

CLAIMS

What is claimed is:

1. A method of analyzing a cell of a cell library used to generate a layout, the method comprising:
 - determining, for each instance of the cell in the layout, a respective routed connection location utilized in the layout for a pin of the cell, resulting in a plurality of routed connection locations; and
 - determining a utilization metric for the pin of the cell based on the plurality of routed connection locations and a plurality of possible connection locations for the pin; and
 - displaying the utilization metric on a display device.
2. The method of claim 1, wherein displaying the utilization metric comprises:
 - displaying, on the display device, a graphical representation of the cell, the graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and
 - displaying the utilization metric overlying the pin coverage area.
3. The method of claim 1, wherein displaying the utilization metric comprises graphically indicating an association between the utilization metric and the pin of the cell.
4. The method of claim 1, wherein displaying the utilization metric comprises displaying a table indicating an association between the utilization metric and the pin of the cell.
5. The method of claim 1, wherein determining the utilization metric comprises:
 - identifying, for each instance of the cell in the layout, a possible connection location of the plurality of possible connection locations for the pin corresponding to the respective routed connection location;
 - determining, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on the possible connection location identified for each instance of the cell in the layout; and

determining the utilization metric for the pin of the cell based on the number of times each possible connection location of the plurality of possible connection locations for the pin is utilized in the layout.

6. The method of claim 1, wherein determining the utilization metric comprises determining a percentage of the plurality of possible connection locations that are utilized in the layout.

7. The method of claim 1, wherein determining the utilization metric comprises determining, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on a number of routed connection locations of the plurality of routed connection locations that correspond to that respective possible connection location.

8. The method of claim 7, further comprising:
displaying, on a display device, a graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and
for each possible connection location, displaying the number of times that respective possible connection location is utilized in the layout overlying a location on the graphical representation of the pin coverage area corresponding to that respective possible connection location.

9. The method of claim 7, wherein determining the utilization metric further comprises determining, for each possible connection location of the plurality of possible connection locations, a utilization percentage based on the number of times that respective possible connection location is utilized in the layout and a number of instances of the cell in the layout.

10. The method of claim 9, further comprising:
displaying, on a display device, a graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and
for each possible connection location, displaying the utilization percentage overlying a location on the graphical representation of the pin coverage area corresponding to that respective possible connection location.

11. A method of analyzing a cell of a cell library used to obtain a layout, the method comprising:

identifying each instance of the cell placed in the layout, resulting in a plurality of placed cells;

identifying, for each placed cell of the plurality of placed cells, a routed connection location utilized by the layout to connect to a first terminal of the cell, resulting in a plurality of routed connection locations;

determining, for each possible connection location of a plurality of possible connection locations for the first terminal of the cell, a number of times that respective possible connection location is utilized in the layout based on a number of routed connection locations of the plurality of routed connection locations that correspond to that respective possible connection location;

determining a utilization metric for the cell based on the number of times that each respective possible connection location is utilized in the layout; and

displaying the utilization metric on a display device.

12. The method of claim 11, wherein:

determining the utilization metric comprises determining, for each possible connection location, a connection location utilization metric; and

displaying the utilization metric comprises:

displaying a graphical representation of the first terminal; and

displaying a graphical representation of the connection location utilization metric for each possible connection location overlying a location on the graphical representation of the first terminal corresponding to the respective possible connection location.

13. The method of claim 11, wherein:

determining the utilization metric comprises determining an overall utilization metric for the first terminal based on a number of different routed connection locations of the plurality of routed connection locations and a total number of possible connection locations for the first terminal; and

displaying the utilization metric comprises graphically indicating an association between the overall utilization metric and the first terminal of the cell.

14. The method of claim 11, wherein:

identifying the routed connection location for each placed cell of the plurality of placed cells comprises determining, for each placed cell of the plurality of placed cells, a coordinate location for a connection to the first terminal of the cell; and

determining the number of times that each respective possible connection location is utilized in the layout comprises determining a number of placed cells of the plurality of placed cells having the coordinate location for the connection to the first terminal corresponding to a respective coordinate location for that respective possible connection location.

15. The method of claim 11, further comprising:

identifying, for each placed cell of the plurality of placed cells, a second routed connection location utilized by the layout to connect to a second terminal of the cell, resulting in a second plurality of routed connection locations;

determining, for each possible second terminal connection location of a plurality of possible second terminal connection locations for the second terminal of the cell, a number of times that respective possible second terminal connection location is utilized in the layout based on a number of routed connection locations of the second plurality of routed connection locations that correspond to that respective possible second terminal connection location;

determining a second utilization metric for the cell based on the number of times that each respective possible second terminal connection location is utilized in the layout; and displaying the second utilization metric on the display device.

