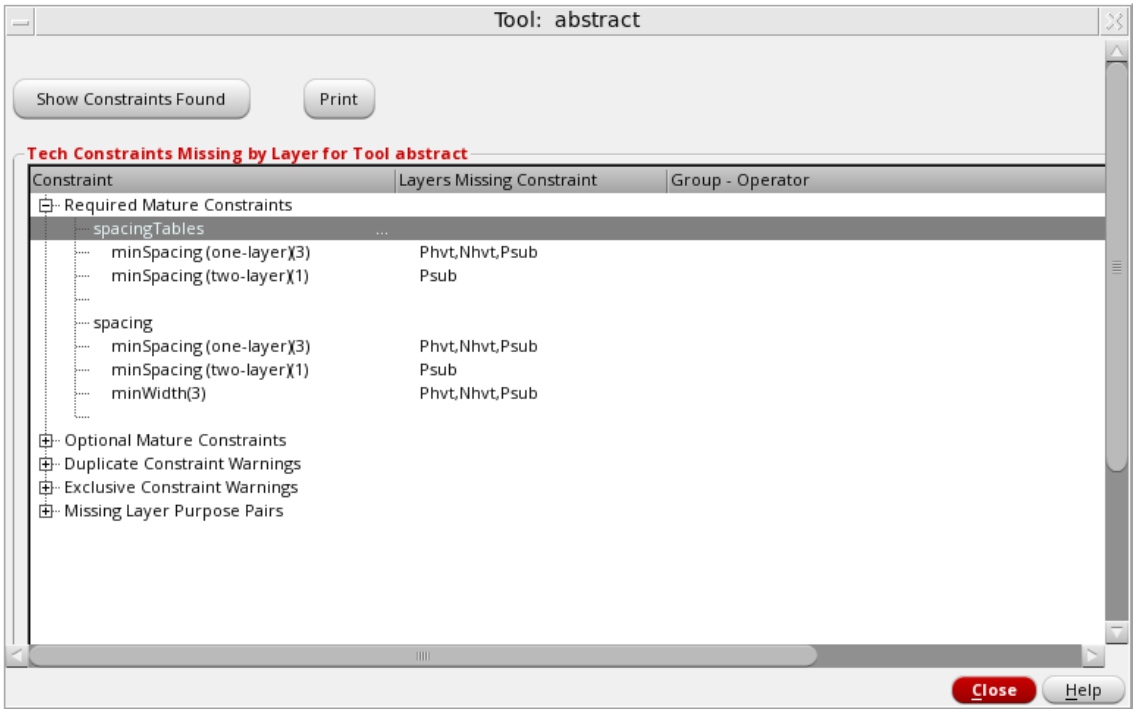
2. Double-click the tool record whose details you want to view.

   If TechDB Checker does not identify any missing, duplicate, or conflicting constraints, it displays an appropriate message.

   If TechDB Checker identifies errors, it displays the Tool form. This form includes the list of constraints that are missing, duplicate, and conflicting in the technology database for the tool, along with the layers.

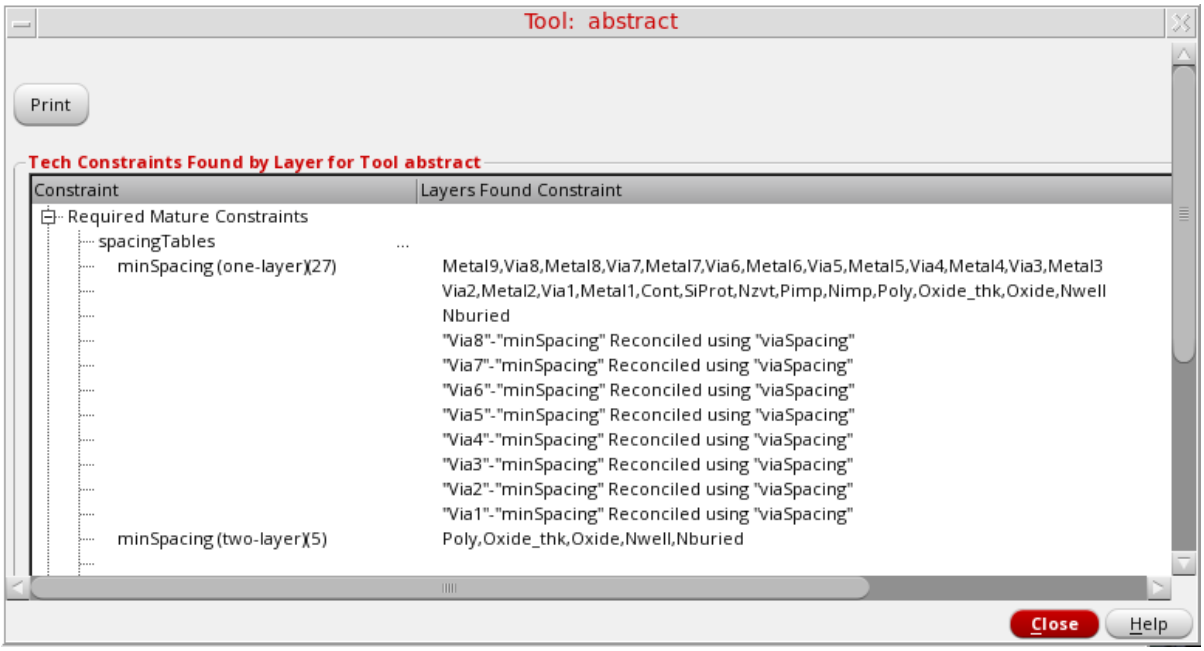
   The following figure illustrates details of the required constraints that are missing in the technology database for the Abstract Generator tool in Virtuoso Layout Suite XL. You can

