TIBCO Statistica®

Quick Reference Guide

Version 14.0.1
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Contents

Overview of Features

TIBCO Statistica® is a comprehensive analytic, research, and business intelligence tool. It is an integrated data management, analysis, mining, visualization, and custom application development system featuring a wide selection of basic and advanced analytic procedures for business, data mining, science, and engineering applications.

Analytic Facilities

Statistica® includes not only general purpose analytic, graphical, and database management procedures, but also comprehensive implementations of specialized methods for data analysis (such as predictive data mining; business, social sciences, and biomedical research; or engineering applications). All analytic tools offered in the Statistica® line of software are available as part of an integrated package. These tools can be controlled through a selection of alternative user interfaces including:

- A highly optimized interactive user interface (with options to execute Statistica® from within Microsoft Office and other applications),
- A complete thin-client, browser-based user interface (in Statistica® Enterprise Server) that enables you to offload time-consuming tasks to the server and work collaboratively, and
- A comprehensive, industry standard, .NET-compatible programming interface (including the built-in, .NET-compatible Visual Basic), offering access to more than 14,000 externally callable functions.

Interactive user interfaces are easily automated using macros and customized using a variety of methods, and they are recordable in the form of industry standard VB scripts. The built-in development environment is used to interface Statistica® with other applications and enterprise-wide infrastructures or to build custom extensions of any complexity, from simple shortcuts to advanced, large-scale development projects.

Unique Features

Statistica® line of software includes the following unique features:

- the breadth of selection and comprehensiveness of implementation of analytical procedures,
- the unparalleled selection, quality, and customizability of graphics integrated seamlessly with every computational procedure,
- a selection of efficient and user-friendly user interfaces,
- the ease of customizability using the truly open architecture compatible with virtually all enterprise and development environments (including .NET), that exposes Statistica® more than 14,000 functions,
- a wide selection of advanced software technologies that are responsible for Statistica®'s practically unlimited capacity, performance (speed, responsiveness), and application customization options,
- Native R scripts are run directly within Statistica® and R output can be retrieved as native Statistica® Spreadsheets and Graphs.

One of the most unique and important features of the Statistica® family of applications is that these technologies enable even inexperienced users to tailor Statistica® to their specific preferences. You can customize practically every aspect of Statistica®, including even the low- level procedures of its user interface. The same version of Statistica® can be used:

- By novices to perform routine tasks using the default analysis Startup dialog box **Quick** tab (containing just a few, self-explanatory buttons), or even by accessing Statistica® with their Web browsers (and a highly simplified front end), and
- By experienced analysts, professional statisticians, and advanced application developers who can integrate any of Statistica® highly optimized procedures (more than 14,000 functions) into custom applications or computing environments, using any of the cutting edge .NET and Web-compatible technologies.

The General Philosophy of the Statistica Approach

Statistica® default configuration (its general user interface and system options) is a result of years of listening carefully to our users.

We have received feedback from tens of thousands of our users, representing hundreds of thousands of our users from all continents and, practically speaking, all walks of life. One of the most important facts that we have learned from these users is how different their needs and preferences are (both across individuals and projects or applications). In order to meet those differentiated needs, Statistica® is designed to offer perhaps one of the most flexible and easily customizable user interfaces of any contemporary application.

Although Statistica® provides access to a powerful arsenal of advanced software technologies, you do not even need to know about them, because they are designed to work automatically and intuitively. A novice user may never see more than a few self-explanatory buttons.

Advanced options, however, are only one tab or mouse click away. Practically every aspect of Statistica® (from the startup configuration, to the way the output is generated and managed by the system, to how Statistica® prompts you to choose your next step) can be changed with a mouse click. Moreover, Statistica® remembers your selections until you change your mind. Practically all dialogs used to select an analysis or perform a routine operation can be easily replaced (such as simplified, enhanced, or combined with custom, user-designed procedures). Statistica® will always look and work the way you want.

Software Technology

Statistica uses and supports virtually all the relevant leading edge software technologies available today. Every one of the more than 14,000 Statistica® functions is accessible to external applications. Practically no limitations are imposed in terms of either the amount or complexity of data that can be stored and accessed.

Statistica® is also optimized for Web and multimedia applications. Computational and graphics procedures are driven by countless proprietary optimizations such as, for example, the quadruple precision computational technology that enables us to overcome the limitations of the IEEE floating point storage standards and delivers computational accuracy normally found only in designated math applications (that feature arbitrary-precision options) but not in high volume data processing applications such as statistical or data mining programs.

As a result, Statistica® offers unmatched speed, numerical precision, and responsiveness, which is aided by multithreading (and the advanced supercomputer-like distributed/parallel processing architecture offered in the Client-Server version, such as Statistica® Enterprise Server).

Data access is based on a flexible streaming technology that enables Statistica® to work effortlessly with both the simple input data files stored on the local drive and queries of multidimensional databases containing terabytes of data and stored in remote data warehouses and processed in-place (such as without having to import them to a local storage; this feature is available in enterprise versions of Statistica®).

For example, you can simultaneously run multiple instances of Statistica® (in any combination of local, network, and Client-Server (Web-based) environments), each running multiple analyses of data from multiple and simultaneously open input data files and queries, and the results can be organized into separate projects. Statistica® input and output data files and graphs can be of practically unlimited size, comprising hierarchies of documents of various types. The output can be directed to a multitude of output channels such as multimedia tables, high performance workbooks, reports (including .pdf files and Microsoft Office documents), and the Internet, as well as the optional Statistica® Document Management System, which can be seamlessly integrated with any Statistica® application.

Web Enablement

One of the unique features of the Statistica® family of applications is that it is fully Web enabled, and if Statistica® Enterprise Server is installed, you can not only offload time-consuming tasks to the server, but also access the comprehensive functionality of the Statistica® system using a thin-client (browser) interface.

This includes the option to execute prepared scripts and a plethora of interactive functionality, including such operations as interactively building predictive data mining models by dragging arrows in the interactive workspace of Statistica® Data Miner (using only the browser, without any client software installed).

Note: Most of the features described in this manual are available in all Statistica® products, although some sections of the manual refer only to specific products such as the Statistica® Enterprise Server facilities or the Statistica® Data Miner line of products.

Record of Recognition

We are pleased to report that, as of this printing, Statistica® has received the highest rating in every published independent comparative review in which it has been featured. In the history of the software industry, very few products have ever achieved such a record.

For more information about Statistica® record of recognition, please visit our Web site at http://statistica.io/

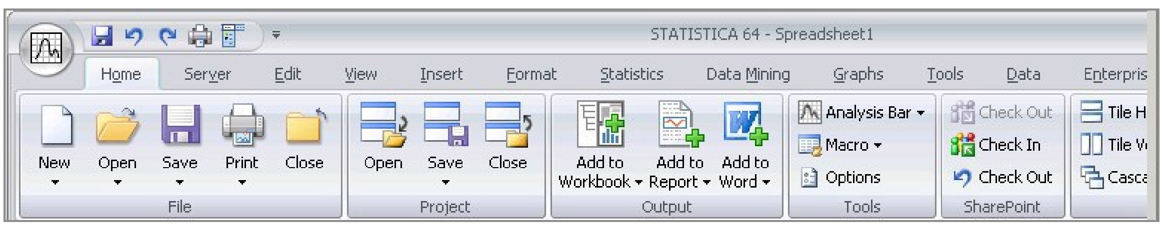
Analytics

Example 1: Correlations

Starting Statistica®

1. Once the installation process is complete, you can navigate to the application using Windows **Start > All Programs > Statistica**
2. When you start Statistica® for the first time, User Interface dialog box is displayed.

> **Note:** To create more space in the application window, minimize the ribbon bar. Either double-click on the selected tab header, or right-click on the right side of the row of tabs and from the shortcut menu, select Minimize the Ribbon.



3. To access common functions in Statistica®, click **OK** button in the **User Interface** dialog box. Welcome to Statistica dialog box is displayed.

   If you prefer, you can select the **Don’t show this dialog again** check box located near the bottom of the dialog, and this dialog will not be displayed when you start Statistica. Depending on the version of Statistica you have, there may be other dialogs displayed as well.

Customizing Statistica®

All aspects of the behavior and appearance of Statistica® (even many elementary features illustrated in this example, such as where output is directed) can be permanently customized to match your preferences.

For example, the first step (opening Statistica®) can be customized, you can change the default full-screen opening mode, the appearance of the data spreadsheet and many other aspects of Statistica®, which is illustrated throughout this manual.

Selecting a data file

For this example, open **Adstudy.sta**: on the **Home** tab in the **File** group, click the **Open** arrow. From the drop-down menu, select **Open Examples** to display the **Open a Statistica Data File** dialog box. Double-click on the **Datasets** folder, and double-click on Adstudy.

You can open data files in the following ways:

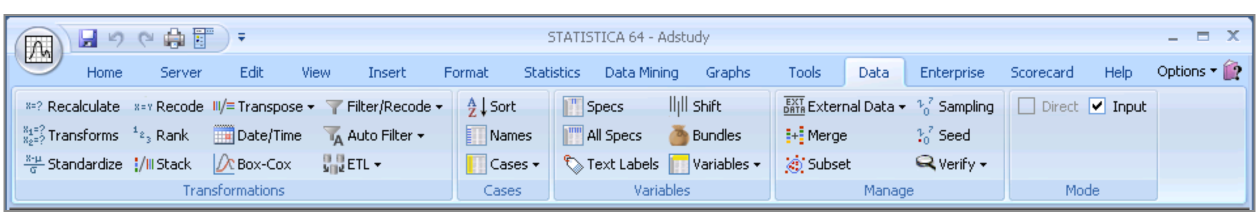
- Select **Open Document** from the **Open** drop-down list to display the **Open** dialog box where you can browse to the appropriate location.
- Click the **Open Data** button located on each **Startup** Panel (the first dialog box displayed when starting analysis or graph specifications).
- Click the folder icon above **Open** on the **Home** tab.

Data spreadsheets (multimedia tables)

Statistica® data files are displayed in a spreadsheet (such as one spreadsheet is one data file). All Statistica® Spreadsheets are displayed using Statistica® powerful multimedia table technology, and they can contain not only unlimited amounts of data, but also sound, video, embedded documents, automation scripts, and custom user interfaces.

You can have more than one data spreadsheet open at a time (with each spreadsheet connected to a different analysis).

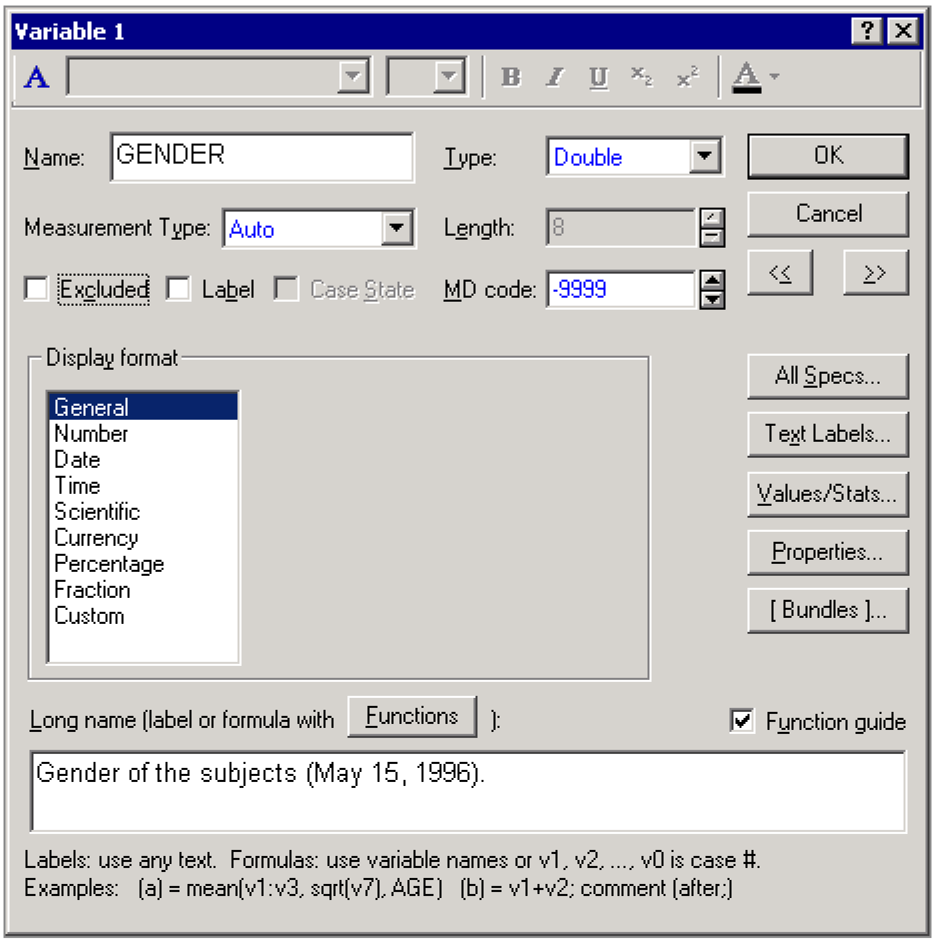
Data management facilities are available on the **Data** tab, which are displayed whenever a spreadsheet is open. Commands on the tabs are organized in logical groups; for example, the **Data** tab contains the **Transformations**, **Cases**, **Variables**, **Manage**, and **Mode** groups.



All the commands on the ribbon bar and classic menus are described in Statistica® Help; point to (highlight) a command, and press F1 on your keyboard to display the respective Help topic.

Variable specifications

The variable (column) headers in the spreadsheet contain the variable names. To display **Variable specifications** dialog box, double-click the first variable header – GENDER.

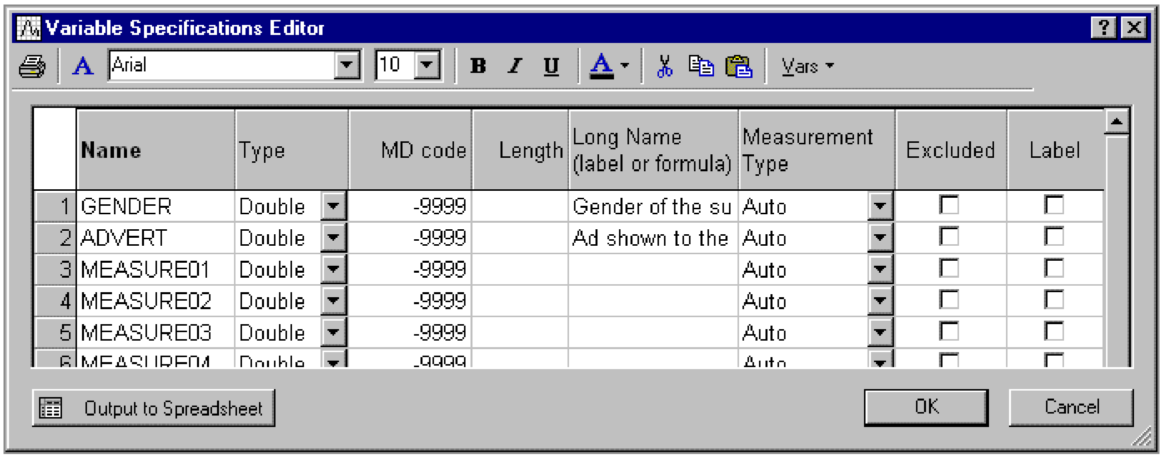


Spreadsheet formulas

You can change the Variable name and format and enter a formula to recalculate the values of the variable, using options in this dialog box. If the entry in the **Long name (label or formula with Functions)** box starts with an equal sign (=), Statistica® interprets it as a formula [a comment can follow after a semicolon (;)].

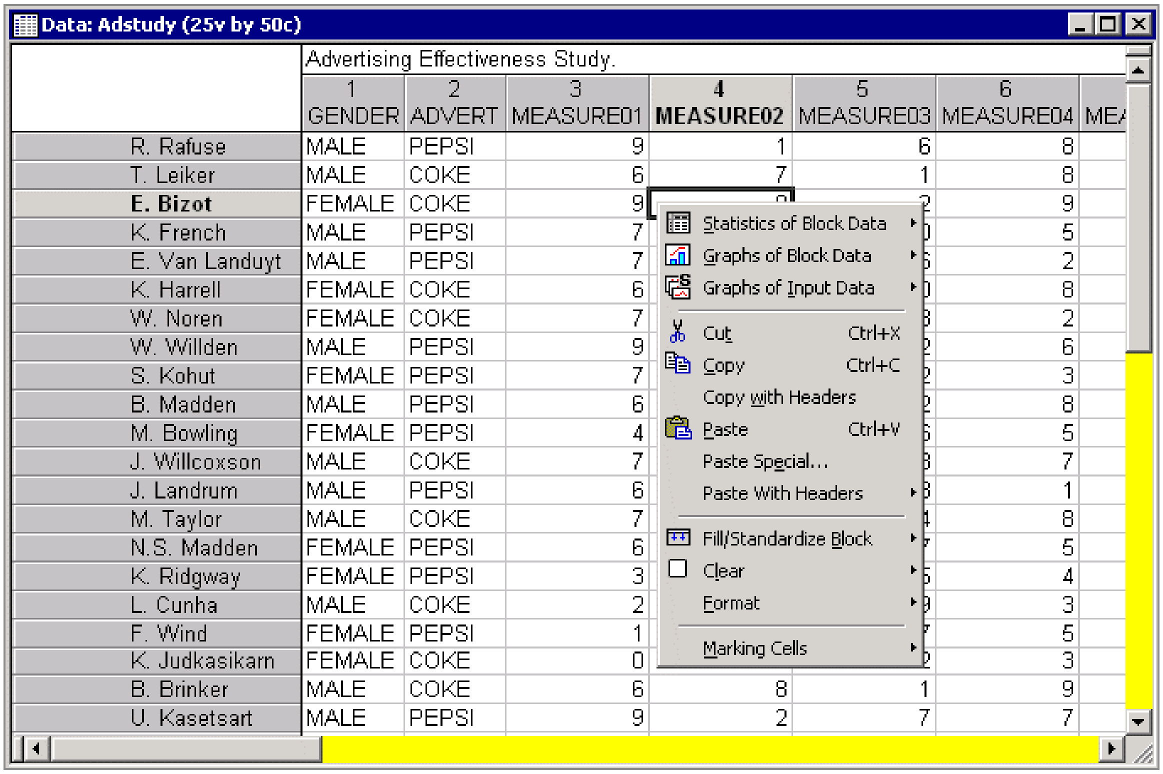
For example, if you enter into the **Long name...** box (of variable one) =(v2+v3+v4)/3 or =mean(v2:v4), the current values of that variable are replaced by the average of variables two through four, separately for each case (row) of the spreadsheet.

Specifications of all variables can be reviewed and edited together in a combined **Variable Specifications Editor** dialog box, accessed by clicking the **All Specs** button in the **Variable specifications** dialog box.



Shortcut menus accessed from spreadsheets

A useful feature of the spreadsheet is the list of commands available from its shortcut menus. Shortcut menus are dynamic menus that are displayed by right-clicking on an item (for example, a cell in the spreadsheet, as shown in the illustration below). The spreadsheet shortcut menus include a selection of specific data management operations and other options related to the currently selected variable (column), case (row), block of cells, or other item.



Six ways of handling output

You can customize the way output is managed in Statistica®. You can direct all output to five basic channels:

- Workbooks
- Stand-alone windows
- Reports
- Microsoft Word
- The Web
- SharePoint or Statistica® Document Management System (SDMS)

The first four output channels listed above are controlled by the options in the **Output Manager** options pane of the Options dialog box [accessible by selecting the **Tools** tab and click **Options**; in the Options dialog box, select **Output Manager** in the tree view (the left pane) to view related specifications in the options pane (the right pane)].

SharePoint options are located on the **Home** tab in the SharePoint group. Statistica® Document Management System (SDMS), a complete solution for managing documents, is available from Statistica.

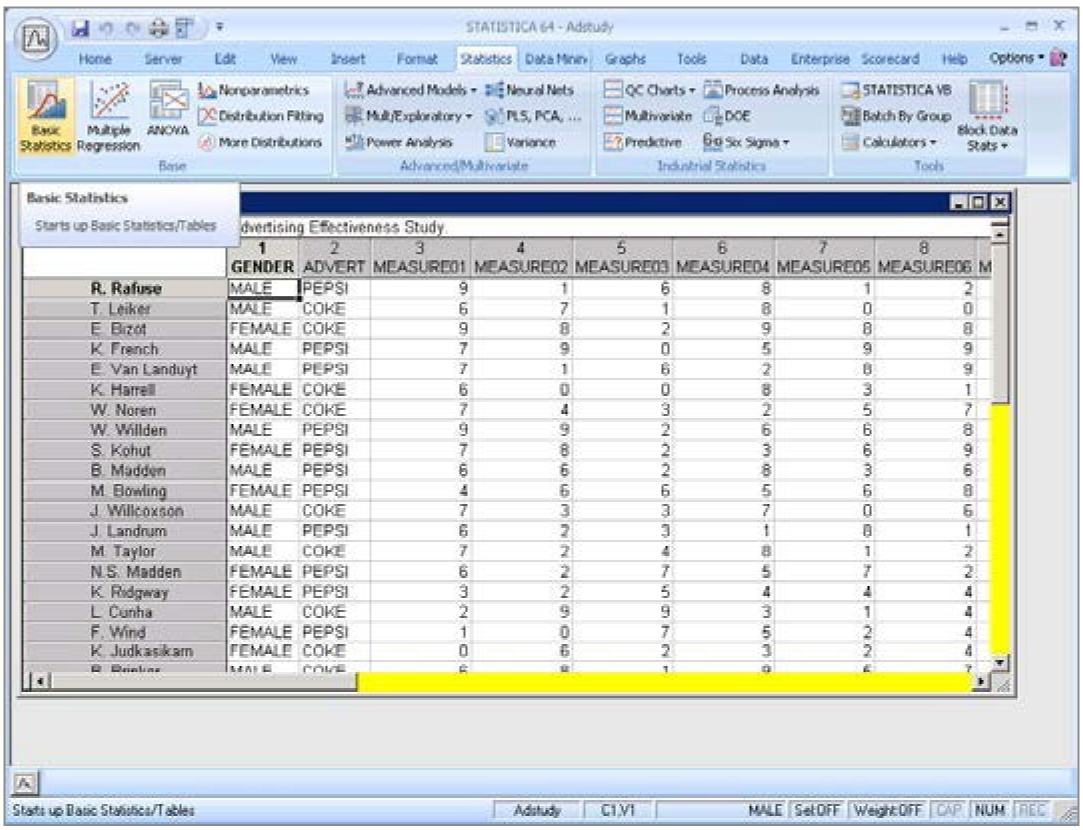
There are a number of ways to output to the Web, depending on the version of Statistica®. These means for output can be used in many combinations (for example, a workbook and report simultaneously), and each output channel can be customized in a variety of ways.

All output objects (spreadsheets and graphs) can contain other embedded and linked objects and documents, so Statistica® output can be hierarchically organized in a variety of ways.

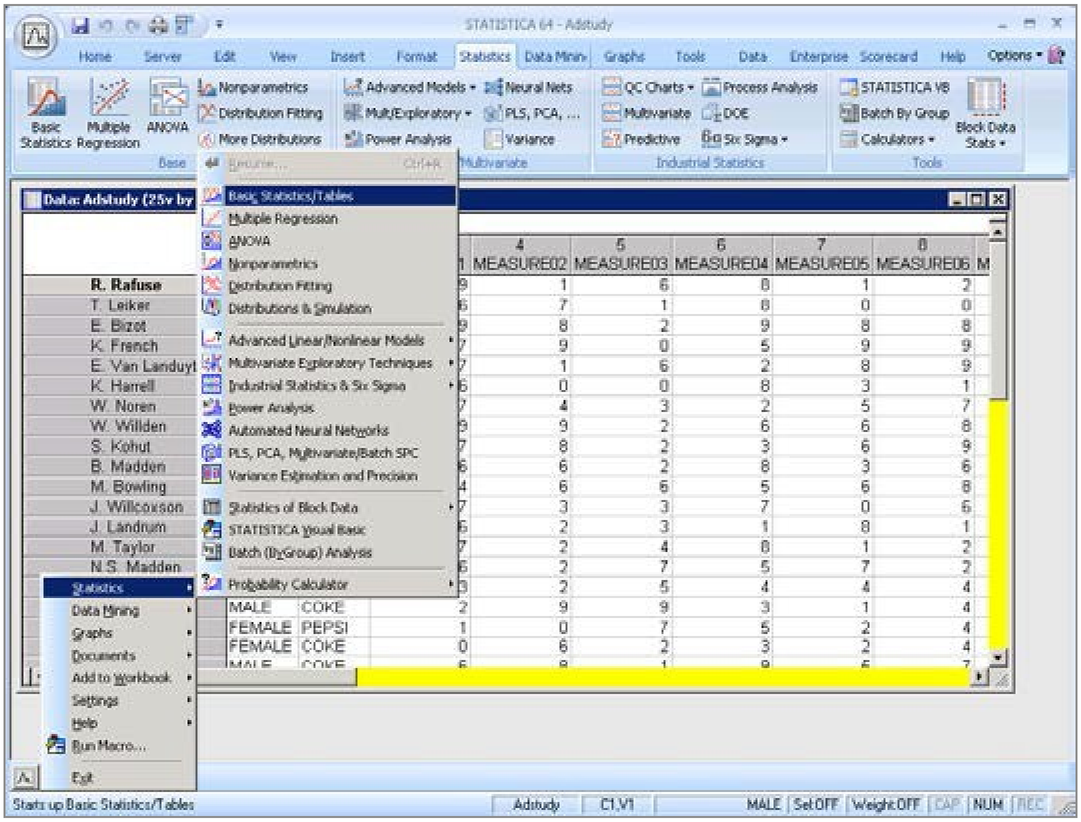
Calculating a correlation matrix

Let us compute a correlation matrix for the variables in the `Adstudy.sta` data file.

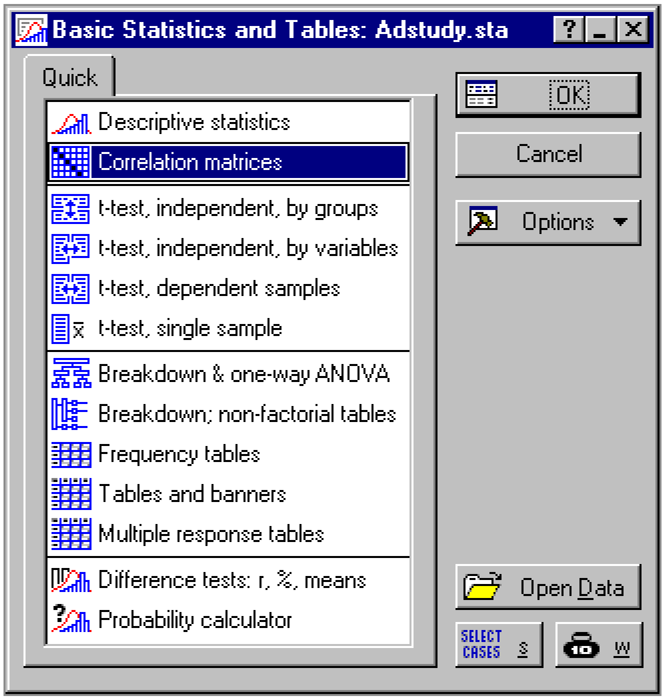
1. To display the **Basic Statistics and Tables** Startup Panel, select the **Statistics** tab.



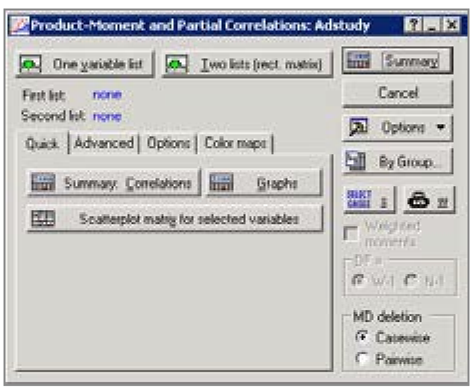
2. In the **Base** group, click **Basic Statistics**, or select **Statistics - Basic Statistics/Tables** from the Statistica® Start menu in the lower-left corner of the screen.



3. Ensure that a block (a group of selected cells) is not selected in the spreadsheet. To deselect a block, click in any cell in the spreadsheet.
4. If a block is selected, Statistica® assumes that the variables corresponding to the block are intentionally preselected for the analysis. When you later click the **OK** or **Summary** button to produce the analysis results, instead of prompting you to select variables, Statistica automatically produces the correlations for the selected block variables.
5. In the **Basic Statistics and Tables** Startup Panel (shown in the next illustration).



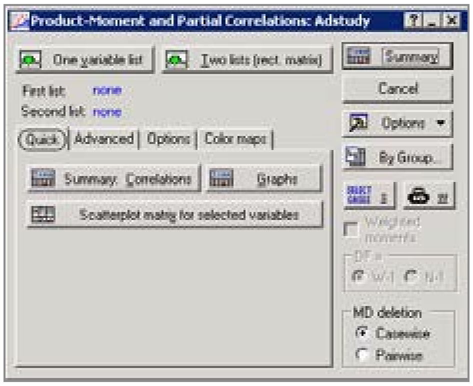
6. To display the Product-Moment and Partial Correlations dialog box, select **Correlation matrices** and click **OK** button (or double-click Correlation matrices).



Quick vs. advanced analyses

As with most analysis specification dialogs boxes (and other types of Statistica® dialogs boxes), the **Product-Moment and Partial Correlations** dialog box is organized by tabs according to the type of options available. Typically, at least two categories of options are available.

Quick tab: Contains the most commonly used options, enabling you to quickly specify a basic analysis without having to search through numerous options.



Advanced tab: Contains the same options available on the **Quick** tab as well as a variety of less commonly used options (for example, in this case, options to save matrices, produce less commonly requested statistics, and create a variety of plots). Additional tabs are often available as well, depending on the type of analysis being specified.

Note: In some cases, only a **Quick** tab is available. As with all dialogs in Statistica®, you can press F1 on your keyboard or click the help button in the upper-right corner to display a Help topic containing information about the options available on the currently selected tab.

The self-prompting nature of Statistica® dialog boxes

All dialog boxes in Statistica® follow the self- prompting dialog box convention, which means that whenever you are not sure what to select next, simply click **OK** button or the **Summary** button and Statistica® proceeds to the next logical step, prompting you for the specific input needed (for example, variables to be analyzed).

Variables button

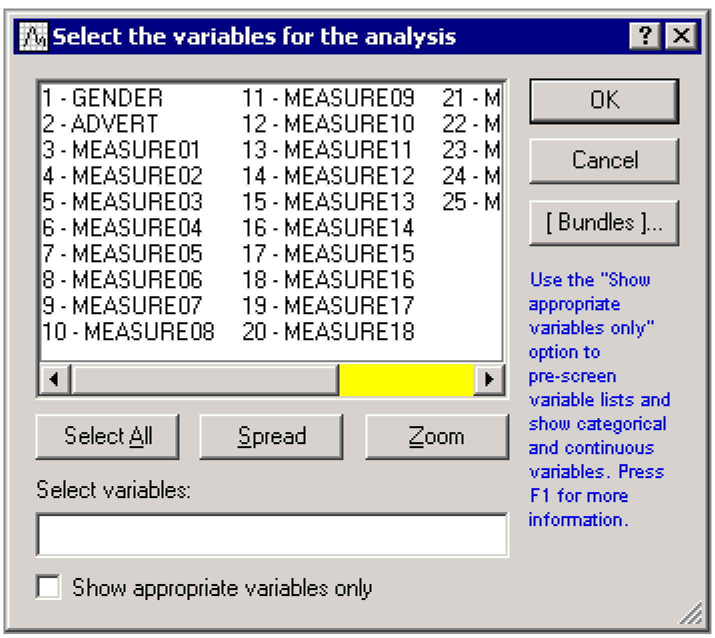
Every analysis specification dialog box in Statistica® contains one or more **Variable** buttons used to display the variable selection dialog box to specify variables to be analyzed.

Variable selection dialog box

To display the Select the variables for the analysis dialog box, click the **One variable list** button (or press ALT+V on your keyboard).

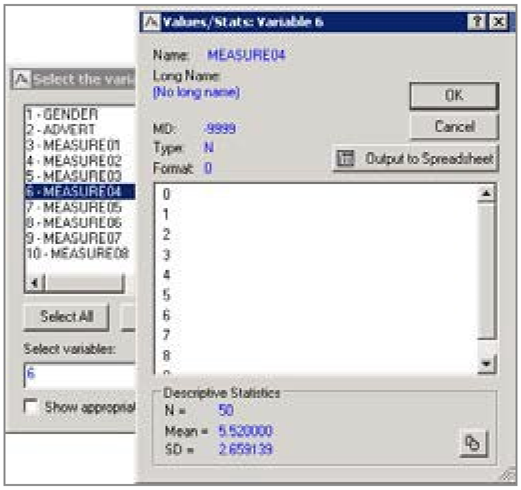
> **Note:** The Variable selection dialog box is also displayed if you click the **Summary** button before variables are selected.

If a block of variables is selected in the data file, those variables are specified automatically for the analysis, and when you click **Summary** button, a correlation matrix is produced for the variables selected in the block, not all variables in the data file.

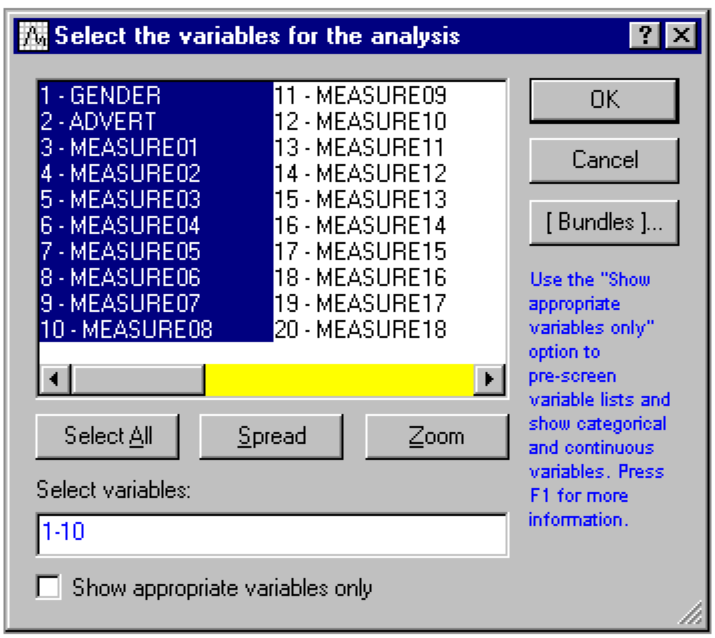


The variable selection dialog box supports various ways of selecting variables (including the standard **Windows SHIFT+click** and **CTRL+click** conventions to select ranges and discontinuous lists of variables).

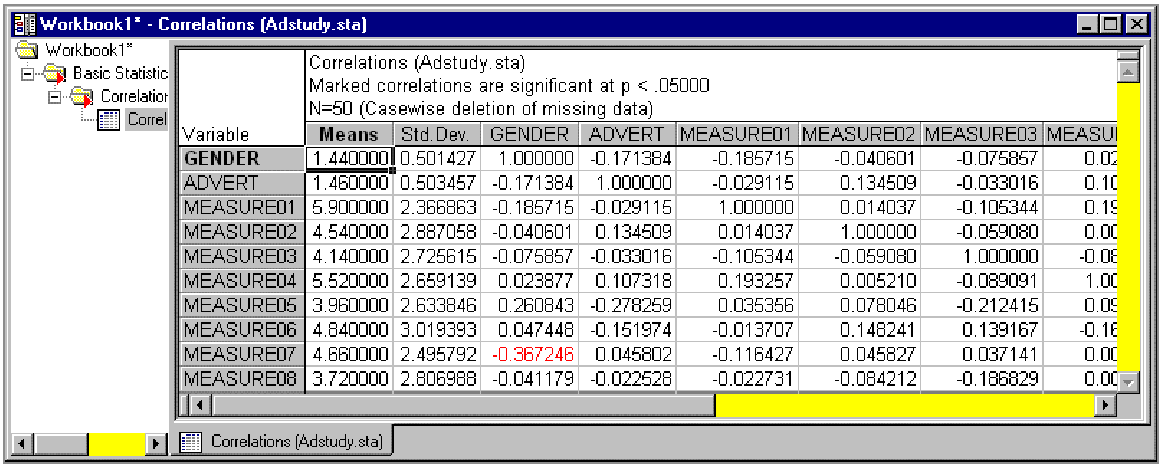
To review the contents of the data file, you can use various shortcuts and options in the variable selection dialog box . For example, you can spread the variable list to review the variables' long names or formulas (click the **Spread** button), or you can zoom in on a variable (click the **Zoom** button) to review a sorted list of all values and descriptive statistics for the selected variable (see the next illustration).



1. For this example, select variables 1 through 10 in the variable selection dialog box.



2. Click **OK** button. A message is displayed informing you that there are text variables selected.
3. Click the Continue with **Current selection** button to return to the Product-Moment and Partial Correlations dialog box.
4. Next, click the **Summary** button to generate a correlation matrix for the selected variables.



