Application Statistics

COOL RIDE provides you with a number of programming and user-interface options for defining application statistics measures and using them to gather your application statistics for a specific period of time—day(s), month(s) or year(s). The accumulated data can be presented in tabular and graphical format. Through the VM's Control Panel you can gain access to the controls of application statistics assessment and display.

Measuring Application Statistics

Measure is a term used in COOL RIDE to designate some kind of statistics for the current application. Every *measure* is defined as a sum of the values of one or more *meters* for which you can choose one of predefined statistic rules (formulas). To define a new measure or modify an existing measure, you should use the **Measures** dialog where you can view a list of currently available measures and if necessary you can customize the list and its items (see "Defining Measures").

Declaring Meter and Choosing Measuring Formula

In COOL RIDE, *meter* is a kind of measuring instrument you can place somewhere in the source code of your application in order to make some statistical evaluations of performance of the entire program and/or its parts.

Meters can be declared in source code according to one of the following three options of the *COOL* syntax:

METER <*meter_identifier*> **ON**

METER <*meter_identifier*> **OFF**

METER<*meter_identifier*> **COUNT** <*integer expr*>

For declaring a particular meter, you can use

- the first option (ON)
- a pair of first two options (ON and OFF)
- the third option (COUNT)
- the third option (COUNT) inside the source code confined by an ON/OFF pair.

Yet, you cannot use the second option (OFF) without the first option (ON) preceding it.

Using an ON/OFF pair to declare a meter as follows

meter m1 **on**;

…

meter m1 **off**;

you actually specify a scope of validity for the meter (m1). For a piece of source code within the boundaries defined by ON and OFF, a number of parameters (**Total Processing Time**, **Total Stopwatch Time**, **Average Processing Time**, **Average Stopwatch Time**, etc.) is measured. By choosing an appropriate formula for the measure in the **Properties of Measure** dialog you can view the corresponding results of the measurements. What is more, you can declare the same meter with a counter

meter m1 **count** <*integer expr*>

When it is done within ON and OFF as shown here

meter m1 **on**;

…

meter m1 **count** n*;*

…

meter m1 **off**;

you can use this meter to evaluate both average processing time and average stopwatch time against the counter value determined by a sum of accumulated increments (in the above example the counter's increment is equal to "n" on the assumption that "n" is of an integer value). For this purpose, you need to choose either **Average Processing Time Per Counter** or **Average Stopwatch Time Per Counter** from the list of the meter's formulas (see "Defining Measures"). For a meter declared with the help of an ON/OFF pair, you can choose **Hit Counter** from the list of the formulas. In this case, the measures will reflect a number of passes through the ON-OFF boundaries specified in your source code. (Such passes or "hits" take place when your application is running under control of the COOL RIDE Virtual Machine.) Note that a meter can also be declared only with an ON option. In such a case the end of the source code will play a role of the missing OFF for the meter's ON-OFF declaration allowing you to choose the **Hit Counter** formula for the meter.

Defining Measure

COOL RIDE lets you define *measures* and use them to display your application statistics for a specific period of time—day(s), month(s) or year(s). The accumulated data can be presented in tabular and graphical format. Regardless of the way used to present the results of statistical measurements, the basis for this information is meter declaration in source code of an application.

> Note
>
> A measure definition is a way of specifying what part of the information gathered with the help of the meters defined in your program.

To define a measure, you need to choose a formula for statistical measurements (**Total Processing Time**, **Total Stopwatch Time**, **Average Processing Time**, **Average Stopwatch Time**, etc.) and then to create a list of meters measurements of which will constitute the measure according to the chosen formula.

> Note
>
> Depending on the meter's declaration done in the source code of your application, the rule chosen for a measure definition based on the meter can produce either a non-zero value or zero.

The results of measurements are summarized and it can be displayed as the measure's values in tabular or graphical format. The accumulated statistics is presented against the time passed (see "Application Statistics Dialog").