expand other categories to view details of duplicate and conflicting constraints and missing optional constraints.



3. Click *Show Constraints Found*.

TechDB Checker displays a form with the list of required and optional constraints found in the technology database for the selected tool, along with the layers.



4. Click *Close* to close the Tool forms after viewing the results.

To save tool compliance results:

1. Open the relevant Tool form. For details, see the procedure to view tool compliance results.
2. Click *Print*.

   TechDB Checker displays the results as a text file.
3. Save and print the file as required.

Viewing Functions Compliance Results

The *Functions* tab of the TechDB Checker form provides information about the required and optional constraints in layers along with their functions for tool enablement. From this tab, you can access information on:

- Missing constraints and the tools that require and support them
- Constraints found in the technology database and the tools that require and support them

You can also save the layer compliance results.

Note: The list of layers in the *Functions* tab is sorted according to the mask number.

To view layer compliance results after running TechDB Checker:

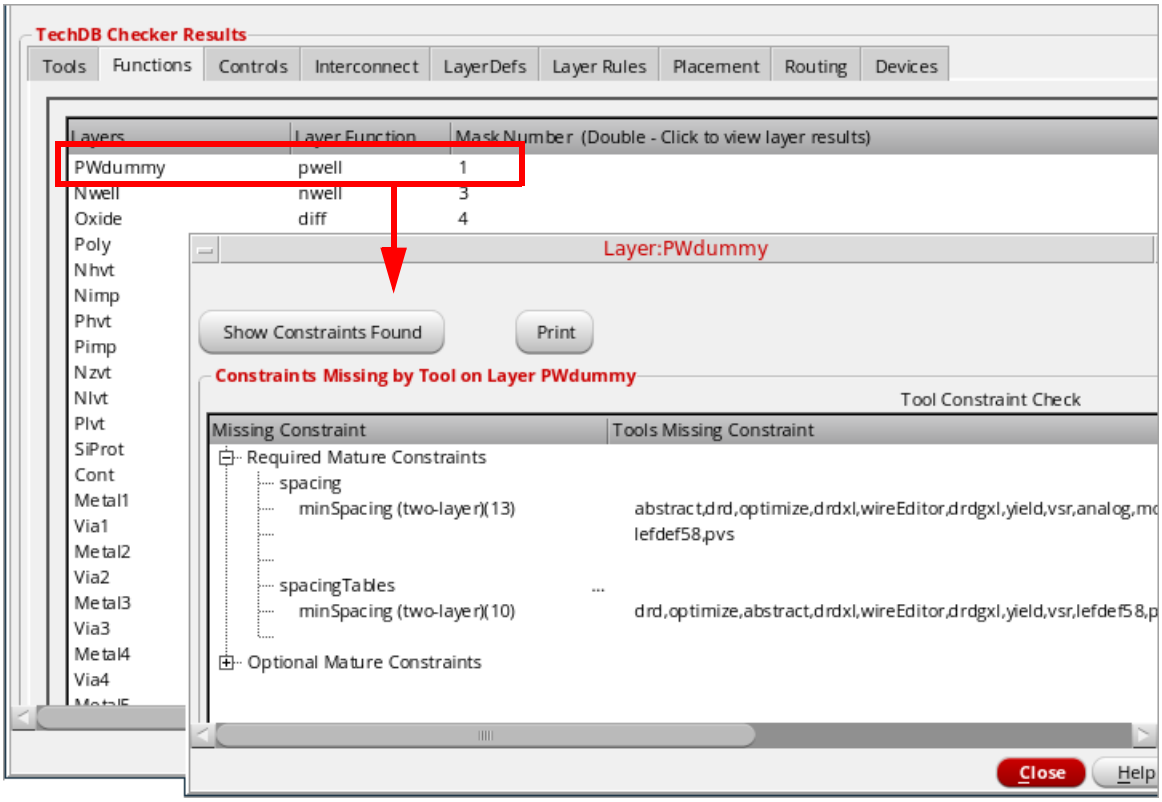
1. Click the *Functions* tab.

   View the high-level report, which includes the list of layers, their function, and mask number.

2. Double-click a layer function record.

   If TechDB Checker does not identify any errors, it displays an appropriate message.

   If TechDB Checker identifies errors, it displays the Layer form with the list of missing constraints for the selected layer and the tools that require and support them.



