MindSphere

Visual Analyzer

System Manual
Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠️ DANGER
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⚠️ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.

⚠️ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

⚠️ NOTICE
indicates that property damage can result if proper precautions are not taken.

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Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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MindSphere Visual Analyzer is an application for MindSphere, the industrial IoT platform from Siemens. MindSphere Visual Analyzer is an easy-to-use basic analytics application of time series data and assists you to gain deeper insights into your production system and how machines are performing. Once started, you can instantly drill down, search or filter data on the fly, which allows you to conduct root-cause analysis and to avoid downtimes. Visual Analyzer is an add-on to Fleet Manager and is completely integrated into MindSphere without the need of upfront data preparation.
<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Changes</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1801.Mar/2019.1</td>
<td>2019-03-11</td>
<td>Modified &quot;Timepicker&quot; user interface</td>
<td>Visualization area (Page 13)</td>
</tr>
<tr>
<td>V1801.Feb/2019.1</td>
<td>2019-02-11</td>
<td>Modified the screenshots for the new OS bar</td>
<td>-</td>
</tr>
</tbody>
</table>
Introduction to "Visual Analyzer"

Overview

MindSphere Visual Analyzer is an easy-to-use basic analytics application of time series data and assists you to gain deeper insights into your production system and how machines are performing. Once started, you can instantly drill down, search or filter data on the fly, which allows you to conduct root-cause analysis and to avoid downtimes.

Visual Analyzer is an add-on to Fleet Manager and is completely integrated into MindSphere without the need of upfront data preparation. Additionally, customized global views of your online data can be created and shared with colleagues or customers across different locations.

You can open Visual Analyzer as an independent app from the Launchpad or directly from Fleet Manager (https://documentation.mindsphere.io/#/kiosk).

Visual Analyzer uses the assets, aspects and variables defined in Asset Manager. You can find additional information on creating and configuring your assets, aspects and variables in the Asset Manager documentation (https://documentation.mindsphere.io/#/kiosk).

Features

Visual Analyzer offers you the following functions:

- Monitor one or multiple data points in a chart.
- Build line, bar and pie charts for analysis of performance in minutes.
- Display aspects and variables in a line chart, pie chart, bar chart or a table.
- Drill down and filter your data on the fly.
- Create customize views and share data with your organization.
- Combine variables of different aspects.
- Save evaluations as virtual aspects and display them in the "Aspects" extension in Fleet Manager.
- Analyze events in the context of your asset data.

Purchase Visual Analyzer

You can buy Visual Analyzer in the MindSphere Store. Visual Analyzer is an add-on to MindSphere Fleet Manager.

See also

2.1 How to get “Visual Analyzer”?

How to get “Visual Analyzer”?

To buy “Visual Analyzer”, proceed with the following steps:

2. Search “Visual Analyzer” or browse for the content under “MindAccess”.
3. Select “Visual Analyzer”.
4. Select a plan size and click on checkout button.
5. Follow the onscreen instructions to complete the purchasing process.

Enable access to Visual Analyzer

In order to enable access to Visual Analyzer you have to assign a role. Open User Management and assign the role “va.usage” to the user who wants to use “Visual Analyzer”. For more information on assigning roles, refer to the Settings documentation (https://documentation.mindsphere.io/resources/html/user-management/en-US/index.html).

See also

3.1 Overview start screen

By using the asset navigation, you can select the asset of your choice to display the asset data in charts or tables. You can also add variables or events to your chart by using the sidebar.

Start screen

1. Shows the asset navigation
2. Visualization data
3. Sidebar navigation
4. Management tools
5. Logout button

3.2 Asset navigation

The asset navigation window allows you to filter, sort and select available assets.

The assets in the asset navigation window are automatically loaded whenever an asset is created in Asset Manager. For more information, please refer to the Asset Manager documentation (https://documentation.mindsphere.io/resources/html/asset-manager/en-US/index.html).
3.2 Asset navigation

Asset navigation screen

1. Opens the filter and sort dialog
2. Search bar
3. Shows or hides the selected filters
4. Shows the activated filters
5. Shows the filtered assets
3.3 Visualization area

1. Aspects drop-down menu
2. Menu for virtual aspects management
3. Date and time selection field
4. Opens sidebar
5. Zoom function
6. Visualization area
7. Tools with the following functions:
   - Create a manual event
   - Open rules configuration
8. Shows selected variables in legend
9. Switchover among visualization options
Symbols

Visual Analyzer add-on contains the following buttons:

