CLAIMS

1. A method including:

by a computer, displaying, on a user interface, a first component of a graphical representation of a data processing application, the display of the first component including a first port of the first component, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

by the computer, responsive to a user interaction with the displayed first component, displaying a representation of one or more ports of the first component that is distinct from the display of the first component, wherein the representation of the one or more ports includes a representation of a second port of the first component that is not included in the display of the first component, and wherein the representation of the second port is responsive to a user interaction with the representation of the second port; and

by the computer, enabling the user to apply a click-and-drop action to (i) the representation of the second port of the first component or (ii) a port of a second component of the graphical representation of the data processing application to generate a connection between the second port of the first component and the port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the second port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

2. The method of claim 1, in which displaying the representation of the one or more ports includes displaying a list of the one or more ports, wherein the list of the one or more ports is distinct from the display of the first component.

3. The method of claim 1, in which the user interaction with the displayed first component includes hovering a pointer over the first component.

4. The method of claim 1, in which displaying the first component includes displaying fewer than all of the ports of the first component.

5. The method of claim 1, in which displaying the first component includes not displaying optional ports of the first component prior to the user interaction with the first component.

6. The method of claim 1, in which displaying the first component includes displaying only the ports of the first component that are associated with a connection.

7. The method of claim 1, in which displaying the representation of the one or more ports of the first component does not alter the display size of the first component.

8. The method of claim 1, in which the representation of the ports includes the indicator of the status of at least one of the ports.

9. The method of claim 1, in which the representation of the second port changes responsive to user interaction with the representation of the second port to indicate the status of the second port.

10. The method of claim 1, in which the status of a port indicates whether the port is available for a connection.

11. The method of claim 1, in which enabling the user to generate a connection includes enabling the user to select the second port from the representation of the one or more ports of the first component.

12. The method of claim 1, in which enabling the user to use a click-and-drop action to generate a connection includes enabling the user to drag a pointer from the second port of the first component to the second component.

13. The method of claim 12, including displaying a representation of one or more of the ports of the second component responsive to the user dragging the pointer to the second component.

14. The method of claim 13, in which only ports of the second component that are available for a connection are included in the representation of the ports of the second component.

15. The method of claim 1, including updating one or more data structures implementing the data processing application to cause data to flow between the first component and the second component according to the generated connection during execution of the data processing application.

16. A method of connecting components in a graph, the method including:

displaying, by a computer, in a user interface, a graph having a first component and a second component, the graph representing a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

displaying, by the computer, a symbol representing a port of the first component, the symbol being distinct from the first component, wherein the port represented by the symbol is not included in the display of the graph, and wherein the symbol is responsive to a user interaction with the symbol; and

enabling, by the computer, a connection to be made between the port of the first component and a second component in response to a click-and-drop action applied to the symbol or to a port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

17. The method of claim 16 in which the click-and-drop action includes a dragging action from the symbol to the second component.

18. The method of claim 17 in which the dragging action starts at the symbol representing the port of the first component and ends at the port of the second component.

19. The method of claim 17 in which the dragging action starts at the symbol representing the port of the first component and ends at a second symbol representing the port of the second component, the second symbol being distinct from the second component.

20. The method of claim 16 in which displaying a symbol representing the port of the first component includes displaying a window that includes the symbol.

21. The method of claim 16 in which enabling a connection to be made between the port of the first component and the second component includes enabling a connection to be made between the port of the first component and the second component without changing a display size of the first component.

22. A method of connecting components in a graph, the method including:

by a computer, interacting with a first component of a graphical representation of a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device, the interacting causing a first symbol to be displayed, the first symbol representing a first port of the first component, the first symbol being distinct from the first component, wherein the first port represented by the symbol is not included in the graphical representation of the data processing application, and wherein the first symbol is responsive to a user interaction with the first symbol; and

by the computer, using a click-and-drop action to connect the first port of the first component to a second port of a second component of the graphical representation of the data processing application by selecting the first symbol and applying a dragging action from the first symbol to the second port or a second symbol representing the second port,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the first port of the first component following processing by the one or more processes represented by the first component and input into the second port of the second component or (ii) data records output from the second port of the second component and input into the first port of the first component for processing by the one or more first processes represented by the first component.

23. The method of claim 22 in which causing a first symbol representing the first port to be displayed comprises causing a window that includes the first symbol to be displayed.

24. The method of claim 22 in which the dragging action causes a flow to be dragged to the second port or the second symbol representing the second port.