3. Click *Show Constraints Found* on the Layer form.

   TechDB Checker displays a form with the list of constraints found in the technology database for the layer, along with the tools that require and support them.

4. Click *Close* to close the Layer forms after viewing the results.

To save layer compliance results:

1. Open the relevant Layer form. For details, see the procedure to view function compliance results.
2. Click *Print*.

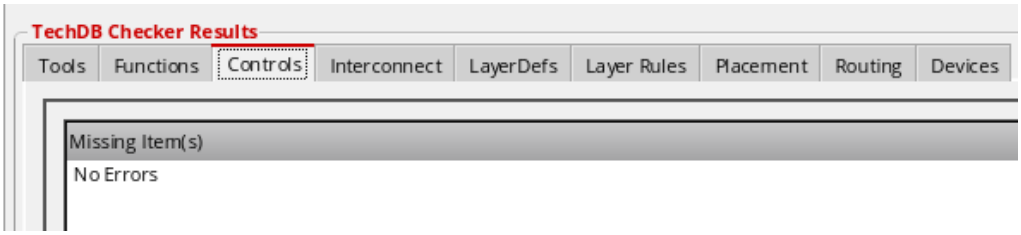
   TechDB Checker displays the results as a text file.
3. Save and print the file as required.

Viewing Missing Control Section Items

The *Controls* tab provides information on any missing items in the control section of the technology database, along with the list of tools that require or support them.

To view missing control section items and the tools that require and support them:

➡ Click the *Controls* tab.

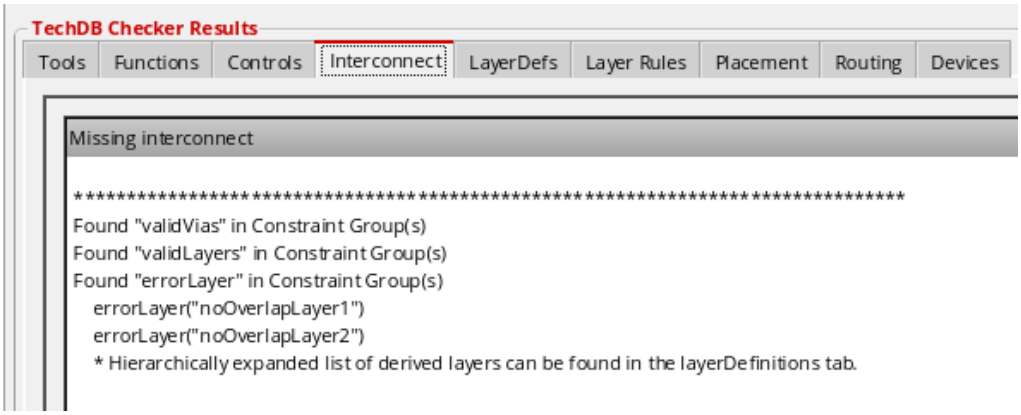


Viewing Interconnect Constraints Items

The *Interconnect* tab provides information on any missing and found interconnect constraint group items in the technology database. It also displays the tools that require and support missing constraints.

To view missing and found interconnect items:

➡ Click the *Interconnect* tab.

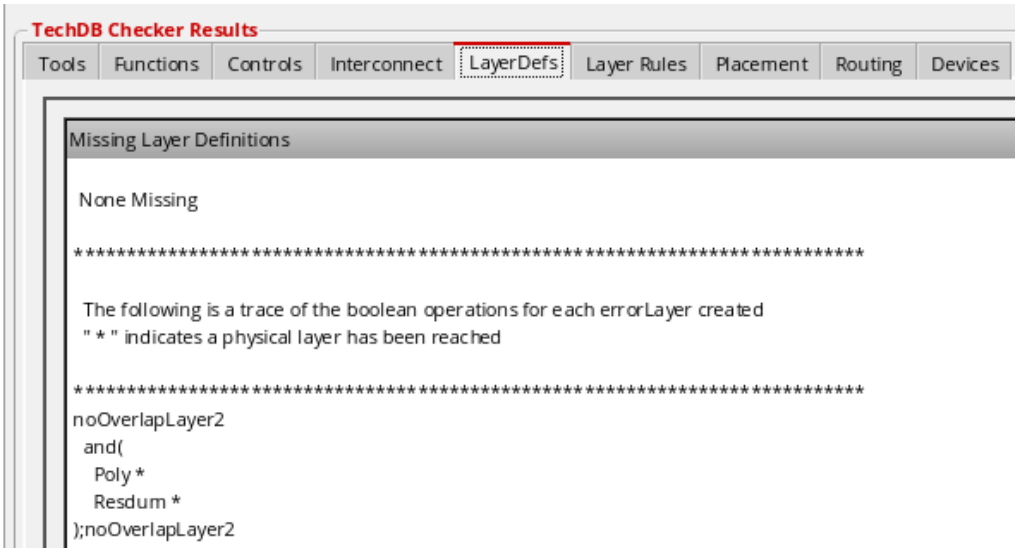


Viewing Missing Layer Definitions

The *LayerDefs* tab provides information on any missing items from the layer definitions section of the technology database. It also displays a trace of the boolean operations for each derived layer.