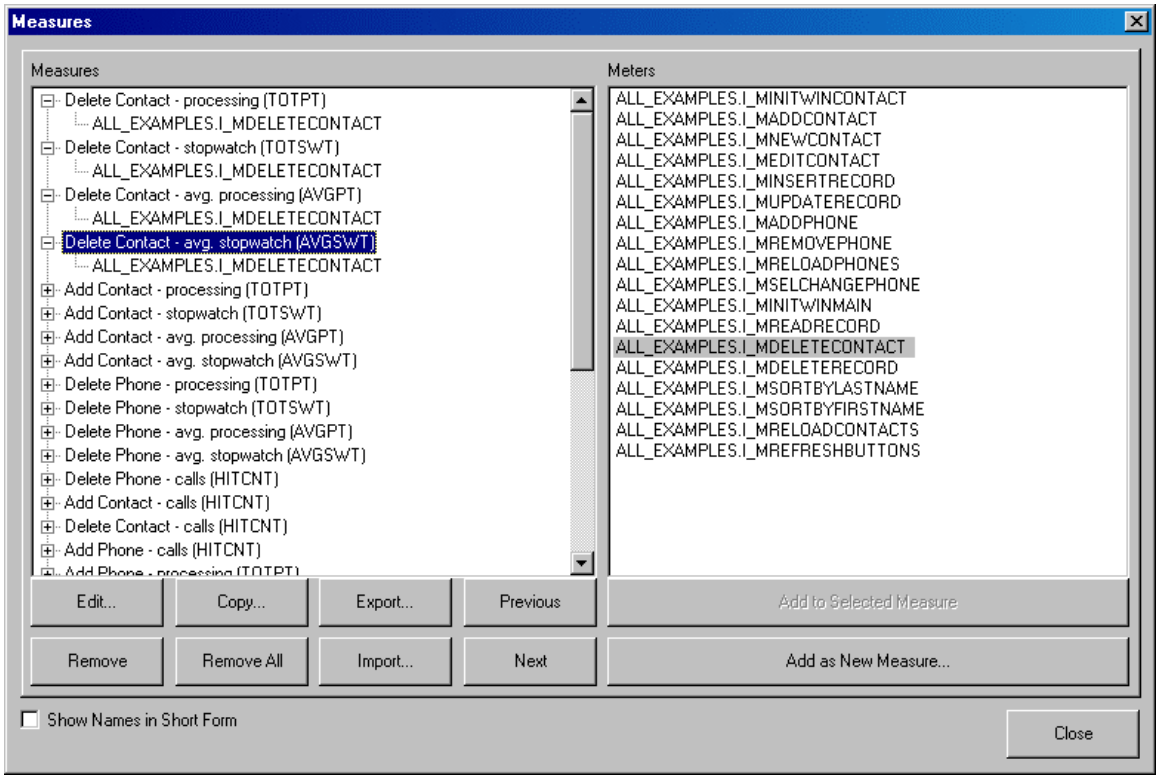
Presenting Statistics

COOL RIDE lets you choose between tabular and graphical formats for presentation of the application statistics and allows you to customize the accumulated data's presentation by selecting measures for the statistics presentation and by specifying the period of the past time—the last day(s), month(s) or years(s)—for which COOL RIDE has to provide you with the history of statistics.

To customize the presentation of the application statistics, use options of two dialogs—**Application Statistics** and **Purge History of Application Statistics**. To choose a way of data presentation, make a choice between tabular and graphical format (the tabs **Table** and **Timers** of the **Application Statistics** dialog). To specify the measures to be included in the statistics presentation, use the **Measures to Display** dialog. To define the period of the past time for which you want to obtain the statistics history, use options of the **Purge History of Application Statistics** dialog. To reset the statistics—either accumulated for the current session or all the statistics—use the **Reset Statistics** dialog.

Defining Measures

For defining a new measure or modifying an existing one, you should open the **Measures** dialog (the **Measures** option from the **Options**|**Statistics** menu of COOL RIDE Control Panel).