Correlations (Adstudy.sta)
Marked correlations are significant at p < .05000
N=50 (Casewise deletion of missing data)

Variable	Means	Std.Dev.	GENDER	ADVERT	MEASURE01	MEASURE02	MEASURE03	MEASU
GENDER	1.440000	0.501427	1.000000	-0.171384	-0.185715	-0.040601	-0.075857	0.02
ADVERT	1.460000	0.503457	-0.171384	1.000000	-0.029115	0.134509	-0.033016	0.10
MEASURE01	5.900000	2.366863	-0.185715	-0.029115	1.000000	0.014037	-0.105344	0.19
MEASURE02	4.540000	2.887058	-0.040601	0.134509	0.014037	1.000000	-0.059080	0.00
MEASURE03	4.140000	2.725615	-0.075857	-0.033016	-0.105344	-0.059080	1.000000	-0.08
MEASURE04	5.520000	2.659139	0.023877	0.107318	0.193257	0.005210	-0.089091	1.00
MEASURE05	3.960000	2.633846	0.260843	-0.278259	0.035356	0.078046	-0.212415	0.09
MEASURE06	4.840000	3.019393	0.047448	-0.151974	-0.013707	0.148241	0.139167	-0.18
MEASURE07	4.660000	2.495792	-0.367246	0.045802	-0.116427	0.045827	0.037141	0.00
MEASURE08	3.720000	2.806988	-0.041179	-0.022528	-0.022731	-0.084212	-0.186829	0.00

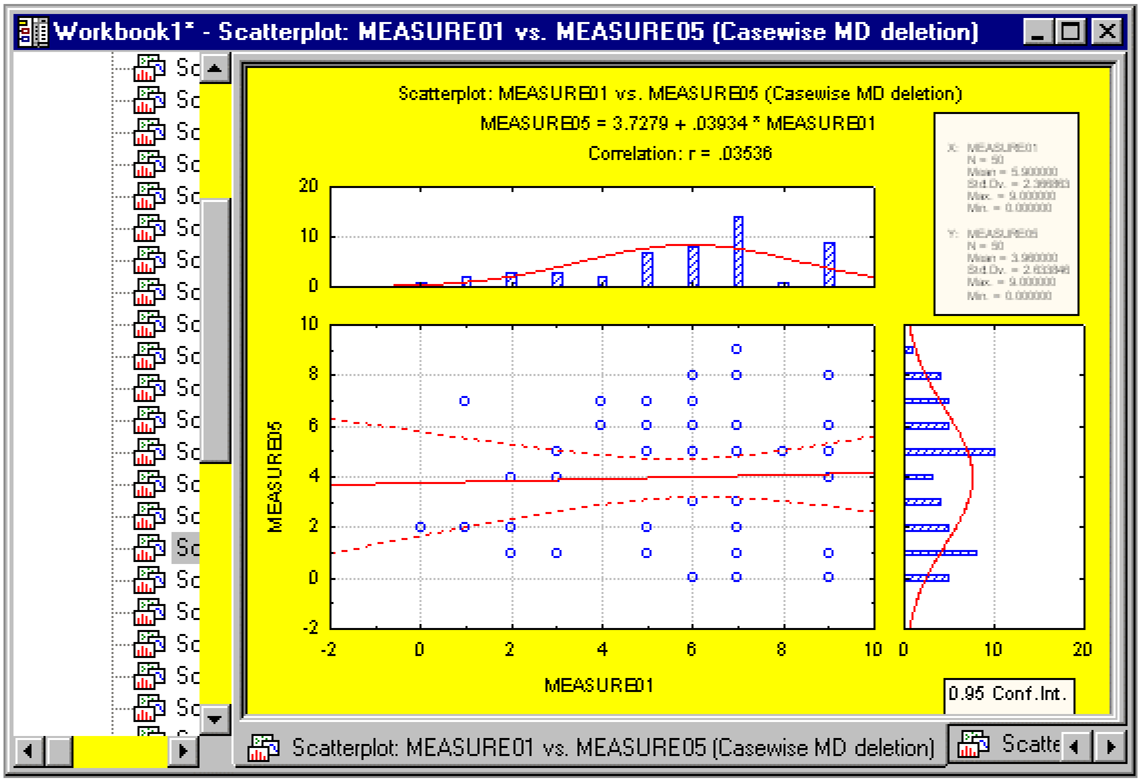
Note that instead of clicking the **Summary** button, you could have clicked the Summary: **Correlations** button on the **Quick** tab or on the **Advanced** tab with the same results.

Also, depending on the defaults you have specified for handling output (in the Output Manager options pane of the Options dialog box), the Correlations spreadsheet is displayed in a report or a stand-alone window or sent to a Word document, rather than in a workbook as shown above.

Summary graphs

Statistica® provides extremely flexible tools and methods for summarizing key results in graphs and/or tables.

1. For example, resume the analysis by clicking the **Product-Moment and...** button on the Analysis bar in the lower-left corner of the screen or by pressing CTRL+R on your keyboard.
2. To display summary graphs for each pair of variables in the correlation matrix, click **Graphs** button.



These graphs not only show the scatterplot of points for each correlation, but also the distributions (histograms) for each variable, as well as the respective correlation coefficient and regression equation.

Statistica® incorporates many such displays to summarize basic descriptive statistics, correlations, the results of Gage or Process capability studies, or other types of data analyses.

Results spreadsheets (multimedia tables)

In addition to storing data, spreadsheets are used in Statistica® to display most of the numeric output. Note that spreadsheets offer many display features and options, and in this example, significant correlations are marked with a different format to help distinguish them. By default, the color is red (in the Correlations spreadsheet, see the cell adjacent to **MEASURE07** under **GENDER**).

Spreadsheets can hold anywhere from a short line to gigabytes of output, and they offer a variety of options to facilitate reviewing the results and visualizing them in predefined and custom-defined graphs, as will be seen later in this example.

Also, Statistica® Spreadsheets can handle not only virtually unlimited amounts of data, but also video, sound, custom user interfaces, and auto-executing scripts, as well as offer virtually unlimited customization options.

Spreadsheet options

Most spreadsheet facilities are accessible using options on the **Data** tab and the shortcut menus (displayed by right-clicking in the spreadsheet). You can try these options to see how they work, or you can review their descriptions by pressing the **Help** key (F1).

You can change all aspects of the display formats for each spreadsheet column, edit the output, or append blank cases and variables to make room for notes or output pasted from other sources.

Spreadsheets can be printed in a variety of ways (by default, in presentation-quality tables with grid lines). Also, since spreadsheets are used for input, you can easily specify an analysis using the results from a previous analysis (for example, you could use this correlation matrix to specify a multidimensional scaling analysis).

To use a results spreadsheet as an input spreadsheet, select the Input check box (located on the Data tab in the Mode group) when that spreadsheet is active.

Analysis workbooks and other output options

All results can be displayed (and stored) in stand-alone windows, reports, Word documents, or workbooks, which represent the default (and perhaps the most versatile) way of handling output from analyses.

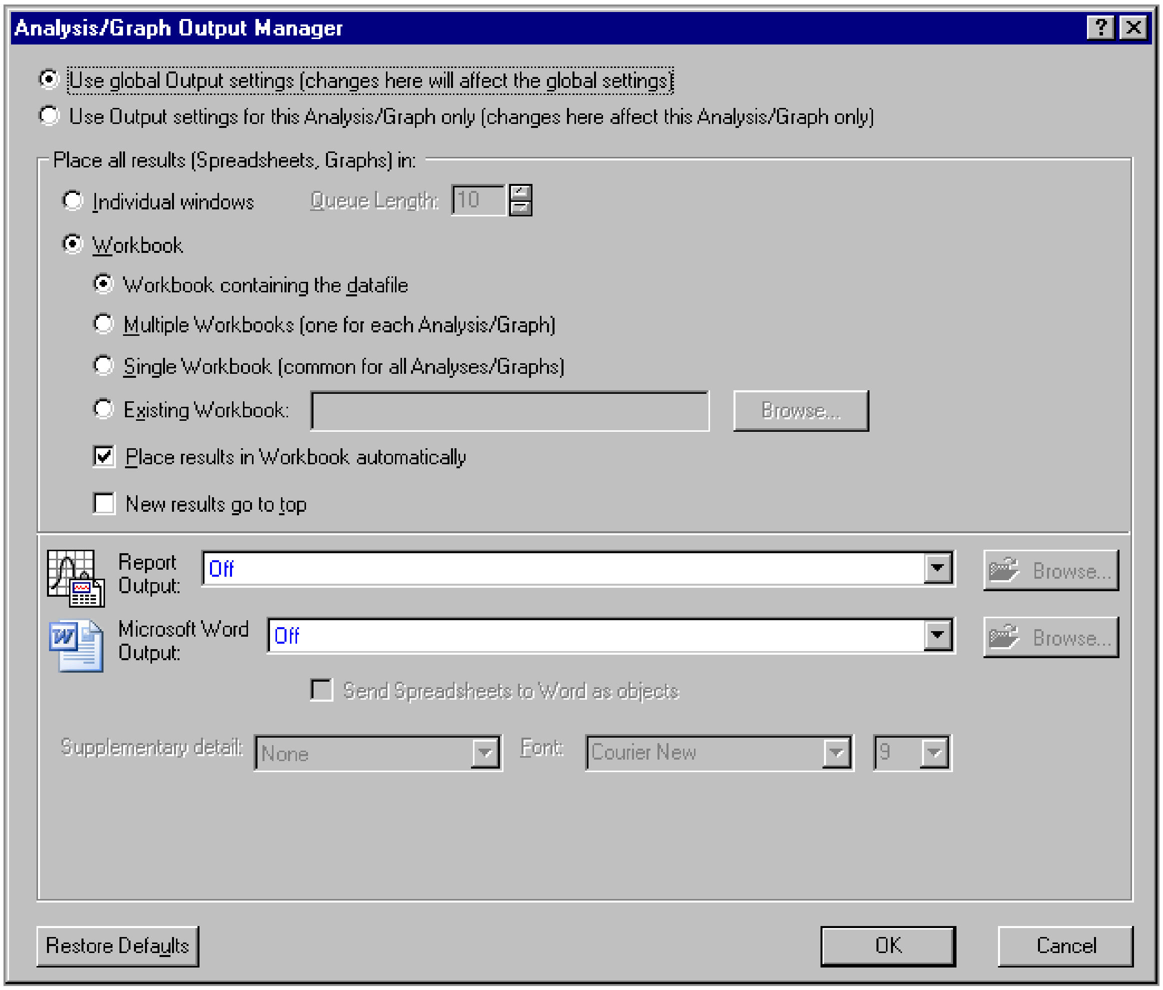
Depending on your selections in the Output Manager (accessible by selecting the **Home** tab and clicking Options in the **Tools** group, and then selecting**Output Manager**, located under **Analyses/Graphs**), results can be put in a single workbook that holds the results from all analyses, a separate analysis workbook that holds the results (spreadsheets and graphs) from a single analysis, the workbook that contains the original data file, or a preexisting workbook.

Additionally, you can choose to have the results sent to a workbook automatically, or you can send them to the workbook yourself by clicking **Add to Workbook** on the **Home** tab in the **Output** group to send selected stand-alone spreadsheets or graphs to a workbook.

Output Manager

You can store your data and results , Which type of workbook you choose, or whether you choose to use a workbook, depends entirely on how you prefer to store your data and results.

- To change the output destination for the results of a particular analysis only, click the **Options** button on any analysis or Graph specification dialog box, and select **Output** to display the **Analysis/Graph Output Manager** dialog box.



- To change output options for all analyses, use the (global) **Output Manager** (the **Output Manager** options pane of the **Options** dialog box, accessible by selecting the **Home** tab and clicking Options in the **Tools** group), or select the **Use global Output settings** (changes here affects the global settings) **option** button in the **Analysis/Graph Output Manager** dialog box.

As with all workbooks, individual documents (for example, spreadsheets or graphs) or groups of documents can be printed, extracted, copied, and deleted from an analysis workbook.

Copy vs. Copy with Headers

Contents of spreadsheets can be copied to the Clipboard by pressing CTRL+C (which copies only the contents of the selected block).

To copy the block along with its respective variable and case names, select the **Edit** tab, and in the Clipboard/Data group, click **Copy** arrow and select **Copy with Headers** from the drop-down list.

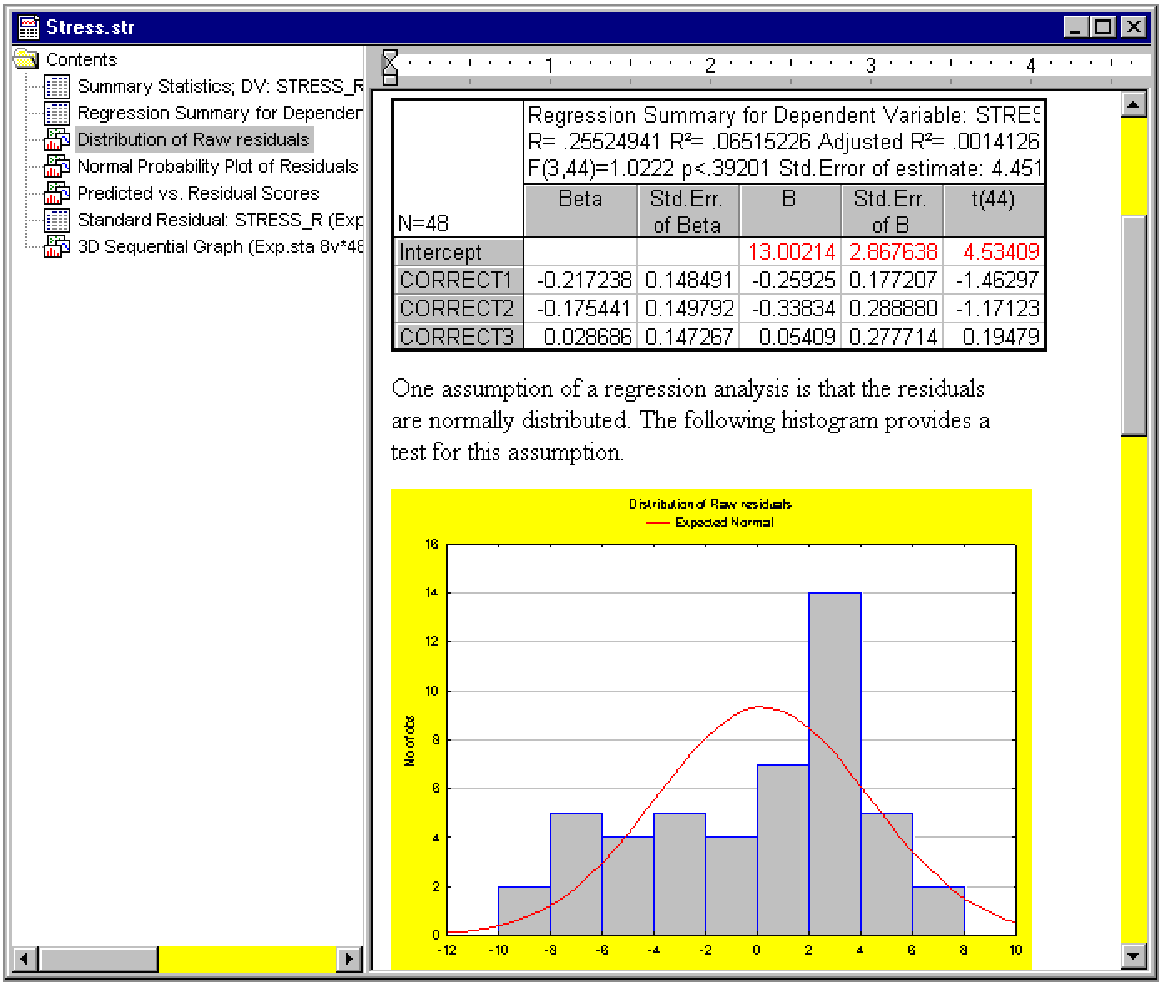
When spreadsheets are pasted into a word processor document, they are active (in-place editable) Statistica® objects, standard RTF-formatted tables, unformatted text, pictures, or HTML (depending on your choice in the Paste Special dialog box of the word processor).

Printing spreadsheets

1. To produce a hard copy of an output spreadsheet, select the **Home** tab.
2. To display the Print Spreadsheet dialog box, in the **File** group, click **Print** (or press CTRL+P), in which you specify printing options.
3. You can also use the shortcut method; click the printer icon located on the **Quick Access** toolbar in the upper-left corner of the ribbon bar. This shortcut method does not display the Print Spreadsheet dialog box, but prints the entire current document.
4. If you want to print a document from within a workbook, ensure that the document is selected in the workbook, and select the **Selection** option button in the **Print Spreadsheet** dialog box.
5. You can also extract a copy of the document from the workbook (drag it from the tree pane, or select the document and click **Move** on the **Workbook** tab in the Extract group) and then print it.

Optional reports of all output

Workbooks offer perhaps the most flexible options to manage your output. It might be useful to automatically produce a log of all results (contents of all spreadsheets and graphs) in a traditional word processor style report format where comments and annotations can be inserted in arbitrary locations, objects can be placed side by side.



Use the options in the Output Manager to create such a report.

1. To display the **Output Manager**, select the **Tools** tab.
2. Click **Options**.
3. In the Options dialog box, select **Output Manager** located under Analyses/Graphs (for global changes).
4. To display the Analysis/Graph Output Manager dialog box, click the button in any analysis or graph specification dialog box, and select **Output** (for local changes).
5. In the **Output Manager** options pane of the Options dialog box or in the Analysis/Graph Output Manager dialog box, click the **Report Output** arrow.
6. From the drop-down menu, select either **Send to Multiple Reports** (one for each Analysis/Graph), **Single Report** (common for all Analyses/graphs), or [**Select File**] (which displays the Open dialog box where you can select an already established

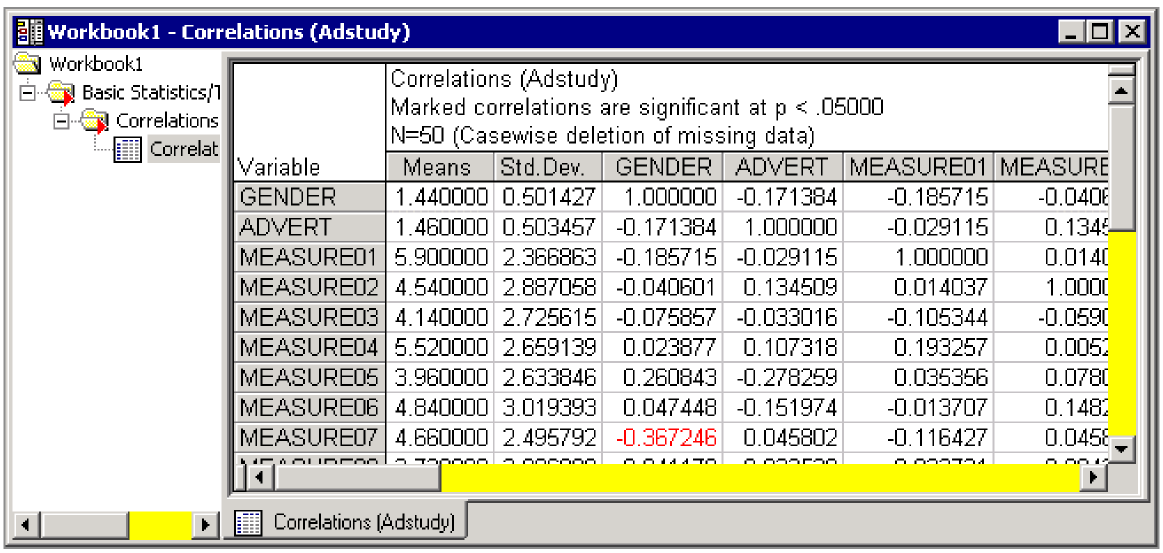
report).

7. In the **Output Manager**, you can specify the amount of supplementary information for including with the spreadsheet results.

8. Use the Supplementary detail option to specify either **Brief** (includes only the selected spreadsheets and graphs), **Medium** (includes the selected spreadsheets and graphs as well as the current data file name, information on case selection conditions and case weights if any were specified, a list of all variables selected for each analysis, and the missing data values for each variable), **Long** [includes all information from the **Medium** format and the long variable labels (for example, formulas), reserving one line of output (or more) for each variable], or **Comprehensive** (includes all information included in the **Long** report format as well as a complete list of all of the text labels for each selected variable).

Interpretation of the results – Statistica® Electronic Manual (Help) and the Electronic Statistics Textbook

Let us return to the example and the correlation matrix that is produced.



Correlations (Adstudy)
Marked correlations are significant at p < .05000
N=50 (Casewise deletion of missing data)

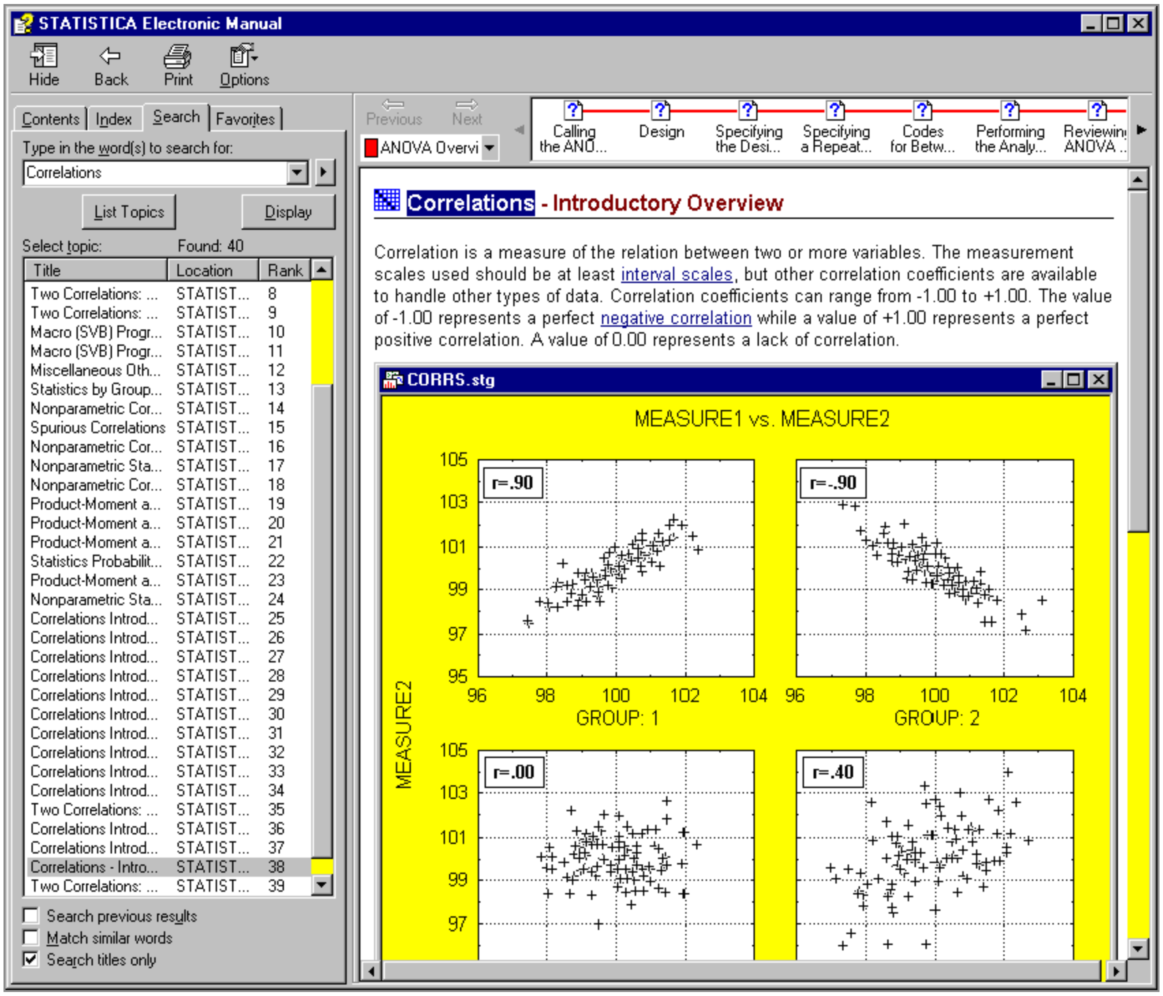
Variable	Means	Std.Dev.	GENDER	ADVERT	MEASURE01	MEASURE
GENDER	1.440000	0.501427	1.000000	-0.171384	-0.185715	-0.040
ADVERT	1.460000	0.503457	-0.171384	1.000000	-0.029115	0.134
MEASURE01	5.900000	2.366863	-0.185715	-0.029115	1.000000	0.014
MEASURE02	4.540000	2.887058	-0.040601	0.134509	0.014037	1.000
MEASURE03	4.140000	2.725615	-0.075857	-0.033016	-0.105344	-0.059
MEASURE04	5.520000	2.659139	0.023877	0.107318	0.193257	0.005
MEASURE05	3.960000	2.633846	0.260843	-0.278259	0.035356	0.078
MEASURE06	4.840000	3.019393	0.047448	-0.151974	-0.013707	0.148
MEASURE07	4.660000	2.495792	-0.367246	0.045802	-0.116427	0.045

Each of the cells of the correlation matrix represents a value (in the range of **–1.00** to **+1.00**) that reflects the relation between the variables (see the respective variable and case headers). The higher the absolute value of the correlation coefficient, the closer the relation.

If the value is positive, the relation is positive (high values of one variable correspond to high values of the other variable; likewise, low values of one variable correspond to low values of the other variable). If the value is negative, the opposite is true (low values of one variable correspond to high values of the other variable).

To learn more about how to interpret values of correlations, you can review a comprehensive, illustrated discussion of the topic in the Electronic Manual (Statistica® Help), which features the complete contents of the Statistica® Electronic Statistics Textbook.

1. To display the **Electronic Manual**, select the **Help** tab.
2. In the **Help** group, click **Help**.
3. On the **Search** tab of the Electronic Manual, enter the respective term (for example, Correlations) into the Type in the words to search for box,
4. Click the **List Topics** button.
5. Select the desired topic in the **Select topic** box (in this case, Correlations - Introductory Overview).



Producing graphs from spreadsheets

One of the important features is the importance of scatterplots in examining correlations. For example, even very large and highly statistically significant correlation coefficients can be entirely due to one unusual data point (outlier), and if that is the case, then the correlation coefficient (even if statistically significant) would have no value to us (such as it would have no predictive validity).

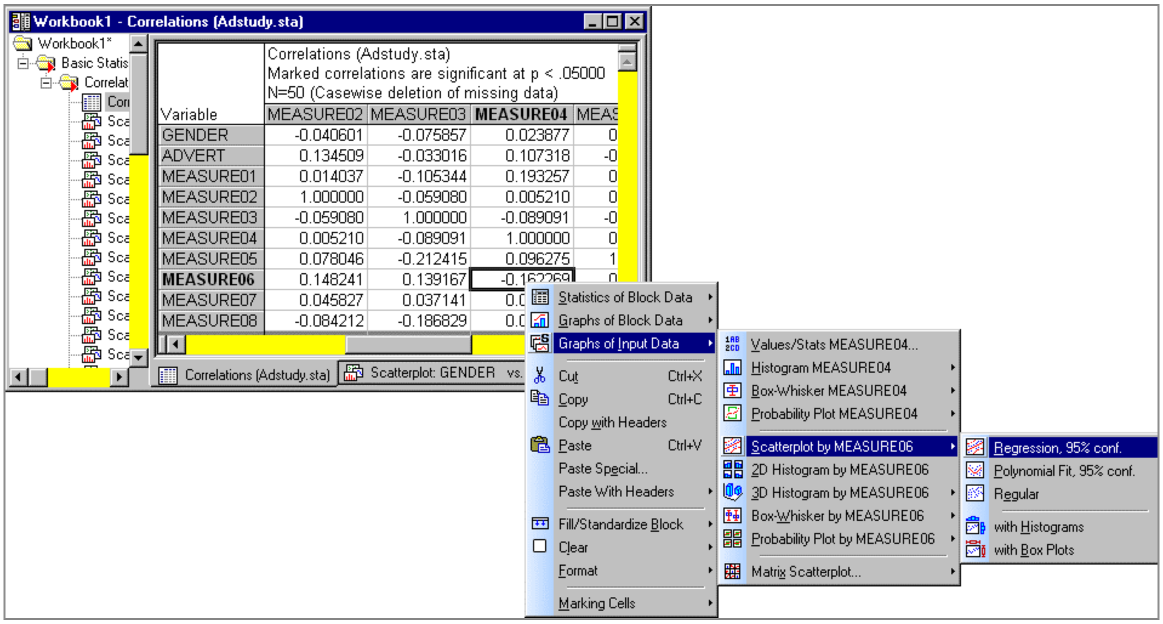
Let us examine a scatterplot that visualizes a relation between the variables and, thus, visualize a particular correlation coefficient from the table.

While examining the spreadsheet, you can view the correlations graphically, for example, to visualize the correlation between variables **Measure06** and **Measure04**.

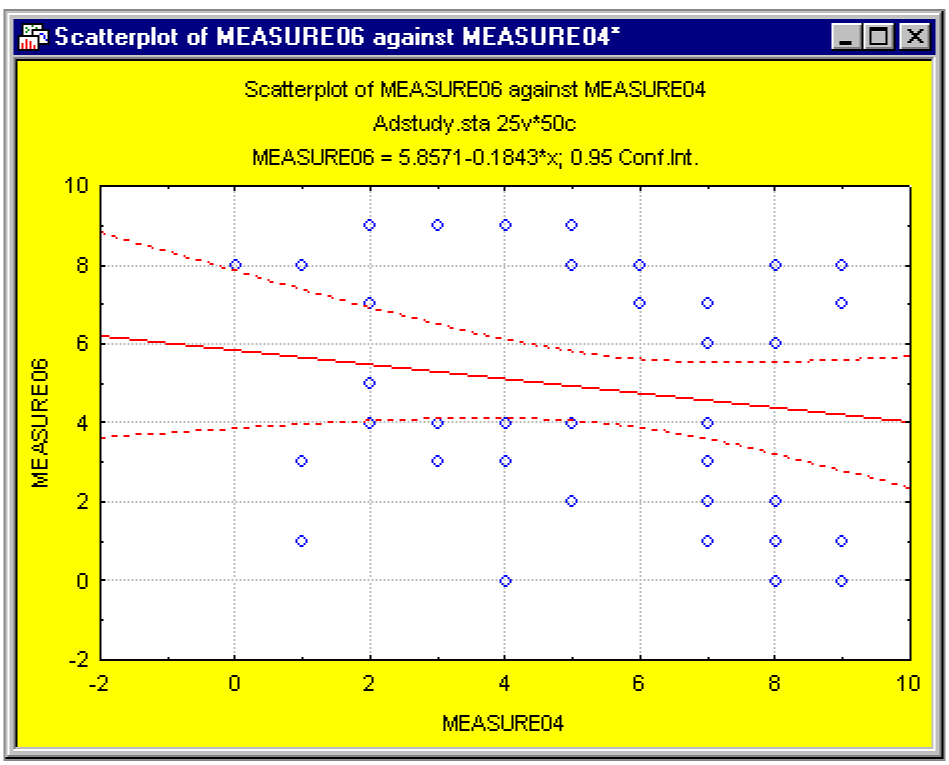
1. To produce a scatterplot for these two variables, right-click on the respective

correlation coefficient (**-0.162269**).

2. In the resulting shortcut menu, select Graphs of Input Data - **Scatterplot** by **MEASURE06** - Regression, 95% conf., as shown in the image.



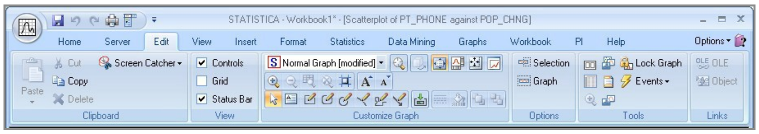
The specified graph is displayed.



As we learn from the graph, there are no unusual patterns of data, thus, there is no reason to be concerned about outliers.

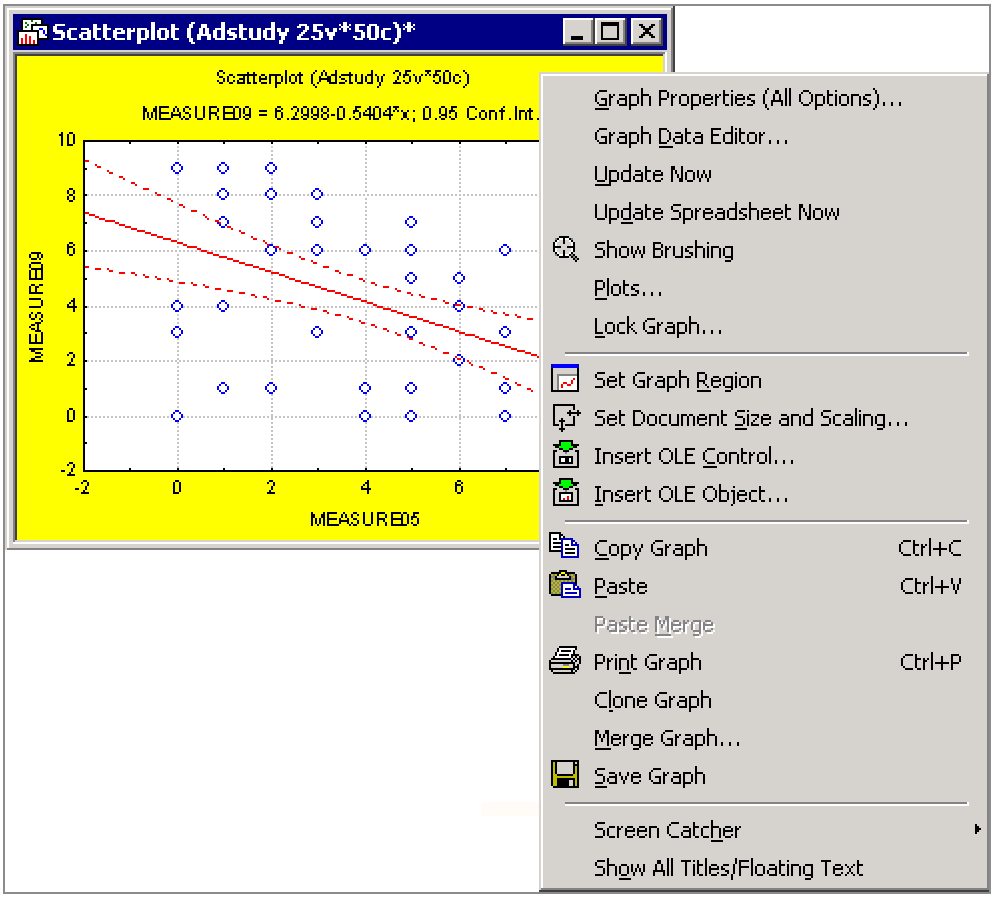
Graph customization

When the focus is on the graph window, the **Edit** tab contains different options than it did for the spreadsheets.

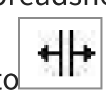
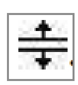


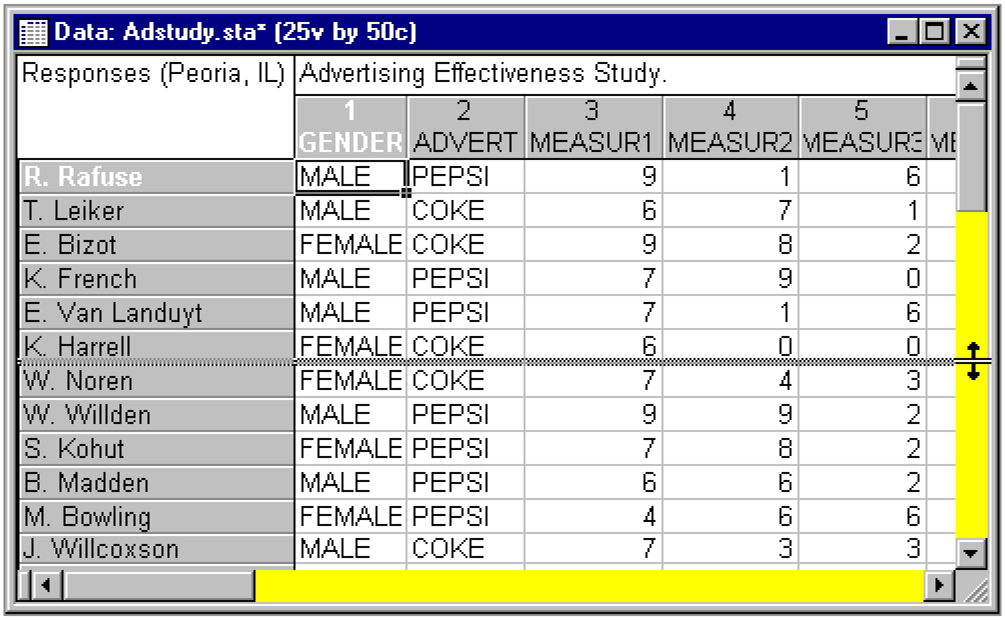
It contains a variety of graph customization and drawing tools. Many of these options are also available from shortcut menus. Right-click on specific parts of the graph to access these options.

> **Note:** The options on shortcut menus are hierarchical, which means that the first one or two options apply specifically to the graph element you have selected, while lower options displays dialog boxes that offer more options on a greater variety of graph elements related to the element you have selected. If you right-click anywhere in the space outside the graph axes, a menu of global options is displayed (as shown in the next image).

