Understanding Ports

In Megaladata, *ports* are the communication points that allow data and control signals to flow between different nodes in your workflows. They define how nodes connect and exchange information.

Port types

- Table data: Used for transferring structured tabular data.
- Variables: Passes or accepts single values or lists of values.
- Hierarchical data: Operates tree-like data structures
- Connection parameters: Carries database or data source connection details.
- Undefined structure: Used when the data structure isn't pre-determined.

Apart from the icon shape, ports are distinguished by:

- Colors (indicating different states, explained further)
- Outlines (dotted or solid, explained further)
- Special auto-synchronization icons (indicating auto-sync on/off)

Input and output ports

- Workflow nodes receive data through *input ports*, located on the left side of the node icon.
- Nodes send processed data out through *output ports*, located on the right side.



Figure 1. Workflow node with two input ports and one output port

Data flow within ports

Ports are more than simple connection points; they allow for data transformation within the port itself.

The data within a port is organized as an input and output set of fields or variables, depending on the port's type. The input set is the data the port has accepted. The output set represents the data the port will pass on. When configuring a port, you can:

- Customize the structure of the output set, modifying the list of its fields/variables and their parameters.
- Map the port's input set fields/variables with those of the output set.

The data flow of a node that accepts and transfers a tabular dataset can be demonstrated in the following scheme:

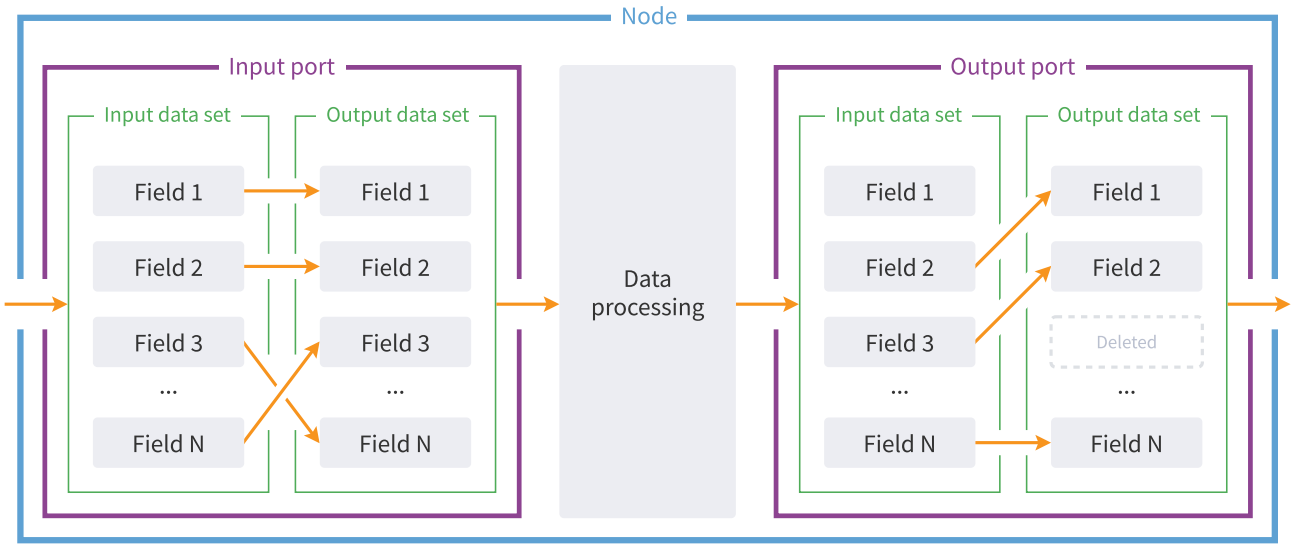

Figure 2. Data flow within a node that accepts and gives back a tabular dataset

1. **Data enters input port:** When data arrives at the input port, it can be modified there before it is passed on to the node.
2. **Data processing:** The node's algorithm processes the data and passes it on to the output port.
3. **Data exits output port:** The processed dataset can be modified within the node's output port. Then, it is sent on as the node's output.

Here is an outline of the transformations possible within ports:

- **Input port:** Data entering the node can be modified (fields or variables renamed, reordered, removed, usage types and labels changed) *before* the node's main processing logic receives it.

- **Output port:** Data generated by the node's main processing logic can be further modified (fields renamed, reordered, removed, etc.) *before* it is sent out to the next node.

For more details on changeable field parameters, see Dataset Field Parameters.

Configuring ports

You can interact with ports directly on the workflow area to configure them, view data, or change their labels.