The dialog has two display panes, a checkbox and a number of buttons. The right pane, **Meters**, shows all the meters defined within the source code of the application. The left pane, **Measures**, displays the list of currently available measures that you can customize and then use it to display performance statistics you wish to get for your application. The list is of a tree-like structure with expandable/collapsible nodes representing measures. The measures each commonly contain one or more meters.

> Note
>
> In COOL RIDE, *measure* is a sum of values of one or more *meters* for which you can choose one of the predefined statistical rules or formulas. As for *meter*, it should be considered as a kind of measuring instrument placed somewhere in the source code of your application in order to make some statistical evaluations of application's performance.

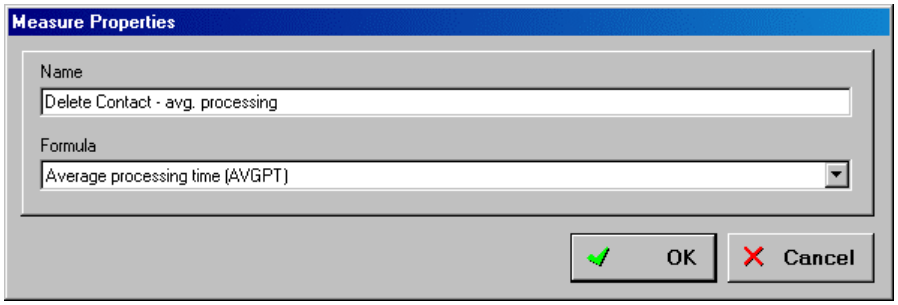
The **Measures** dialog can show the meters' names in either short or full form. When the **Show Names in Short Form** checkbox is unmarked, both panes, **Meters** and **Measures**, display not only the meter's name but also the name of the project layout containing the module where the

meter is defined (see "COOL RIDE Development Environment User Manual: Building Project").

While the list of meters on the right pane of the **Measures** dialog is non-modifiable, the list of measures on the left pane can be customized with the help of the dialog's controls. You can create measures, make copies of existing ones, edit measures by adding and/or deleting meters, remove measures, export and import them.

Creating Measure

To define a new measure, select a desired meter within the right pane and then click the **Add as New Measure** button to open the **Measure Properties** dialog.



The dialog lets you define the measure's name and choose one of the formulas from the dropdown list box. Note that for different measures you can use the same meter with appropriate formulas chosen from the **Formula** dropdown list box of the dialog. With the help of the list box, you are choosing an appropriate formula for the meter(s) selected for the measure. Among the options provided by the **Formula** list box there are **Total Processing Time**, **Total Stopwatch Time**, **Average Processing Time**, **Average Stopwatch Time**, etc.

To complete the operation, click **OK**. As a result, the desired measure will append the list of measures on the **Measures** pane.

Editing Measure

For an existing measure, you can modify its name, formula and set of meters.

To edit the name or the formula of an existing measure, select its name in the list of measures displayed by the **Measures** pane and then click the **Edit** button. It opens the **Measure Properties** dialog where you can customize the measure's name and formula.

To add a meter to the measure selected in the left pane you should select desired meter within the **Meters** list and then click **Add to Selected Measure**. As a result, desired meter will appear under the selected measure on the **Measures** display pane.

To remove a meter from the list of meters constituting a measure you should select the desired meter, click the **Remove** button and confirm your decision through the confirmation dialog. Note that for a measure with only one meter there is nothing to remove.

Copying Measure

For an existing measure, you can create a copy. It is commonly done whenever you wish to use an existing measure as a base for construction of another measure.

To create a copy of an existing measure, select it within the list of measures displayed by the **Measures** pane and then click the **Copy** button. It opens the **Measure Properties** dialog where you can specify the measure's name and formula.

To customize the measure's set of meters, do it as defined for editing a measure.

To complete the operation, click **OK**. As a result, the desired measure will append the list of measures on the **Measures** pane.

Moving To Next/Previous Measure

For moving quickly along the list of measures of the **Measures** pane, use two buttons—**Next** and **Previous**. They help you jump over long list of meters of a current measure to the adjacent, sometimes out of view measure on the **Measures** display pane.