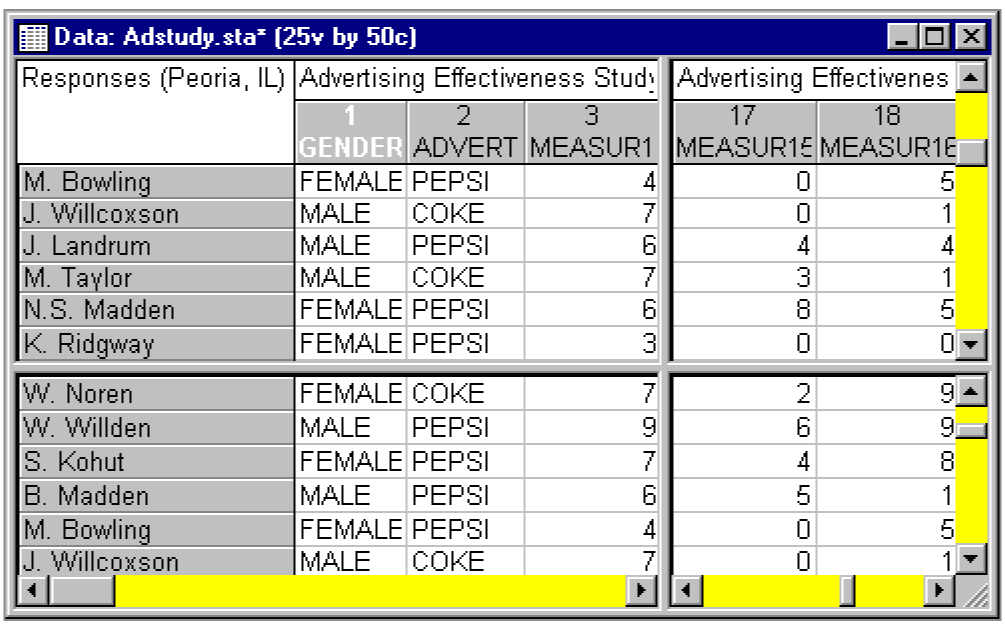


Split scrolling in spreadsheets

Spreadsheets can be split into up to four sections (panes) by dragging the split box (the small rectangle at the top of the vertical scrollbar or to the left of the horizontal scrollbar). This is useful if you have a large amount of information and you want to review results from different parts of the spreadsheet. When you move the mouse pointer to the split box, the mouse pointer changes to  or . Now, to position the split, drag it to the desired position.



You can change the position of the split by dragging the split box (now located between panes) to a new position.

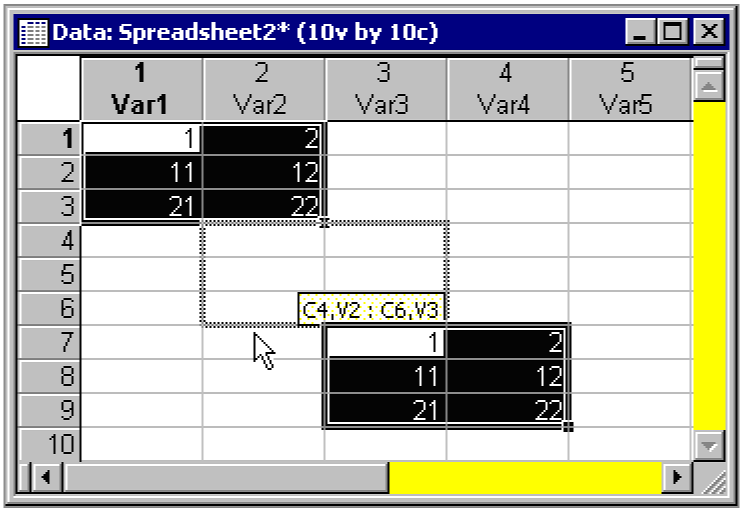


Note: Vertically split panes scroll together when you scroll horizontally; horizontally split panes scroll together when you scroll vertically.

Drag-and-drop

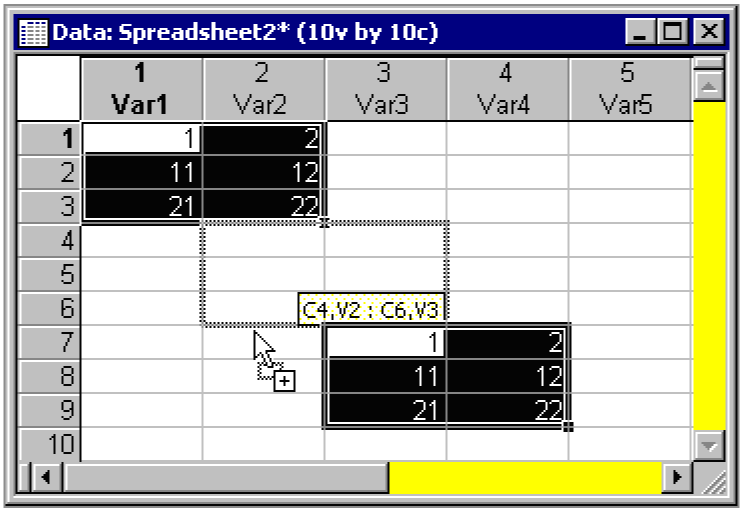
Statistica supports the complete set of standard spreadsheet (Microsoft Excel- style) drag-and-drop facilities.

- To move a block, point to the border of the selection (the mouse pointer changes to an arrow) and drag it to the new location.

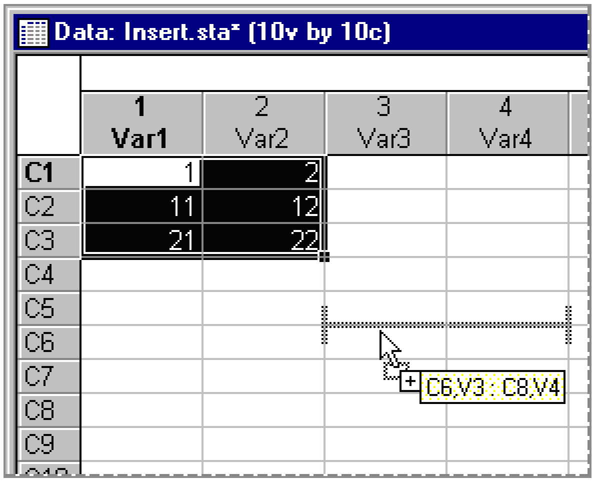


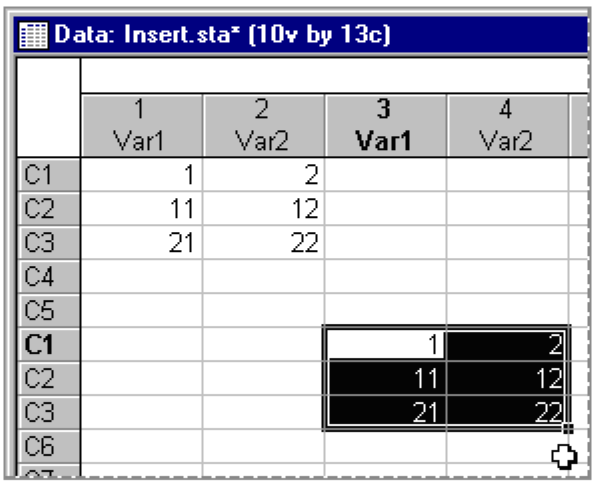
- To copy a block of data, point to the border of the selection (the mouse pointer changes to an arrow), and drag the selection to a new location while pressing the CTRL key.

> **Note:** When you are dragging the selection, a plus sign (+) is displayed next to the mouse pointer to indicate you are copying the text rather than moving it (see the next image).

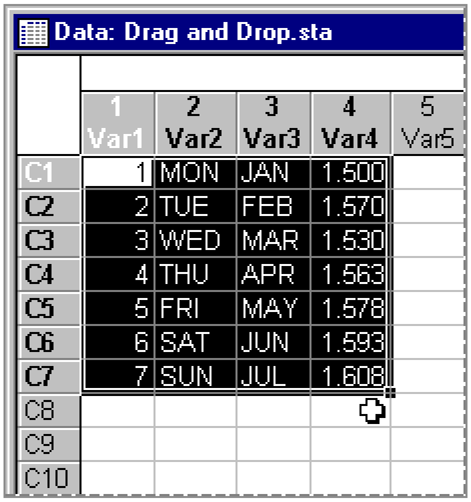


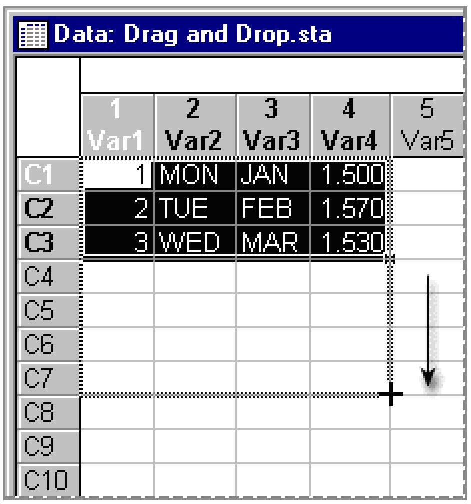
- To insert a block between columns or rows, point to the border of the selection (the mouse pointer changes to an arrow) and then drag the selection while pressing the SHIFT key.
- If you point between rows, an insertion bar is displayed between the rows, and when you release the mouse button, the block is inserted between those two rows [creating new case(s)].
- If you point between columns, an insertion bar is displayed between the columns, and when you release the mouse button, the block is inserted between those two columns [creating new variable(s)].
- If you also press the CTRL key while you are dragging the selection, the block is copied and inserted instead of moved and inserted; a plus appears next to the mouse pointer (as shown in the next illustration).





- A series of values within a block can be extrapolated (AutoFilled) by dragging the Fill Handle (the small, solid square located on the lower-right corner of the block border).



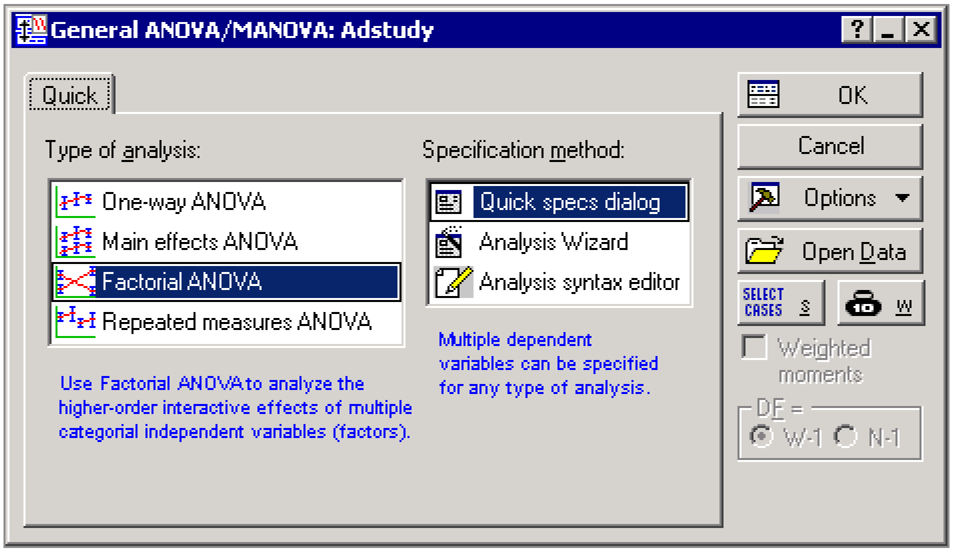


Example 2: ANOVA

Calling the ANOVA module

For this example of a 2 x 2 (between) x 3 (repeated measures) design:

1. Open `Adstudy.sta` data file.
2. To start the **ANOVA/MANOVA** analysis, select **Statistics** tab.

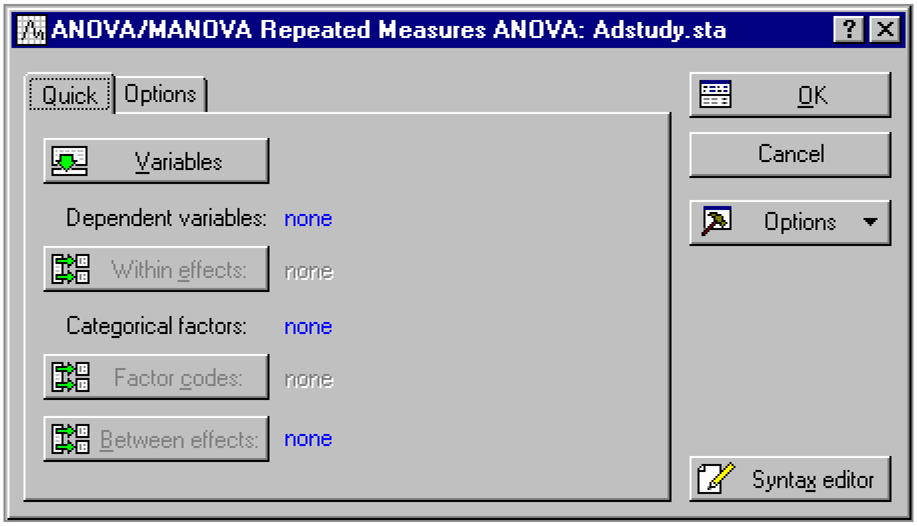


3. To display the General ANOVA/MANOVA Startup Panel, in **Base** group, click **ANOVA**.

This dialog is used to specify very simple analyses (for example, through One-way ANOVA – designs with only one between-group factor) and more complex analyses (for example, through **Repeated measures ANOVA** – designs with between-group factors and a within-subject factor).

Design

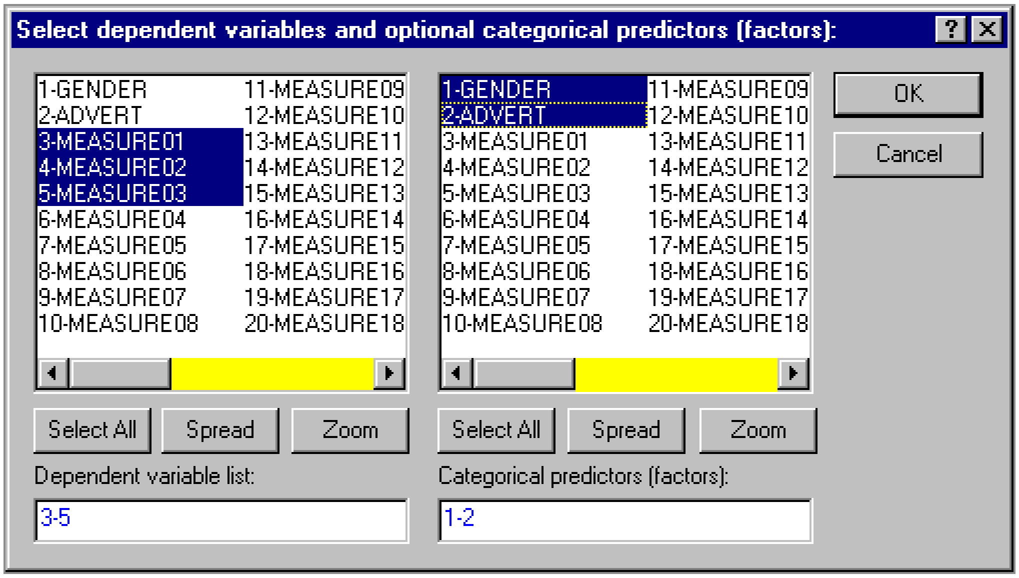
1. Select **Repeated measures ANOVA** as the Type of analysis and Quick specs dialog box as the Specification method.
2. To display ANOVA/MANOVA Repeated Measures ANOVA dialog box; in General ANOVA/MANOVA Startup Panel, click **OK** button.



Specifying the design (variables)

The first between-group factor is Gender (with 2 levels: Male and Female). The second between-group factor is Advert (with 2 levels: Pepsi and Coke). The two factors are crossed, which means that there are both Male and Female subjects in the Pepsi and Coke groups. Each of those subjects responded to three questions (this repeated measure factor is called Response; it has three levels represented by variables **Measure01**, **Measure02**, and **Measure03**).

1. To display Variable selection dialog box; in ANOVA/MANOVA Repeated Measures ANOVA dialog box, click **Variables** button .
2. Select **Measure01** through **Measure03** as dependent variables from the Dependent variable list field.
3. Select **Gender** and **Advert** as factors from the Categorical predictors (factors) field.



4. To return to **ANOVA/MANOVA Repeated Measures ANOVA** dialog box, click **OK** button.

The repeated measures design

The design of the experiment that we are going to analyze can be summarized as follows:

	Between-Group	**Between-Group**	**Repeated MeasureFactor Response**		
	Factor #1: Gender	Factor #2: Advert	Level #1: Measure01	Level #2: Measure02	Level #3: Measure03
Subject 1	Male	Pepsi	9	1	6
Subject 2	Male	Coke	6	7	1
Subject 3	Female	Coke	9	8	2

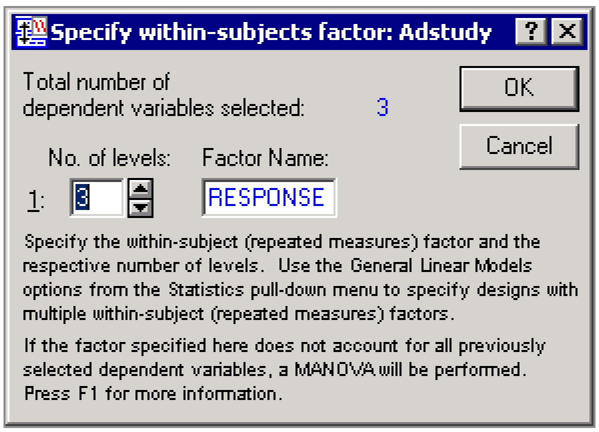
Specifying a repeated measures factor

The minimum necessary selections are now complete, and, if we did not want to select the repeated measures factor, we would be ready to click the OK button and see the results of the analysis.

Specify the three dependent variables that are selected be interpreted as three levels of a repeated measures (within-subject) factor. Unless we do so, Statistica® assumes that those are three different dependent variables and runs a **MANOVA** (such as Multivariate ANOVA).

1. Define the desired repeated measures factor using Specify within-subjects factor dialog box; click **Within effects** button on **Quick** tab .

   Note: Statistica® has suggested the selection of one repeated measures factor with 3 levels (default name R1). You can specify only one within-subject (repeated measures) factor using this dialog box. To specify multiple within-subject factors, use the General Linear Models module (available in the optional Advanced Linear/Nonlinear Models package).

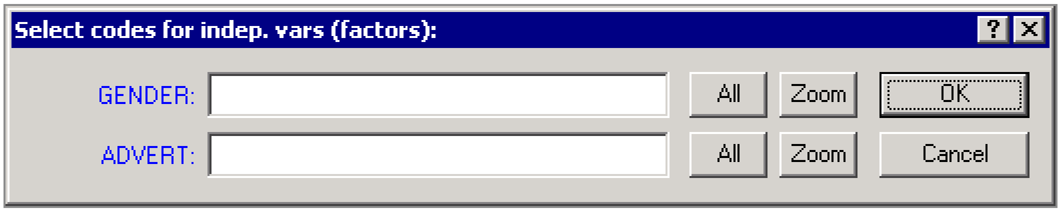


2. To display the Electronic Manual topic that describes all options in this dialog box and contains links to comprehensive discussions of repeated measures and examples of designs, press **F1** key on your keyboard while the **Specify within-subjects factor** dialog box is displayed (or click the help button in the upper-right corner of the dialog box) .
3. For this example, edit the name for the factor: in the **Factor Name** text box, change the default **R1** to **RESPONSE**, and to exit the dialog box, click **OK** button.

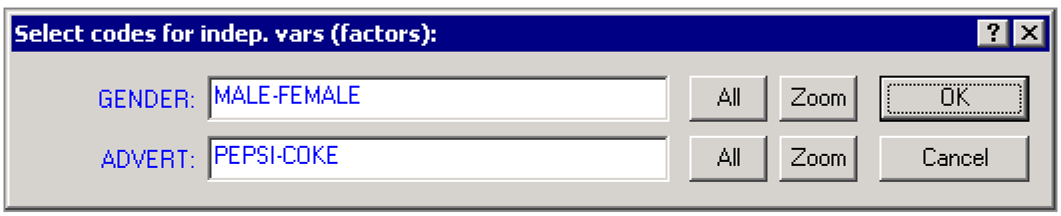
Codes (defining the levels) for between-group factors

You do not need to manually specify codes for between-group factors [such as there is no need to instruct Statistica® that variable Gender has two levels: 1 and 2 (or Male and Female)] unless you want to prevent Statistica® from using, by default, all codes encountered in the selected grouping variables in the data file.

1. Enter such custom code selection, using **Select codes for indep. vars (factors)** dialog box and click **Factor codes** button.



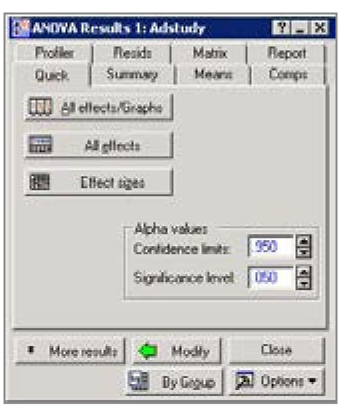
2. To review values of individual variables, use the options in this dialog box, before you make your selections. Click **Zoom** button, scan the file, and fill in the codes fields (for example, Gender and Advert) for an individual variable or all variables.
3. In **Select codes for indep. vars (factors)** dialog box, click **OK** button; Statistica® automatically fills in the codes fields with all distinctive values encountered in the selected variables, and closes the dialog box.



Performing the analysis.

1. In ANOVA/MANOVA Repeated Measures ANOVA dialog box, click **OK** button .

   The analysis is performed and the ANOVA Results dialog box is displayed, which contains various output spreadsheets and graphs options. You can locate the desired results options using several tabs present on this dialog box.

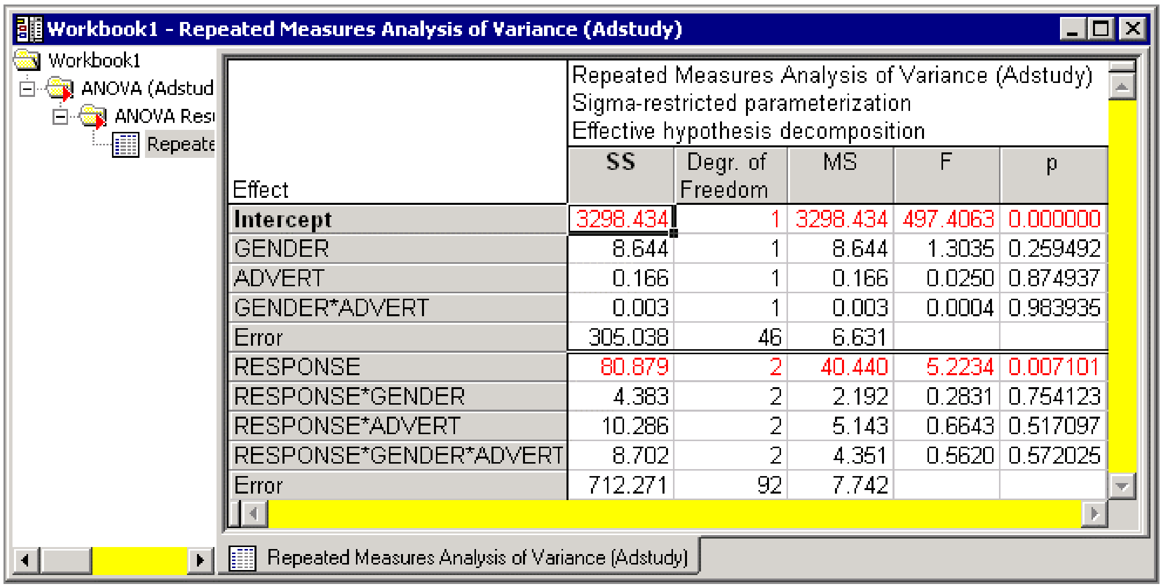


2. To perform planned comparisons, select **Comps** tab.
3. To view residual statistics, select **Resids** tab.

   For this example, we can use the results options available on **Quick** tab.

Reviewing ANOVA results.

1. Observe ANOVA summary of all effects table. Click **All effects** button (the one with the **SUMM** icon).

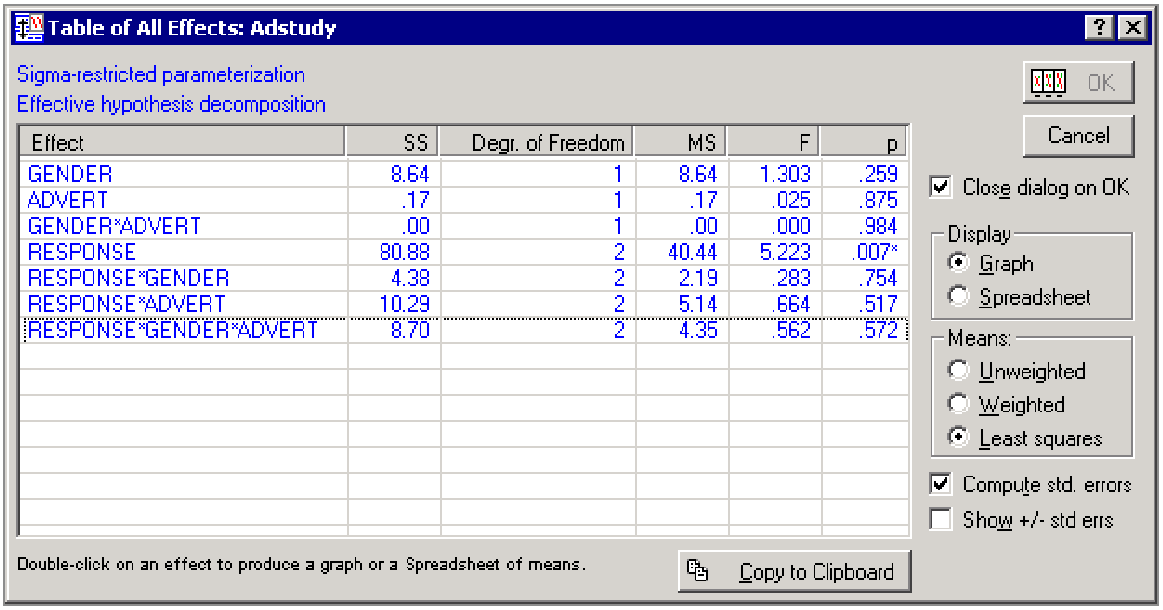


Repeated Measures Analysis of Variance (Adstudy)
Sigma-restricted parameterization
Effective hypothesis decomposition

Effect	SS	Degr. of Freedom	MS	F	p
Intercept	3298.434	1	3298.434	497.4063	0.000000
GENDER	8.644	1	8.644	1.3035	0.259492
ADVERT	0.166	1	0.166	0.0250	0.874937
GENDER*ADVERT	0.003	1	0.003	0.0004	0.983935
Error	305.038	46	6.631		
RESPONSE	80.879	2	40.440	5.2234	0.007101
RESPONSE*GENDER	4.383	2	2.192	0.2831	0.754123
RESPONSE*ADVERT	10.286	2	5.143	0.6643	0.517097
RESPONSE*GENDER*ADVERT	8.702	2	4.351	0.5620	0.572025
Error	712.271	92	7.742		

   The only effect (ignoring the Intercept) in this analysis that is statistically significant **(p = .007)** is the **RESPONSE** effect. This result might be caused by many possible patterns of means of the RESPONSE effect (for more information, consult the **ANOVA Introductory Overview** in the Electronic Manual). Observe the marginal means for this effect graphically, to see what it means.

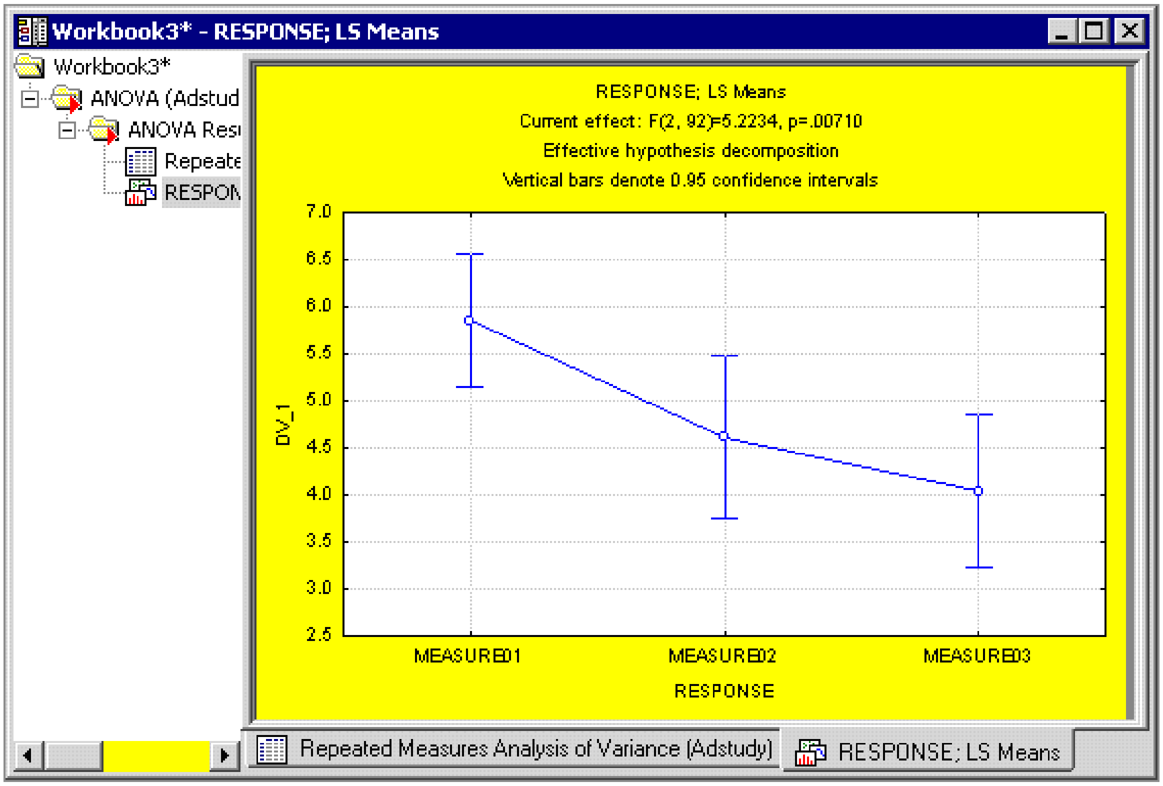
2. To display ANOVA Results dialog box (that is, resume the analysis), press CTRL+R or click **ANOVA Results** button on the analysis bar.
3. Review the means for individual effects using the **Table of All Effects** dialog box; click **All effects/Graphs** button.



This dialog box contains a summary table of all effects (with most of the information you have seen in the all effects spreadsheet) and is used to review individual effects from that table in the form of the plots of the respective means (or, optionally, spreadsheets of the respective mean values).

Plot of means for a main effect

To produce the respective plot; in **Table of All Effects** dialog box, double-click the significant main effect RESPONSE (the one marked with an asterisk in the p column).

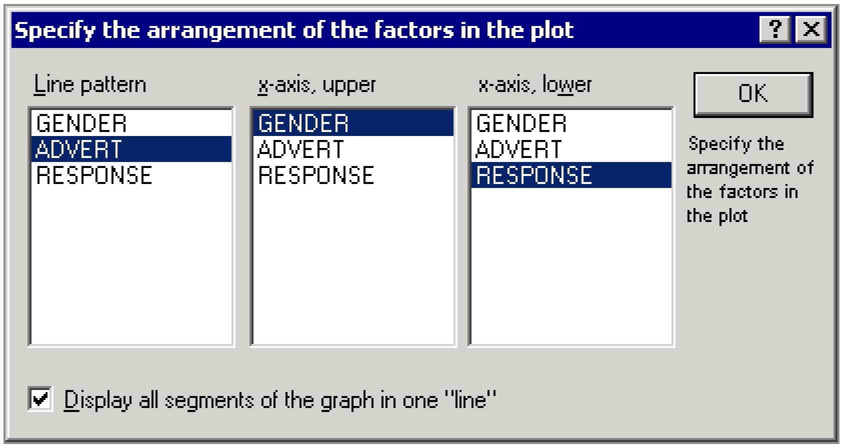


The graph indicates that there is a clear decreasing trend; the means for the consecutive three questions are gradually lower. Even though there are no significant interactions in this design, refer the highest-order interaction to examine the consistency of this strong decreasing trend across the between-group factors.

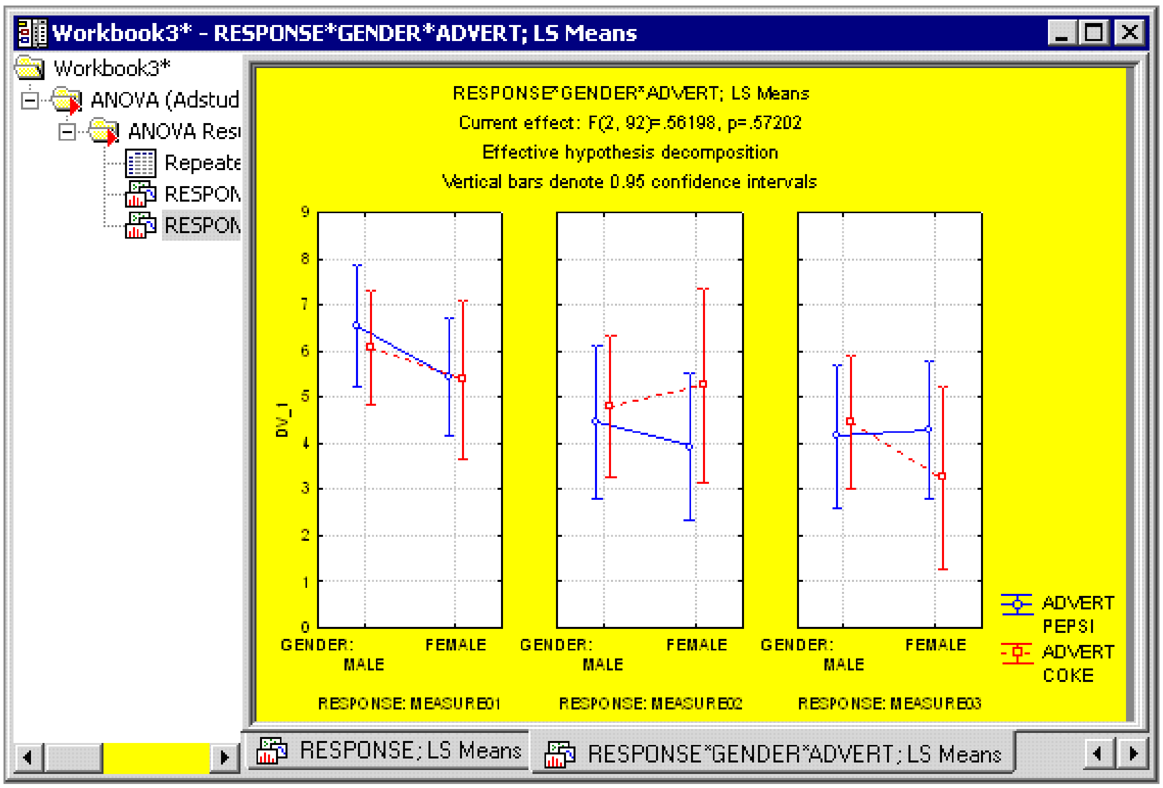
Plot of means for a three-way interaction

1. To see the plot of the highest-order interaction, in **Table of All Effects** dialog box, double- click the row marked **RESPONSE*GENDER*ADVERT**, representing the interaction between factors 1 (**Gender**), 2 (**Advert**), and 3 (**Response**).
2. Specify the arrangement of the factors in the plot dialog box is displayed, which is used to customize the default arrangement of factors in the graph.

> **Note:** Unlike the previous plot of a simple factor, the current effect can be visualized in a variety of ways



3. To accept the default arrangement and produce the plot of means, click **OK** button.



This pattern of means (split by the levels of the between-group factors) does not indicate any salient deviations from the overall pattern revealed in the first plot (for the main effect, RESPONSE). Now you can continue to interactively examine other effects – run post-hoc comparisons, planned comparisons, extended diagnostics. – to further explore the results.

Interactive data analysis in Statistica®

This example illustrates the way in which Statistica supports interactive data analysis. You are not forced to specify all output to be generated before seeing any results.

Even simple analysis designs can produce large amounts of output and countless graphs, but usually you cannot know what will be of interest until you have a chance to review the basic output. With Statistica®, you can select specific types of output, interactively conduct follow-up tests, and run supplementary what-if analyses after the data are processed and basic output reviewed.

Statistica®'s flexible computational procedures and wide selection of options used to visualize any combination of values from numerical output offer countless methods to explore your data and verify hypotheses.

Automating analyses (macros and Statistica® Visual Basic)

Selections that are made in the course of the interactive data analysis (including both specifying the designs and choosing the output options) are automatically recorded in the industry standard Visual Basic code. You can save such macros for repeated use (you can also assign them to toolbar buttons, modify or edit them, combine them with other programs).

Example 3: Variable Bundles

Statistica offers a unique option – variable bundles – to locate a subset of data quickly and easily in a large data file. Bundles can be created to organize large sets of variables and to facilitate the repeated selection of the same set of variables.