To view missing layer definition items and boolean operations for derived layers:

➡ Click the *LayerDefs* tab.

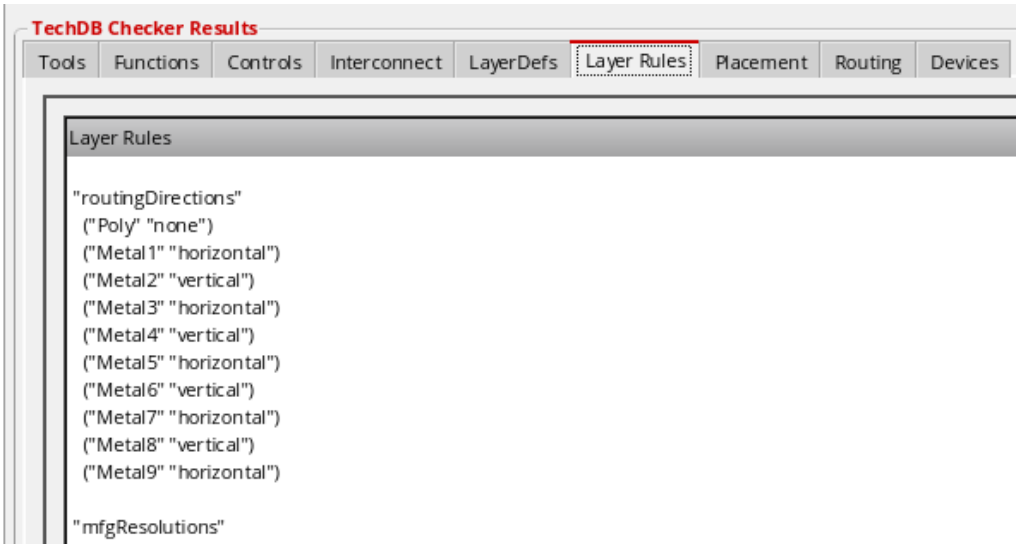


Viewing Layer Rules

The *Layer Rules* tab provides information on layer rule items from the layer rules section of the technology database.

To view layer rule items:

➡ Click the *Layer Rules* tab.

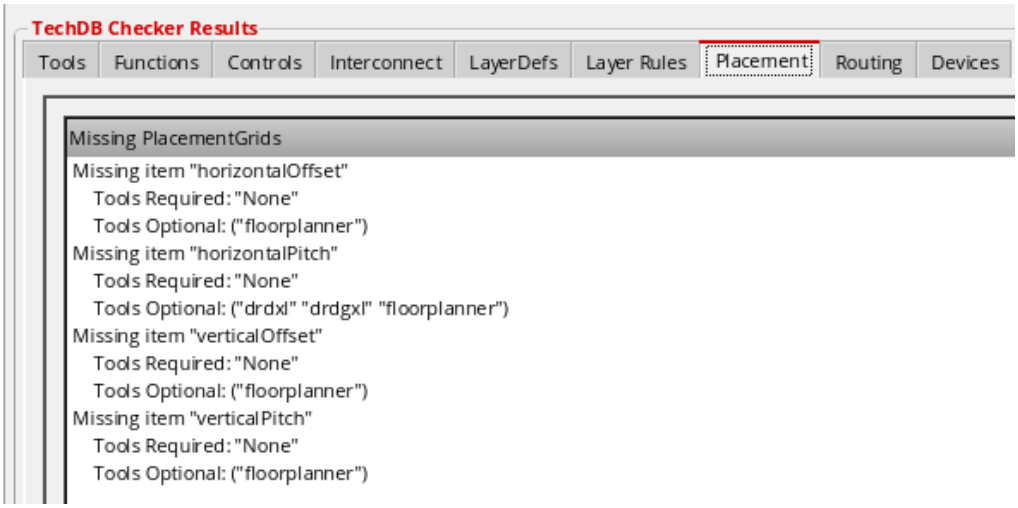


Viewing Missing Placement Grids

The *Placement* tab provides information on placement grids that are missing from the technology database, along with the list of tools that require and support them.

To view missing placement grids and the tools that require and support them:

➡ Click the *Placement* tab.