Removing Measures

To remove an existing measure, select it within the list of measures displayed by the **Measures** pane and then click the **Remove** button.

To remove all measure shown on the **Measures** pane, click the **Remove All** button.

Whenever you remove a selected item from the list of measures or all the items, you have to confirm your decision through the confirmation dialog.

Exporting Measures

To export all current measures, use the **Export** button. It will open the standard **Save As** dialog where you can specify the name of the .MSR file that will contain exported data and the file's location.

Importing Measures

To import measures previously exported, use the **Import** button. It will open the standard **Open** dialog where you can specify the name of a .MSR file with previously exported measures and the file's location. The imported measures will be added to the existing list of measures. For resolving a possible ambiguity of name duplication, COOL RIDE will ask you whether you wish to define new name for each importing measure.

Once the measure's definition is completed, click **OK** to return to the **Measures** dialog displaying a list of currently available measures. When satisfied with the list of the measures, you can close the **Measures** dialog and then use the measures for presentation of the statistics of your application.

Presenting Application Statistics

There are two major ways of presenting COOL RIDE application statistics: within the COOL RIDE environment and outside it. The latter option is implemented as an application statistics' export resulting in a Microsoft Excel workbook—an .XLS file that can be handled within the Excel environment. (For details, refer to "Exporting Application Statistics").

Within the COOL RIDE environment, you are provided with a number of controls to customize the statistics presentation. To view the statistics of your application and if necessary to customize the statistics presentation, you can use the options of the **Application Statistics** dialog (the **Graphs|Statistics** menu) and two options (**Purge History** and **Reset**) of the **Options|Statistics** menu in the COOL RIDE Control Panel.

The **Application Statistics** dialog shows the application statistics in tabular and graphical formats. What is more, the dialog lets you customize the statistics presentation by specifying a set of measures used by COOL RIDE for displaying the collected statistical data.

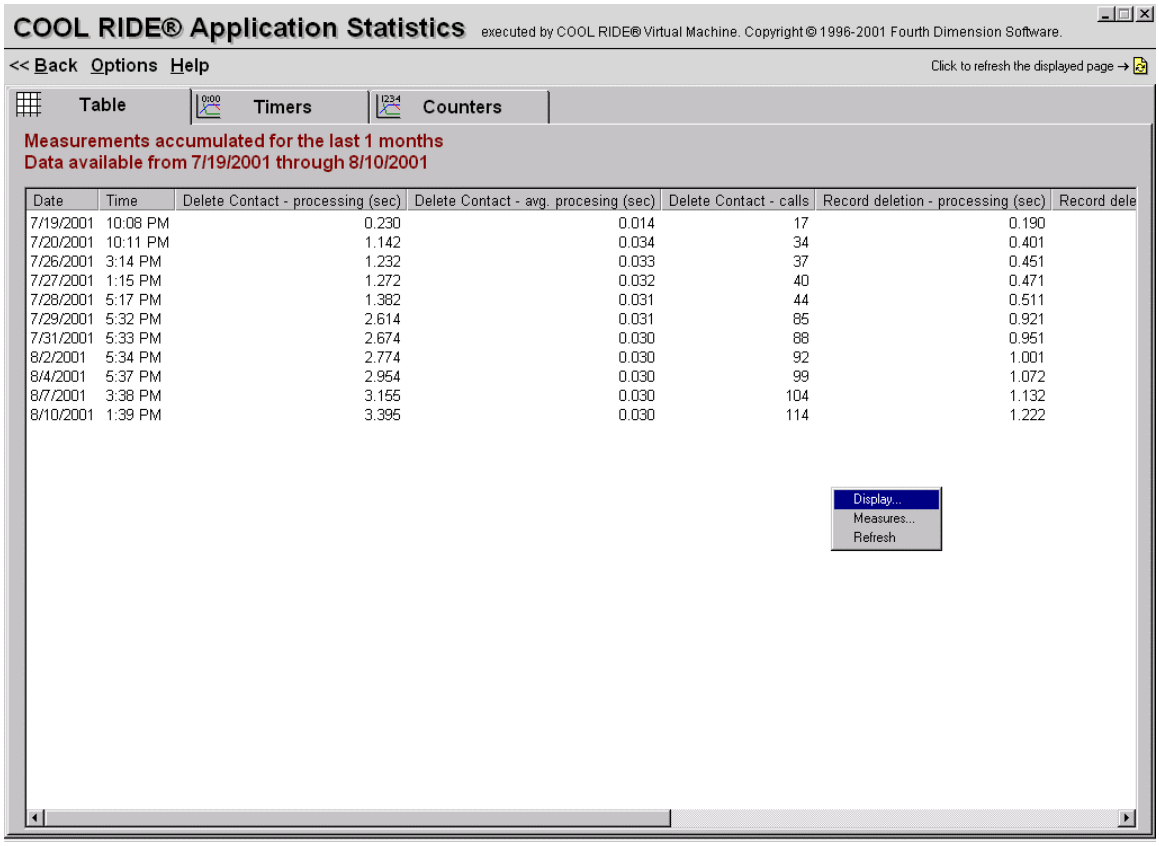
> Note
>
> For gathering the application statistics, COOL RIDE provides you with a special measuring mechanism based on use of *meters* whose readings allow you to specify *measures* that are in fact sources of data constituting the statistics presentation.