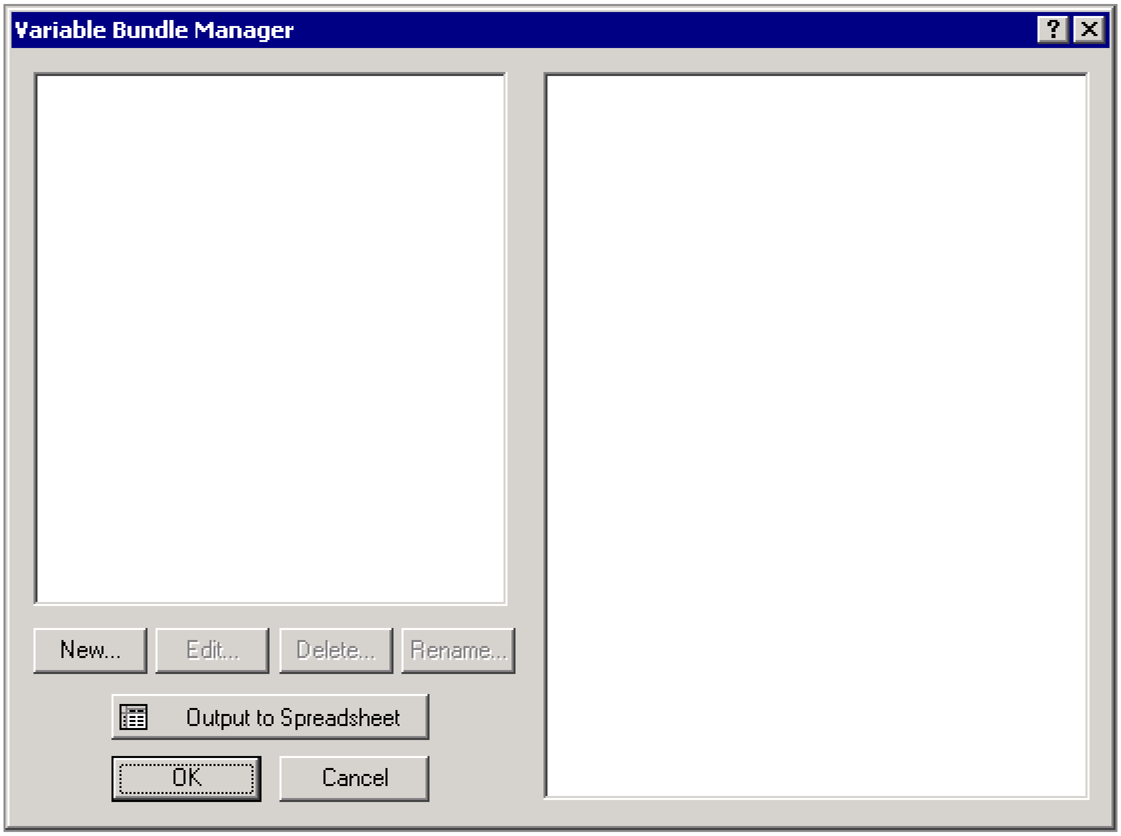
1. Open `EnginePerformance.sta`.

   This data set describes the performance of large engines and contains various process parameters recorded during their manufacture. It includes 128 engines (their Efficiency, Fuel Economy, and Power as measured during testing) and 74 process parameters collected during the manufacture of each engine.

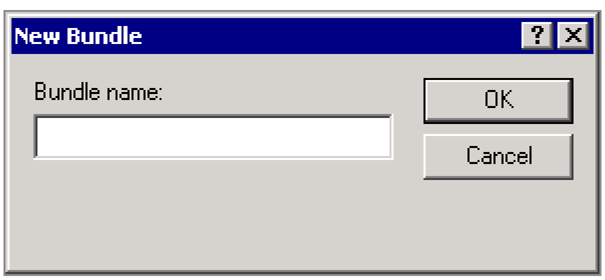
   For this example, we can proceed with the premise that we often need to generate analyses in which the same set of variables is repeatedly used.

2. Select the **Data** tab.

3. To display **Variable Bundle Manager** dialog box, in the **Variables** group, click **Bundles** button .

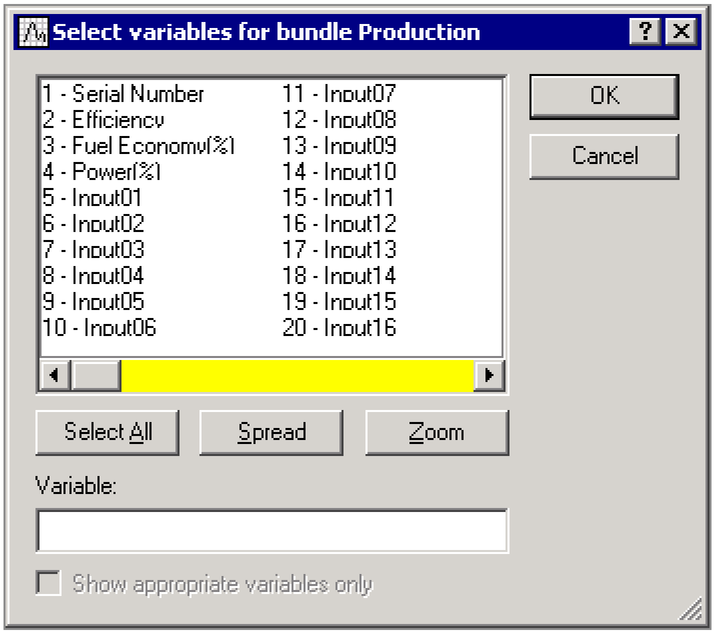


4. To display the **New Bundle** dialog box, click **New** button.



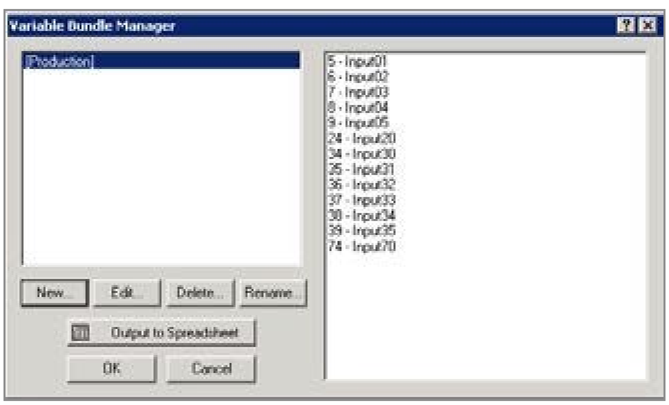
5. In the Bundle name field, enter the **name Production**.

6. Click **OK** button. The **Select variables for bundle** dialog box is displayed, which contains all the variables in the `EnginePerformance.sta` data set.



7. Select the variables **Input01-Input05**, **Input20**, **Input30-Input35**, and **Input70**.

8. To close the **Select variables for bundle** dialog box, click **OK** button and return to the **Variable Bundle Manager** dialog box.



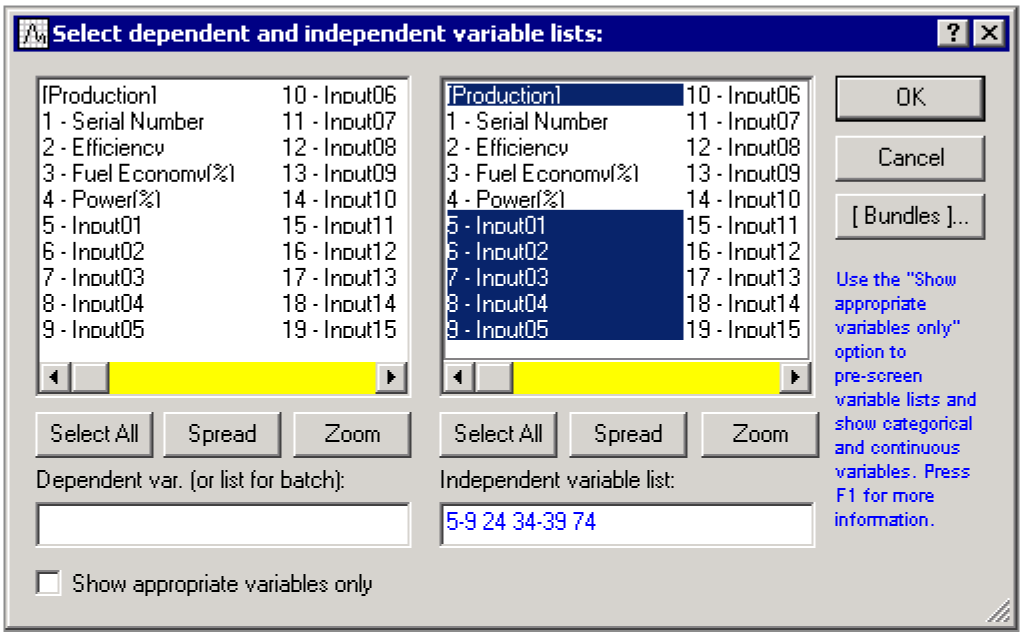
-The left pane of this dialog box displays the names of all bundles that are defined for this spreadsheet (you can create numerous bundles in each spreadsheet if needed).

-The right pane displays the contents of the bundle that is currently selected in the left pane. If both of these panes are empty, no bundles are created for this spreadsheet.

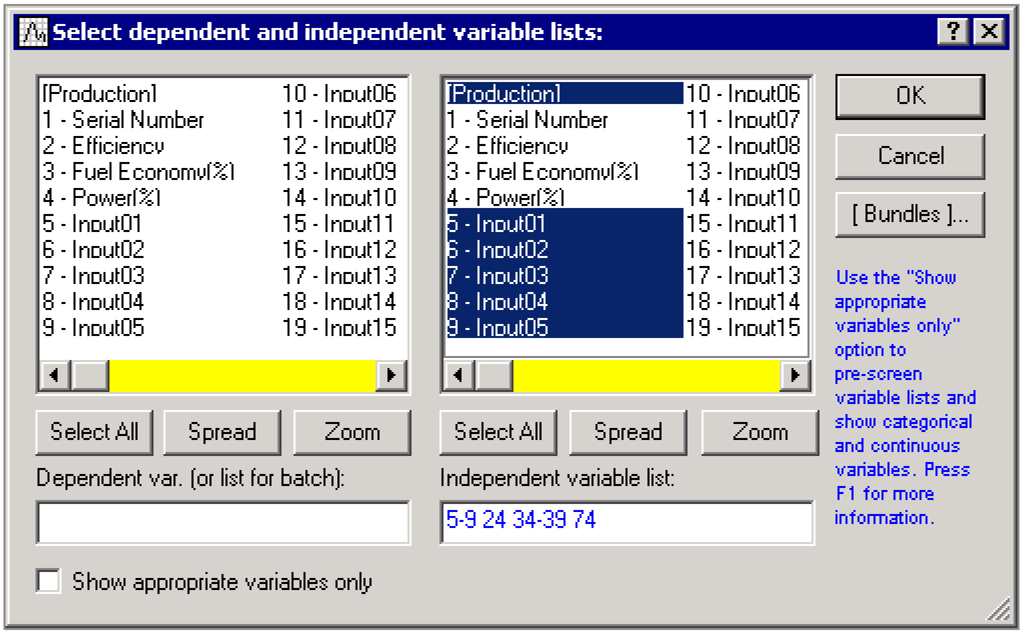
9. To make changes to a bundle, click **Edit** button, to discard a bundle, click **Delete** button, to change the title of a bundle, click **Rename** button, and to produce a

spreadsheet containing information about the bundles for the active data spreadsheet, click **Output to Spreadsheet** button.

10. For this example, to accept the bundle created and close the **Variable Bundle Manager** dialog box, click **OK** button .
11. To display Multiple Linear Regression Startup Panel, select the **Statistics** tab, and in the **Base** group, click **Multiple Regression** button.
12. To display the **variable specification** dialog box, on **Quick** tab, click **Variables** button. Bundles are displayed in brackets and listed (in alphabetical order) at the top of the variable list.
13. In the Independent variable list, select the Production bundle to specify – with one click of the mouse button – **Input01-Input05**, **Input 20**, **Input 30-Input35**, and **Input 70** as the independent variables for the analysis.



If you are not sure what variables are included in a bundle, move the mouse pointer over the bundle name in the **variable selection** dialog box, and a ToolTip displays the variable numbers.



Additionally, To view the list of variables (by name), in the variable specification dialog box, click **Bundles** button. This displays the Variable Bundles Manager dialog box.

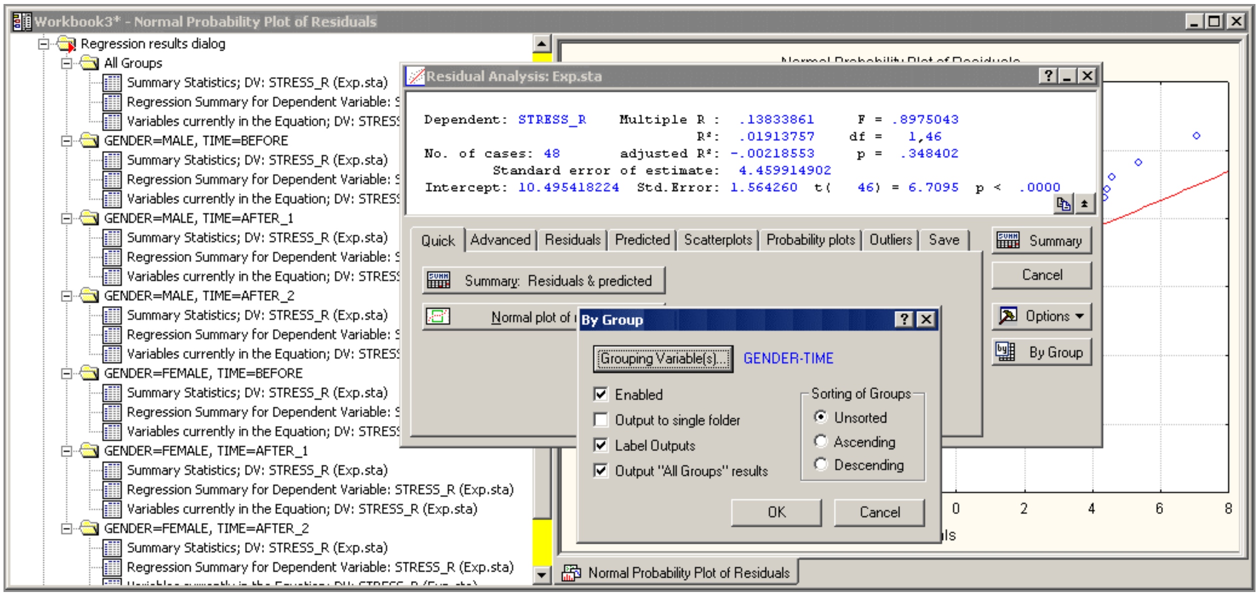
Note: Bundles are defined for a single spreadsheet, and they are only used for variable selection. They are never listed in reports or other output.

As you can see with this example, you can save considerable time by selecting a bundle rather than looking for the correct variables to choose in a large data set.

Example 4: By-Group Analyses

Statistica offers a powerful option to turn every statistical or graphics analysis into an analysis by group. When reviewing results in the results dialog of practically any analysis, or using the graphs options, you can select one or more grouping variables, and then create results for

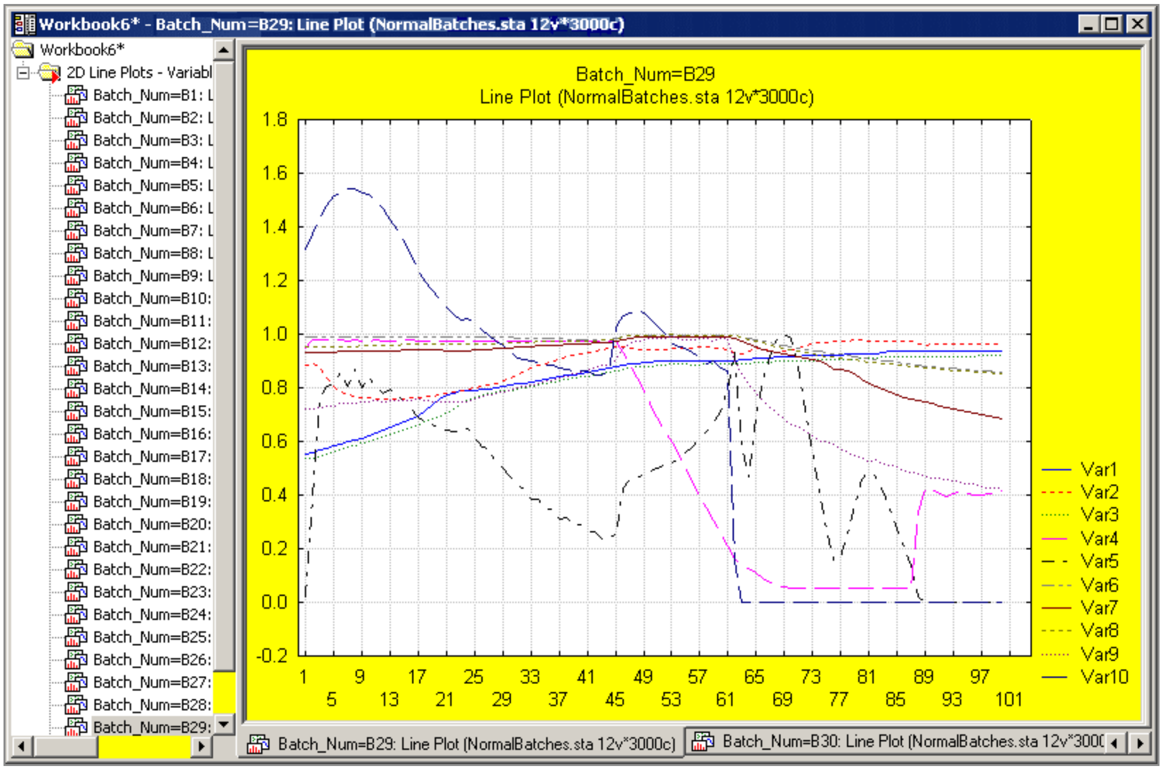
- fll cases in the data combined
- broken down by each combination of unique values in the grouping variables.



This is a very powerful tool for interactive and exploratory data analysis, allowing you to review quickly whether any patterns or specific results hold in all subgroups, samples, or strata in your data.

For example, you might be performing a multiple regression analysis and decide to review, without exiting the current dialog box, the results broken down by Gender and another grouping variable in your data. After selecting (enabling) this option (by clicking **By Group** button), each time you click any of the results buttons (for example, to create a summary results spreadsheet or graph), all results are computed not only for all groups (optionally), but also for each unique combination of grouping variables that were specified (for example, by Gender and another grouping variable).

The results of the **By Group analysis** can be placed either in the default results workbook into their own folder, labeled with the respective by-group condition (for example, Gender=**Female**; Time=**After1**), or into the same folder with all other results.

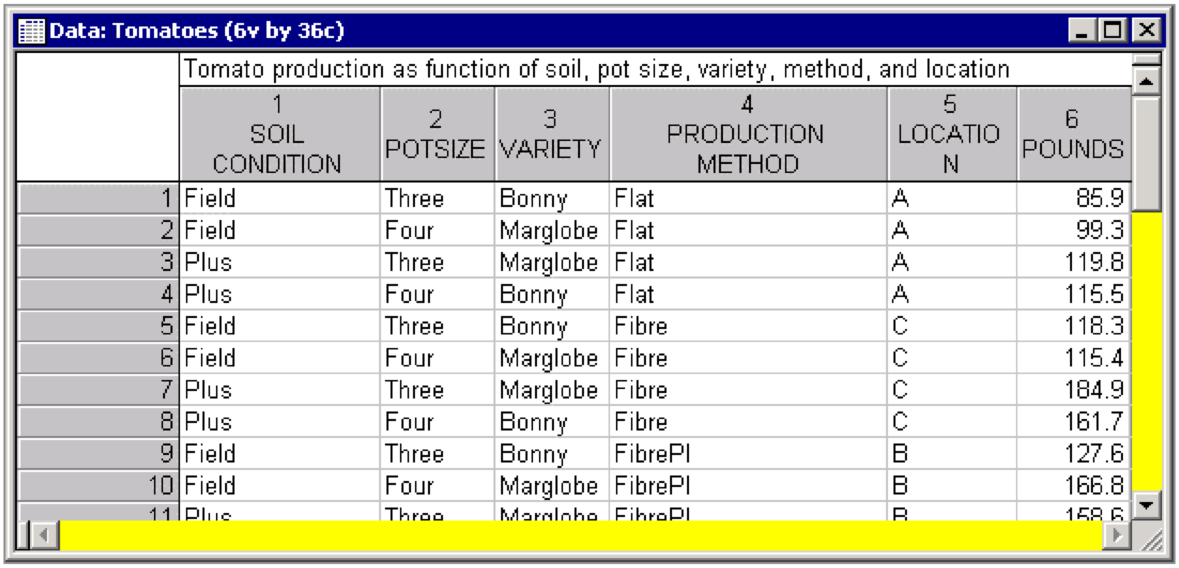


For example, you can create multiple line plots to describe a multivariate batch process, creating a separate graph (trajectories) for each batch.

Exploring Experimental Data Using the By Group Option

This example is based on the data file `Tomatoes.sta`, based on various methods of producing tomato plant seedlings prior to transplanting in the field.

1. Open the example `Tomatoes.sta` data set.
2. Select **Home** tab.
3. To display **Open a Statistica Data File** dialog box, in the **File** group, click **Open** arrow and select **Open Examples** from the drop-down list.
4. Double-click **Datasets** folder, and then select and open the Statistica data set `Tomatoes.sta`.



Data: Tomatoes (6v by 36c)

Tomato production as function of soil, pot size, variety, method, and location

	1 SOIL CONDITION	2 POTSIZE	3 VARIETY	4 PRODUCTION METHOD	5 LOCATIO N	6 POUNDS
1	Field	Three	Bonny	Flat	A	85.9
2	Field	Four	Marglobe	Flat	A	99.3
3	Plus	Three	Marglobe	Flat	A	119.8
4	Plus	Four	Bonny	Flat	A	115.5
5	Field	Three	Bonny	Fibre	C	118.3
6	Field	Four	Marglobe	Fibre	C	115.4
7	Plus	Three	Marglobe	Fibre	C	184.9
8	Plus	Four	Bonny	Fibre	C	161.7
9	Field	Three	Bonny	FibrePl	B	127.6
10	Field	Four	Marglobe	FibrePl	B	166.8
11	Plus	Three	Marglobe	FibrePl	B	158.6

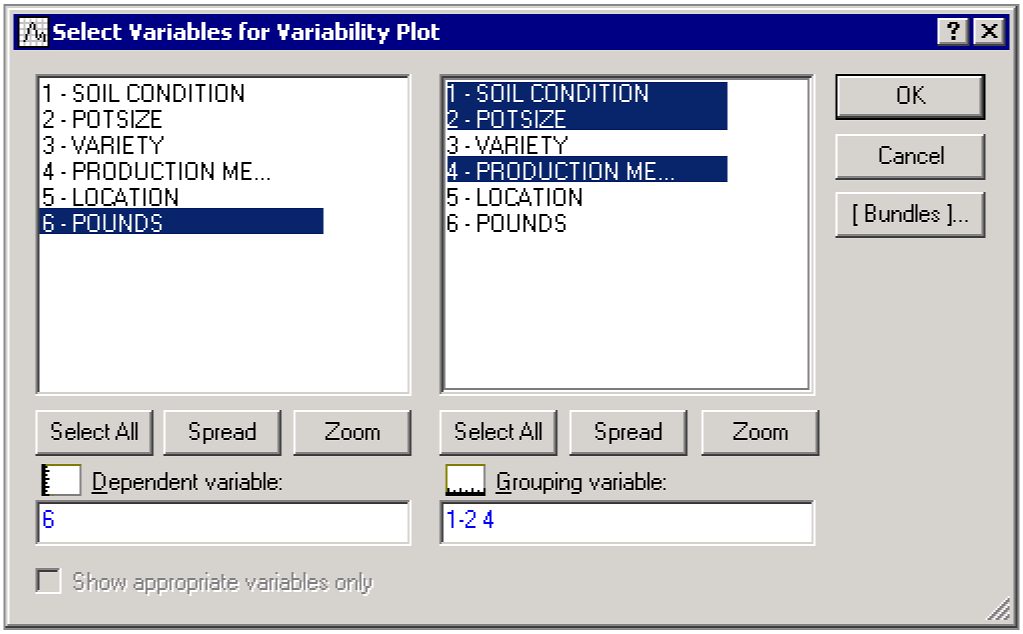
Exploring Patterns by Variety

This example illustrates a workflow as it often applies to the analysis of discrete or batch-manufacturing data, such as the goal of the analysis is to verify (graphically or analytically) that some patterns or distributions equally apply to all samples, parts, or batches.

We can explore the effect of Production Method, Soil Condition, and Potsize on yield (Pounds), and evaluate whether any patterns hold for each Variety in the study. Instead of performing a complete analysis of variance, we can use mostly graphical methods and visual inspection.

Specifying variability plots

1. Select **Graphs** tab.
2. In **More** group, click **2D** button.
3. To display **Variability Plot** dialog box; from the drop-down menu, select **Variability Plots**.
4. Click **Variables** button, and in Select Variables for Variability Plot dialog box, Select **POUNDS** as the Dependent variable, and **SOILCONDITION**, **POTSIZE**, and **PRODUCTION METHOD** from the Grouping variable list.



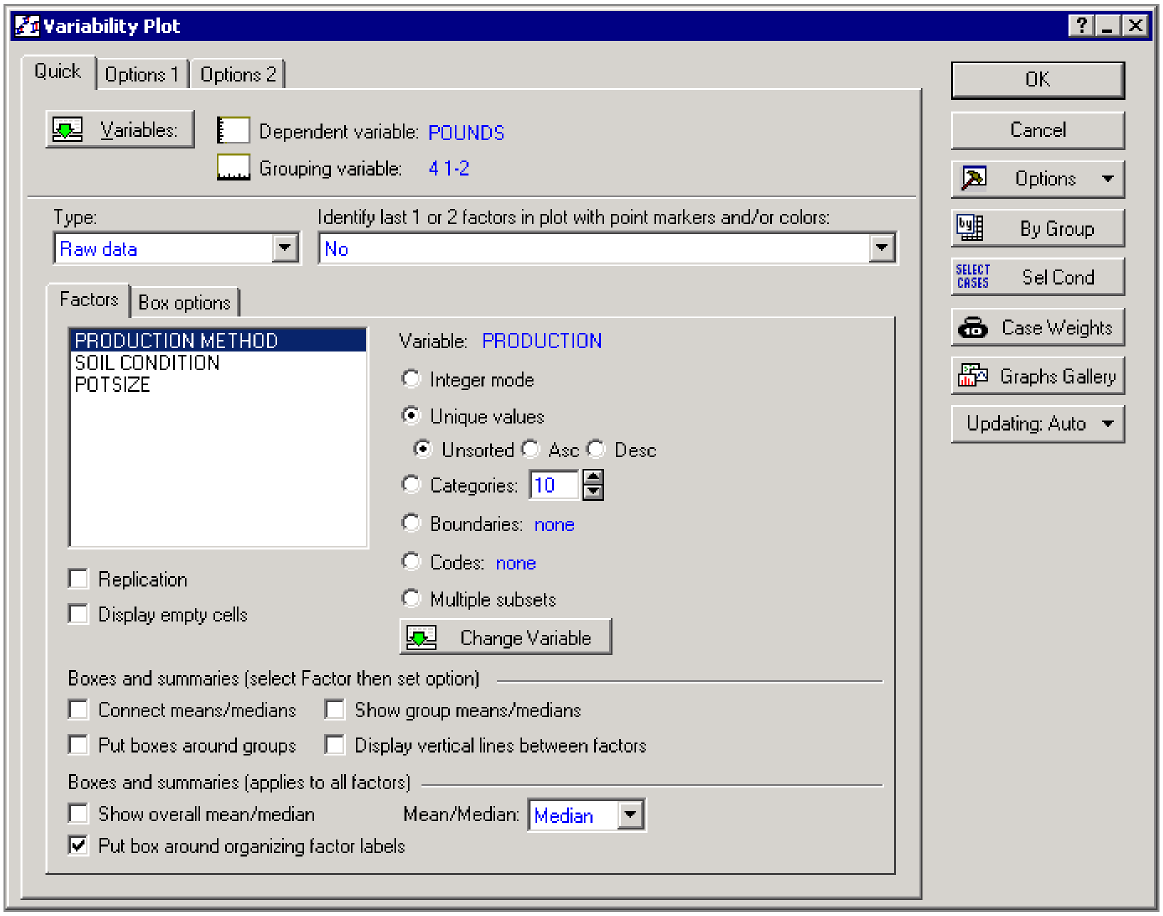
In the example, we can create the graph by **VARIETY** to illustrate the By Group features.

5. In variable selection dialog box, click **OK** button.

Reordering variables for variability plot

For the most informative plot, let us reorder the variables so that PRODUCTION METHOD is the first factor in the list of Factors.

1. Click on that variable in the Factors list, and then, while pressing the left mouse button, drag it to the top of the list.



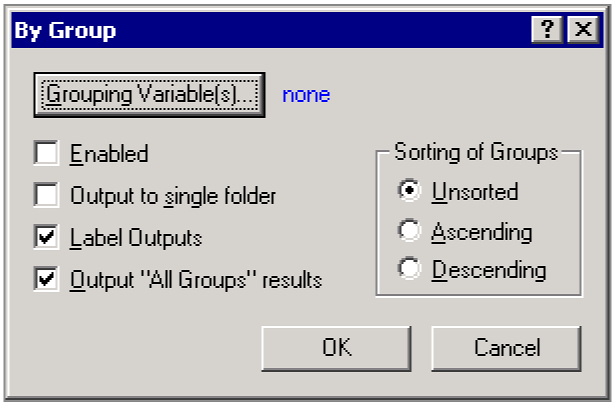
2. In **Variability Plot** dialog box, ensure that PRODUCTION METHOD is selected in the Factors list.

3. Select **Put boxes around groups** check box.

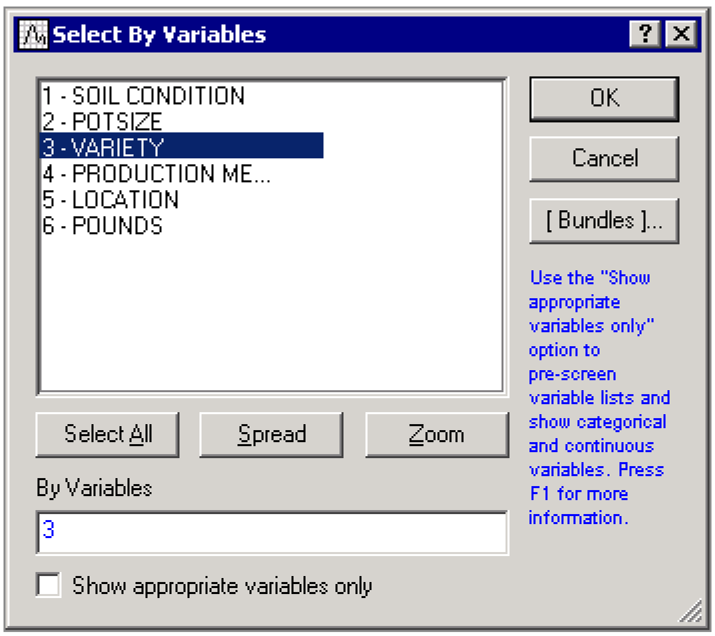
Specifying by grouping

Create the variability plot for PRODUCTION METHOD, SOIL CONDITION, and POTSIZE for all varieties of tomatoes combined, and broken down by **VARIETY** (one graph per **VARIETY**).

1. To display the **By Group** dialog box, click **By Group** button.



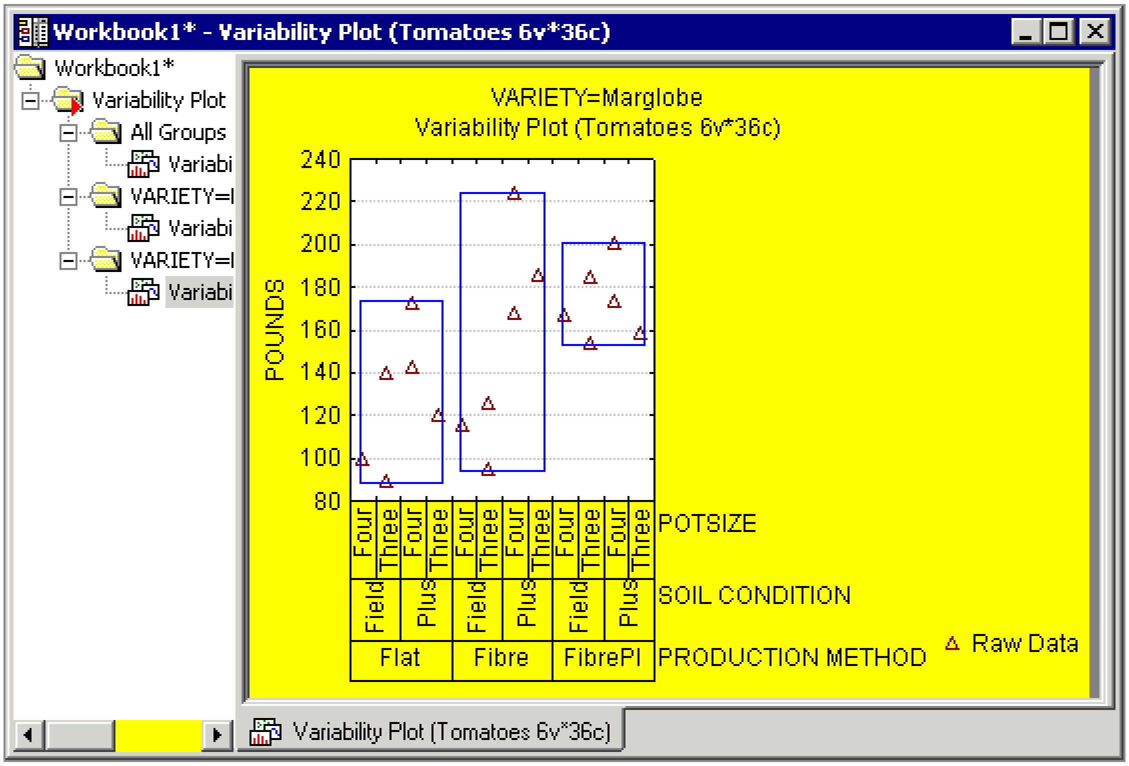
2. To display the **Select By Variables** dialog box, click **Grouping Variable(s)** button and specify **VARIETY** as the **By Group** variable.



You can specify more than one By Group variable, in which case all subsequent analyses will be performed broken down by each unique combination of values found in the By Group variables.

Reviewing the variability plots

1. To close the **Select By Variables** dialog box, click **OK** button.
2. To close the **By Group** dialog box, click **OK** button.
3. To create the graphs; in the **Variability Plot** dialog box, click **OK** button.



Notice how the Variability Plot is created 1) for All Groups, and 2) for each Variety (Bonny and Marglobe).

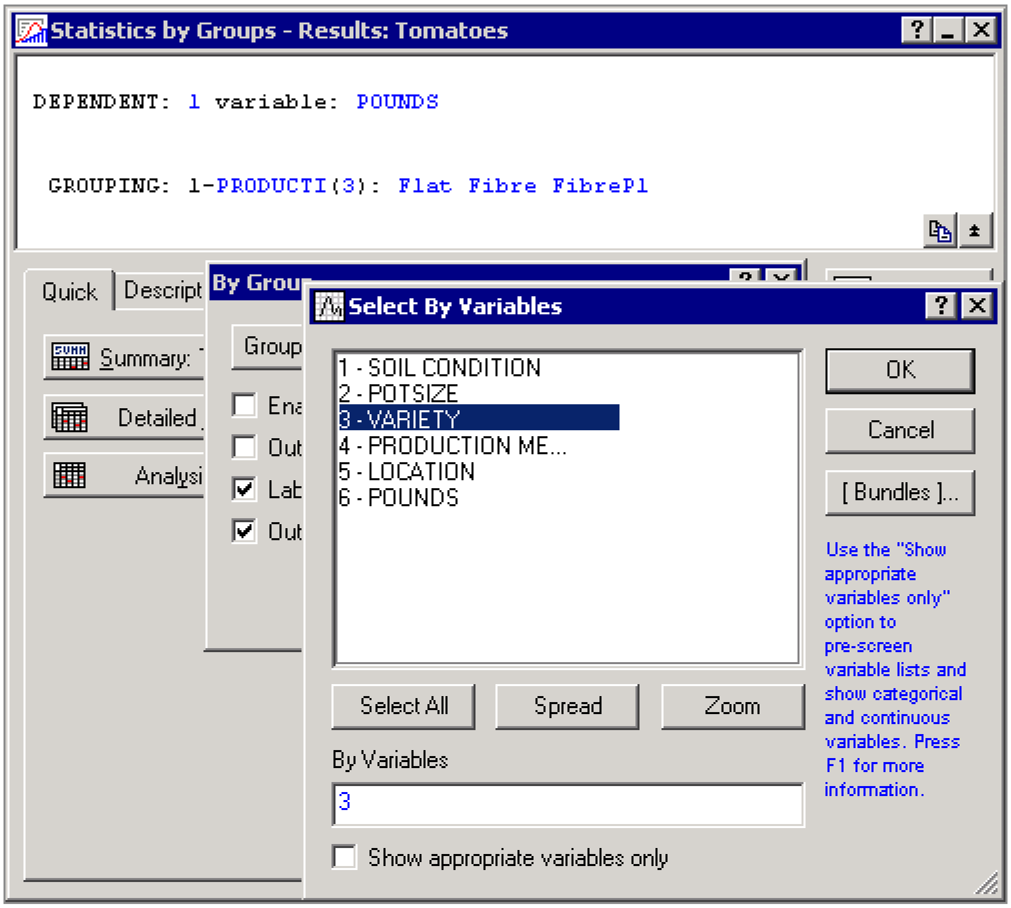
If you review these graphs carefully, you can see that the **Production Method** appears to make little difference (in the observed values for Pounds) for Variety=Bonny, while for Variety=Marglobe, the FibrePl method shows the least variability in values, which are generally at the higher end of the distribution of all values for variable Pounds.