Port actions menu

A single left click on a port icon opens a small menu presenting available actions:

- **Quick view**: Opens the Quick View visualizer to inspect the data currently available at that port. This option is available only for output ports after node execution.
- **Configure port**: Opens the main port configuration wizard, allowing you to define the port's structure and mappings (detailed below).
- **Edit port caption**: Allows you to change the display name (caption) of the port. Customizing the caption is helpful for identification. It may be displayed in some node configuration wizards where input datasets need to be distinguished. For output ports, it will also appear in the visualizer selection pane (though the visualizers themselves might need their own captions).

Port configuration capabilities

When configuring a port (having selected the **Configure port** command in the menu), you can define its output structure:

- If you don't know the exact input data structure (e.g., the input port isn't linked with any other node yet), the wizard allows you to preconfigure the output data structure only.
- If the input data structure is already known, you can specify the exact fields or variables (names, order, types) that the port will output, by mapping them to the ones of the input set. To do so, you can choose one of the two visual representations:
    - Links: A graphical view showing lines connecting fields/variables of the input set to those of the output set.
    - Table: A tabular interface where you select the corresponding input field/variable for each output field/variable and assign them necessary usage types.

You can also configure how the port reacts if the structure of incoming data changes unexpectedly.

Automapping

Ports are crucial not only for data transfer but also for field synchronization within your workflow (also called *auto-mapping*).

- **Default Behavior:** When you add a new node, its ports usually have automapping of fields enabled by default. This automatically sets the port's output structure to be identical to its input structure.
- **Disabling:** Automapping is automatically disabled if you manually modify the port's output structure (e.g., by deleting a field).

Hiding optional ports

Megaladata hides certain less frequently used ports by default to simplify the workflow view:

- Execution order ports: Click the toolbar button **Customize execution order** above the workflow area to show/hide these ports, which control execution sequence.
- Control variables ports: Right-click the node and select **Show control variables port** from the context menu to display these.

Port color and outline indicators

Ports use color and line style to indicate their status and requirements:

- **Line style:**
  - **Solid line:** Required port. Must be connected for the node to function correctly.
  - **Dashed/dotted line:** Optional port. Connection is not mandatory for the node to function.
- **Color (using a required table port as an example):**
  - Port executed successfully.
  - Port is configured but not yet executed.
  - Port is not configured or contains an error.
  - Port configuration is incomplete.

> **Note**: The color indicators are similar for variable, connection, and undefined structure ports.

Linking ports

Links between ports define the path of data flow in your workflow. Connections can be made manually or automatically.

Manual linking

1. Move your mouse cursor over the source port (e.g., an output port on the right of a node).
2. Click and hold the left mouse button.
3. Drag the cursor towards the target port (e.g., an input port on the left of another node). A dashed line will appear, following your cursor. The end of the line near the cursor will indicate the port type required for a valid connection (the port icon appears).
4. Release the left mouse button when the cursor is over the desired target port.

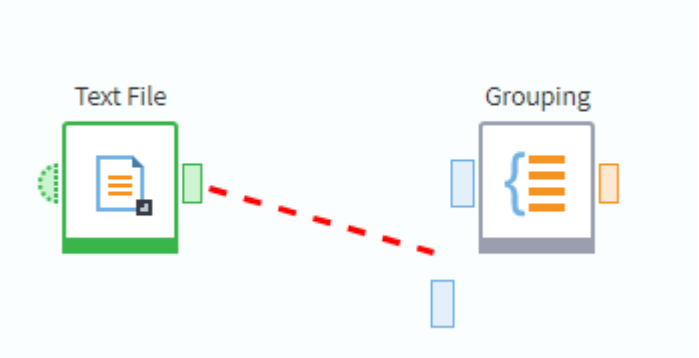

Figure 3. Connection of ports

When linking the ports manually, follow these rules:

- **Matching types:** You can only connect ports of the same type (e.g., table to table, variable to variable).
- **No self-connection:** You cannot connect a node's output port directly to its own input port.
- **No cyclic links:** Creating loops (e.g., Node A to Node B and back to Node A) is not allowed.

Automatic linking

1. Drag a component from the Components pane onto the workflow area.
2. If the dragged component enters an auto-link area of a compatible output port on the existing node, the potential link appears, along with a tooltip showing the output port's caption and current state.
3. When you release the mouse button in the auto-link area, a connection is automatically created.
4. For **connection** type ports, the potential auto-link correctness is checked immediately. For other types, the check occurs when you finish adding the node to the workflow.
5. If multiple connections are possible, the system typically attempts to connect the topmost compatible input ports of each type on the new node.
6. To prevent automatic connection while dragging, hold down the `Alt` key.

Articles in Section:

- Automapping of Fields
- Data Tree Ports
- Table and Variables Ports
- Service Ports
- Optional Ports