16. A computer-readable medium having computer-executable instructions or data stored thereon executable by a computing device to:

obtain a layout representative of a netlist, the layout utilizing a cell library to implement the netlist;

identify each instance of a first cell of the cell library placed in the layout;

determine a utilization metric for the first cell based on routed connection locations for a pin of the first cell utilized in the layout for the identified instances of the first cell; and

display a graphical representation of the utilization metric on a display device communicatively coupled to the computing device.

17. The computer-readable medium of claim 16, wherein the computer-executable instructions or data stored thereon are executable by the computing device to determine, for each identified instance of the first cell in the layout, a respective routed connection location utilized in the layout to connect to the pin of the respective instance of the first cell, resulting in the plurality of routed connection locations.

18. The computer-readable medium of claim 17, wherein the computer-executable instructions or data stored thereon are executable by the computing device to determine the utilization metric based on the plurality of routed connection locations and a plurality of possible connection locations for the pin.

19. The computer-readable medium of claim 18, wherein the computer-executable instructions or data stored thereon are executable by the computing device to:

identify, for each instance of the cell in the layout, a possible connection location of the plurality of possible connection locations for the pin corresponding to the respective routed connection location;

determine, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on the possible connection location identified for each instance of the cell in the layout; and

determine the utilization metric for the pin of the cell based on the number of times each possible connection location of the plurality of possible connection locations for the pin is utilized in the layout.

20. The computer-readable medium of claim 16, wherein the computer-executable instructions or data stored thereon are executable by the computing device to display a graphical representation of the first cell on the display device, the graphical representation of the utilization metric being displayed overlying the graphical representation of the first cell.

CLAIMS

1. A method of analyzing a cell of a cell library used to generate a layout, the method comprising:

determining, for each instance of the cell in the layout, a respective routed connection location utilized in the layout for a pin of the cell, resulting in a plurality of routed connection locations; and

determining a utilization metric for the pin of the cell based on the plurality of routed connection locations and a plurality of possible connection locations for the pin; and

displaying the utilization metric on a display device, wherein the utilization metric enables a user to identify issues regarding accessibility of the pin of the cell in the layout based on the displayed utilization metric.

2. The method of claim 1, wherein displaying the utilization metric comprises:

displaying, on the display device, a graphical representation of the cell, the graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and

displaying the utilization metric overlying the pin coverage area.

3. The method of claim 1, wherein displaying the utilization metric comprises graphically indicating an association between the utilization metric and the pin of the cell.

4. The method of claim 1, wherein displaying the utilization metric comprises displaying a table indicating an association between the utilization metric and the pin of the cell.

5. The method of claim 1, wherein determining the utilization metric comprises:

identifying, for each instance of the cell in the layout, a possible connection location of the plurality of possible connection locations for the pin corresponding to the respective routed connection location;

determining, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on the possible connection location identified for each instance of the cell in the layout; and

determining the utilization metric for the pin of the cell based on the number of times each possible connection location of the plurality of possible connection locations for the pin is utilized in the layout.

6. The method of claim 1, wherein determining the utilization metric comprises determining a percentage of the plurality of possible connection locations that are utilized in the layout.

7. The method of claim 1, wherein determining the utilization metric comprises determining, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on a number of routed connection locations of the plurality of routed connection locations that correspond to that respective possible connection location.

8. The method of claim 7, further comprising:

displaying, on a display device, a graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and

for each possible connection location, displaying the number of times that respective possible connection location is utilized in the layout overlying a location on the graphical representation of the pin coverage area corresponding to that respective possible connection location.

9. The method of claim 7, wherein determining the utilization metric further comprises determining, for each possible connection location of the plurality of possible connection locations, a utilization percentage based on the number of times that respective

possible connection location is utilized in the layout and a number of instances of the cell in the layout.

10. The method of claim 9, further comprising:

displaying, on a display device, a graphical representation of the cell including a graphical representation of a pin coverage area for the pin; and

for each possible connection location, displaying the utilization percentage overlying a location on the graphical representation of the pin coverage area corresponding to that respective possible connection location.