Descriptive Statistics By Group

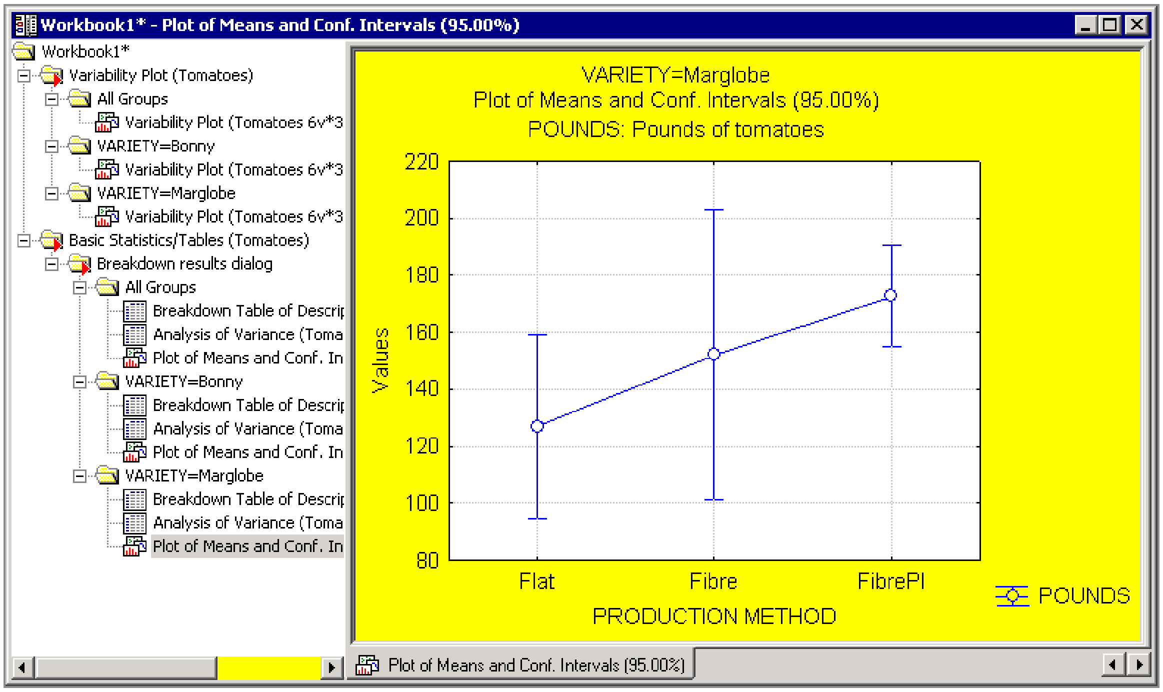
Let us use the descriptive statistics options to further explore this.

1. Select **Statistics** tab.
2. To display **Basic Statistics and Tables Startup** Panel; in the **Base** group, click **Basic Statistics** button.
3. To display **Statistics by Groups (Breakdown)** dialog box, select **Breakdown & one-way ANOVA,** and click **OK** button.
4. Click **Variables** button, and in **Select the dependent variables and grouping variables** dialog box, specify **Pounds** as the **Dependent variable** and **Production Method** as the **Grouping variable**.

5. To close **variable selection** dialog box, click **OK** button.
6. To display **Statistics by Groups - Results** dialog box, click **OK** button in the **Statistics by Groups (Breakdown)** dialog box.
7. To compute these statistics by Groups, broken down further by tomato Variety, click **By Group** button.
8. In **By Group** dialog box, click **Grouping Variable(s)** button.
9. In **Select By Variables** dialog box, select **Variety** as the **By Group** variable.



10. Click **OK** button in this dialog and click **OK** in **By Group** dialog box.
11. In **Statistics by Groups - Results** dialog box, click in sequence **Summary** button , **Analysis of Variance** button and **Interaction plots** button.



All results are placed into the respective folder, either the **All Groups** folder or the **Variety**=**Bonny** or **Variety**=**Marglobe** folders.

You can now review these results for all groups combined and broken down by Variety. Production Method appears to have an effect on yield (Pounds) for **Variety**=**Marglobe**, while there is no indication of such an effect for **Variety**=**Bonny**.

Summary

With Statistica, you can perform ad-hoc by-group analyses from virtually any results dialog box, reviewing results for all groups combined or broken down by one or more grouping variable. This feature for exploratory data analysis can be used to compare groups and verify consistency of results across groups for any analysis.

Before concluding this topic, a few comments about the technical details regarding the implementation of this feature might be useful.

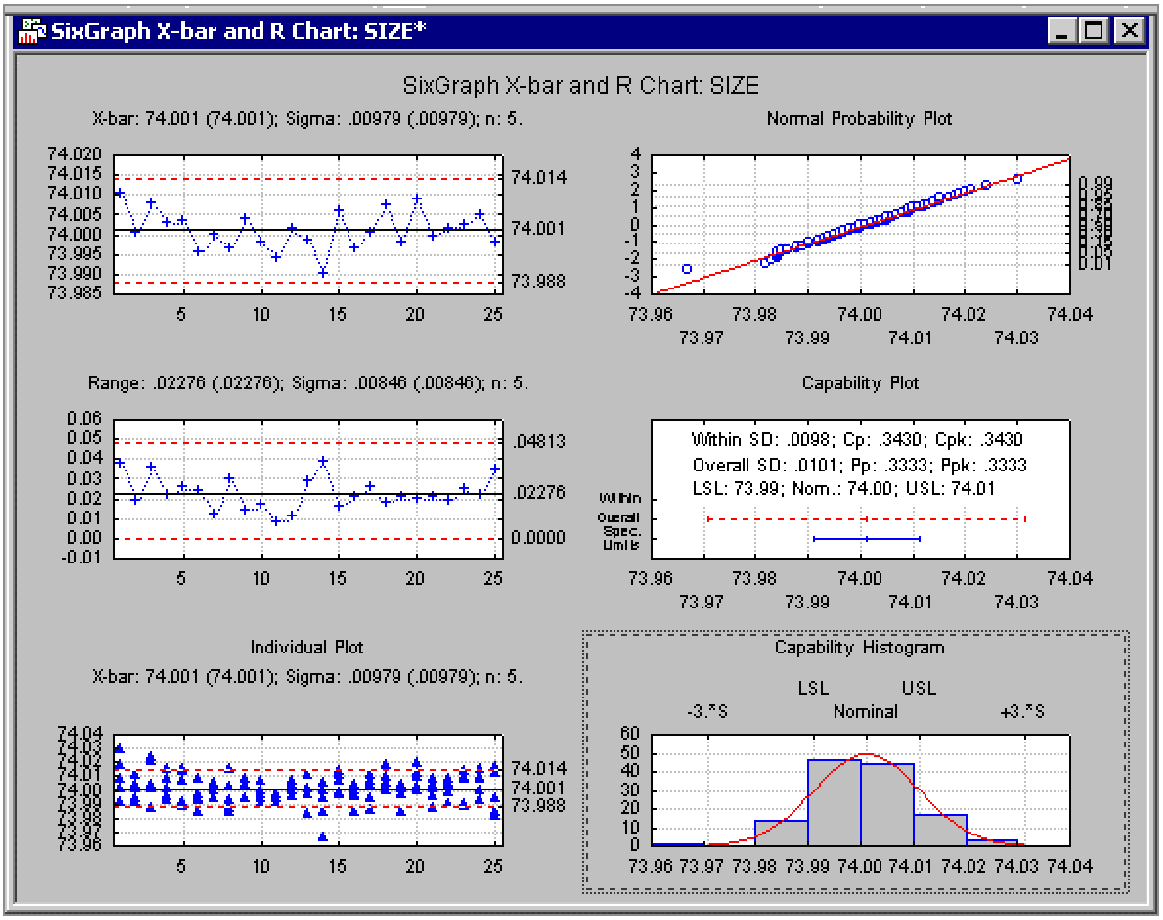
- When performing by-group analyses, as illustrated in this example, the program actually reruns the analyses for each group (and all groups), leveraging the Statistica Visual Basic macro code that is recorded automatically during the interactive analyses, and which can be saved as macros.
- When analyzing very large data problems (for example, very large unbalancedv experimental designs or complex analyses that require iterated computations before

results can be displayed), the individual analyses might take up significant amounts of computing time, in particular when there are many unique groups identified in the data (for example, imagine a complex generalized linear model estimated for each of 100 groups).

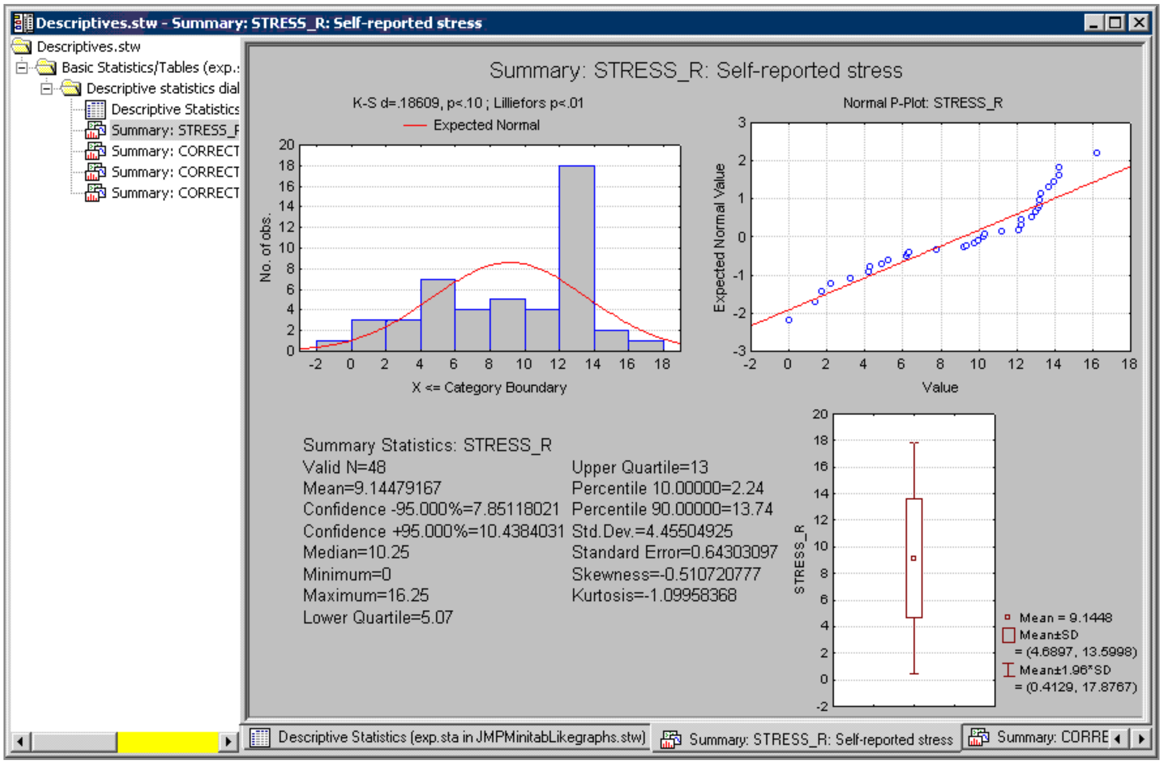
- Therefore, it is generally a good idea to begin each exploratory analysis by computing simple descriptive statistics, frequency tables, and graphs to understand the structure of the data and identify the number of unique groups (combination of values in the grouping variables) in the data.

Example 5: Summary Results Panels (Quality, Process, Gage-Sixpacks)

Several analyses in Statistica® support summary graphs and reports are arranged into a single (graphics) document. In Six Sigma and manufacturing applications, these types of displays are referred to as **Quality Sixpacks** because they summarize the quality of a single variable with six (or fewer) individual graphs and tables.



Statistica® includes many such displays to summarize basic descriptive statistics, correlations, the results of gage or process capability studies, or other types of data analyses, as shown in the following illustration.



Process Capability Analysis Consistent with DIN 55319 and ISO 21747

In recent years, European (and other international) manufacturers have developed standards for the computation of process capability indices that explicitly accounts for systematic and random process variation over time, and non-normal distributions. These indices are adopted throughout the auto manufacturing industry and their suppliers, and Statistica® fully supports these standards.

Process capability indices measure the number of times that the observed (normal) distribution of values can fit inside the specification limits for the respective part under consideration. Thus, these indices summarize the quality of a process to produce products or parts that are consistent with design specifications.

For example, even if a distribution of data points within each sample is Normal, if there is systematic or random variation that occurs over time as successive samples are taken, the resultant distribution of values are not Normal. Therefore, in many cases the normal distribution-based process capability computations are not applicable. Also, it is usually of interest to identify any time-dependent variability or trends because they can indicate machine wear or other process problems.

The following example illustrates step-by-step how to compute process capability indices consistent with these international standards, and how to create an efficient single-document summary report.

Select data

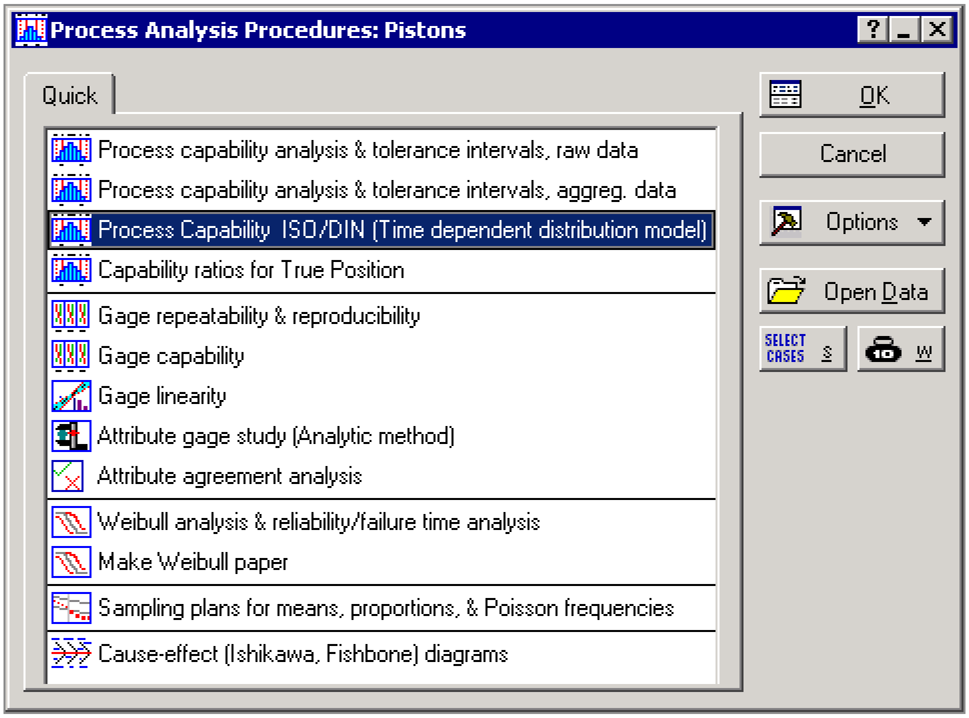
This example is based on a data set reported in Montgomery (1985, page 177, 1991, page 234). Use the data file `Pistons.sta` that is located in Statistica®'s examples directory. Specifically, we are interested in monitoring the size (diameter) of piston rings for automotive engines.

Therefore, constant samples of five observations each have been taken from the ongoing manufacturing process. As is the case in many ongoing manufacturing processes, samples are taken over time, so any variability in the process quality over time will affect the overall variability.

1. On the **Home** tab, click the **Open arrow**, and from the drop-down menu, select **Open Examples** to display the Open a Statistica Data File dialog box.
2. Open the **Datasets** folder, and double-click `Pistons.sta` or select it and click **Open** button.

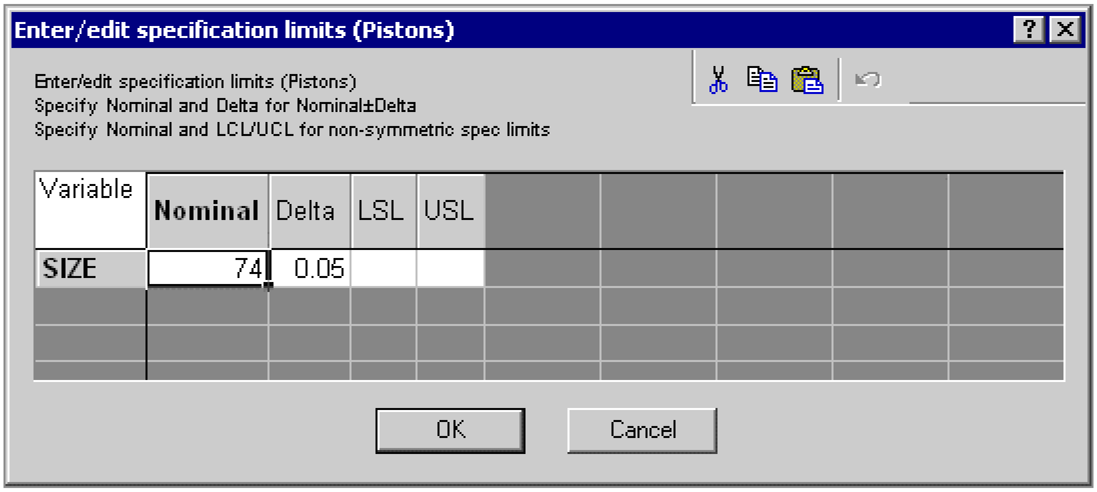
Specifying analysis

1. Select the **Statistics** tab.
2. In the Industrial Statistics group, click **Process Analysis**.
3. In the Process Analysis Procedures Startup Panel, select Process Capability ISO/DIN (Time dependent distribution model).

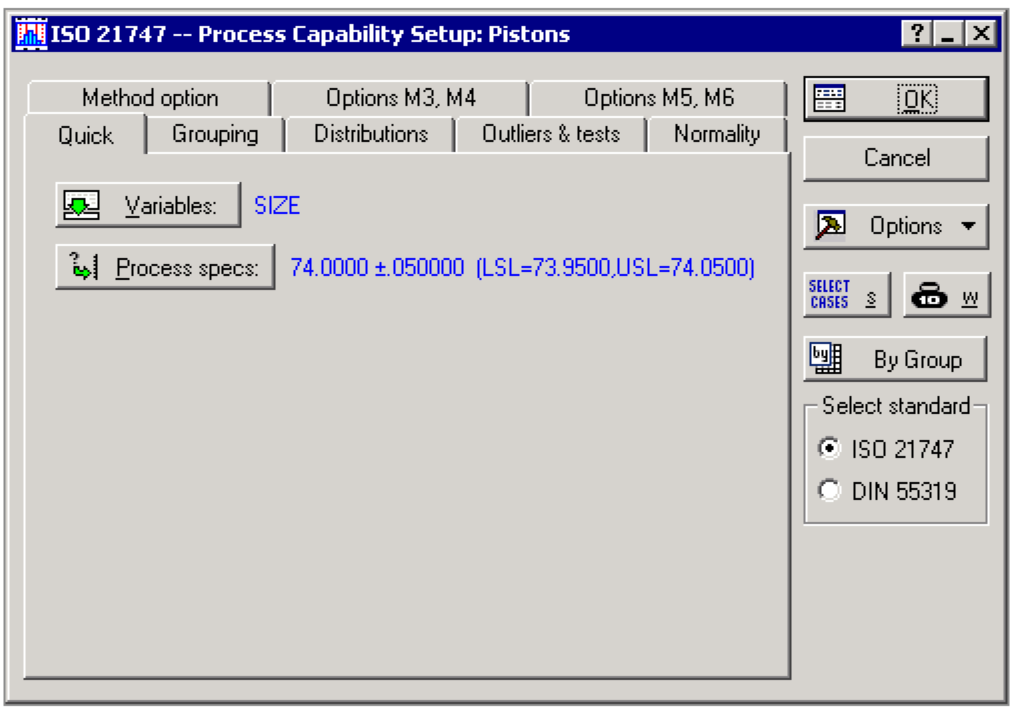


4. Click **OK** button in the Process Analysis Procedures Startup Panel.
5. On the **Quick** tab of the ISO 21747 - Process Capability Setup dialog box, click the **Variables** button.
6. In the Select Variables (and optional grouping variable) dialog box, select variable Size in the Variables for the analyses list, and Sample in the by ... (Time/Grouping var.) list, and click **OK** button.
7. In the ISO 21747 - Process Capability Setup dialog box, click the **Process specs** button. Enter the process specifications limits. . Specification or design limits define the maximum and (or) minimum allowable values for the respective part; in this case, specify the lower and upper spec limits (LSL, USL) as 74 +/- 0.05 (LSL=73.95, USL=74.05). Enter 74 in the Nominal field, and enter

   0.05 in the **Delta** field.



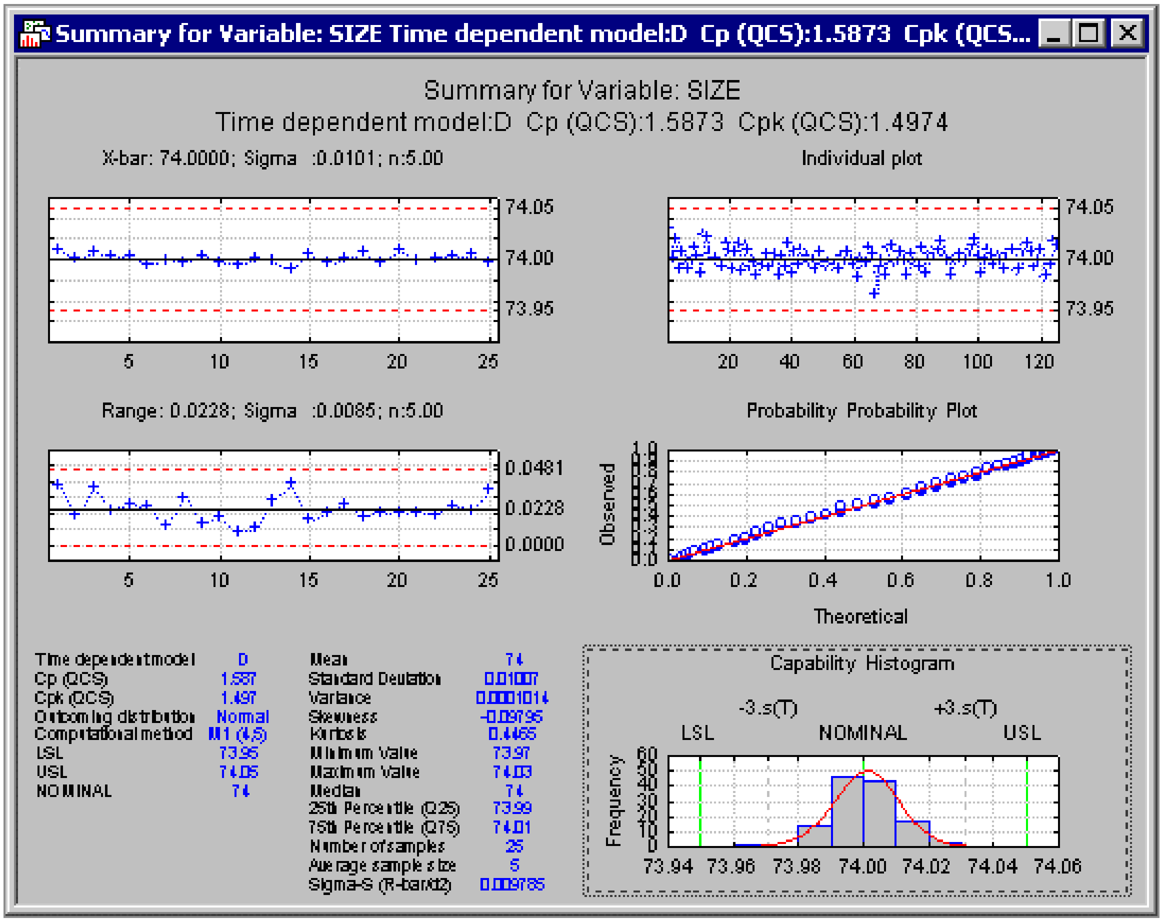
8. To finalize this choice, click OK button. This return you to the ISO 21747 - Process Capability Setup dialog box. In this dialog box, there are numerous other options available to modify the rules that are applied to select the most appropriate distribution and time-dependent distribution model for the data so that the appropriate process capability indices can be computed.



9. To perform the analyses for variable Size, click **OK** button in the **ISO 21747 - Process Capability Setup** dialog box.

Reviewing results

To review the analysis summary display, in the ISO 21747 - Process Capability Results dialog box, click **Summary** button.



As you can see, all relevant details (as recommended in ISO 21747 and/or DIN 55319) are summarized on a single page (document), which contains all information necessary to judge the process as capable or not capable (or questionable).

Attribute Gage Analysis

For another example of this type of summary (compound) displays in Statistica, let us perform an attribute gage analysis.

In general, any measurement system used in manufacturing must be validated to ensure that the respective gages measure the quality characteristic of interest with sufficient accuracy and precision. Often, a gage of particular importance is the one that determines whether a manufactured part is of sufficient quality to be accepted or rejected; in other words, the gage measures a simple accept/reject attribute.

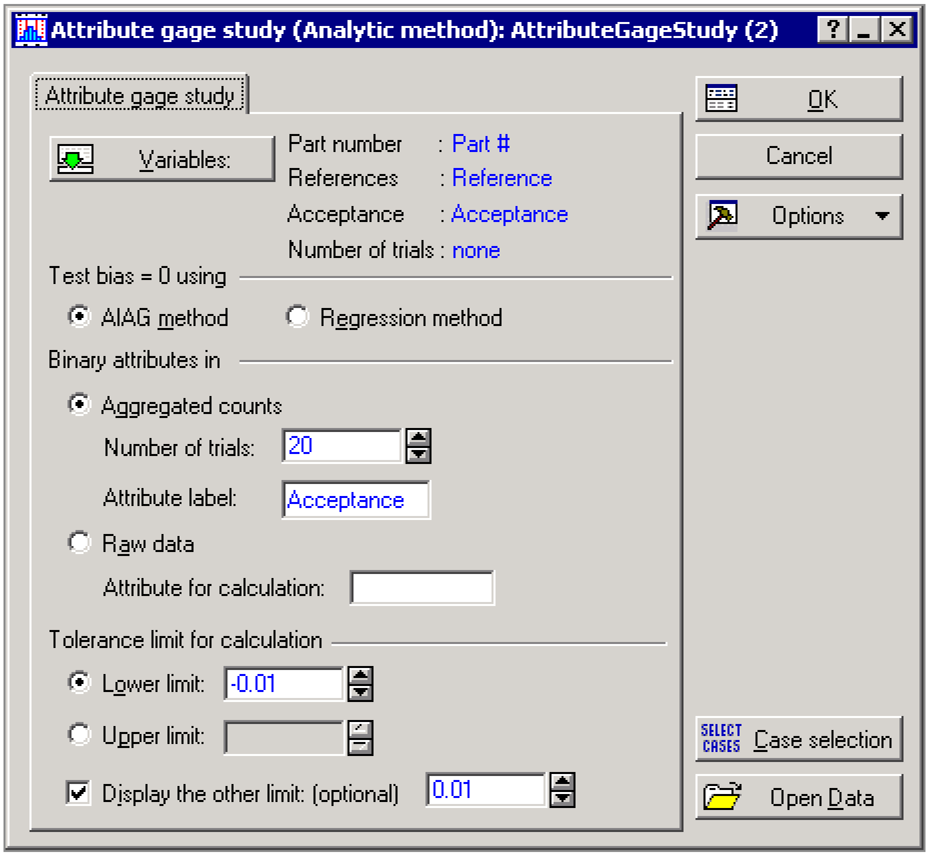
To determine the quality of the gage, a study is periodically performed where the gage (accept/reject decision) is applied to reference parts with known deviations from the desired specifications. This process is described in the respective section of the Statistica Electronic Manual, as well as the AIAG (Automotive Industry Action Group) Measurement System Analysis (MSA) manual (2000).

Select data

1. Open the `AttributeGageStudy.sta` data file. This file contains the data, already summarized to acceptance data, of the attribute gage study.

Specify analysis

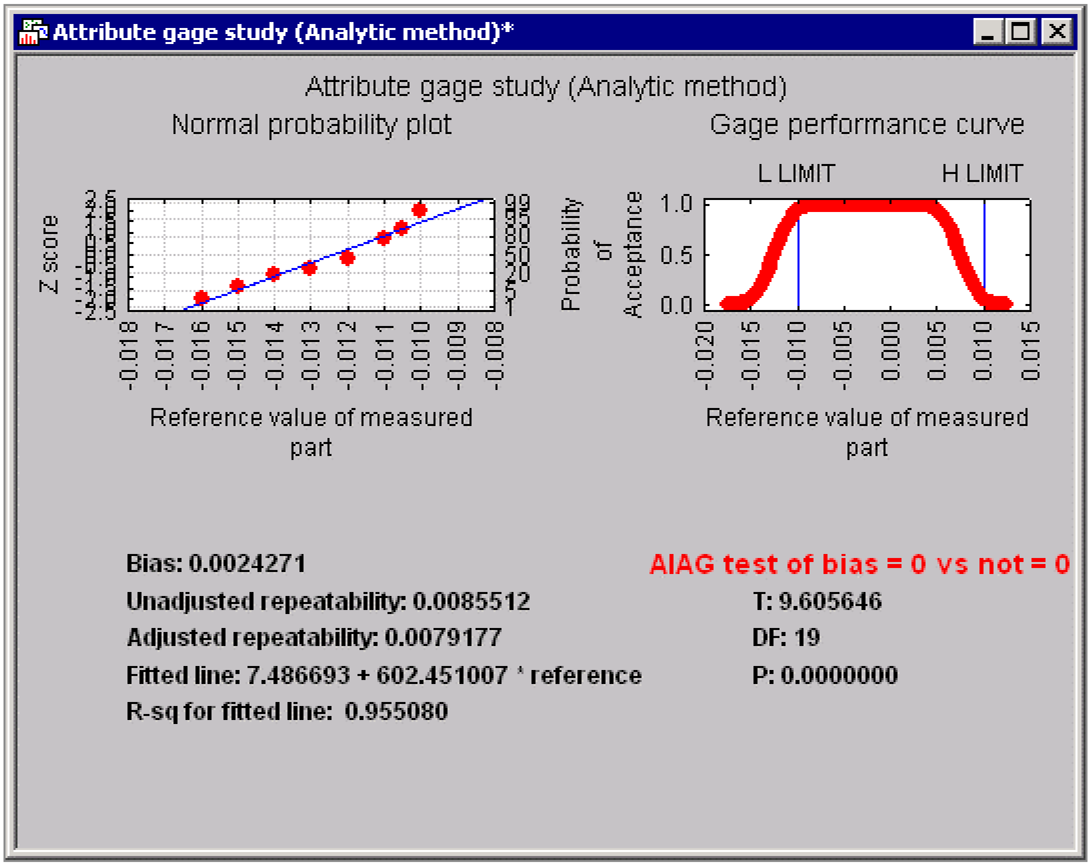
1. Select **Statistics** tab.
2. In the **Industrial Statistics** group, click **Process Analysis**.
3. In the Process Analysis Procedures Startup Panel, select **Attribute gage study** (Analytic method), and click **OK** button.
4. In the Attribute gage study (Analytic method) dialog box, click **Variables** button.
5. Select Part# in the Part numbers list, Reference in the Reference values list, and Acceptance in the Acceptance/Response list. To close this dialog and return to the Attribute gage study (Analytic methods) dialog box. Click **OK** button.
6. In the Tolerance limit for calculation group, specify -0.01 as the Lower limit, select the **Display the other limit** check box, and then specify 0.01 as that limit.



We are interested in evaluating the gage performance for a process or type of manufactured part that should be identified as unacceptable (should be rejected), when its real lower limit drops below -0.01 (expressed here as a deviation from the spec). In the data file, the Acceptance probabilities summarize the number of reference parts measurements, from a total of 20 such parts and measurements each, that were declared as unacceptable (such as that were rejected).

Reviewing results

1. In the Attribute gage study (Analytic methods) dialog, click **OK** button.
2. To review the summary results, in the Results dialog box, click **Summary** button.

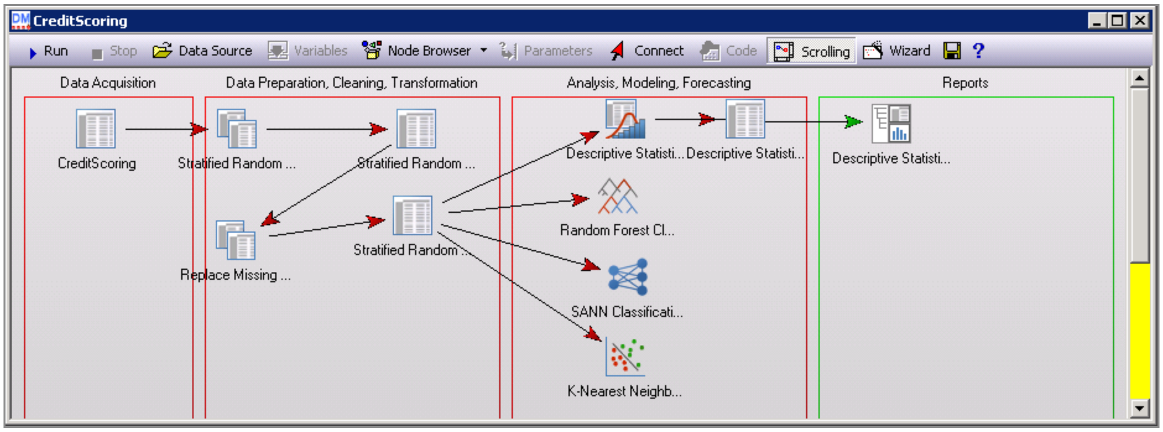


All important results to determine the bias and repeatability (of measurements) of the attribute gage are summarized on a single page.

Example 6: Statistica Data Miner

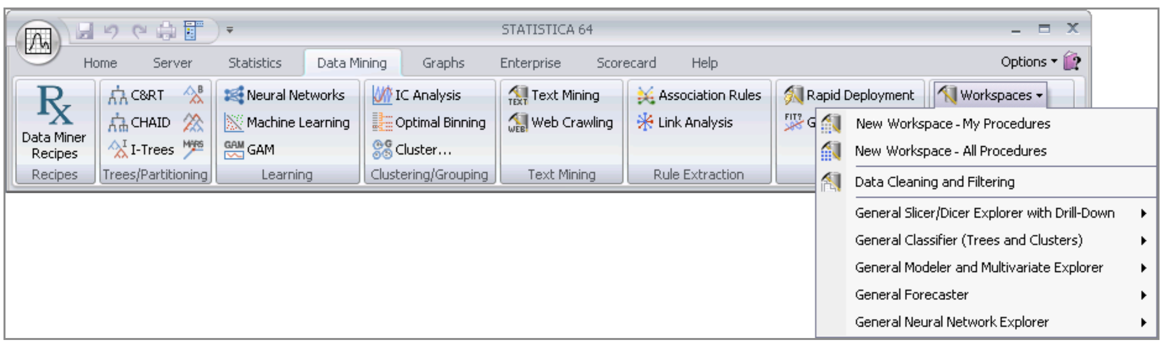
Statistica Data Miner (SDM) is a comprehensive system for predictive modeling that offers a wide variety of analytic techniques and model building, validation, and model deployment options. The default type of user interface provided in SDM follows the general interactive data mining workspace approach that enables you to build models by dragging icons representing steps of data acquisition, data preparation, modeling, and deployment and connect them with arrows.

The workspace user interface option in SDM represents a powerful alternative to the traditional interactive data analysis user interface, and it can be used not only as a tool for developing and testing predictive data mining modes, but also as a powerful general tool to be used for visual programming of analytic workflows for many types of analyses.

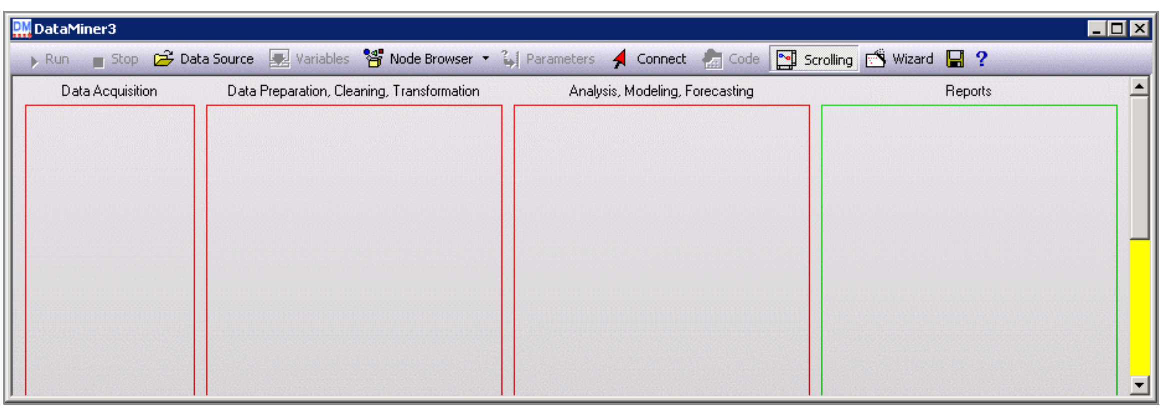


You can access the Data mining workspace as follows:

1. To open a new (blank) data mining workspace, select the **Data Mining** tab.
2. In the **Tools** group, click **Workspaces** and from the menu, select either **New Workspace > My Procedures** - or **New Workspace > All Procedures**.



A blank data mining workspace is displayed.



3. To display the Select Data Source dialog box, which is used to select a data file for analysis, click the toolbar. The Select dependent variables and predictors dialog box

is displayed.

4. Next, the Select dependent variables and predictors dialog is displayed. Click the button to display the variable selection dialog, used to specify the dependent variables and predictors.
5. To create analytic nodes, and connect them with arrows to specify the desired project workflow, click **Node Browser** button.