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Button Image]</td>
<td>Saves the current settings of Visual Analyzer as a new virtual aspect.</td>
</tr>
<tr>
<td>![Button Image]</td>
<td>Resets the graphic view. Restores the standard view of the selected aspect.</td>
</tr>
<tr>
<td>![Button Image]</td>
<td>Saves the changes of the graphic view in the selected aspect.</td>
</tr>
<tr>
<td>![Button Image]</td>
<td>Deletes the selected aspect.</td>
</tr>
<tr>
<td>![Button Image]</td>
<td>Shows or hides the sidebar.</td>
</tr>
<tr>
<td>![Button Image]</td>
<td>Takes the time range from the graph. The calendar takes the start and end date from the left and right edge of the line chart.</td>
</tr>
</tbody>
</table>
| ![Button Image] | Selection between:  
  - UTC: Coordinated Universal  
  - Time Browser (e.g. +02:00): Uses the system time. Daylight saving is taken into account. |
| ![Button Image] | Switches the start of the time range to the current date and time. The time range uses the pre-defined time interval which updates every minute. |
| ![Button Image] | Switches the time range in the pre-defined time interval back. |
| ![Button Image] | Switches the time range in the pre-defined time interval forwards. |
| ![Button Image] | Opens the calendar for exact selection of the date and time. |
| ![Button Image] | Enlarges the graph. |
| ![Button Image] | Reduces the size of the graph. |
| ![Button Image] | Restores the standard zoom level. |
| ![Button Image] | Changes the display to the line chart. |
| ![Button Image] | Changes the display to the pie chart. |
| ![Button Image] | Changes the display to the bar chart. |
| ![Button Image] | Table display of the data. |
| ![Button Image] | Opens the menu to create a manual event. |
| ![Button Image] | Redirects to the window of the "Rules" extension in Fleet Manager. |
"Timepicker" user interface

The graph shows the set time period in the timepicker. You can also move the time period of the graph to the right or left using drag-and-drop. You can access the calendar of the timepicker by clicking.

1. Shows the selected start date of the visualization
2. Time zone selection
3. Latest time zone and automatic updation of date range
4. Manual selection of date range
5. Quick selection of date range
6. Shows the selected end date of the visualization
7. Accept or cancel the settings

**Note**
To update the "From" and "To" fields to the current date and time, you can use.

**See also**
Usage of virtual aspects (Page 29)

### 3.4 Sidebar functions

With the sidebar you can get to a list of variables and events which are related to an asset.
"Variables" helps you to select variables to the visualization area. The view of variable combinations can be saved as virtual aspects.

Through "Events", you can analyze and interpret events in the context of your asset data.

To open the sidebar, click the button in Visual Analyzer.

**Properties of sidebar**

The sidebar offers you the following options:

- Show and hide individual variables and events
- Create new scales
- Move variables to new scales
- Change the color of the variables
- Change the status of events

You can add filters to reduce the number of variables or events displayed.

Sidebar screen

1. Open/Close sidebar
2. "Variables" and "Events" menu
3. Show and hide active filters
4. Scale menu
5. Variables list

Sidebar variables screen

The variables are initially created in Asset Manager. The assets will have aspects and aspects contain variables.

The "Variables" screen will allow you to view and select variables in the visualization area.
3.4 Sidebar functions

1. Activates the variables view
2. Opens the filter and sort dialog for variables
3. Clears all filter and sorting rules
4. Shows or hides active filters
5. Master button for activating or deactivating all variables inside a scale
6. Shows or hides the scale variables
7. Variable details
8. Opens a flyout menu with the following options:
   - Rules limits
   - Choose color
   - Move to scale
9. Open the rules limits
10. Opens a window to change the variable color
11. Activates or deactivates the selected variable
12. Moves the variable to a different scale
Parameters in "Variables"

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| Data format | Format in which the variables are available. The following data formats are possible:  
  - Boolean  
  - Int  
  - Long  
  - Double  
  - String  
  - Timestamp |
| Unit       | Scale of measure |

Filter and Sort menu for "Variables"

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>No filters applied.</td>
</tr>
<tr>
<td>Selected variables</td>
<td>Filter and sort by the selected variables.</td>
</tr>
<tr>
<td>Data formats</td>
<td>Filter the variables according to the data formats defined.</td>
</tr>
<tr>
<td>Units</td>
<td>Filter the variables according to the units.</td>
</tr>
</tbody>
</table>
Sidebar "Events" screen

The event sidebar displays all MindSphere events which are related to your selected asset. Those events can be from different sources, for example, Fleet Manager Rules. For further information on event characteristics, refer "Event Management (https://developer.mindsphere.io/apis/advanced-eventmanagement/api-eventmanagement-overview.html)" in Developer Documentation.