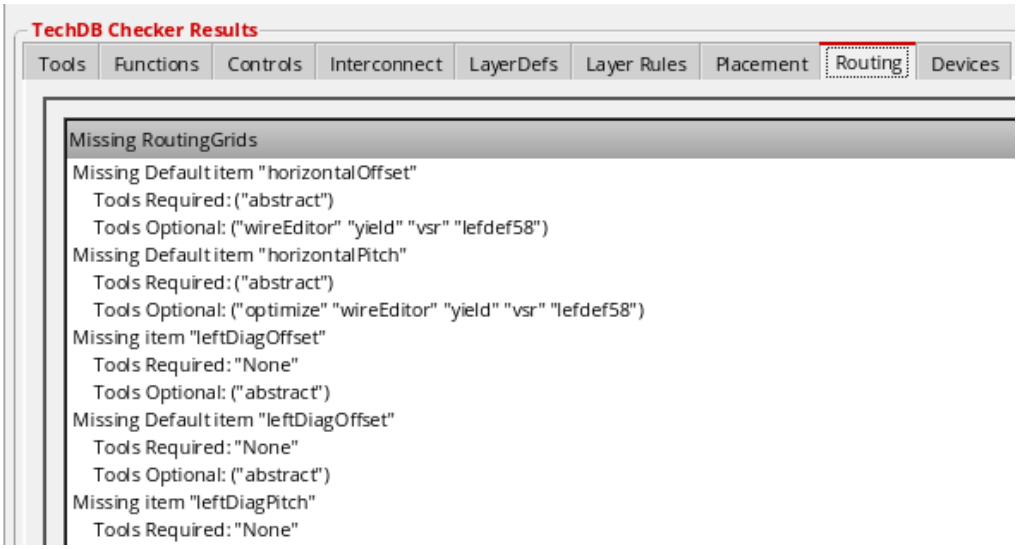


Viewing Missing Routing Grids

The *Routing* tab provides information on routing grids that are missing from the technology database, along with the tools that require and support them.

To view missing routing grids and the tools that require and support them:

➡ Click the *Routing* tab.

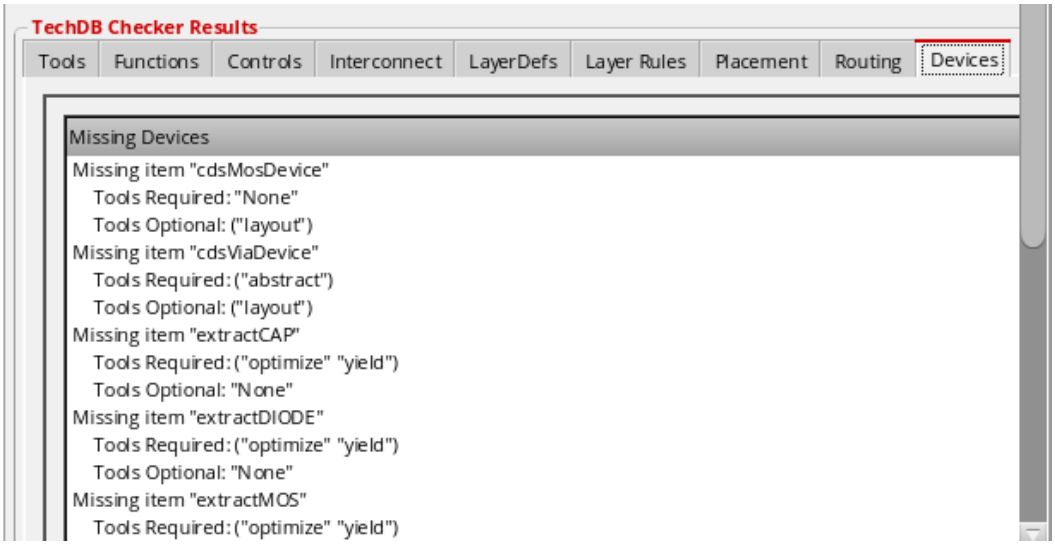


Viewing Missing Devices

The *Devices* tab provides information on devices that are missing from the technology database, along with the list of tools that require and support these them.

To view missing devices and the tools that require and support them:

➡ Click the *Devices* tab.



A

Technology Database Checker Forms

This appendix describes the following TechDB Checker forms:

Virtuoso Technology Database Checker Form

Virtuoso Technology Database Checker is the main form that appears when you start TechDB Checker. You access all the TechDB Checker features from this form.

Form Components

Form Component	Description
Process PDK Name	Lists the PDK library names defined in the `cds.lib` file.
Tools Checked	Opens the Check These Tools Form.
Layers Checked	Opens the Layers Checked Form.
Run TechDB Checker	Starts investigating the technology database of the PDK library selected in Process PDK Name.
View Summary	Displays the summary report. See "Viewing the Summary Report" on page 18.
View Detailed	Displays the detailed report. See "Viewing the Detailed Report" on page 21.
Dump Tool/Constraint Spreadsheet	Opens the TOOL Form that contains details about the required and optional information in various sections of the technology database for the tool selected in the Tools tab.
View Techfile	Displays the technology file content associated with the PDK library selected in Process PDK Name. See "Viewing the Technology File" on page 13.
Display Logfile	Opens the log file. See for "Viewing Logs" on page 15.
TechDB Checker Results	Includes various tabs to display structured results.
Tools	Displays tool compliance results. See "Viewing Tools Compliance Results" on page 25.
Functions	Displays function compliance results. See "Viewing Functions Compliance Results" on page 28.