The following section includes a step-by-step example of Data Miner Recipes – an innovative user interface for data mining introduced by Statistica – which offers a powerful alternative to the workspace-based approach to model building, and can be used by both novices and advanced analysts.

Overview

This example pertains to Statistica® Data Miner Recipes, a Statistica® product that offers a wide selection of methods for predictive data mining.

A trend in data mining is the increasing emphasis on solutions based on simple analytic processes rather than the creation of ever-more sophisticated general analytic tools. Statistica® Data Miner Recipes (SDMR) offers an easy-to-use alternative to the traditional data miner workspace user interface for building predictive data mining models.

This approach provides an intuitive graphical interface to enable those with limited data mining experience to execute a recipe-like step-by-step analytic process. With these intuitive dialogs, you can perform various data mining tasks such as regression, classification, and clustering. Other recipes are built quickly as custom solutions.

Completed recipes are saved and deployed as project files to score new data. The project files are generated as C/C++ language or PMML script, or sent to Statistica® Enterprise.

The SDMR user interface is also used by advanced analysts to automate and store specific data mining algorithms.

SDMR spans the entire data mining process – from querying external databases to the final deployment of solutions and consists of the following steps:

1. Identifies the data from which to learn
   • Connects to ODBC or OLEDB compliant databases
   • Connects to Statistica data files
2. Cleans data and removes the redundant predictors
   • Flexible and efficient methods for sampling the data (simple, stratified, systematic,

etc.)

• More flexible ways to identify and recode the missing data

• Identification of outliers

• Transform the data prior to performing the subsequent steps

• Identify and eliminate redundant predictors

3. Identifies important predictors from a large pool of predictors that are strongly related to the dependent (outcome or target) variable of interest
   • Feature selection for very large data sets (for example, thousands of variables)

   • Detection of important interactions among the predictors by using tree-based methods

4. Generates a pool of eligible models
   • Leverage the comprehensive selection of cutting edge techniques for predictivedata mining available in SDMR

   • Offload computationally expensive tasks to Statistica Enterprise Server, freeingyour local computer for other tasks

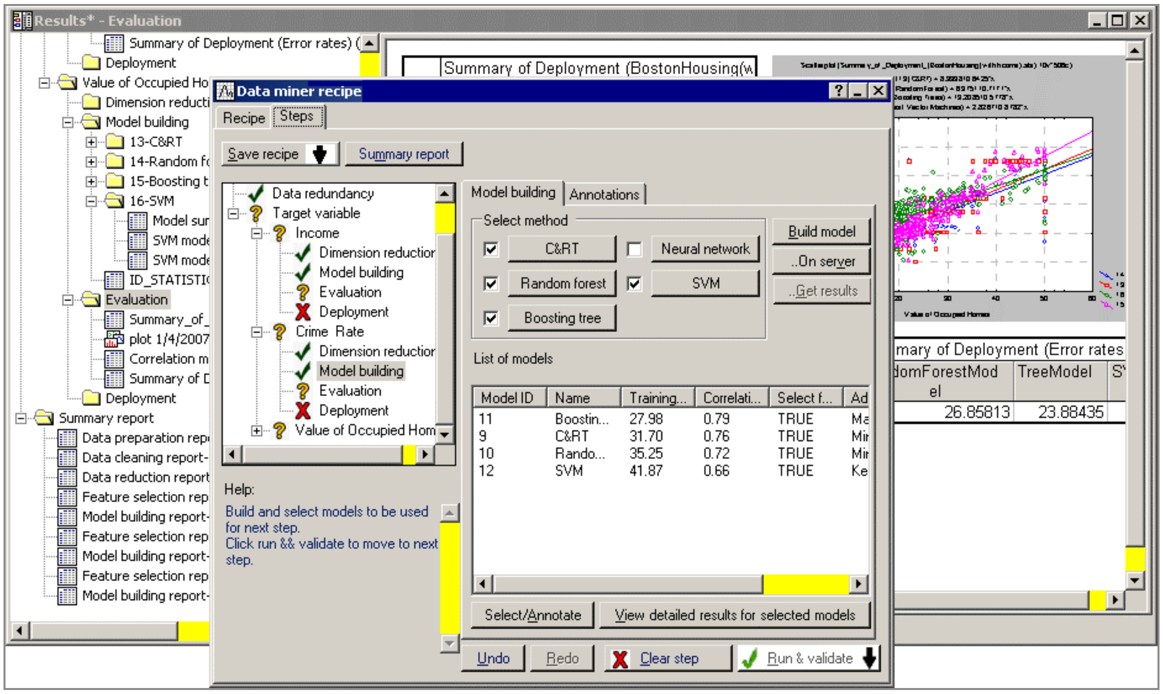
5. Performs automatic competitive evaluation of models to identify the optimum model with respect to performance and complexity

Statistica® Data Miner Recipes provides the solution that maps the steps of the data mining workflow into a results-oriented user interface. From data cleaning to model validation, SDMR guides your analysis from start to finish so that you can get actionable results and answers quickly. At the same time, SDMR still applies the most comprehensive collection of data mining algorithms in a single package without requiring the user to know the details of those algorithms.

Statistica® Data Miner Recipes contains the largest collection of data mining methods and algorithms in a single package or library. In most general terms, these algorithms borrow insights and methodologies from various domains such as statistics, engineering, artificial intelligence, cognitive science to learn patterns from data that can be used to make predictions (about insurance or credit risk, process or product quality, equipment failure, medical diagnoses, and so on).

In practice, specific domains and types of data are best analyzed using particular types of methods and algorithms. For example, the data mining techniques that work best for modeling insurance loss data are different from those that work best for predicting emissions from a furnace. However, there is a typical workflow – from the definition of the data and analysis problem through sampling, model building, and evaluation – that is applicable to all predictive data mining.

Data Miner Recipes enable those without extensive experience with data mining tools to move very quickly from the definition of a problem to tangible and actionable results.



In this approach, you simply follow a recipe-like user interface to complete the necessary steps to move to a solution. In fact, most of these steps are entirely automated so that the only required input is to define the data and variables for the analyses, while the program automatically does the rest – determines learning and testing samples, performs feature selection, tries various data mining algorithms and methods, and evaluates results to select the best data mining model. These computations and analyses can be performed with either the desktop Statistica® Data Miner software or, if available, on the Statistica® Data Miner Server.

Data Miner Recipes Project Files

When you save a Data Miner Recipes project at any stage of completion, two separate files are created:

- A Data Miner Recipes file with the file name extension `.dmrproj`
- A Statistica® Workbook file by the same name, but with the file name extension .stw, containing results and detailed information for each step of the recipe

Note: Both files must reside in the same file directory.

You can copy a Data Miner Recipe project called `MyDataMinerProject` to a new file directory in the following way: ,

- By emailing the project
- By checking it into the Statistica® Document Management System

Copy files MyDataMinerProject.dmrproj and MyDataMinerProject.stw to the new destination.

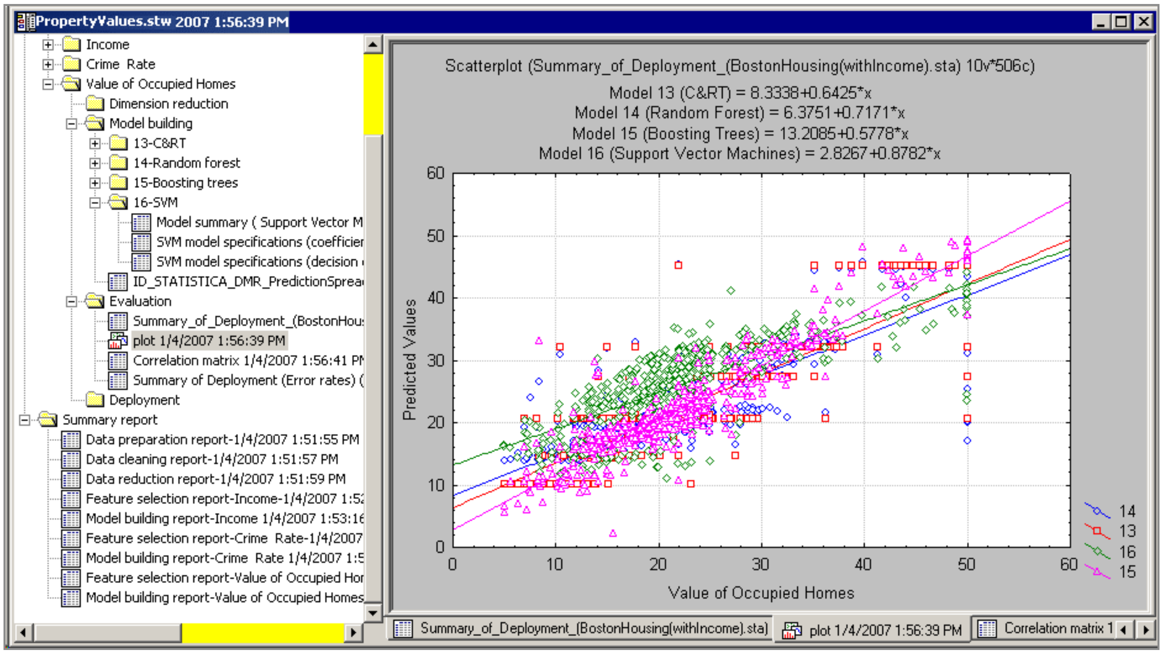
Additional details about the above mentioned files are as follows:

Data Miner Recipes file (`.dmrproj`) : The Data Miner Recipes are XML (extensible markup language) format files that contain all information regarding users' choices (or choices automatically made by the program), including:

- Data file information (or data connection information)
- Variable selections and variable metadata (for example, defining continuous and categorical predictors and outcomes)
- Choices about data preprocessing steps (for example, missing data handling, filtering of duplicate records, transformations)
- Final variable selections based on the application of feature selection algorithms
- Results from model building and final evaluation and choices of models
- All information necessary to deploy predictive models and to predict new cases (for example, to score databases, compute component scores, inferred sensor values, predicted risk or failure probabilities)

Therefore, when deploying Data Miner Recipes to the Statistica® Enterprise software to automatically compute predicted values in an enterprise application (automated credit scoring, multivariate control charting and failure analysis), all information necessary to compute predicted values, classifications, or classification probabilities (for example, probability of default, loss) is contained inside these XML format files.

Data Miner Recipes Workbook file (`.stw`) : These files contain detailed information describing the results for each step.



The results stored in this workbook provide complete documentation for the computations and analyses performed as the Data Miner Recipe was (or is in the process of being) completed. Therefore, if the data mining analyses are performed in a regulated (for example, FDA, ISO.) environment, or if data mining is part of an organization's mission critical activities performed under the guidance and in compliance with specific standard operating procedures (SOPs), then it is usually recommended that this file be stored in the Statistica® Document Management System along with the Data Miner Recipe project file (`.dmrproj`).

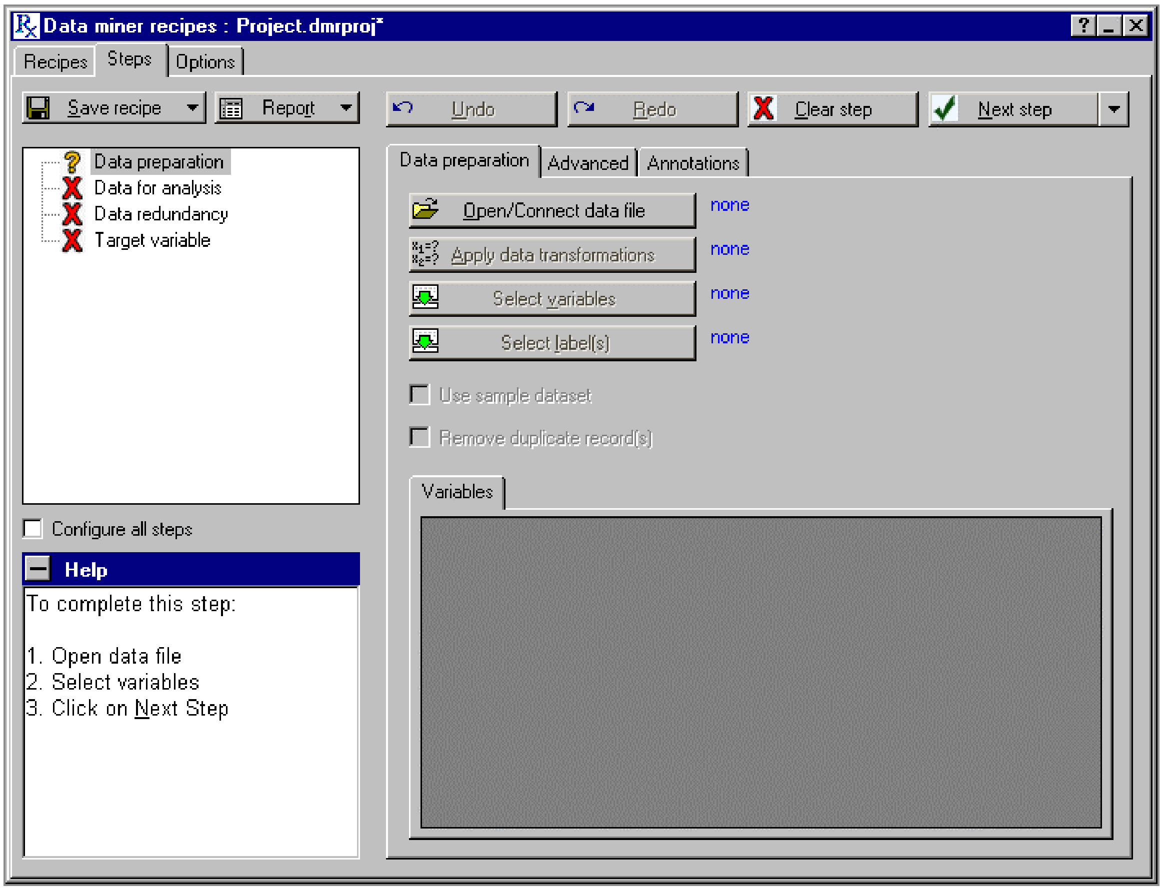
Using Statistica® Data Miner Recipes (SDMR)

This example illustrates how quickly and efficiently data mining projects are completed using Statistica® Data Miner Recipes, even if the best solution to the (prediction) problem emerges only after (automatically) comparing the efficacy of various advanced data mining algorithms.

Using this example you can explore the use of SDMR for credit scoring applications. The example is based on the data file `CreditScoring.sta`, which contains observations on 18 variables for 1,000 past applicants for credit.

Each applicant is rated as good credit (700 cases) or bad credit (300 cases). We want to develop a credit scoring model that is used to determine if a new applicant is a good credit risk or a bad credit risk, based on the values of one or more of the predictor variables. An additional **Train/Test indicator** variable is also included in the data file for validation purposes.

1. In Statistica®, select the **Data Mining** tab.
2. In the **Recipes** group, click **Data Miner Recipes** to display the Data miner recipes dialog box.
3. On the **Recipes** tab, click the **New** button to create a new project. The **Steps** tab is selected automatically.



The step-node panel is located in the upper-left area of the **Steps** tab. It contains four major nodes:

- Data preparation
- Data for analysis
- Data redundancy
- Target variable

Nodes (steps)

Each node (or step) can exist in one of four states, depending on whether all required options have been specified. Each state is represented by an icon: a red indicates a wait state, meaning a step cannot be started because it is dependent on a previous step that has not been completed; a yellow indicates a ready state, meaning you are ready to start the step because previous steps have been completed; a green indicates a completed step. Note that you must click the **Next step** button to change the yellow (ready state) to the green (completed state).

The change will be made only if the step has been successfully completed (such as all required information has been specified). Lastly, if you have opened a data set and selected variables, and you do not want to proceed step by step through all the options, you can select the Configure all steps check box on the Steps tab. The steps will now be represented by a navy icon.

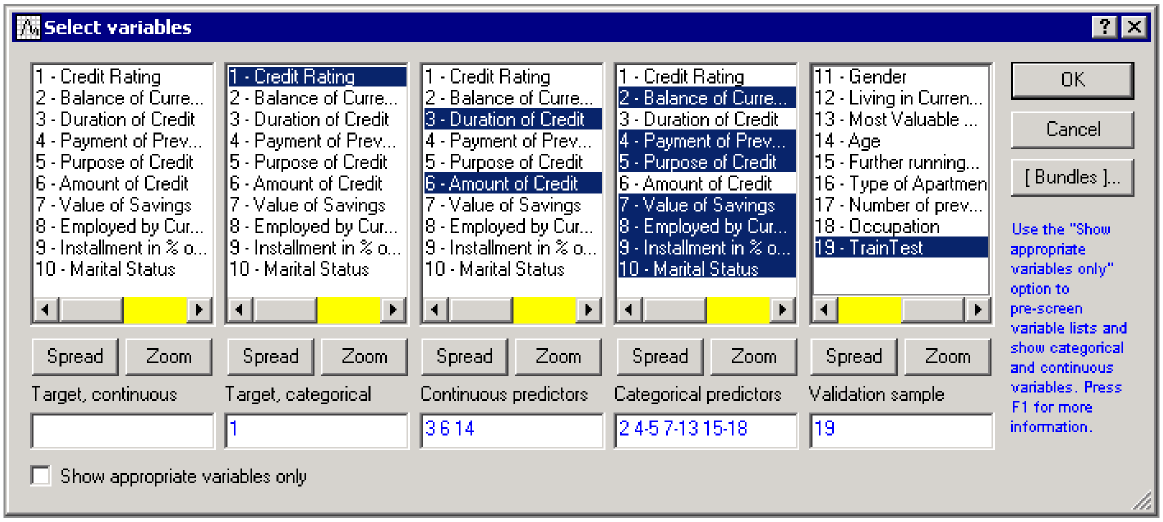
You can select any of the steps and modify the options, or you can leave all options at their defaults. Then, click the Next step arrow, and from the drop-down list, select Run to completion. Statistica® Data Miner Recipes runs the analysis and creates the model results.

Options tab : The Options tab of Statistica® Data Miner Recipes is used to set global options for recipes using very large data files. Options include specifications for sampling and for maximum file size to save in the Project Workbook. Since most of these options are applied to the **Data preparation** step, they should be set prior to starting work on a new recipe. Modifications to the values on this tab apply only to the current recipe unless you click the **Save defaults** button.

Data Preparation

1. On the **Data preparation** tab, click the **Open/Connect data file** button.
2. In the Select Data Source dialog box, click **Files** button and locate and open the `CreditScoring.sta` data file (located in the `Examples/Datasets` folder installed with Statistica® - on most computers `C/Program Files/Statistica/Statistica/Examples`).
   If the data file is already open, it will be listed in the Open Spreadsheet Documentsfolder; double-click it to open it, or select it and click the OK button.
3. Click the **Select variables** button. In the Select variables dialog box, select the **Show appropriate variables only** check box. Then, select:
4. On the **Data preparation** tab, click the **Open/Connect data file** button.

- Variable 1 (Credit Rating) as the Target, categorical variable,
- Variables 3, 6, and 14 as Input, continuous (continuous predictors)
- Variables 2, 4-5, 7-13, and 15-18 as Input, categorical (categorical predictors)
- Variable 19 (TrainTest) as the Testing sample (validation sample variable)

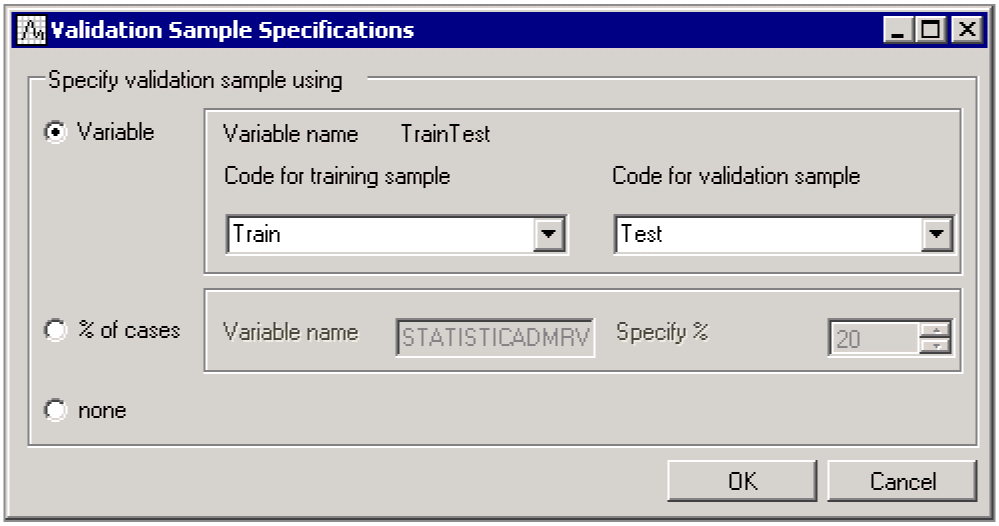


5. Click the **OK** button in the variable selection dialog box.
6. In the Data miner recipes dialog box, select the **Advanced** tab and select the Use sample data checkbox.
7. Select the Stratified random sampling option button as the sampling strategy to ensure that each class of the dependent variable Credit Rating is represented with approximately equal numbers of cases in train and validation sets. To display the Stratified sampling dialog box, click the **More options** button.
8. Click the **Strata variables** button, select Credit Rating as the strata variable, and click **OK** button in this dialog box and click **OK** button in the Stratified sampling dialog box.
9. To ensure that the step is successfully completed (in the step-node panel next to **Data preparation**, the yellow changes to a green), click the **Next step** button for the **Data preparation** step.

Data for Analysis

After the **Data preparation** step is completed, the **Data for analysis** step is selected automatically.

1. On the **Data for analysis** tab, click the **Select testing sample** button.
2. In the Testing Sample Specifications dialog box, select the **Variable option** button. Verify that the category (value) **Train** is selected in the Code for **training sample** field and **Test** is selected in the **Code for testing sample** field.



3. Click the **OK** button.

   The models are fitted using the training sample and evaluated using the observations in the testing sample. By using observations that did not participate in the model fitting computations, the goodness-of-fit statistics computed for (predicted values derived from) the different data mining models (algorithms) are used to evaluate the predictive validity of each model and, hence, are used to compare models and to choose one or more over others.

Descriptive statistics : This step also computes descriptive statistics for all variables selected in the analysis. Descriptive stats provide useful information about ranges and distributions of the data used for the project.

1. Click the **Next step** button to ensure that this step is successfully complete.

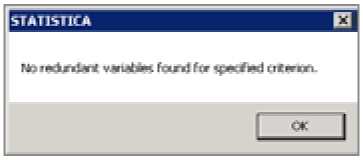
Data Redundancy

The Data redundancy step is selected. The purpose of this step is to eliminate highly redundant predictors. For example, if the data set contains two measures for weight, one in kilogram the other in pounds, then those two measures are redundant.

1. On the **Data redundancy** tab, select the **Correlation coefficient option** button.
2. Specify the Criterion value as 0.8.

3. To eliminate the redundant predictors that are highly correlated (r≥0.8), click the **Next step** button.

   Since there is no redundancy in the data set we are using in this example, a message dialog box is displayed stating this.

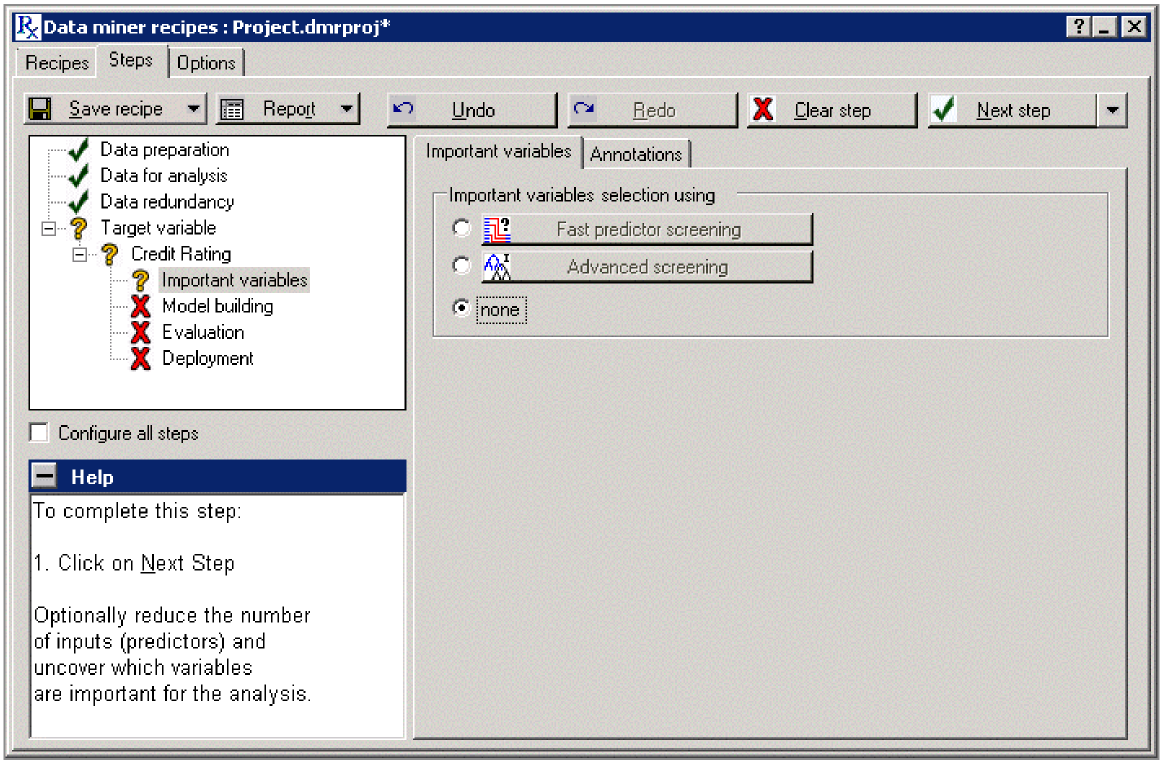
4. Click the **OK** button.

   The data cleaning and preprocessing for model building is now complete.

Target Variable: Building Predictive Model

Next, we need to build predictive models for the target in this example. In the step-node panel, the Target variable node has a branching structure with the parent node connecting to four child nodes including Important variables, Model building, Evaluation, and Deployment.

- Important variables
- Model building
- Evaluation
- Deployment

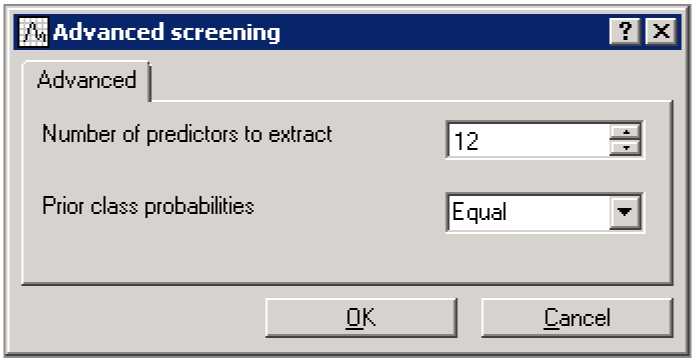


Dimension reduction : The Important variables node is selected automatically. In this step, the goal is to reduce the dimensionality of the prediction problem, such as to select a subset of inputs that is related to the target variable (in this example Credit Rating) and, yields accurate and useful predictive models. This type of analytic strategy is sometimes called feature selection. You can implement this using the following strategies:

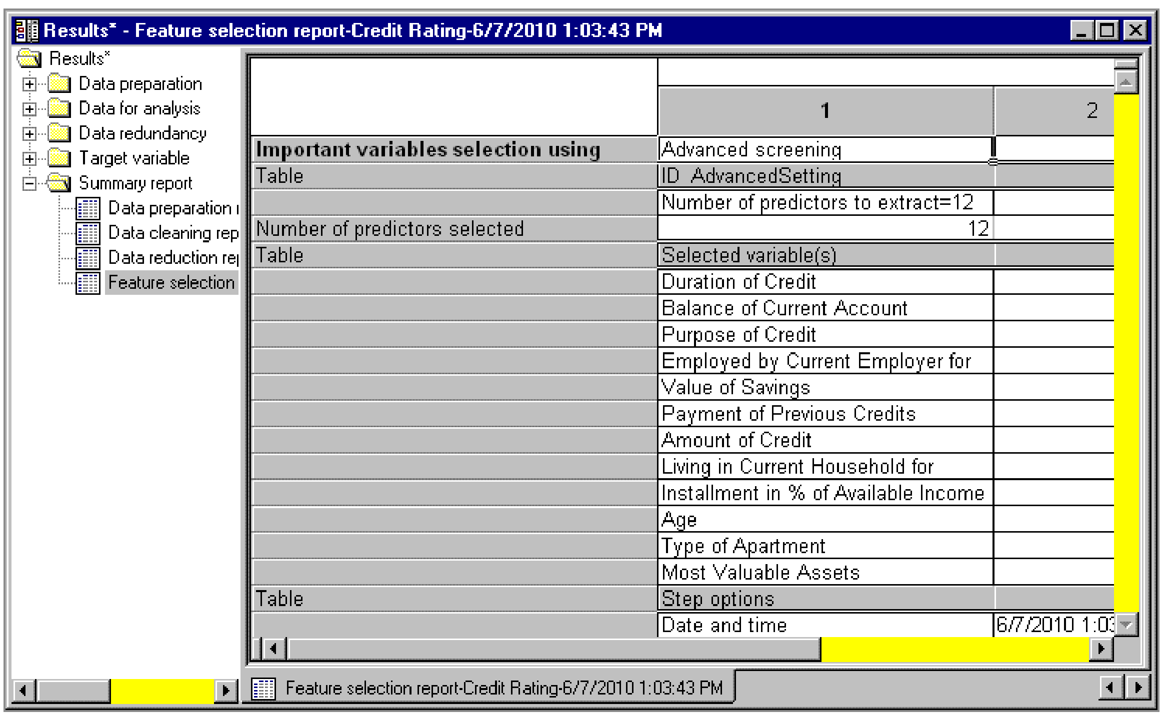
- When the **Fast predictor screening** option button is selected, the program screens through thousands of inputs and finds the ones that are strongly related to the dependent variable of interest.
- When the **Advanced** screening option button is selected, tree methods are used to detect important interactions among the predictors.

For this example,

1. Select the **Advanced screening** option button as the feature selection strategy.
2. To display the Advanced screening dialog box, click the **Advanced screening** button.
3. To extract field enter 12 in the Number of predictors.



4. In the Prior class probabilities field, select **Equal**.
5. Click **OK** button in this dialog, and then click the **Next** step button to complete this step.
6. To review a summary of the analysis thus far, on the **Steps** tab, click the **Report** button, and from the drop-down list, select **Summary report** to display the **Results** workbook.



These predictors are further examined using various cutting-edge data mining and machine learning algorithms available in SDMR.

Building Models for Target Variables Step

The Data miner recipe dialog box is minimized so that the Results workbook dialog box is visible. To display the dialog box again, click the **Data miner recipes** button located on the **Analysis** Bar at the bottom of the application.

Next, the Model building node is selected. In this step, you can build a variety of models for the selected inputs.

On the **Model building** tab, the **C&RT**, **Boosted tree**, and **Neural network** check boxes are selected by default as the models or algorithms that are automatically be tried against the data.

The computations for building predictive models are performed either locally (on your computer) or on the Statistica® Enterprise Server. However, the latter option is available only if you have a valid Statistica® Enterprise Server account and you are connected to the server installation at your site.

For this example, to perform the computations locally on your computer, click the **Build model** button. This takes a few moments; when finished, click the **Next step** button to complete this step.

Evaluating and selecting models

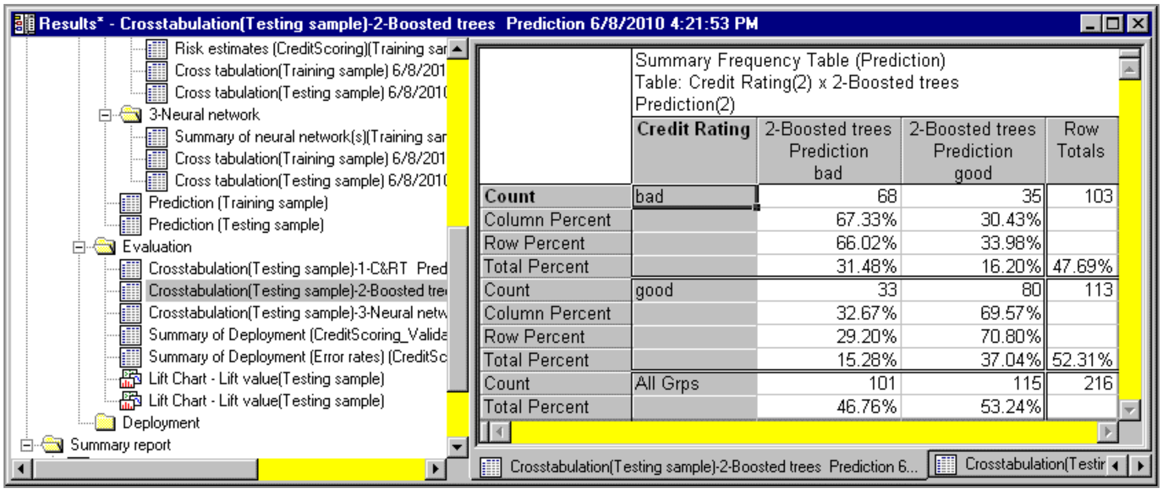
Now, the Evaluation node is selected.

1. To perform the competitive evaluation of models for identifying the best performing model in terms of performance in the validation sample, on the **Evaluation** tab, click the **Evaluate models** button.

   Notice that the Neural network model has the minimum error rate of 35.75% (exact results may vary). In other words, 64.25% of the cases in the validation sample are correctly predicted by this model. Your results (the best model and the percentages) might vary because these advanced data mining methods randomly split the data into subsets during training to produce reliable estimates of the error rates.

2. On the **Steps** tab, click the **Report** button, and from the drop-down list, select **Summary report** to display the Results workbook. Review the Summary Frequency table (predictions) output for the best model.

   This spreadsheet shows the classification performance of the best model on the validation data set. The columns represent the predicted class frequencies, as predicted by the Neural network model, and the rows represent the actual or observed classes in the validation sample.



In this matrix, you can see that this model predicted 145 out of 197 bad credit risks correctly, but misclassified 52 of them. This information is usually much more informative than the overall misclassification rate, which simply tells us that the overall accuracy is 76.61%.

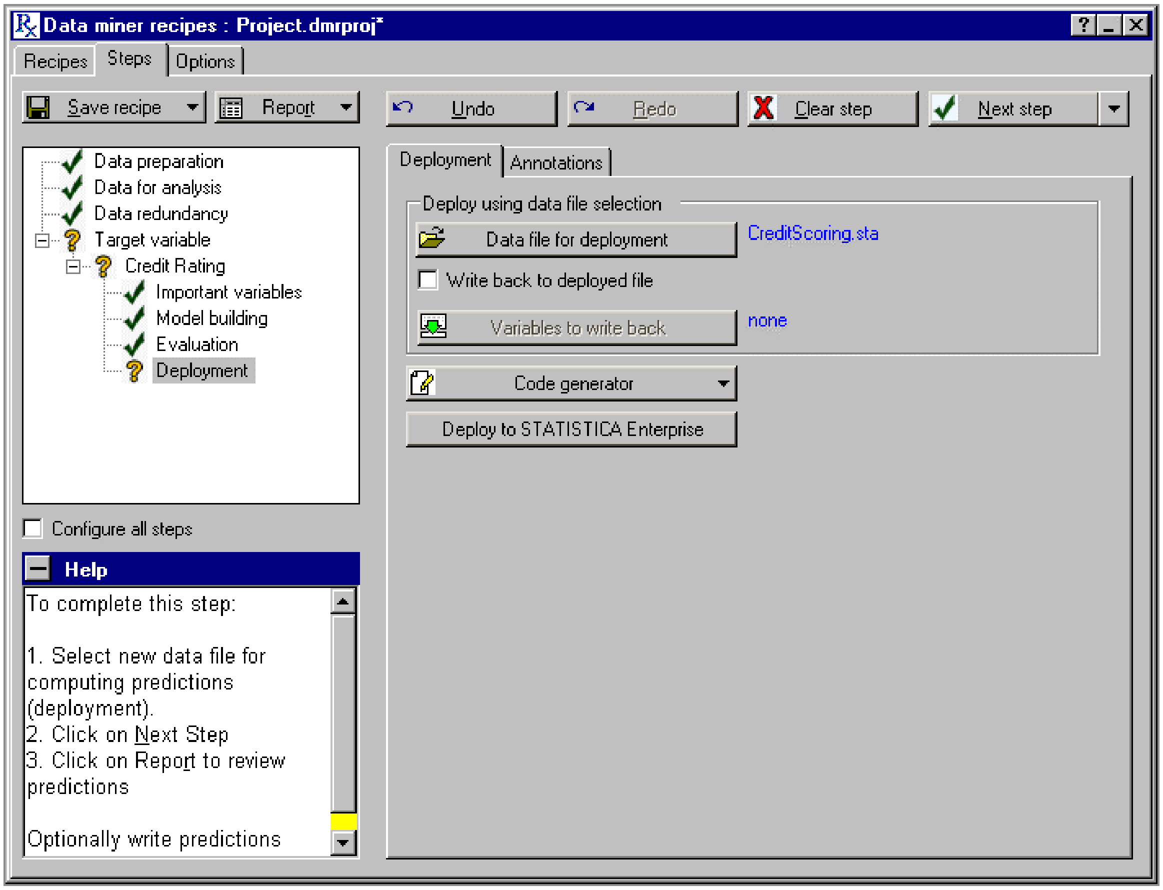
3. Display the Data miner recipes dialog box again, and click the **Next** step button to complete this step.
   A message is displayed with instructions to select only one model for deployment. Click OK, and clear the check boxes adjacent to C&RT and Neural network. We will deploy the Boosting Trees model that gave us the best predictive accuracy on the test sample. Now, click the Next step button again.