When defining a measure, you choose a formula for the meters contributing to the measure's resultant value. Choosing the formula, you actually make a decision what kind of measurers, "timers" or "counters," have to determine the measure's values. Two formula's options—**Counter** and **Hit Counter**—specify meters as counters; the other options—**Total Processing Time**, **Total Stopwatch Time**, **Average Processing Time**, **Average Stopwatch Time**, **Average Processing Time Per Counter**, **Average Stopwatch Time Per Counter**, **Absolute Processing Time Maximum**, **Absolute Processing Time Minimum**, **Absolute Stopwatch Time Maximum**, **Absolute Stopwatch Time Minimum**, **Sum Of Maximum Processing Times**, **Sum Of Minimum Processing Times**, **Sum Of Maximum Stopwatch Times** and **Sum Of Minimum Stopwatch Times**—specify meters as timers.

Every measure, specified for evaluation of the application statistics, is represented in the statistics output by a set of the meters' values. Depending on the meter specification, timer or counter, the measurement values are expressed either in seconds or on a per-count basis.

Allowing for tabular and graphical presentation of statistics measured by timers and by counters, the **Application Statistics** dialog is of a multi-tab design, letting you to customize the statistics display.

Virtual Machine: Application Statistics



In general, you have three major display options (the dialog's tabs)—**Table**, **Timers**, and **Counters**. With the proviso that there is some statistics for the current application, the first option, **Table**, is always available. As to two other options, **Timers** and **Counters**, either can be missing if no measures are specified as timers or counters, respectively.

The **Table** tab shows all accumulated statistics in tabular format where the first and second columns show respectively date and time for every row of the table and where other columns contain information provided by the measures defined for the application (every measure occupies a separate column). With the **Table** tab activated, you can gain access to two dialogs—**Display Time Range** and **Measures To Display**—via the local menu's options—**Display** and **Measures**—respectively. The local menu can be open with a right click of the mouse.