Parameters in "Events"

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event heading</td>
<td>Description of the event</td>
</tr>
<tr>
<td>Time</td>
<td>Time of creation of the event</td>
</tr>
<tr>
<td>Source</td>
<td>Source of the event</td>
</tr>
<tr>
<td>Property</td>
<td>Aspect</td>
</tr>
<tr>
<td>State</td>
<td>New or Acknowledged</td>
</tr>
</tbody>
</table>
### Filter and sort dialog for "Events"

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>Show events which are in state &quot;New&quot;.</td>
</tr>
<tr>
<td>Acknowledged</td>
<td>Show events which are in state &quot;Acknowledged&quot;.</td>
</tr>
<tr>
<td><strong>Severity</strong></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>Filter events based on errors traced.</td>
</tr>
<tr>
<td>Warning</td>
<td>Filter the events which give warning.</td>
</tr>
<tr>
<td>Information</td>
<td>Filter events based on information.</td>
</tr>
<tr>
<td><strong>Sort</strong></td>
<td></td>
</tr>
<tr>
<td>None (Newest Events)</td>
<td>No filters applied. By default, sort and display with the newest event on top.</td>
</tr>
<tr>
<td>Oldest Events</td>
<td>Sort according to the dates starting from the oldest.</td>
</tr>
<tr>
<td>Sort by most critical severity</td>
<td>Sort based on critical severity of the events.</td>
</tr>
</tbody>
</table>
3.4 Sidebar functions
User rights in "Visual Analyzer"

Visual Analyzer adopts the user rights from Settings.
The user rights depend on the following user roles:

- Administrator (va.adminusage)
- Subtenant user (va.subtenantusage)
- Standard user (va.usage)

Roles for different users

The following table gives an overview of the roles assigned to the different users:

<table>
<thead>
<tr>
<th>Right</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Administrator</td>
</tr>
<tr>
<td>Read Aggregates</td>
<td>✓</td>
</tr>
<tr>
<td>Read time series data</td>
<td>✓</td>
</tr>
<tr>
<td>Create manual events</td>
<td>✓</td>
</tr>
<tr>
<td>Acknowledge events</td>
<td>✓</td>
</tr>
<tr>
<td>Read events</td>
<td>✓</td>
</tr>
</tbody>
</table>
User rights in "Visual Analyzer"
5.1 Build common chart types

To use the visualization options, select an aspect or combine the variables of the sidebar you want to analyze, and then select the type of visualization you want to create.

You can choose between pie, bar and line charts and a table view to display your selected variables. To visualize the data, follow the steps below:

1. Select an asset from the asset navigation.
2. Select an aspect or select variables from the variable list in the sidebar.
3. Select the type of view you want to create from the toolbar.

For any chart, Visual Analyzer displays the variable values for a specific time period defined from the calendar.

The table view is only available for variables of non-numeric data types (Boolean, String, Chart) only. All numeric data types can be viewed in all other graphic representations.

Pie chart view

Pie charts are used to visualize the proportion of a whole.

Note

Only the last value of all variables is displayed in the selected period.
Bar chart view

Bar graphs are used to compare values of different groups or to track changes over time. The bar chart uses the unit of the variables.

The values are set in proportion to the unit.

**Note**

Only the last value of all variables is displayed in the selected period.
5.1 Build common chart types
Line chart view

Line graphs can be used to compare the variables over the same period of time for variables of different aspects.

Table view

To view the data in tabular format, you can click button:
5.2 Usage of virtual aspects

The aspects are usually created in Asset Manager.

The aspects created in Asset Manager will be shown in Visual Analyzer. Visual Analyzer will consider these as default aspects. If required, you can save the combination of variables as virtual aspects for later use in Visual Analyzer. Those virtual aspects will also be displayed in the "Aspect" extension within Fleet Manager (https://documentation.mindsphere.io/resources/html/fleet-manager/en-US/index.html).

Creating a new virtual aspect

You have the option to save different views of the graph as a new virtual aspect.

By default, the aspects created in Asset Manager can be chosen from the "Aspects" drop-down menu.

To create a new virtual aspect, use the following procedure:

1. Select one or more variables from the "Variables" sidebar.

2. For the new view displayed in the visualization area, click the "Save As" button to save as a new virtual aspect. This "Save As" button has exclamation symbol inscribed when there are modifications to the current view.