11. A method of analyzing a cell of a cell library used to obtain a layout, the method comprising:

identifying each instance of the cell placed in the layout, resulting in a plurality of placed cells;

identifying, for each placed cell of the plurality of placed cells, a routed connection location utilized by the layout to connect to a first terminal of the cell, resulting in a plurality of routed connection locations;

determining, for each possible connection location of a plurality of possible connection locations for the first terminal of the cell, a number of times that respective possible connection location is utilized in the layout based on a number of routed connection locations of the plurality of routed connection locations that correspond to that respective possible connection location;

determining a utilization metric for the cell based on the number of times that each respective possible connection location is utilized in the layout; and

displaying the utilization metric on a display device, wherein the utilization metric enables a user to identify issues regarding accessibility of the pin of the cell in the layout based on the displayed utilization metric.

12. The method of claim 11, wherein:

determining the utilization metric comprises determining, for each possible connection location, a connection location utilization metric; and
displaying the utilization metric comprises:
displaying a graphical representation of the first terminal; and
displaying a graphical representation of the connection location utilization metric for each possible connection location overlying a location on the graphical representation of the first terminal corresponding to the respective possible connection location.

13. The method of claim 11, wherein:

determining the utilization metric comprises determining an overall utilization metric for the first terminal based on a number of different routed connection locations of the plurality of routed connection locations and a total number of possible connection locations for the first terminal; and

displaying the utilization metric comprises graphically indicating an association between the overall utilization metric and the first terminal of the cell.

14. The method of claim 11, wherein:

identifying the routed connection location for each placed cell of the plurality of placed cells comprises determining, for each placed cell of the plurality of placed cells, a coordinate location for a connection to the first terminal of the cell; and

determining the number of times that each respective possible connection location is utilized in the layout comprises determining a number of placed cells of the plurality of placed cells having the coordinate location for the connection to the first terminal corresponding to a respective coordinate location for that respective possible connection location.

15. The method of claim 11, further comprising:

identifying, for each placed cell of the plurality of placed cells, a second routed connection location utilized by the layout to connect to a second terminal of the cell, resulting in a second plurality of routed connection locations;

determining, for each possible second terminal connection location of a plurality of possible second terminal connection locations for the second terminal of the cell, a number of times that respective possible second terminal connection location is utilized in the layout based on a number of routed connection locations of the second plurality of routed connection locations that correspond to that respective possible second terminal connection location;

determining a second utilization metric for the cell based on the number of times that each respective possible second terminal connection location is utilized in the layout; and

displaying the second utilization metric on the display device.

16. A computer-readable medium having computer-executable instructions or data stored thereon executable by a computing device to:

obtain a layout representative of a netlist, the layout utilizing a cell library to implement the netlist;

identify each instance of a first cell of the cell library placed in the layout;

determine a utilization metric for the first cell based on routed connection locations for a pin of the first cell utilized in the layout for the identified instances of the first cell; and

display a graphical representation of the utilization metric on a display device communicatively coupled to the computing device, wherein the utilization metric enables a user to identify issues regarding accessibility of the pin of the cell in the layout based on the displayed utilization metric.

17. The computer-readable medium of claim 16, wherein the computer-executable instructions or data stored thereon are executable by the computing device to determine, for each identified instance of the first cell in the layout, a respective routed connection location utilized in the layout to connect to the pin of the respective instance of the first cell, resulting in the plurality of routed connection locations.

18. The computer-readable medium of claim 17, wherein the computer-executable instructions or data stored thereon are executable by the computing device to determine the utilization metric based on the plurality of routed connection locations and a plurality of possible connection locations for the pin.

19. The computer-readable medium of claim 18, wherein the computer-executable instructions or data stored thereon are executable by the computing device to:

identify, for each instance of the cell in the layout, a possible connection location of the plurality of possible connection locations for the pin corresponding to the respective routed connection location;

determine, for each possible connection location of the plurality of possible connection locations, a number of times that respective possible connection location is utilized in the layout based on the possible connection location identified for each instance of the cell in the layout; and

determine the utilization metric for the pin of the cell based on the number of times each possible connection location of the plurality of possible connection locations for the pin is utilized in the layout.

20. The computer-readable medium of claim 16, wherein the computer-executable instructions or data stored thereon are executable by the computing device to display a graphical representation of the first cell on the display device, the graphical representation of the utilization metric being displayed overlying the graphical representation of the first cell.

21. A system for analyzing a cell of a cell library used to generate a layout, the system is adapted to execute the method in accordance with any one of the claims 1-15.

22. The system of claim 21, comprising the computer-readable medium of any one of the claims 16-20.