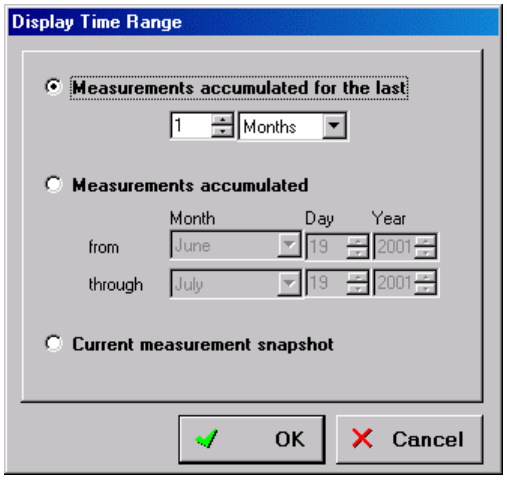
When available, two other tabs of the **Application Statistics** dialog—**Timers** and **Counters—** provide graphical presentation of the part of the application statistics represented by the measures specified as timers and counters, respectively. Both the tabs—**Timers** and **Counters**—present data with points of different colors on a plane scaled by two axes of which the horizontal axis shows date & time of measurement(s) and the vertical axis provides a reference to measure values (processor/stopwatch time or counter number). Note that the points of the same color represent the values of the same measure. Using the **Legend** option of the local menu you can show/hide an explanatory list of measure names and point colors. In addition to the **Legend** option, the local menu of the both tabs, **Timers** and **Counters**, provides the same options as the local menu of the **Table** tab. That is, you can gain access to two dialogs—**Display Time Range** and

Measures To Display. For all three tabs of the **Application Statistics** dialog, the local menu also provides the **Refresh** option.

For customizing a display of the application statistics, you can use two controls of the **Application Statistics** dialog. They are **Display** and **Measures**.

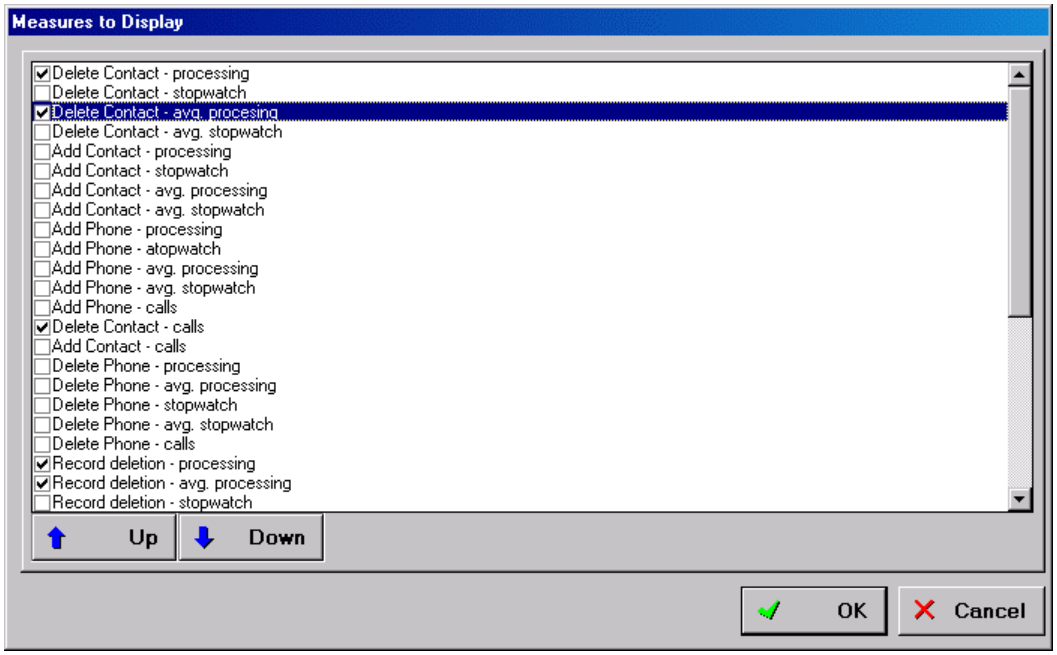
Choosing **Display** from the local menu accessible with a right click of your mouse opens the **Display Time Range** dialog where you can specify a period of time for which you wish to view the application statistics represented by:

- the measurements accumulated for the last one or more days, months or years
- the measurements accumulated for a period of time from one past date (month/date/year) through another past date
- a snapshot of the current measurements.