Form Component	Description
Controls	Displays missing control section items. See "Viewing Missing Control Section Items" on page 30.
Interconnect	Displays interconnect constraint items. See "Viewing Interconnect Constraints Items" on page 30.
LayerDefs	Displays missing layer definitions. See "Viewing Missing Layer Definitions" on page 31.
Layer Rules	Displays layer rules. See "Viewing Layer Rules" on page 32.
Placement	Displays missing placement grids. See "Viewing Missing Placement Grids" on page 32.
Routing	Displays missing routing grids. See "Viewing Missing Routing Grids" on page 33.
Devices	Displays missing devices. See "Viewing Missing Devices" on page 34.

References

- "Running TechDB Checker" on page 9
- "Analyzing Results" on page 17
- "Viewing the Technology File" on page 13
- "Viewing Tool Requirements" on page 14
- "Viewing Logs" on page 15

Check These Tools Form

The Check These Tools form appears when you click the Tools Checked button. From this form, select the tools for which TechDB Checker must inspect the technology database associated with the selected Process PDK Name.

Note: The tools available for selection in the Check These Tools form depends on the Virtuoso version.

Form Components

Form Component	Description
Tools	Lists the VLS tools, LEF/DEF 5.8, and PVS. This area provides a checkbox for each tool. Select the checkbox corresponding to a tool for instructing TechDB Checker to inspect the technology database for compliance with that tool.
Clear All	Deselects all the tools listed in the Tools area.
Select All	Selects all the tools listed in the Tools area.

References

- "Running TechDB Checker" on page 9
- "Viewing Tools Compliance Results" on page 25
- "Viewing Tool Requirements" on page 14
- "Viewing the Summary Report" on page 18

Layers Checked Form

The Layers Checked form appears when you click the Layers Checked button. From this form, select the layers for which TechDB Checker must inspect the technology database associated with the selected Process PDK Name.

Form Components

Form Component	Description
Layer Source	Lists all layer sections in the technology database associated with the selected Process PDK Name. Select a layer section to display its layers in the Layers area.
Layers	Lists all the layers belonging to the selected Layer Source. This area provides a checkbox for each layer. Select the checkbox corresponding to a layer for instructing TechDB Checker to inspect the technology database for compliance with that layer.
Select All	Selects all the layers listed in the Layers area.
Clear All	Deselects all the layers listed in the Layers area.

References

- "Running TechDB Checker" on page 9
- "Viewing Functions Compliance Results" on page 28
- "Viewing Tools Compliance Results" on page 25
- "Viewing the Summary Report" on page 18
- "Viewing the Detailed Report" on page 21

TOOL Form

The TOOL: *ToolName* form appears when you select a tool listed under the Tools tab and click Dump Tool/Constraint Spreadsheet. This form displays the required and optional constraints in a technology database for the selected Cadence tool. This information helps you identify the technology database sections and subsections that TechDB Checker uses to base its reports.

Reference

- "Viewing Tool Requirements" on page 14

Tool Form for Missing Constraints

The Tool: *ToolName* form appears when you double-click a tool record in the Tools tab. This form lists the required and optional constraints that are missing, duplicate, and conflicting in the technology database for the selected tool.

Form Components

Form Component	Description
Tech Constraints Missing by Layer for Tool	Displays details of the missing, duplicate, conflicting, and under relevant categories and columns. These constraints are associated with the selected record in the Tools tab.
Show Constraints Found	Opens the Tool form with details of the tool constraints that TechDB Checker found in the technology database for the tool selected in the Tools tab. See "Tool Form for Found Constraints" on page 42.
Print	Opens the constraint details in a text file for printing and saving.

Reference

- "Viewing Tools Compliance Results" on page 25

Tool Form for Found Constraints

The Tool: *ToolName* form, which displays the constraints found in the technology database for a tool, appears when you click the Show Constraints Found button in the Tool Form for Missing Constraints. It lists the required and optional constraints that are present in the technology database for the tool selected in the Tools tab.

Form Components

Form Component	Description
Tech Constraints Found by Layer for Tool	Displays details of the required and optional constraints found in the technology database under relevant categories and columns. These constraints are associated with the selected record in the Tools tab.
Print	Opens the constraint details in a text file for printing and saving.

Reference

- "Viewing Tools Compliance Results" on page 25

Layer Form for Missing Constraints

The Layer: *LayerName* form appears when you double-click a layer record in the Functions tab. This form lists the required and optional constraints that are missing in the technology database for tool enablement. It provides an interface to view TechDB Checker results on the basis of layers, as opposed to tool-based results available in the Tool Form for Missing Constraints form.

Form Components

Form Component	Description
Tech Constraints Missing by Tool for layer	Displays details of the required and optional constraints that are missing from the technology database under relevant categories and columns. These constraints are associated with the record selected in the Functions tab. This area also displays the list of tools that require or support the constraints.
Show Constraints Found	Opens the Layer form with details of the constraints that TechDB Checker found in the technology database for the layer selected in the Functions tab.
Print	Opens the constraint details in a text file for printing and saving.

Reference

- "Viewing Functions Compliance Results" on page 28

Layer Form for Found Constraints

The Layer: *LayerName* form, which displays the constraints found in the technology database for the layer, appears when you click Show Constraints Found in the Layer Form for Missing Constraints. It lists the required and optional constraints that are present in the technology database for the layer record selected in the Functions tab.