Deploying for Target Variables Step

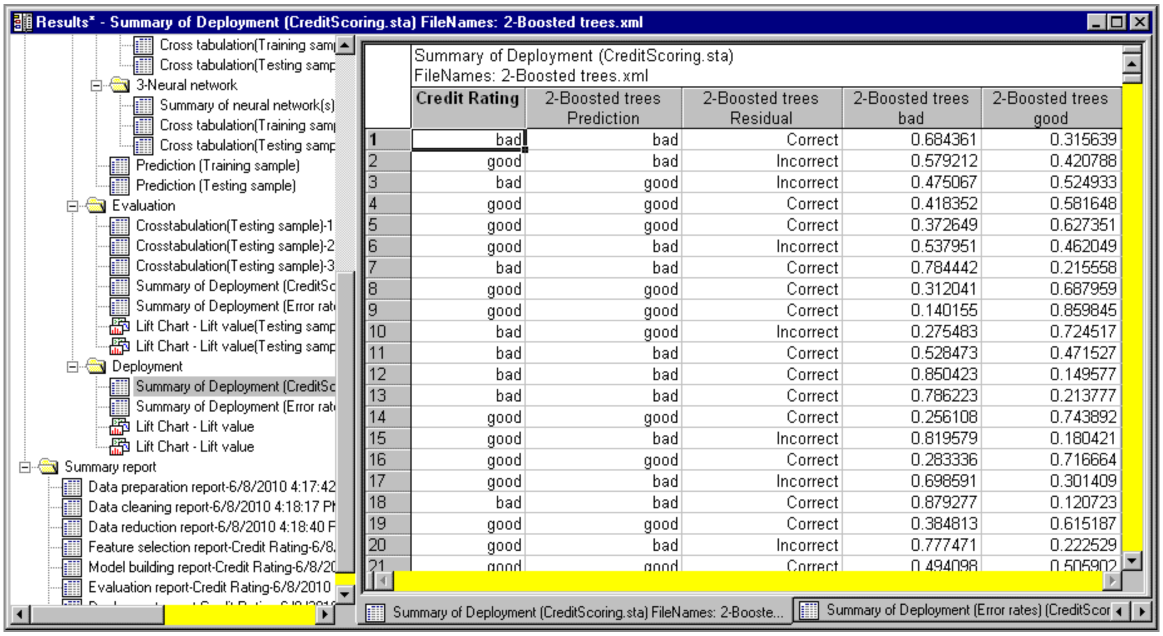
The final **Deployment** step involves using the best model and applying it to new data in order to predict the good or bad customers.

This step also provides the option for writing back the scoring information (classification probabilities computed by the best model, predicted classification) to the original input data file or database. This is extremely useful for deploying models on very large data sets to score databases.

1. On the **Deployment** tab, click the **Data file for deployment** button and double-click on the `CreditScoring.sta` data file (located in the `Examples/Datasets` folder installed with StatisticaA). For demonstration purposes, we are using the same data file for deployment of the best model.



2. Click the **Next step** button to score this data file using the best model. The scored file with classifications and prediction probabilities (titled Summary of Deployment) is located in the Deployment folder in the project workbook is shown as follows:



Summary

The purpose of this example is to demonstrate the efficiency of the data miner workflow implemented in Statistica Data Miner Recipes. With only a few clicks, the program will take you through the complete analytic process - from the definition of input data and analysis problem, through data cleaning and preparation and model building, all the way to final model selection and deployment.

Even though most of the computational complexities of data mining are resolved automatically in Statistica Data Miner Recipes, which enables you to move from problem definition to a solution very quickly even if you are a novice, the program will apply and try a large number of advanced data mining algorithms and automatically determine which approach is most successful.

Thus, the Statistica Data Miner Recipes methodology and user interface enables you to leverage the largest collection of data mining algorithms in a single package to solve your problems.

Data Management

Example 1: Spreadsheet Formulas and Batch Formulas

You can define new variables for Statistica Spreadsheets in terms of other variables, sometimes referred to as variable transformations. You can also verify data, transform data, and recode data on a single variable (as opposed to a set of transformation formulas, such as batch formulas). This is done using spreadsheet formulas.

Access spreadsheet formulas using the following steps:

1. To display the Variable specification dialog box, double-click a variable header in a Statistica Spreadsheet.
2. Enter the formula in the Long Name text box (label or formula with Functions). This field is located at the bottom of the dialog box.
3. Enter a long variable name in the formula editor with an equal sign,. Statistica recognizes it as a formula and verifies it for formal correctness.
4. Reference the formula with other variables either by name (MEASURE01, TIME), or by absolute variable number using the Vx syntax (x is the absolute variable number). For example, V3 is variable number 3. V0 has special meaning, and refers to the current case number.

   Spreadsheet formulas are evaluated a case (row) at a time. For each case in the spreadsheet, the formula is evaluated, and references to the other variables are substituted with their values from the current case.

   Access variables values from other cases using random access spreadsheet functions the formula. In Statistica, random access spreadsheet functions enable the formula to access variable values from other cases. A common example of this is the Lag function, which will reference a variable, and lag it forward or backward a certain number of cases.

The following table lists several spreadsheet formulas and their results.

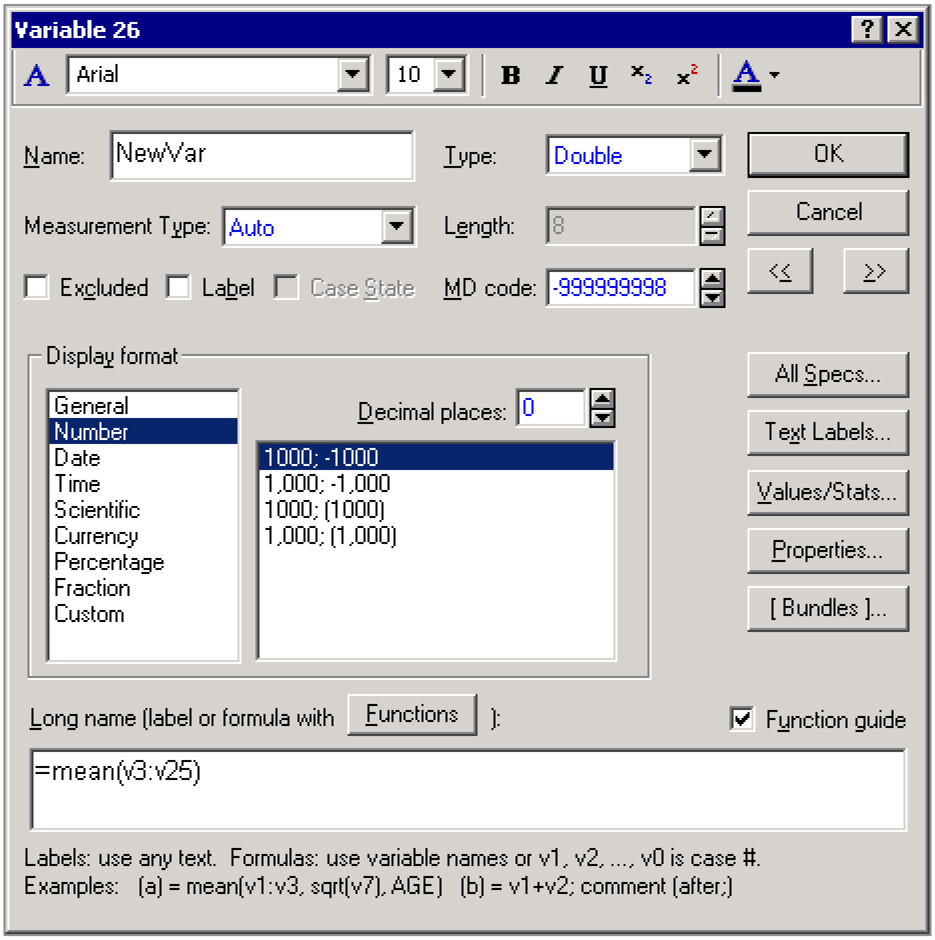
Formula	Result
=contains(v1, "B12C")	Returns 1 if the text “B12C” is found in variable 1. Returns 0 if no match is found.
=(v1+v2+v3)/3	Computes the mean of the first three variables.
=(v0<=10)*1+(v0>10)*2	Recodes cases 1-10 as 1. The other cases are set to 2.
=((v1=1) AND (v2=5))*5	Returns the value of 5 if v1=1 and v2=5, otherwise set to 0.
=student(v4,15)	Returns probability density values of the Student’s t distribution based on the values of v4 and 15 degrees of freedom.
=cusum(v3)	Performs a cumulative sum of variable 3.
=v1+v2	Concatenates two text variables: If v1='A' and v2='B', then the result is 'AB'
=vnormal(rnd(1), 50, 3)	Generates random numbers from a Normal distribution (μ = 50, σ = 3)
=DTMonth(DTToday)	Returns number representing month of the parameter, for example, 3 if it is currently March
=match(v1, 1, 0, 2, 0, v1)	Compares first value to a set of value/result pairs, returning the first result if the corresponding value matches. If no match, then a final default result is used. For example, returns 0 if v1 is 1 or 2, else returns v1.
=trunc((v0-1)/10)	Assigns consecutive integers to the consecutive sets of 10 cases (such as cases number 1 through 10 will be assigned 0, cases number 11-20 will be assigned 1, and so on

Note: To display the Function Browser dialog box, which contains the complete list of formulas and operators (=, +, >, and, or), click the **Functions** button in the Variable specification dialog box.

Spreadsheet Formula

1. Open the `Adstudy.sta` data file.
2. Create a new variable that is the mean of variables 3 through 25 (such as **MEASURE01** through **MEASURE23**).
3. To display the Add Cases and/or Variables dialog box, double-click the first blank variable header (after variable 25).

4. To accept the default (add one variable), click **OK** button. The Variable specification dialog box is displayed.
5. In the Display format group, select **Number**.
6. In the Long name field at the bottom of the dialog, enter:=mean(v3:v 25).



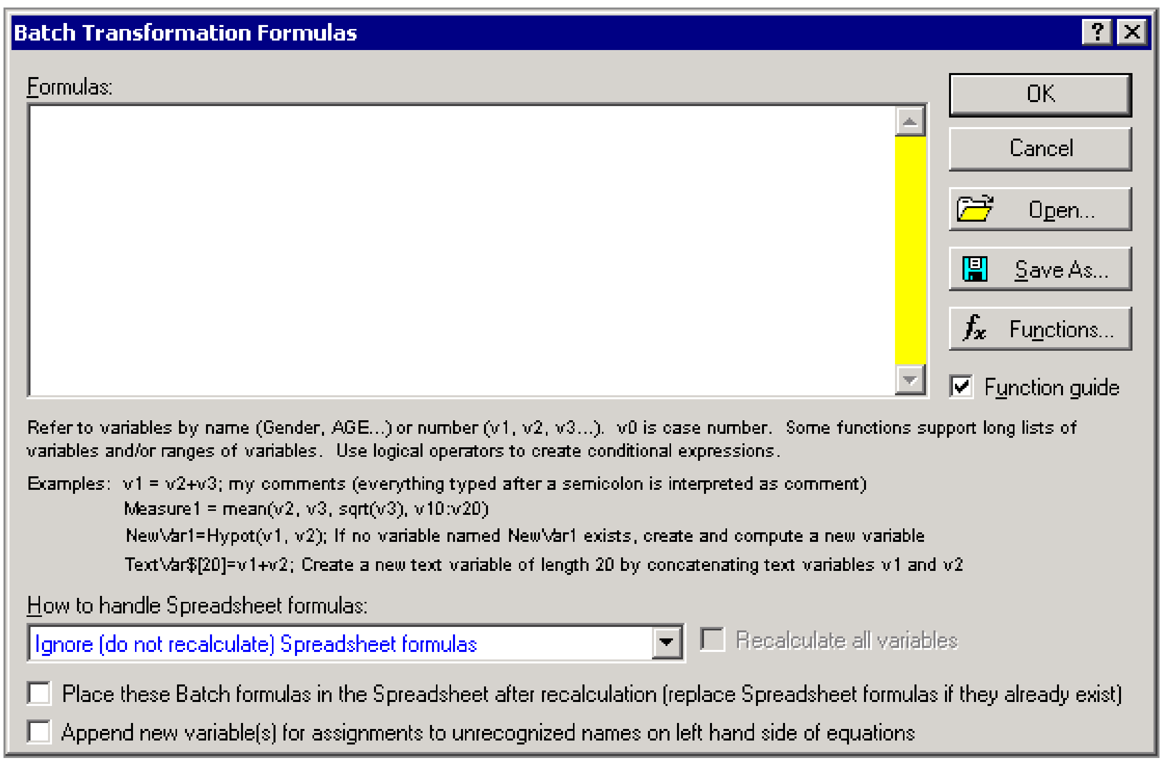
7. Click **OK** button. A dialog box is displayed that informs you whether the formula is formally correct. Click **OK** button.
8. To proceed, Click **Yes** button. The new variable is now filled with the mean of variables 3 through 25 for each case.

Since you can refer to variables by their names or their numbers, the formula created can also be expressed as: `=mean(MEASURE01:MEASURE23)`.

Batch Formulas

Spreadsheet formulas are useful for defining a formula for one variable at a time. However, there are many situations in which you need to evaluate several formulas for different variables simultaneously. This can be done with the batch formulas facilities in Statistica.

1. Open the `Characteristics.sta` data file. This data file contains information about patients in a study. For this example, we shall
    - calculate patient Body Mass Index (BMI)
    - convert height to centimeters (cm)
    - add these two variables to the data set
2. To display the **Batch Transformations Formulas** dialog box; on the **Data** tab, in the Transformations group, click **Transfoms** button.



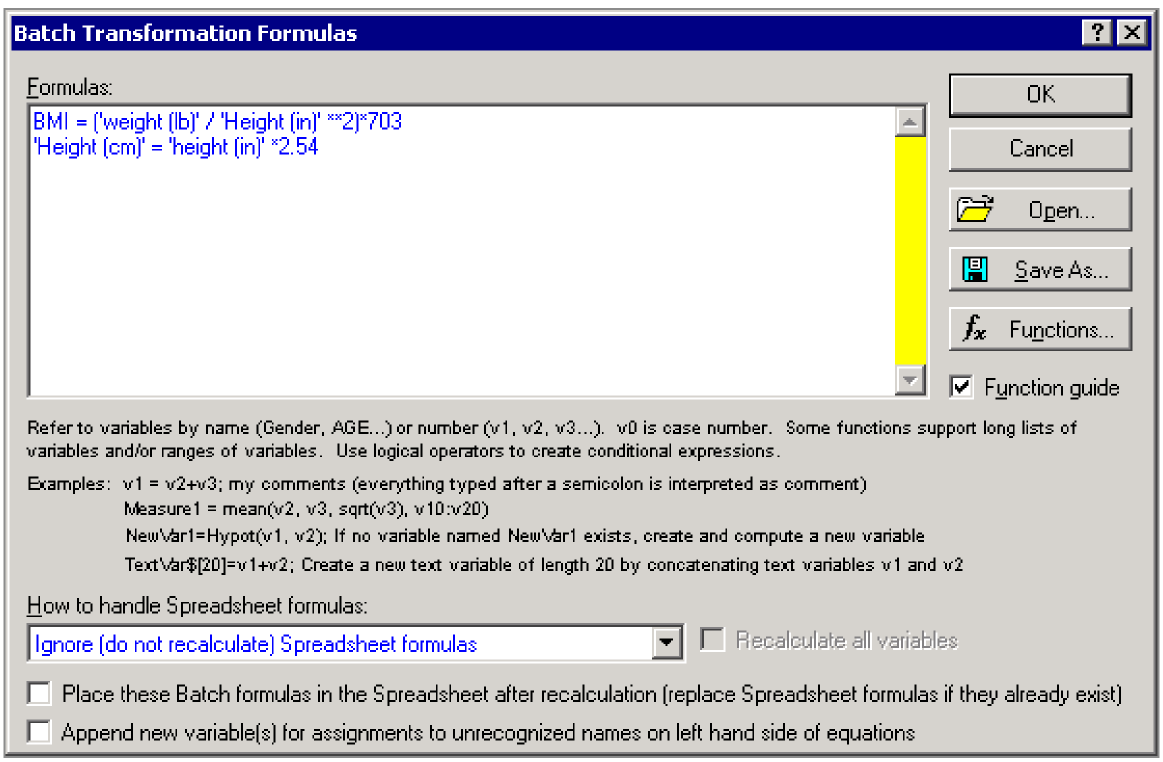
The only differences in syntax between the batch transformation formulas and the spreadsheet formulas is the support for multiple formulas in the batch option. The batch formulas are not attached to any specific variable (they can be copied from data file to data file), hence, they cannot start with an equal sign, but they must have a target variable (for example, v1=... or Measure03=...) so that Statistica knows to which variable each formula should apply.

There is also an option to distribute all batch formulas into the respective variables in the spreadsheet and save them with the data file, effectively replacing the spreadsheet formulas (if there are any).

The calculations used to calculate BMI and to convert Height (in) to centimeters, and the formulas to enter in the Batch Transformation dialog box are as follows:

Calculation	**Batch Transformation Dialog Entry**
BMI=weight(lb)/height(in)^2*703	BMI = ('weight (lb)' / 'Height (in)' **2)*703
height(cm)=height (in) *2.54	'Height (cm)' = 'height (in)' *2.54

1. In the Formulas field, enter the list of transformation formulas to be applied to the active data spreadsheet.
2. Separate each transformation formula by a return (press ENTER on your keyboard).



3. In the **Batch Transformation Formulas** dialog box, click the **OK** button . The Add New Variables? Dialog box will be displayed.
4. To add the two new variables to the `Characteristics.sta` data file, click the **Yes**

button. A message is displayed to inform you whether the expressions you entered in the Batch Transformation dialog box are correct.

5. If the expressions entered are correct, click **Yes** button to proceed. Statistica calculates the formulas and adds the two variables, **BMI** and **Height (cm)**, to the spreadsheet.

Data: Characteristics* (14v by 100c)

	8 Wellness 2	9 Test Item 1	10 Test Item 2	11 Test Item 3	12 Test Total (Avg)	13 BMI	14 Height (cm)
1	58.974	8	16	17	13.667	38.53875	175.26
2	50.776	5	16	12	11.000	24.85354	167.64
3	65.185	8	21	14	14.333	31.0078	170.18
4	75.948	5	21	17	14.333	20.65959	177.8
5	71.653	13	16	16	15.000	30.78225	165.1
6	47.883	12	24	17	17.667	23.67245	177.8
7	44.571	11	20	14	15.000	37.55001	160.02
8	59.643	8	21	15	14.667	25.35899	182.88
9	69.995	11	17	19	15.667	21.23907	185.42
10	74.886	8	15	17	13.333	19.63852	175.26
11	44.467	8	21	17	15.333	25.93243	187.96
12	50.304	13	17	11	13.667	28.8882	167.64
13	54.906	8	18	10	12.000	25.82449	177.8

The options in the Batch Transformation Formulas dialog box are particularly well suited (optimized) for transforming large data sets. The formulas are evaluated one by one, in sequence, so that the results of one transformation in the list can serve as the input for the next. Thus, it is possible to create a new variable with one formula and then use that variable in subsequent formulas.

6. To display the Statistica Electronic Manual topic related to these options and links to various other topics containing examples of formulas and syntax rules, click the **Help** button in the upper-right corner of the **Batch Transformation Formulas** dialog box.

Example 2: Input Data Directly from Excel

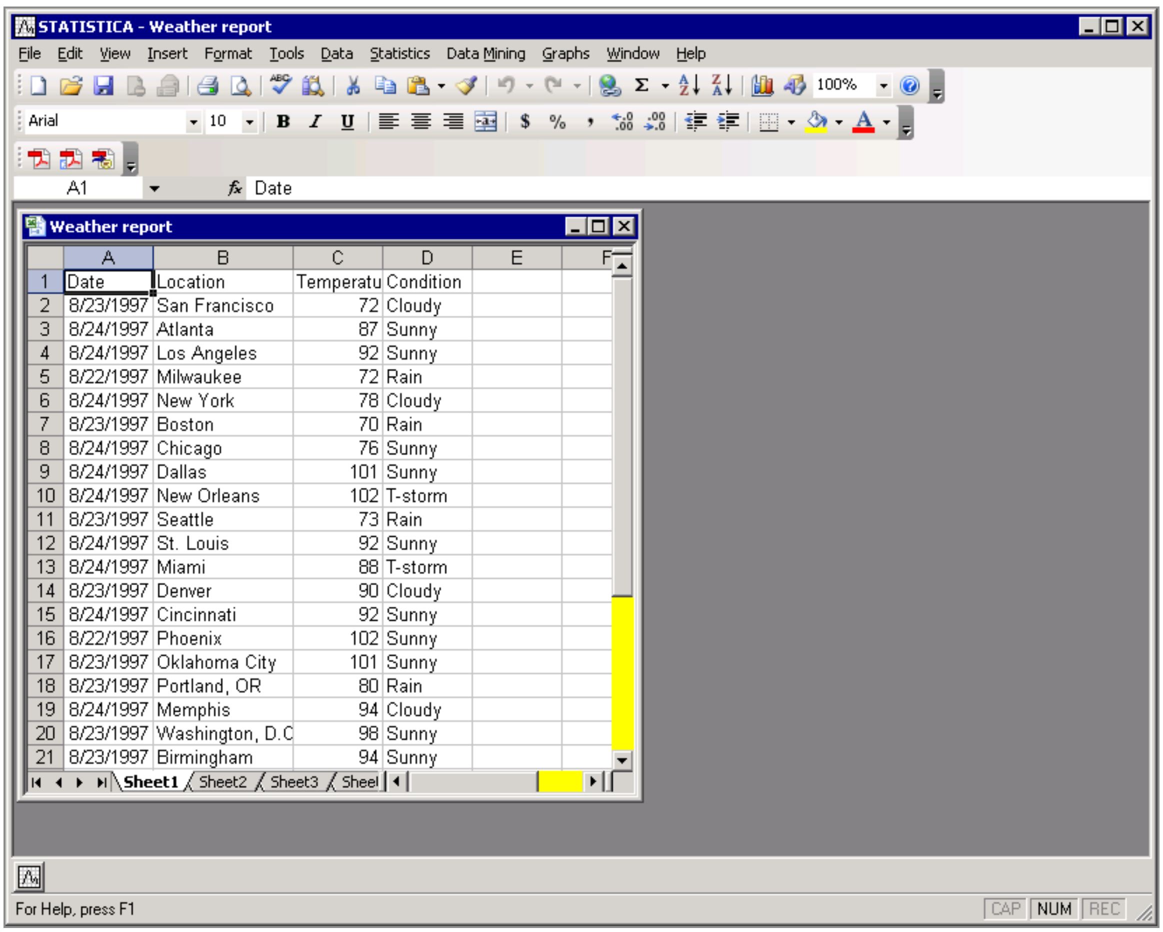
In addition to using the traditional Statistica spreadsheet, you can open Excel files in a Statistica window and then perform analyses using the Excel file as your data source.

1. To display Open a Statistica Data File dialog box; on the Statistica **Home** tab, in the

File group, click the **Open** arrow and select **Open Examples** from the drop-down list.

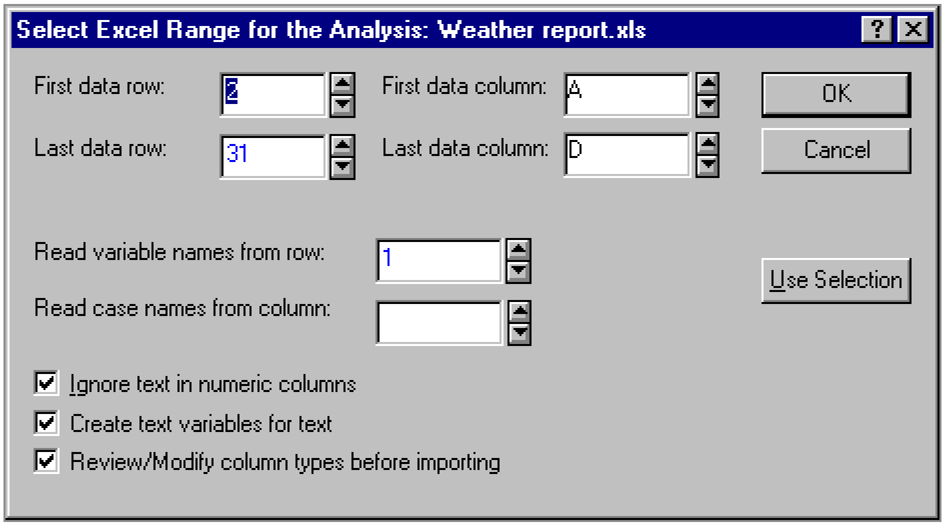
2. From the files of type drop-down list at the bottom of the dialog box, select Excel Files (*.xls;*xlsx;*.xlsm).
3. Double-click **Datasets** folder. Select the Weather report data file (Excel file).
4. To display Opening file dialog box, click **Open** button.
5. To display Excel file, click **Open as an Excel Workbook** button.

> **Note:** When an Excel worksheet is opened in Statistica, the Excel and Statistica menus merge, enabling you to access key functionality for both applications.



6. To display Select Excel Range for the Analysis dialog box; from the Statistics menu,

select **Basic Statistics/Tables**.

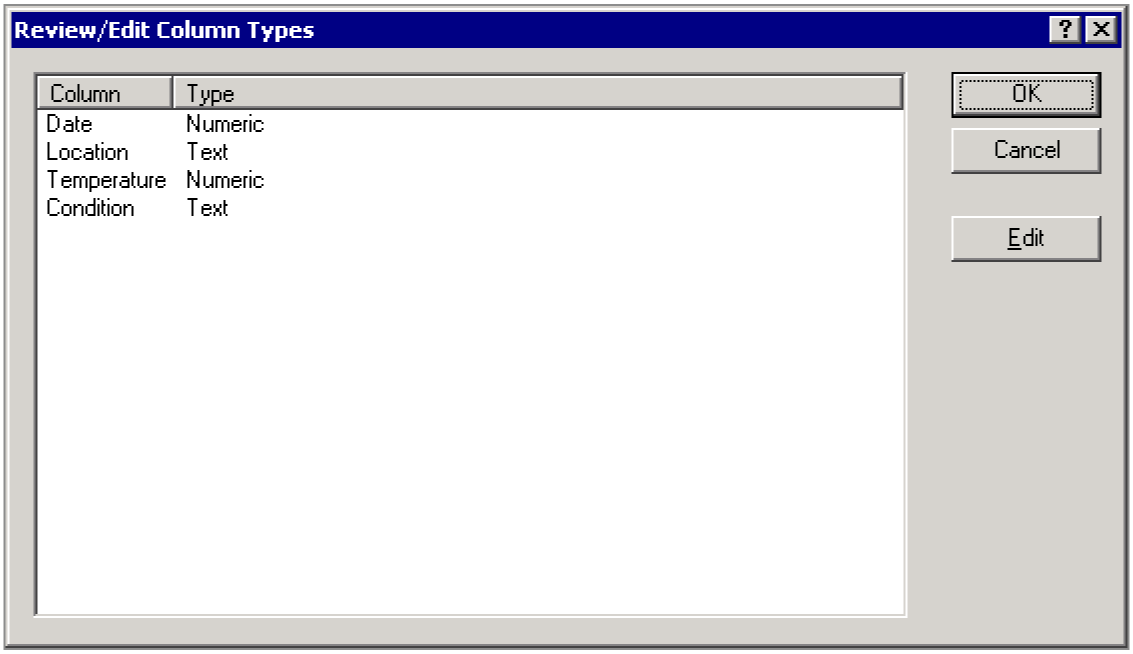


This dialog box is displayed when you select a command from the Statistics, Data Mining, or Graphs menu after opening an Excel worksheet in the Statistica application.

Note: Statistica has determined the logical specifications, but these options can be changed if necessary.

When variable names are not included with the Excel worksheet, Statistica assigns variable names: Var1, Var2, Var3. As with Statistica spreadsheets, all values in a column are used for the selected analysis unless case selection conditions are specified.

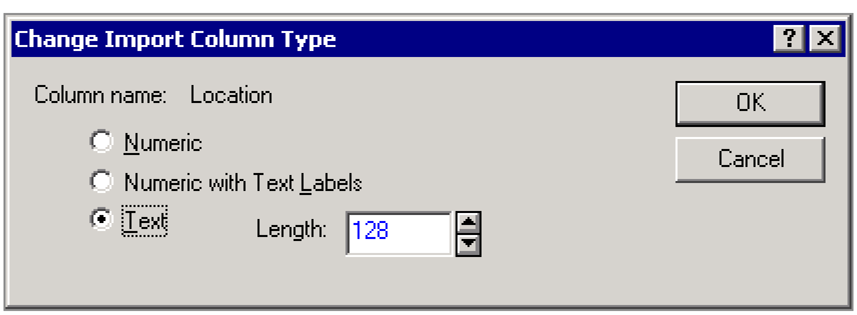
7. To accept the defaults, in Select Excel Range for the Analysis dialog box, click **OK** button; the dialog box closes. The Review/Edit Column Types dialog box is displayed.



In Statistica, you can define the data type for the specific columns. Data types include numeric, text, mixed numeric and text, and missing data. Empty cells in an Excel worksheet are always treated as missing data, and when a numeric column contains text values, those values are also treated as missing data.

Default data types for all columns based on the first few rows of data are available in Statistica (You can clear the **Review/Modify** column types before importing check box in the Select Excel Range for the Analysis dialog box before clicking **OK** button. The Review/Edit Column Types dialog box is not displayed).

8. To display Change Import Column Type dialog box, select the name of the column you want to change and click **Edit** button (or double-click on the name of the column you want to change).



9. Accept the defaults. In Change Import Column Type dialog box, click **Cancel** button.

10. In Review/Edit Column Types dialog box. Click **OK** button. The Startup Panel for the selected analysis or graph is displayed (in this example, the Basic Statistics and Tables Startup Panel), and you can proceed with the analysis.

Example 3: Accessing Data Directly from a SQL Server Database

Access to virtually all databases (including many large databases such as Oracle, Sybase) is available through Statistica query. These are available from either **Home** tab (in the **File** group, click the **Open** arrow to access the **Open External Data** submenu) or the Data tab (in the **Manage** group, click **External Data**). Using Statistica Query, you can also import data from a database directly into a Statistica Spreadsheet (so that it can be saved).

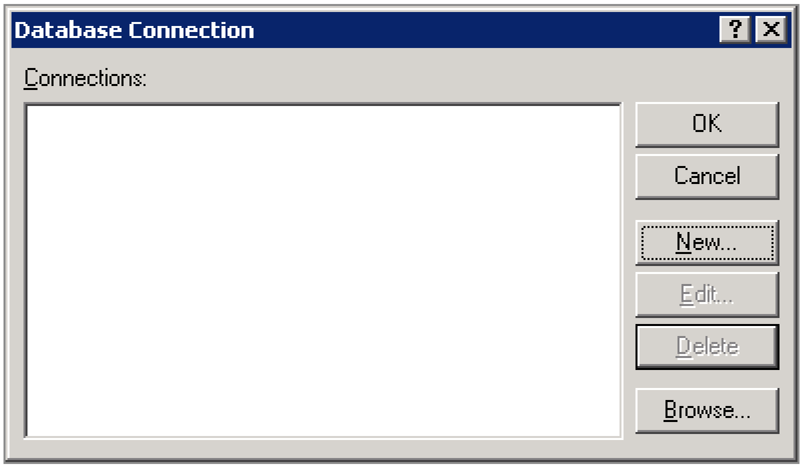
With Statistica Query, you can easily access data using OLE DB conventions. OLE DB is a database architecture [based on the Component Object Model (COM)] that provides universal data integration over an enterprise’s network, from mainframe to desktop, regardless of the data type.

Statistica Query supports multiple database tables; specific records (rows of tables) can be selected by entering SQL statements. Statistica Query automatically builds the SQL statement for you as you select the components of the query via a simple graphical interface and/or intuitive menu options and dialogs.

An extensive knowledge of SQL is not necessary for you to create advanced and powerful queries of data in a quick and straightforward manner. Multiple queries based on one or many different databases can be created to return data to an individual spreadsheet; hence, you can maintain connections to multiple external databases simultaneously.

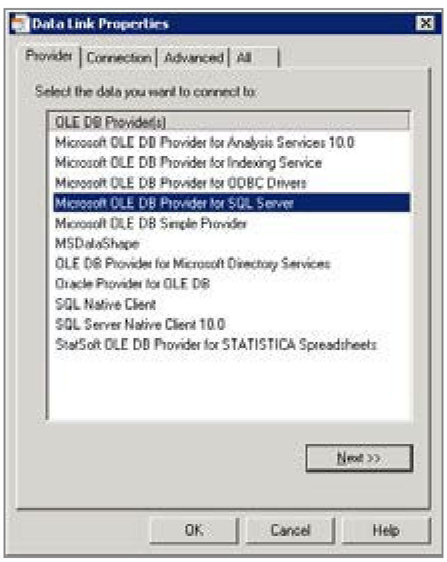
For this example, create a new database query:

1. Select **Home** tab
2. In the **File** group, click **Open** arrow.
3. From the drop-down list, select **Open External Data - Create Query**. Statistica Query starts, and the Database Connection dialog box is displayed.



4. Choose existing database connections or define new ones. For this example, create a new database connection.

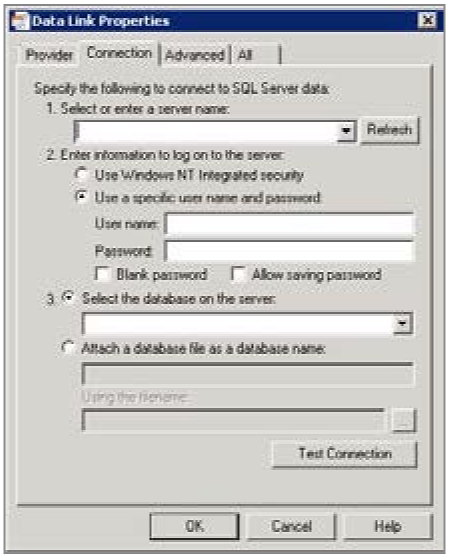
5. To display the Data Link Properties dialog box, click **New** button .



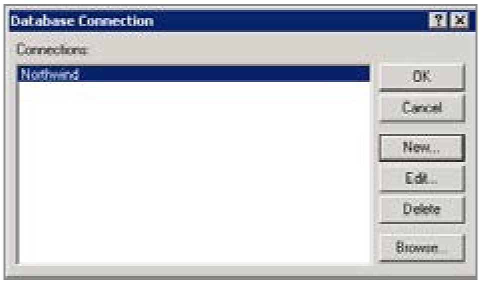
6. You can choose either the **OLE DB provider** that is supplied by your database vendor, or one of the **Microsoft default OLE DB providers** that is compatible with your database system.

7. Use the **Northwind** sample database installed with Microsoft SQL Server.

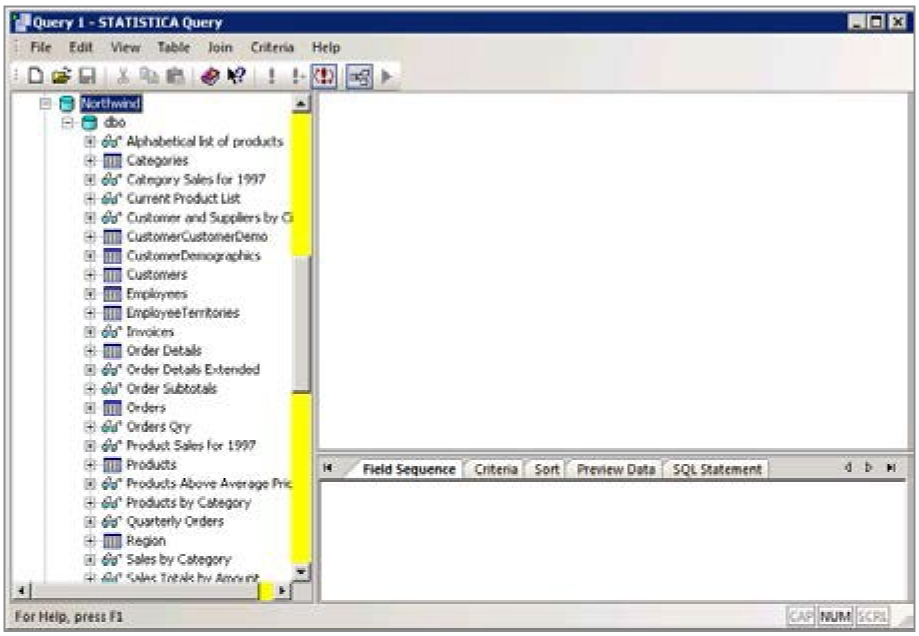
8. Select **Microsoft OLE DB Provider** for SQL Server and click the **Next >>** button. The Data Link Properties dialog box- **Connection** tab is displayed.