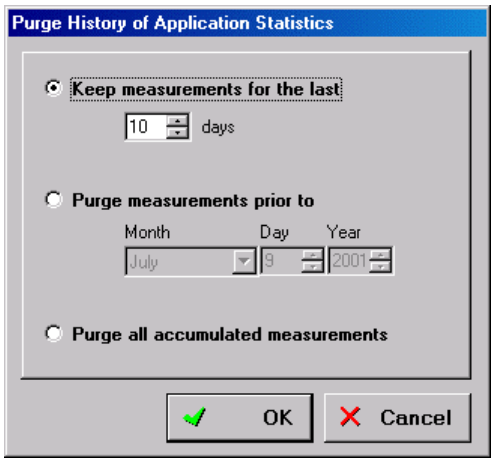
For customizing a set of measures used to display the application statistics, you should use another control of the **Application Statistics** dialog. This is the **Measures** option of the local menu.

Choosing **Measures** opens the **Measures To Display** dialog where you can specify a list of measures you wish to be used by COOL RIDE to display the application statistics. You do it by checking the desired measures in the list of the currently available measures.



It worth to note that the contents of the **Measures** list provided by the **Measures To Display** dialog is specified via the **Measures** dialog (the **Measures** option of the **Options|Statistics** menu of the COOL RIDE Control Panel). For detailed information, refer "Defining Measures."

For customizing the application statistics presentation, you can use not only the above-mentioned options of the **Application Statistics** dialog but also two options of the **Options|Statistics** menu—**Purge History** and **Reset**.

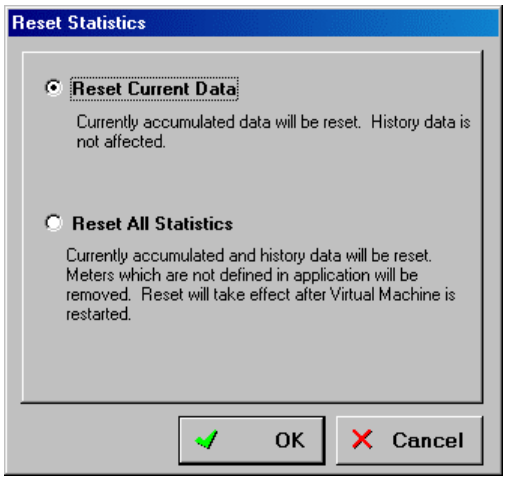


Choosing **Purge History** opens the **Purge History of Application Statistics** dialog letting you specify a period of time for which you wish to purge or preserve the application statistics previously accumulated.

The dialog provides you with three major options:

- keep the statistics measurements for several last days (a number of days can be set up with the help of a day counter)
- purge the statistics measurements made prior to a particular date (the date can be specified via a date set letting you set up a month, date and a year
- purge all the statistics measurements previously accumulated.

Besides **Purge History** the **Options|Statistics** menu contains one more option—**Reset**—for customizing the presentation of the application statistics. Choosing **Reset** opens the **Reset Statistics** dialog.



Two radio buttons helps you decide whether to reset the currently accumulated statistics or to reset all statistics including the statistics history.

Whatever option(s) you use to customize a presentation of your applicaion statistics, the **Application Statistics** dialog is the only tool for displaying the statistics in tabular or graphical formats. Remember that the **Refresh** button of the dialog allows you to refresh the current display.

Exporting Application Statistics

COOL RIDE allows you to export application statistics as an .XLS file (Microsoft Excel workbook).