3. Save the newly created virtual aspect.
Note
Default aspects created in Asset Manager cannot be changed. You can only create new virtual aspects. Also when you change the view (pie chart etc.), you must save it as a virtual aspect.

Saving an existing aspect

To save a modified view as an aspect, click the button.
The newly saved aspects then can be selected using the "Aspects" drop-down menu.
The created virtual aspects are shown in Visual Analyzer and are displayed within Fleet Manager.
6.1 Insert new scale to chart

As per default variables will be scaled automatically to minimum and/or maximum values, it can be required to create a new scale for ease of viewing the variables.

For example: There are two variables toggling between 0-1 and 1000-11000. You might see only two lines. By defining a new scale, you will be able to move a variable to the newly created scale. Hence, the minimum and/or maximum values will change and the values will be more readable.

Note

Name of scale

The following characters are not permitted: °, $, §, € \, >, <, ßäöüßÄÜ.

Create a new scale

The procedure to enter a new scale is given below:
1. Click the button in the "Variables" tab for a variable.
2. Select "Move to Scale" and then "New Scale".
3. Type the required scale name.
4. Click the button to save the new scale.

Edit and delete an existing scale

You can always edit an existing scale. If an existing scale is not required, you can delete it.

View an existing scale

You can view the variables existing in a scale by clicking the button next to the scale name.

6.2 Move variables to a scale

You have the possibility to move the variables to a new scale.
**Procedure**

The procedure to move an existing scale is given below:

1. In order to create a new scale, click the button in the "Variables" tab for a variable.
2. Select "Move to Scale" and then select the scale where you want to move the selected variable. The "Standard Scale" variable will be present by default.

**Result**

The following graphic shows an arrangement of two scales – "Standard Scale" and "Brewery Scale" which have two variables each.

---

**6.3 Display thresholds of rules in chart**

You have the possibility to display the threshold value of a rule as a boundary in the line chart. The threshold value rule is created in Fleet Manager. To know more about setting rules, refer to the Fleet Manager documentation ([https://documentation.mindsphere.io/resources/html/fleet-manager/en-US/index.html](https://documentation.mindsphere.io/resources/html/fleet-manager/en-US/index.html)).
Procedure

The procedure to view a threshold value of a rule as a boundary is given below:

1. In order to display a rule as a boundary in a diagram, click the button in the "Variables" tab of the sidebar.
2. The menu item "Rules limits" displays all the created rules of the variable.
3. Click on the rule you want to select.

Result

The following graphic shows a displayed rule as a blue line:

6.4 Create a manual event

Example scenario

A production manager is analyzing data and detects some unexpected issues or behavior. To document the results of investigation or the need for further maintenance tasks a manual event can be created.
Objective

A new manual event "Check the speed", needs to be created and acknowledged.

Procedure

To create a manual event and acknowledge an event, proceed as follows:

1. Click on the icon, at the bottom right of the page.
2. Fill in the following fields in the "Create manual event" window:
   - Description: Enter the description for the event.
   - Severity: Select the severity from the drop down menu. The supported values are: Error, Warning and Information.
   - Timestamp: Select the date and timestamp.
   - Measuring Point: Select the measuring point from the drop down menu.
3. Click "Create". The sidebar organizes the newly created event above the existing events (i.e. events are sorted according to the dates with the latest creations being on top of the events window).

Result

- An event is created manually for the aspect.

6.5 Change event state

Procedure for state change of an event

To change the event state from "New" to "Acknowledged", follow the steps below:

1. Select the event which is to be changed.
2. Select the checkbox in the event description.
3. Click the "Acknowledge" button.
Result

The state will be changed from "New" to "Acknowledged".

Simultaneously, the "State" checkbox will be disabled for any further changes.

Note

Once the state is changed to "Acknowledged", it cannot be changed back.

6.6 Interpret event data

Visual Analyzer helps you to interpret events received by your system. Hence, you can use the event list from the sidebar to filter for relevant events and add them to your chart.

Procedure

Follow the steps below to interpret events data:

1. Select the asset from the asset navigation window.
2. Select the aspect from the drop down menu.
3. Open the event list in the sidebar. By default, the event list shows all events related to the asset.
4. Filter and sort the events as per the requirement.
5. Select or deselect the event to display them in the chart.
6. If required, acknowledge the events. For more information, see Change state in events (Page 34).
Options to view events

1. **View relevant events**: Filter and sort.
2. **View events in charts**: Select/Deselect the events.
3. **View new and acknowledged events**: Events can be set from "New" to "Acknowledged" in the event list.