Form Components

Form Component	Description
Tech Constraints Found by Tool for layer	Displays details of the required and optional constraints found in the technology database under relevant categories and columns. These constraints are associated with the selected record in the Functions tab. This area also displays the list of tools that require or support the constraints.
Print	Opens the constraint details in a text file for printing and saving.

Reference

- "Viewing Functions Compliance Results" on page 28

Log and Report Text Window

TechDB Checker displays the following content in a text window:

- Summary Report
- Detailed Report
- Technology File
- Log
- Tool compliance results for saving and printing
- Layer compliance results for saving and printing

B

Frequently Asked Questions

This appendix provides answers to the following frequently asked questions on TechDB Checker:

- How can I find information about the missing and found constraints for a Cadence tool?
- Can I view a layer-based list of missing and found constraints for Cadence tools?
- What is the difference between the summary report and the detailed report?
- Where can I get details about errors, warnings, and notices on technology database sections?
- What are mutually exclusive and duplicate constraints?
- How can I identify mutually exclusive and duplicate constraints?

How can I find information about the missing and found constraints for a Cadence tool?

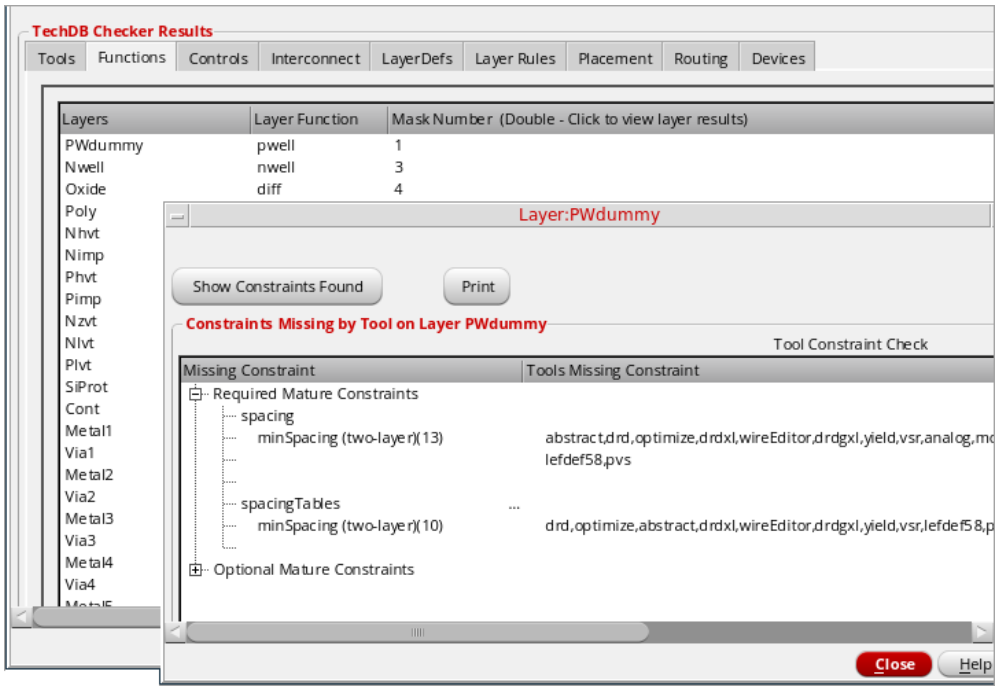
To view information about the constraints missing for a tool, run TechDB Checker on the technology database, and then on the *Tools* tab, double-click the required record. This displays the Tool: *ToolName* form in which you can view the different categories of missing constraints, warnings, and related layer information for the tool. To view information about the constraints that were found for the tool, click the *Show Constraints Found* button.

For more details, see "Viewing Tools Compliance Results" on page 25.

Can I view a layer-based list of missing and found constraints for Cadence tools?

Yes, you can use the Layer: *LayerName* form to view a layer-based list of missing and found constraints for various tools.

To view this information, run TechDB Checker on the technology database, and then on the *Functions* tab, double-click the required record. This displays the Layer: *LayerName* form in which you can view the different categories of missing constraints and the related tool information for the layer.



To view information about the constraints found for the layer, click the *Show Constraints Found* button in the Layer: *LayerName* form.

For more details, see “Viewing Functions Compliance Results” on page 28.

What is the difference between the summary report and the detailed report?

The summary report includes high-level information on tool enablement in a technology database, whereas the detailed report includes comprehensive and detailed information on tool enablement.

Summary Report Contains...	Detailed Report Contains...
Tool enablement summary	Tool enablement summary
Tool requirements summary	Tool requirements summary
Layer summary for required constraints	Layer summary for required constraints
Layer summary for optional constraints	Layer summary for optional constraints
-	Summary of errors, warnings, and notices on technology database section
-	Detailed errors, warnings, and notices on technology database sections
-	Constraints by layers report
-	Layers by constraints report
-	Trace of the boolean operations for derived layers

For more details and examples, see "Viewing the Summary Report" on page 18 and "Viewing the Detailed Report" on page 21.