25. A non-transitory computer-readable medium storing instructions for causing a computer system to:

display, on a user interface, a first component of a graphical representation of a data processing application, the display of the first component including a first port of the first component, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

responsive to a user interaction with the displayed first component, displaying a representation of one or more ports of the first component that is distinct from the display of the first component, wherein the representation of the one or more ports includes a representation of a second port of the first component that is not included in the display of the first component, and wherein the representation of the second port is responsive to a user interaction with the representation of the second port; and

enable the user to apply a click-and-drop action to (i) the representation of the second port of the first component or (ii) a port of the second component of the graphical representation of the data processing application to generate a connection between the second port of the first component and the port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the second port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

26. The non-transitory computer-readable medium of claim 25, in which the user interaction with the displayed first component includes hovering a pointer over the first component.

27. The non-transitory computer-readable medium of claim 25, in which displaying the first component includes displaying fewer than all of the ports of the first component.

28. The non-transitory computer-readable medium of claim 25, in which displaying the representation of the ports includes displaying a representation of ports that are not included in the display of the first component.

29. The non-transitory computer-readable medium of claim 25, in which displaying the representation of the one or more ports of the first component does not alter the display size of the first component.

30. The non-transitory computer-readable medium of claim 25, in which the representation of the second port changes responsive to user interaction with the representation of the second port to indicate the status of the second port.

31. The non-transitory computer-readable medium of claim 25, in which enabling the user to generate a connection includes enabling the user to select the second port from the representation of the one or more ports of the first component.

32. The non-transitory computer-readable medium of claim 25, storing instructions for causing the computer system to display a representation of one or more of the ports of the second component responsive to the user dragging a pointer from the particular port of the first component to the second component.

33. The non-transitory computer-readable medium of claim 25, storing instructions for causing the computer system to update one or more data structures implementing the data processing application to cause data to flow between the first component and the second component according to the generated connection during execution of the data processing application.

34. A computing system including:

at least one processor configured to:

display, on a user interface, a first component of a graphical representation of a data processing application, the display of the first component including a first port of the first component, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

responsive to a user interaction with the displayed first component, display a representation of one or more ports of the first component that is distinct from the display of the first component, wherein the representation of the one or more ports includes a representation of a second port of the first component that is not included in the display of the first component, and wherein the representation of the second port is responsive to a user interaction with the representation of the second port; and

enable the user to apply a click-and-drop action to (i) the representation of the second port of the first component or (ii) a port of a second component of the graphical representation of the data processing application to generate a connection between the second port of the first component and the port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the second port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

35. The computing system of claim 34, in which the user interaction with the first component includes hovering a pointer over the first component.

36. The computing system of claim 34, in which displaying the first component includes displaying fewer than all of the ports of the first component.

37. The computing system of claim 34, in which displaying the representation of the ports includes displaying a representation of ports that are not included in the display of the first component.

38. The computing system of claim 34, in which displaying the representation of the one or more ports of the first component does not alter the display size of the first component.

39. The computing system of claim 34, in which the representation of the second port changes responsive to user interaction with the representation of the second port to indicate the status of the second port.

40. The computing system of claim 34, in which enabling the user to generate a connection includes enabling the user to select the second port from the representation of the one or more ports of the first component.

41. The computing system of claim 34, in which the at least one processor is configured to display a representation of one or more of the ports of the second component responsive to the user dragging a pointer from the particular port of the first component to the second component.

42. The computing system of claim 34, in which the at least one processor is configured to update one or more data structures implementing the data processing application to cause data to flow between the first component and the second component according to the generated connection during execution of the data processing application.

43. A computing system including:

means for displaying, on a user interface, a first component of a graphical representation of a data processing application, the display of the first component including a first port of the first component, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

means for, by the computer, responsive to a user interaction with the displayed first component, displaying a representation of one or more ports of the first component that is distinct from the display of the first component, wherein the representation of the one or more ports includes a representation of a second port of the first component that is not included in the display of the first component, and wherein the representation of the second port is responsive to a user interaction with the representation of the second port; and

means for enabling the user to apply a click-and-drop action to (i) the representation of the second port of the first component or (ii) a port of a second component of the graphical representation of the data processing application to generate a connection between the second port of the first component and the port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the second port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