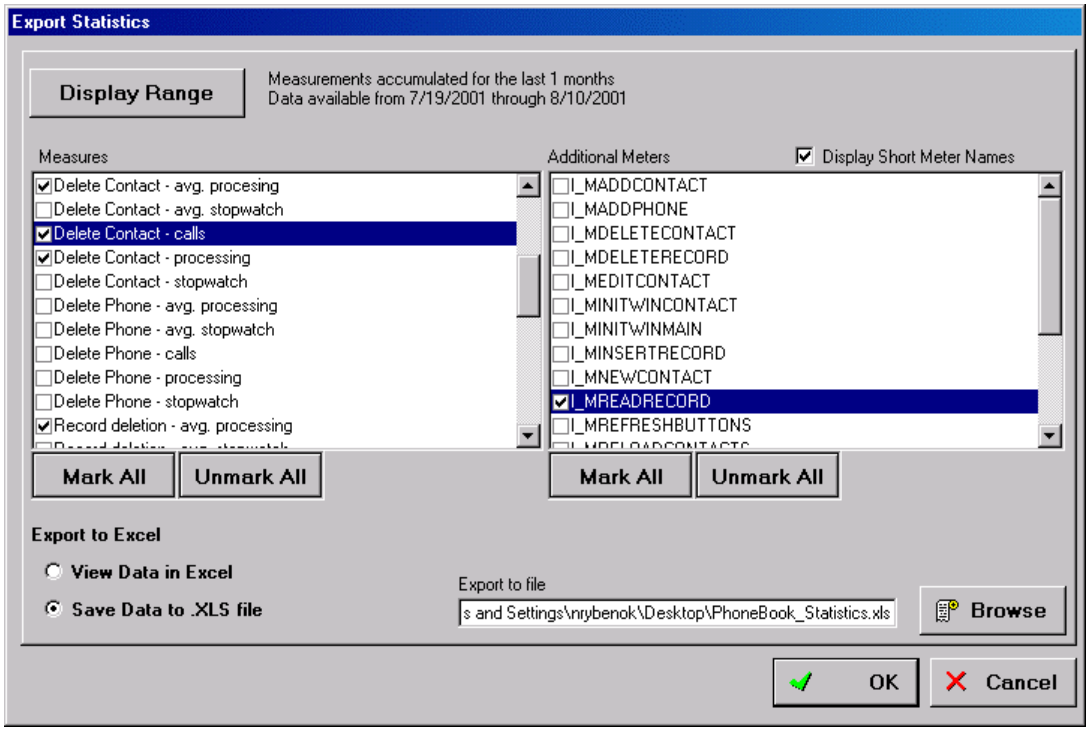
> Note
>
> The Microsoft Excel workbook is a collection of several worksheets. When exporting your application statistics, COOL RIDE creates worksheets of both types of data presentation—as a table and as a chart.

Virtual Machine: Application Statistics

Once your application contains the application statistics' meters and optionally measures, you can make COOL RIDE export the statistics.

> **Note**
>
> In COOL RIDE, *measure* is a sum of values of one or more *meters* for which you can choose one of the predefined statistical rules or formulas. As for *meter*, it should be considered as a kind of measuring instrument placed somewhere in the source code of your application in order to make some statistical evaluations of application's performance. For detailed information, refer to "Measuring Application Statistics."

To export the application statistics, you should choose **Export** from the **Options|Statistics** menu of the COOL RIDE Control Panel. This will open the **Export Statistics** dialog.



Two list boxes—**Measures** and **Additional Meters**—allow you to choose meters and measures you wish to be used for application statistics assessment you are going to export. For choosing particular items of the two lists, you should mark the corresponding items of the lists. However, if you need to check the entire list or discard the previous checking, two pairs of the **Mark All** and **Unmark All** buttons are at your disposal.

With the help of the **Display Range** button, you can opens the **Display Time Range** dialog letting you specify a period of time for which you wish to export the application statistics. The latter can be represented either by the measurements accumulated for the last one or more days, months or years, or by the measurements accumulated for a period of time from one past date (month/date/year) through another past date, or by a snapshot of the current measurements.

Virtual Machine: Application Statistics

The **Export Statistics** dialog allows you to make a choice between two export options—either to open Microsoft Excel with the exported application statistics or to store the data to an .XLS file. Two radio buttons serve this purpose. When your choice is to store the application statistics as a Microsoft Excel workbook, you have to specify the .XLS file's location in the **Export To File** data entry field.

On completing the export option settings, click **OK** to confirm the export operation; to discard it, click **Cancel**.

When the application statistics is exported as a Microsoft Excel workbook, you can use Excel as a tool for viewing and handling the statistics data presented in table and chart formats.