Where can I get details about errors, warnings, and notices on technology database sections?

You can access the detailed report to get information on errors, warnings, and notices on the following sections of the technology database:

- `controls`
- `layerDefinitions`
- `layerRules`
- `viaDefs`
- `devices`
- `constraintGroups`
- `routingGrids`
- `placementGrids`

As illustrated in the following figure, the detailed report provides a summary of total errors, warnings, and notices, and their descriptive text messages. For more details, see "Viewing the Detailed Report" on page 21.

```
Techfile Section Summary:

Section                          Errors  Warnings  Notices

controls                              0         0        2

layerDefinitions                      0         0        3

layerRules                            0         0        5

viaDefs                               0         0        0

devices                               0         1       12

constraintGroups                      1         0       33

routingGrids                          0         0       44

placementGrids                        0         0        0

Techfile Section Details:

Techfile Section:  controls

    Errors:  none

    Warnings:  none

    Notices:

        Default Grid Snap Resulution set to 0.005.

        Default Spacing measurements are in euclidian.
```

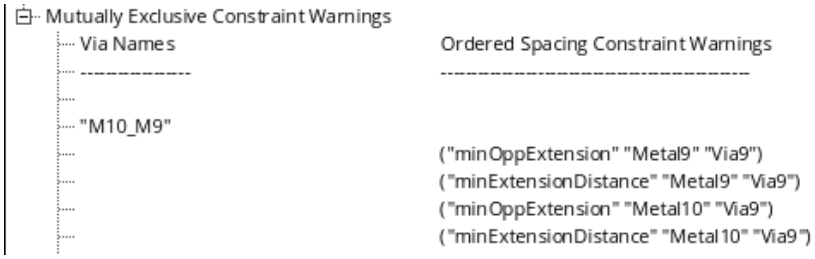
For hierarchical member constraint groups, TechDB Checker displays details using appropriate entries and indentation, as illustrated in the following figure.

```
Techfile Section: constraintGroups

        Group: virtuosoDefaultSetup

            Errors:              none

            Warnings:                        none

            Notices:

                userDefined virtuosoDefaultSetup validLayers does not contain 'diffusion in constraint G
```

What are mutually exclusive and duplicate constraints?

Mutually exclusive constraints have different constraint names, with potentially identical operation with same layers. Duplicate constraints have the same layer name and constraint name.

In the following image, `minOppExtension` and `minExtensionDistance` are defined for `Metal9` and `Via9`. This indicates a potential conflict.



In the example, it is possible that the deprecation of certain constraints may be the reason for the conflict. The technology database may have two forms of a single constraint for backwards compatibility.

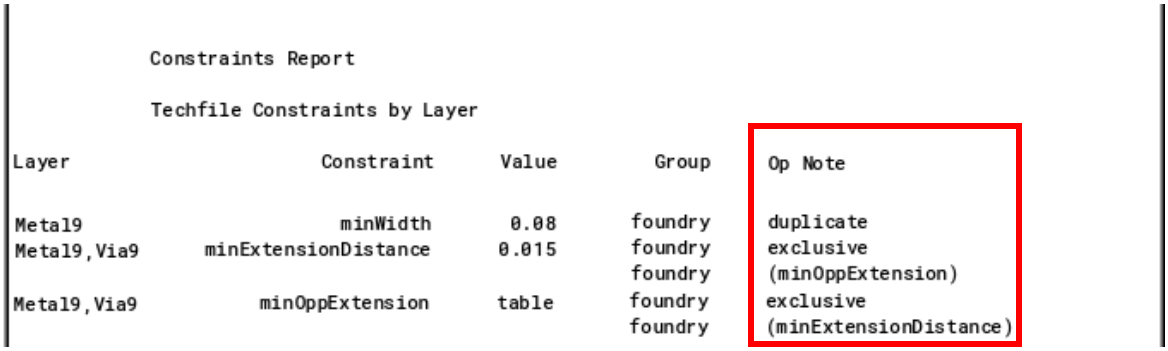
How can I identify mutually exclusive and duplicate constraints?

You can identify mutually exclusive and duplicate constraints by using the following features:

- Detailed report
- Tools form

Detailed Report

The following figure shows a detailed report. The mutually exclusive and duplicate constrains can be identified by the entry in the *Op Note* column.



Constraints Report

Techfile Constraints by Layer

Layer	Constraint	Value	Group	Op Note
Metal9	minWidth	0.08	foundry	duplicate
Metal9,Via9	minExtensionDistance	0.015	foundry	exclusive
			foundry	(minOppExtension)
Metal9,Via9	minOppExtension	table	foundry	exclusive
			foundry	(minExtensionDistance)

For more details, see “Viewing the Detailed Report” on page 21.

Tools Form

To view mutually exclusive and duplicate constraints for a tool, run TechDB Checker for a technology database. Then, on the *Tools* tab, double-click the required record. You can see the details listed in the form that opens.