44. A non-transitory computer-readable medium storing instructions for causing a computer system to:

display, by the computer system, in a user interface, a graph having a first component and a second component, the graph representing a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

display, by the computer system, in the user interface, a symbol representing a port of the first component, the symbol being distinct from the first component, wherein the port represented by the symbol is not included in the display of the graph, and wherein the symbol is responsive to a user interaction with the symbol; and

enabling, by the computer, a connection to be made between the port of the first component and a second component in response to a click-and-drop action applied to the symbol or to a port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

45. A computing system for connecting components in a graph, the computing system including:

at least one processor configured to:

display, by a computer, in a user interface, a graph having a first component and a second component, the graph representing a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

display, by the computer, in the user interface, a symbol representing a port of the first component, the symbol being distinct from the first component, wherein the port represented by the symbol is not included in the display of the graph, and wherein the symbol is responsive to a user interaction with the symbol; and

enabling, by the computer, a connection to be made between the port of the first component and a second component in response to a click-and-drop action applied to the symbol or to a port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

46. A computing system for connecting components in a graph, the computing system including:

means for displaying, by a computer, in a user interface, a graph having a first component and a second component, the graph representing a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device;

means for displaying, by the computer, a symbol representing a port of the first component, the symbol being distinct from the first component, wherein the port represented by the symbol is not included in the display of the graph, and wherein the symbol is responsive to a user interaction with the symbol; and

means for enabling, by the computer, a connection to be made between the port of the first component and a second component in response to a click-and-drop action applied to the symbol or to a port of the second component,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the port of the first component following processing by the one or more processes represented by the first component and input into the port of the second component or (ii) data records output from the port of the second component and input into the second port of the first component for processing by the one or more processes represented by the first component.

47. A non-transitory computer-readable medium storing instructions for causing a computer system to:

interact with a first component of a graphical representation of a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device, the interacting causing a first symbol to be displayed, the first symbol representing a first port of the first component, the first symbol being distinct from the first component, wherein the first port represented by the symbol is not included in the graphical representation of the data processing application, and wherein the first symbol is responsive to a user interaction with the first symbol; and

use a click-and-drop action to connect the first port of the first component to a second port of a second component of the graphical representation of the data processing application by selecting the first symbol and applying a dragging action from the first symbol to the second port or a second symbol representing the second port,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the first port of the first component following processing by the one or more processes represented by the first component and input into the second port of the second component or (ii) data records output from the second port of the second component and input into the first port of the first component for processing by the one or more processes represented by the first component.

48. The non-transitory computer-readable medium of claim 47 in which the dragging action causes a flow to be dragged to the second port or the second symbol representing the second port.

49. A computing system for connecting components in a graph, the computing system including:

at least one processor configured to:

interact with a first component of a graphical representation of a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device, the interacting causing a first symbol to be displayed, the first symbol representing a first port of the first component, the first symbol being distinct from the first component, wherein the first port represented by the symbol is not included in the graphical representation of the data processing application, and wherein the first symbol is responsive to a user interaction with the first symbol; and

use a click-and-drop action to connect the first port of the first component to a second port of a second component of the graphical representation of the data processing application by selecting the first symbol and applying a dragging action from the first symbol to the second port or a second symbol representing the second port,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the first port of the first component following processing by the one or more processes represented by the first component and input into the second port of the second component or (ii) data records output from the second port of the second component and input into the first port of the first component for processing by the one or more processes represented by the first component.

50. The computing system of claim 49 in which the dragging action causes a flow to be dragged to the second port or the second symbol representing the second port.

51. A computing system for connecting components in a graph, the computing system including:

means for interacting with a first component of a graphical representation of a data processing application, the first component representing one or more processes of the data processing application, the one or more processes being executable to process incoming data received by a computing device, the interacting causing a first symbol to be displayed, the first symbol representing a first port of the first component, the first symbol being distinct from the first component, wherein the first port represented by the symbol is not included in the graphical representation of the data processing application, and wherein the first symbol is responsive to a user interaction with the first symbol; and

means for using a click-and-drop action to connect the first port of the first component to a second port of a second component of the graphical representation of the data processing application by selecting the first symbol and applying a dragging action from the first symbol to the second port or a second symbol representing the second port,

in which the connection is indicative of a flow of data during execution of the data processing application, the flow of data being either (i) data records output from the first port of the first component following processing by the one or more processes represented by the first component and input into the second port of the second component or (ii) data records output from the second port of the second component and input into the first port of the first component for processing by the one or more processes represented by the first component.