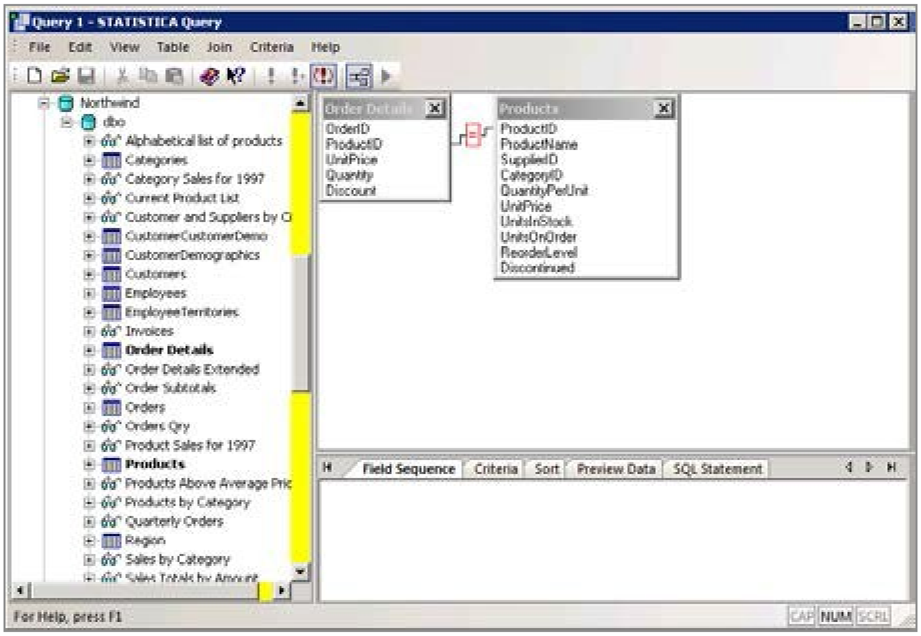
9. Select a server from the **Select or enter a server name** drop-down list.
10. Select the **log on** option button for **SQL Server Northwind** database installation.
11. Select either **Use Windows NT Integrated security** option button, or select **Use a specific user name and password** option button and enter **User name** and **Password** in the respective fields.
12. Select **Northwind** from the **Select the database on the server** drop-down list.
13. To attempt a connection to the specified data source, click **Test Connection** button . If the connection fails, ensure that the settings are correct. For example, spelling errors and case sensitivity can cause failed connections. If the connection succeeds, click **OK** button in the message dialog box.
14. To display Add a Database Connection dialog box, click **OK** button in the**Data Link Properties** dialog box.
15. Enter **Northwind** in the **Name** text box, and click **OK** button. The Database Connection dialog box is displayed again, with the new Northwind connection defined.



16. Select this connection, and click **OK** button. The Statistica Query window is displayed, with all the database tables in the tree view on the left.

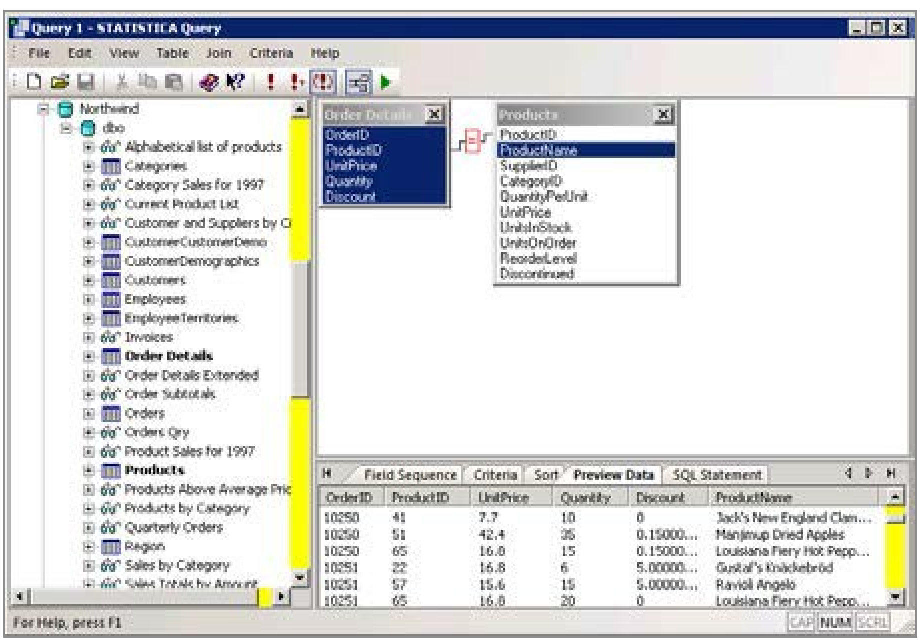


17. Right-click **Order Details** table, and from the shortcut menu, select **Add** to add the table to the table view pane (the upper-right pane in the Statistica Query window).
18. Right-click **Products** table, and add it to the table view pane. Since both tables contain the **ProductID** field, Statistica Query automatically joins the two tables on this key.



19. To select the fields to include in the query, right-click **Order Details** table in the table view pane, and from the shortcut menu, select **Select All Fields**. In the Product table, select the **ProductName** field.

20. To display a preview of the query, click the **Preview Data** tab in the lower-right pane.

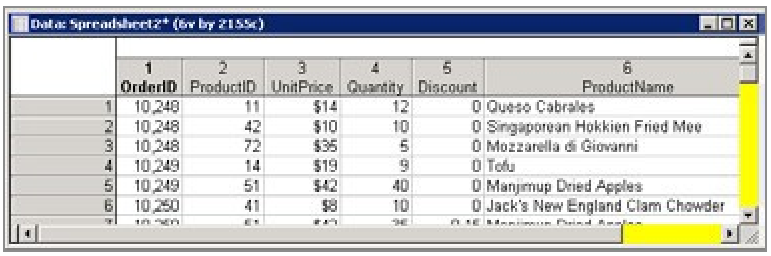


21. To display the SQL Statement generated by the query, click **SQL Statement** tab.

22. To return the data to a Statistica Spreadsheet, click green arrow on the Statistica Query toolbar. The Returning External Data to Spreadsheet dialog box is displayed, where you can control whether the query is placed into a new or current spreadsheet and adjust other query parameters.

23. Select the **New Spreadsheet** option button, and click the **Run Now** button to run the query.

24. If the Connect to OLE DB Provider dialog box is displayed, click **OK** button. After a few moments, the data is returned to the Statistica Spreadsheet. Now the data can be analyzed with any of the Statistica tools.



> **Note:** The spreadsheet retains the database connection, and you can re-run the query at any time: select the **Data** tab, and in the **Manage** group click **External Data** button.

25. Select **Refresh Data** from the drop-down list. You can also press F5 on your keyboard when the spreadsheet is open.

Example 4: Data preparation - Cleaning and Filtering

Summary of Options for Data Filtering/Recoding

In practice, the time required to complete a data analysis or data mining project is spent on the preparation of data. Sometimes 90% of all time and effort required to complete a project is related to the proper cleaning and preparation of the data.

When building prediction models using data mining tools, or even when just computing simple descriptive statistics (averages, frequency distributions), results of analyses can be very misleading if, for example, large numbers of duplicate records are included (for example, the same part numbers are recorded multiple times) or the data include outliers or miscoded values (outside the valid data ranges) or excessive numbers of missing (blank) data.

On **Data** tab, in **Transformations** group, click **Filter/Recode** to display a drop-down menu containing commands to address such data quality issues quickly and effectively so that meaningful and valid data analyses or data mining projects can be completed in less time.

FilterRecodeMenu

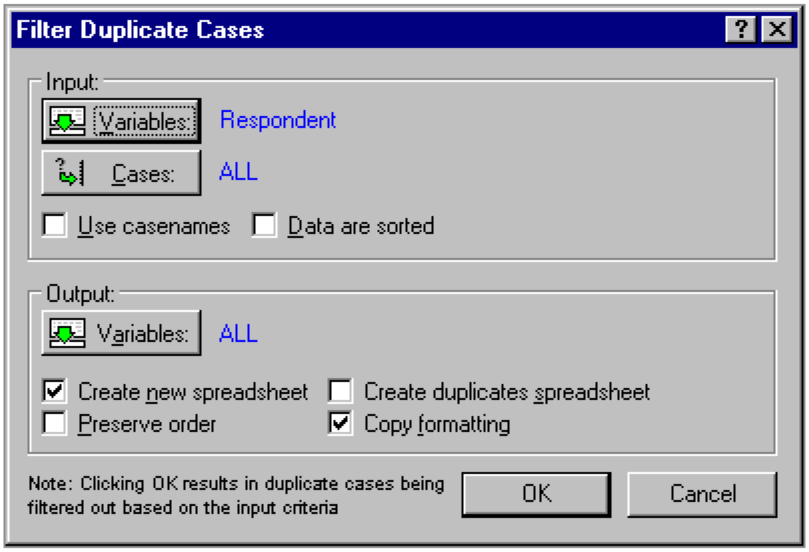
Filter Duplicate Cases

Use this option when you suspect that your data file might contain duplicate records (for example, **duplicate/identical** customer records).

For example, suppose that in an analysis of customer records, to identify typical customer demographics (profiles), you want to count each customer only once; however, your customer database is organized by transactions, so each customer may appear multiple times. In this case, you can use the **Filter Duplicate Cases** options to create a data file for the analyses containing only unique records (such as where each customer ID is listed only once).

Duplicate information example

1. Open `Duplicates.sta` data file.
2. To display the **Filter Duplicate Cases** dialog box; from the **Filter/Recode** menu, select **Filter Duplicate Cases**.
3. Specify the basis of distinction for duplicates, in the **Input** group box, the Variables option.
4. Click the **Variables** button.
5. In Variable selection dialog box, select **Respondent** (all respondents are checked for duplicates).
6. To return to Filter Duplicate Cases dialog box, click **OK** in **Variable selection** dialog box.



7. To display Spreadsheet Case Selection Conditions dialog box, in **Input** group box, click **Cases** button (contains options to select only specified observations or cases for the de-duping operations).
8. To filter all the cases, click **Cancel** button in the Spreadsheet case Selection Conditions dialog box.
9. Clear **Use casenames** check box. If **Use casenames** check box is selected, case names are used as one of the bases for distinction. Statistica treats as duplicates any cases that have the same case name (provided the cases match on any other specified variables as well). If check box is cleared, duplicate case names are ignored.
10. Clear **Data are sorted** check box (because the current data file is not sorted - when you have an extremely large data file, it is more efficient to sort the data first).
11. In the **Output** group box, verify that all variables are selected.

    This option is used to select the variables in the input spreadsheet that is included in the output (filtered) spreadsheet. The default is **ALL**.
12. Select **Create new spreadsheet** check box
13. Select **Create duplicates spreadsheet** check box.
14. Clear **Preserve order** check box and select **Copy formatting** check box. Click **OK** button.

    Two new spreadsheets are generated. One of the spreadsheets is 10v by 51c (10 variables by 51 cases) and contains the respondents from the original spreadsheet excluding the duplications. The other spreadsheet is 10v by 9c and contains the duplicate respondents that are extracted from the original spreadsheet.

Look at the original spreadsheet, `Duplicates.sta`, and notice that some of the variable headers – **Respondent**, **State**, and **Colors** – are formatted differently. Then observe at the two new spreadsheets; the variable headers for **Respondent**, **State**, and **Colors** have the same formatting in all three spreadsheets. Statistica uses sub-setting to create the new spreadsheets and ensures that variable properties of the parent spreadsheet are maintained in the child spreadsheets.

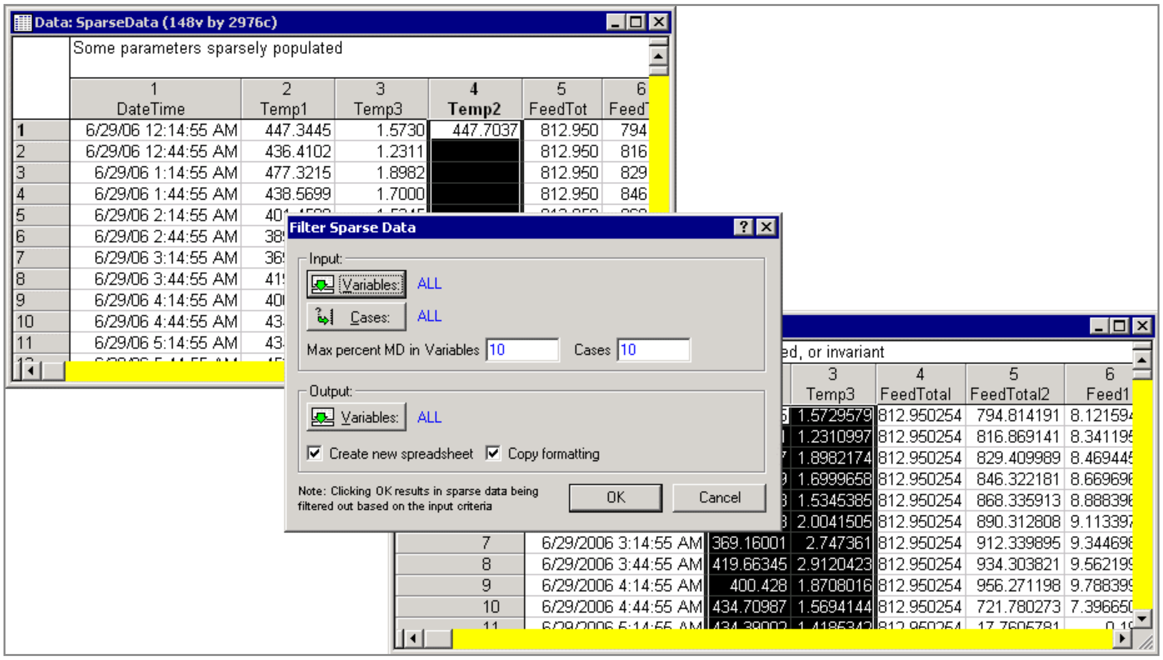
15. Close two new spreadsheets, but leave the `Duplicates.sta` spreadsheet open. Note that it is 10v by 60c.
16. To display **Filter Duplicate Cases** dialog box, from **Filter/Recode** menu, select **Filter Duplicate Cases**.
17. In the **Input** group box, click **Variables** button.
18. In the variable selection dialog box, select **Respondent** and click **OK** button.
19. In the **Input** group box, clear **Data are sorted** check box. In the **Output** group box, clear Create new spreadsheet check box. Click **OK** button.

    The dialog box closes and, instead of creating a new spreadsheet with the duplicates excluded, the `Duplicates.sta` spreadsheet is modified. All duplicate cases are removed from it; it now has 10v by 51c.

> **Note:** The filter duplicate cases functionality does not use case sensitivity (upper-case, lower-case letters) for a comparison of uniqueness, such as if you have two respondents – C. Barrett and C. BARRETT – the second respondent is excluded.

Filter Sparse Data

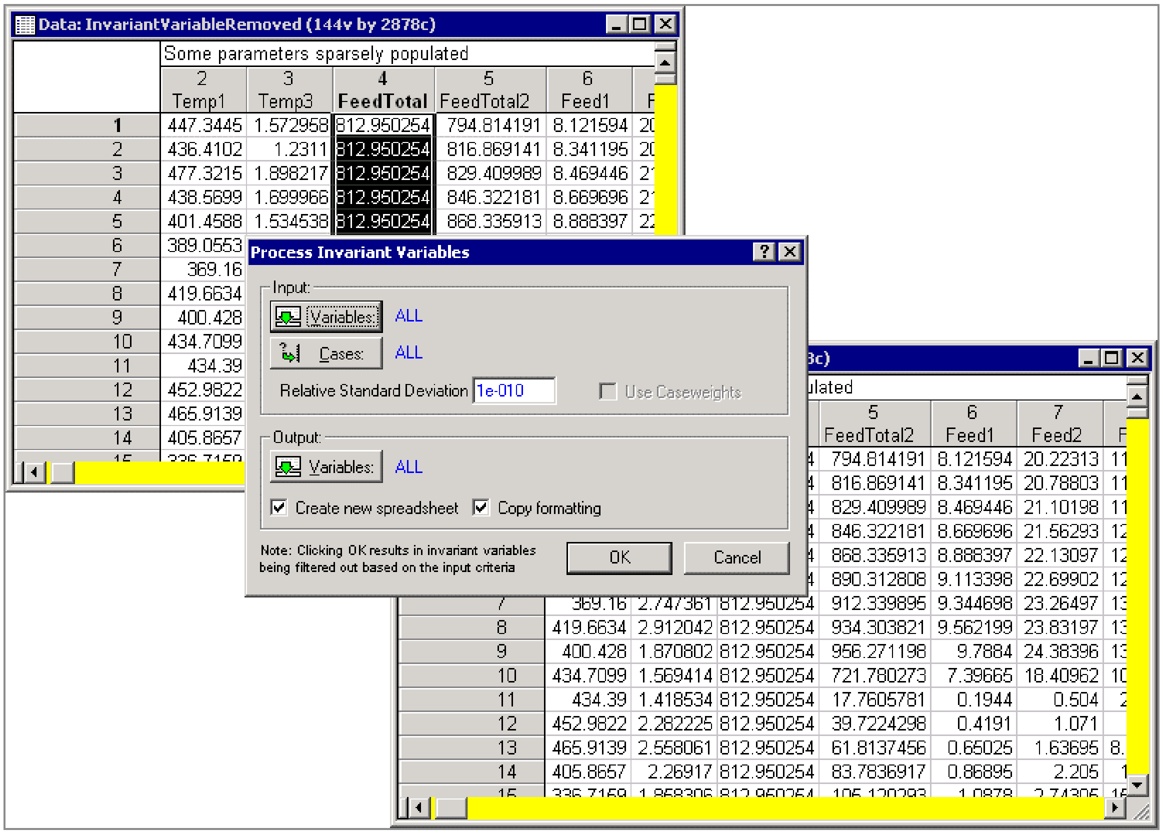
Some variables (parameters or data fields) available for predictive modeling have few valid data. For example, in a customer database self-reported (by customers), income might be recorded; however, very few customers volunteer their current incomes, so most of data (in that field of database) is blank (or missing). In manufacturing data, a data field may exist to record a specific parameter, but the sensor might be faulty for an extended period of time, recording mostly missing (invalid) data.



Including such sparse populated (with data) variables in an analysis may lead to erroneous results, or prevent you from building predictive models altogether (depending on how the missing data are handled later in the analyses). Therefore you might want to identify such sparse variables ahead of time using the **Filter Sparse Data** options (accessible from the **Filter/Recode** menu located on **Data** tab in the Transformations group), eliminate them from subsequent consideration.

Process Invariant Variables

A similar (to the sparse-data case) data quality issue that often occurs, in particular in industrial manufacturing (process) data, is that some variables (parameters) that are recorded and included in the analyses are invariant, such as all values are the same.

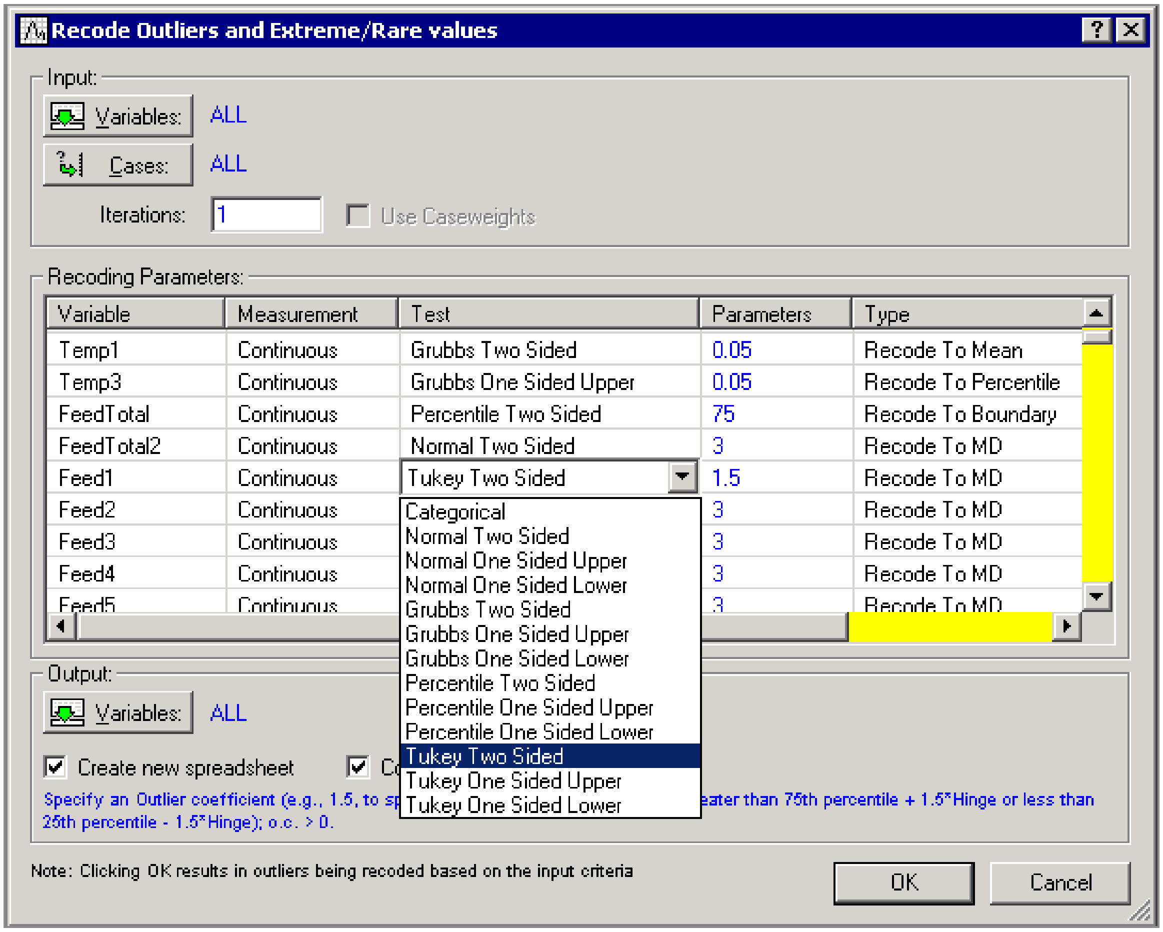


Such variables are not useful for predictive modeling, and the Process Invariant Variables options (accessible from the Filter/Recode menu located on the Data tab in the Transformations group) enable you to identify those variables automatically, and exclude them from further analyses.

Recode Outliers

Extreme data values or outliers can greatly affect various analyses and cause poor accuracy of prediction (data mining) models. There is no formal definition of what constitutes an outlier or extreme value, and Statistica's graphical tools may provide the best way to review data to identify such unusual observations (for example, you could create box plots of the key variables to identify extreme observations and brush or flag them in the data).

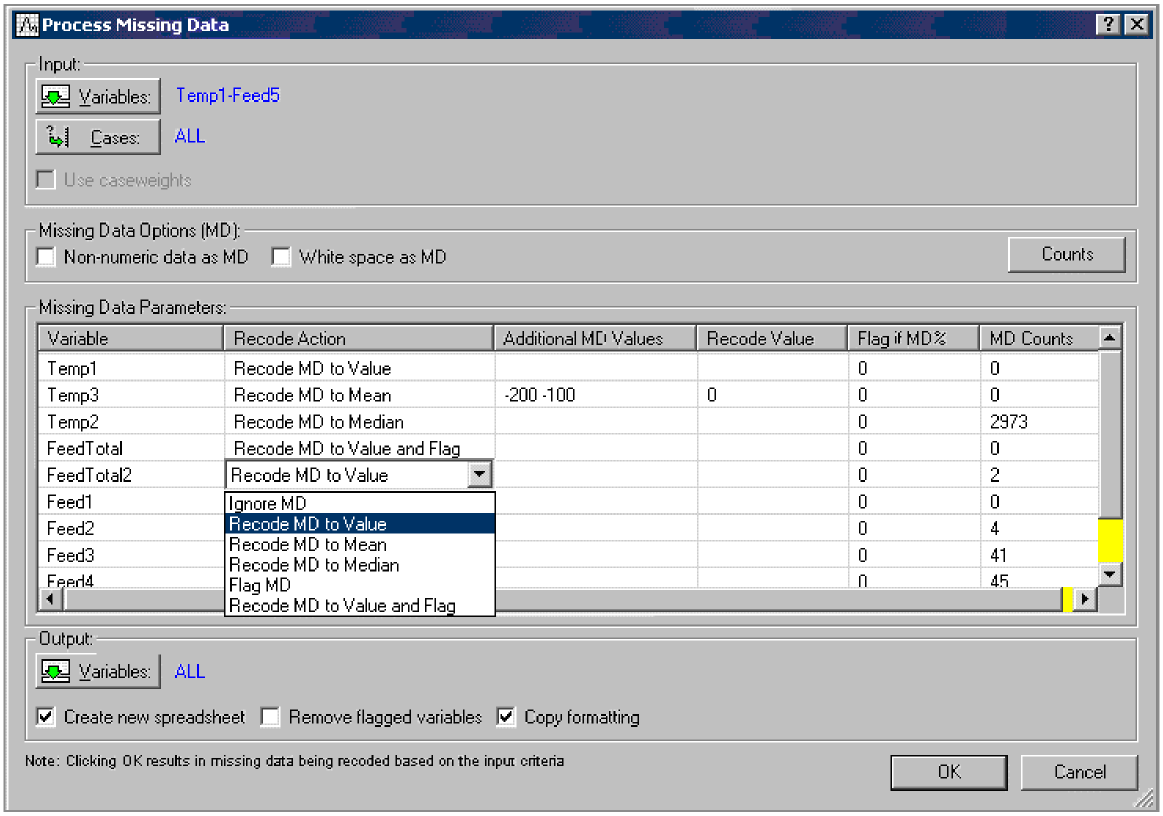
To automatically process lists of variables to identify and remove outliers, the Recode Outliers options (accessible from the **Filter/Recode** menu located on **Data** tab in the **Transformations** group) provide several tests for outliers (approaches for identifying extreme values).



Outliers can be recoded to missing data or to valid data values (for example, to the respective percentile boundary values).

Process Missing Data

Missing data or invalid data values must obviously be dealt with a manner that is consistent with the goals of the analyses. In some cases, missing or invalid data might themselves provide useful information about a process or variable of interest. For example, in marketing research, it is common that respondents refuse to provide detailed personal information regarding their health, financial status (for example, savings), and such refusal itself might be correlated with other significant variables of interest (for example, refusal to answer questions related to income might itself be a good indicator of high income, if indeed wealthier individuals in the survey tended not to answer those questions).



The Process Missing Data options (accessible from the **Filter/Recode** menu located on **Data** tab in the **Transformations** group) enable you to recode missing data flexibly, define multiple missing data values or codes for a single variable (which can then be recoded to the variable missing data code), or just to flag variables that have more than a certain percentage of missing data.

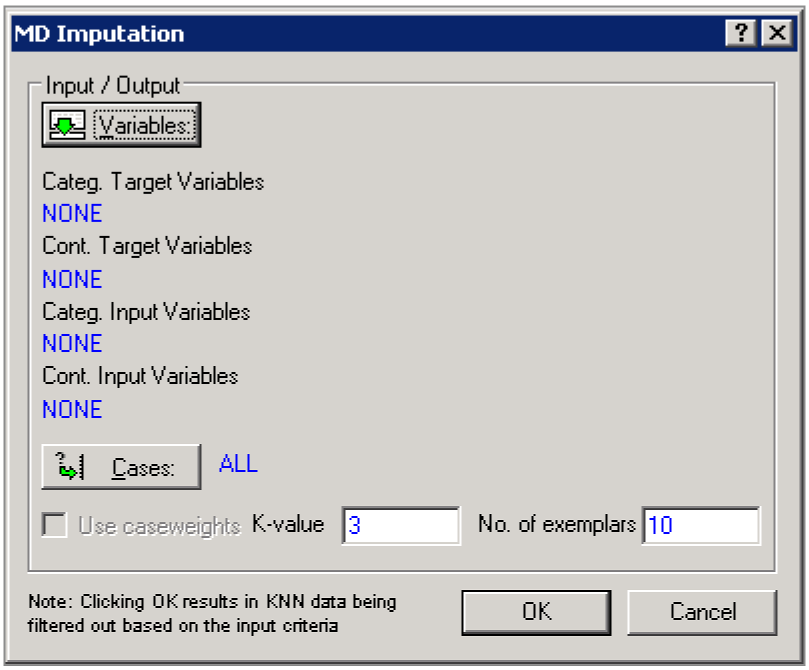
Imputation of Missing Data (k-Nearest Neighbor)

The best way to recode missing data is not clear yet and sometimes by recoding missing data for a particular variable to a specific value (for example, the mean), the final results might be biased.

For example, suppose in a survey all respondents who refuse to report their income tend to be in the higher income bracket. In this case, assigning the mean-income to those individuals (such as recoding missing data for variable income to the mean income for the whole sample) may yield highly misleading results.

Statistica includes a very efficient method (applicable to very large data sets and databases) for replacing missing data with valid data values that are consistent with the other observations in the sample.

Using the MD Imputation options (accessible from the Filter/Recode menu), in a first pass through the data, the k-nearest neighbour algorithm selects a smaller sample from the available data. IN the second pass through data file, when missing data are encountered, they are replaced with valid values found in similar observations in the smaller sample (with respect to all other variables that are selected). To continue this example, if indeed hiher-income respondents are less likely to report this fact but do report other indicators of high-income respondents are less likely to report this fact, but do report other indicators of high-income (for example, ownership of a luxury car, more square footage of their home), then the k-nearest neighbor algorithm accurately assigns those individuals (who failed to report their income) to the high-income bracket.

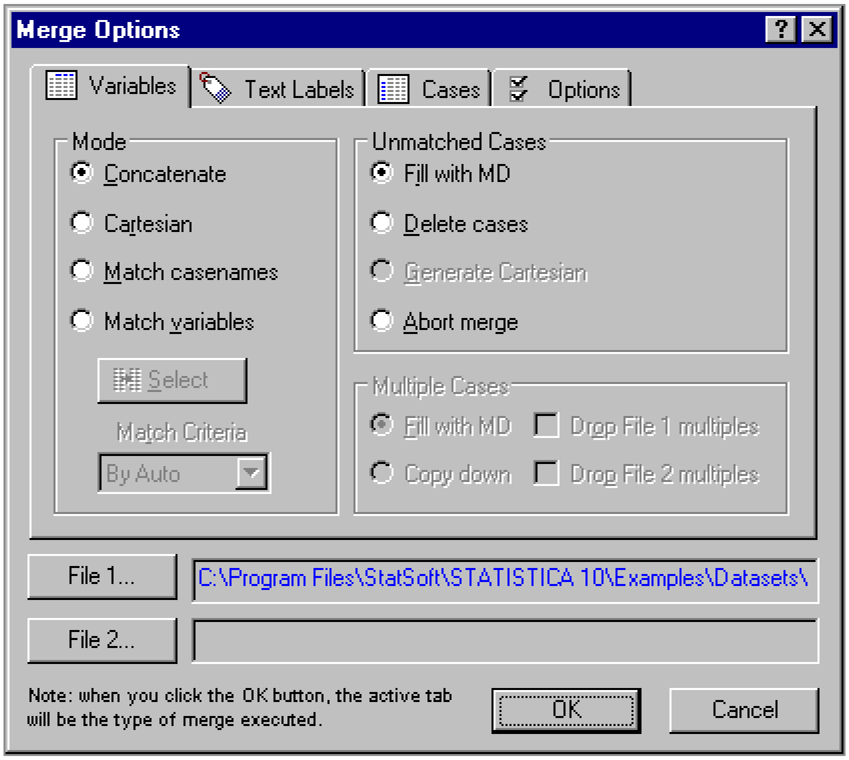


The k-nearest neighbor algorithm is fast and efficient, and provides an effective method for replacing missing data in the input file with reasonable guesses based on similar data points in the sample. This approach does not make any particular assumptions about the nature of the relationships between variables (such as require that a model be estimated for each variable to predict missing data values), but simply uses the observed data as the model.

Merge Data Files

Merge two data files by the variables or by cases using Statistica Merge Options dialog box. This helps to centralize all the observations to one table.

1. To display the Merge Options dialog box, select **Data** tab, and in the Manage group, click **Merge** button.

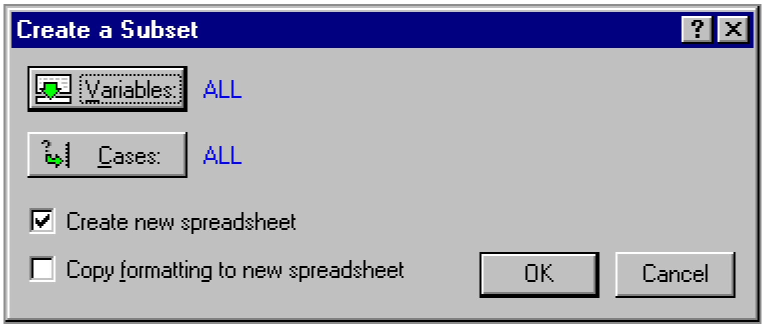


2. To access Help topics describing all the options in this dialog box, click **Help** button in the upper-right corner of the dialog box.

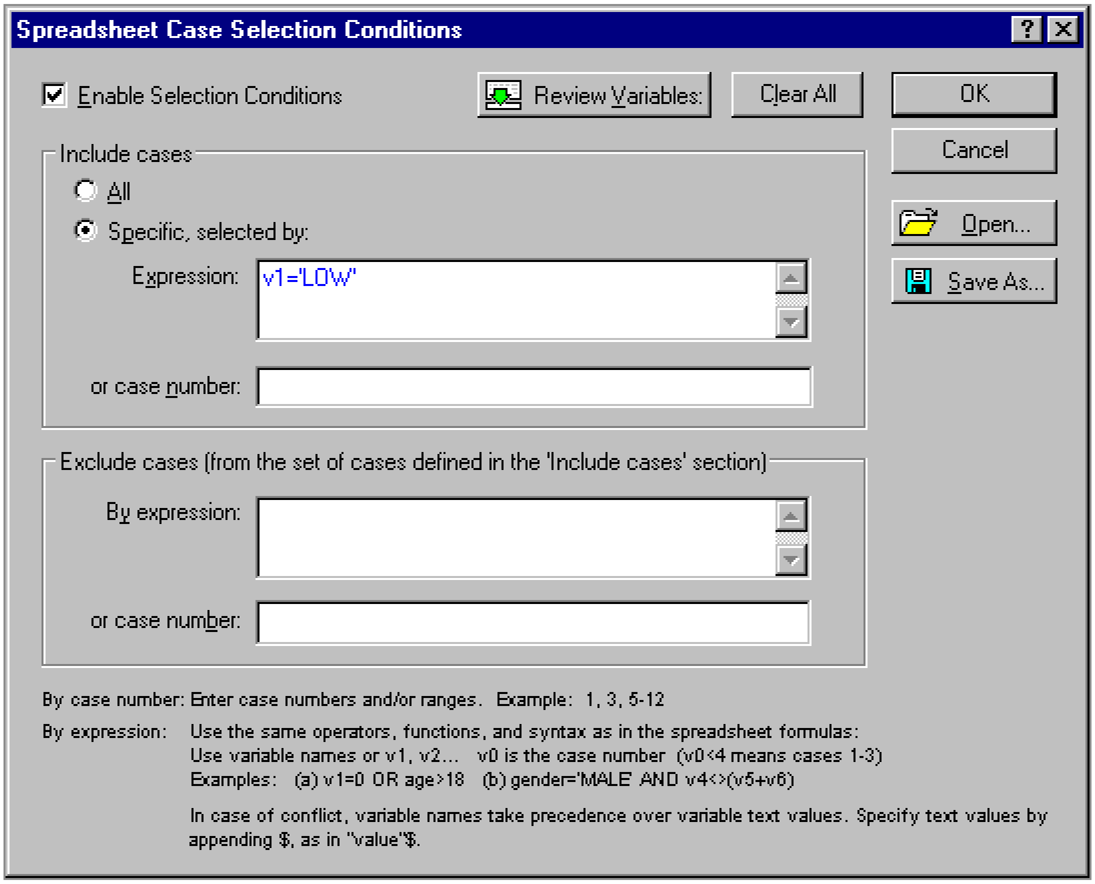
Creating Subsets

If you have a large spreadsheet, you may want to create a new spreadsheet containing a specified subset of the current spreadsheet. For example, open `Boston2.sta`. This data set contains over a thousand cases. We want to extract housing tracts with low median prices.

1. To display Create a Subset dialog box, select **Data** tab, and in the **Manage** group, click **Subset** button.



2. To display Spreadsheet case Selections Conditions dialog box, click **Cases** button. This contains options to create conditions to define the selection of cases to be considered for the sample.
3. To activate the options, select **Enable Selections Conditions** check box.
4. Select the Specific, selected by option button in the Include cases group box to specify which cases to include in the analysis.
5. Type v1='LOW' in the Expression text box.



6. To set the selection condition and to return to Create a Subset dialog box, click **OK** button.
7. To create the new spreadsheet, click **OK** button.

The resultant spreadsheet contains 334 cases (instead of the original 1,012 cases) and all 15 variables from the original spreadsheet. For the PRICE variable, all cases have a value of LOW.

Example 5: Using Statistica ETL (Extract, Transform, and Load)

The Statistica®Using ETL (Extract, Transform, and Load) you can process and merge data, particularly data that is difficult to manage using standard database tools. The process of validating and aligning multiple diverse data sources into a single source suitable for ad-hoc or automated analyses is automated.

ETL offers two options for aligning data:

- Time-indexed, which aggregates data from multiple data sources based on a date/time stamp variable and aligns data by minute, hour, day, week, month, quarter, or year; and ID-based, which aggregates data from multiple data sources based on an identifier variable and an optional time variable, and optionally aligns data by N equal intervals or N user-specified intervals.

This example illustrates how the ETL module handles stock-related data sets with different time intervals.

Stocks are bought and sold at varying prices throughout each day. Microsoft (ticker MSFT) and Oracle (ticker ORCL) are software companies that trade on the NASDAQ electronic stock exchange. Using this example, you can compare data sets containing historical stock prices with different date/time stamps. The first set contains daily Microsoft price quotes from NASDAQ, while the second set contains weekly Oracle price quotes from another source.

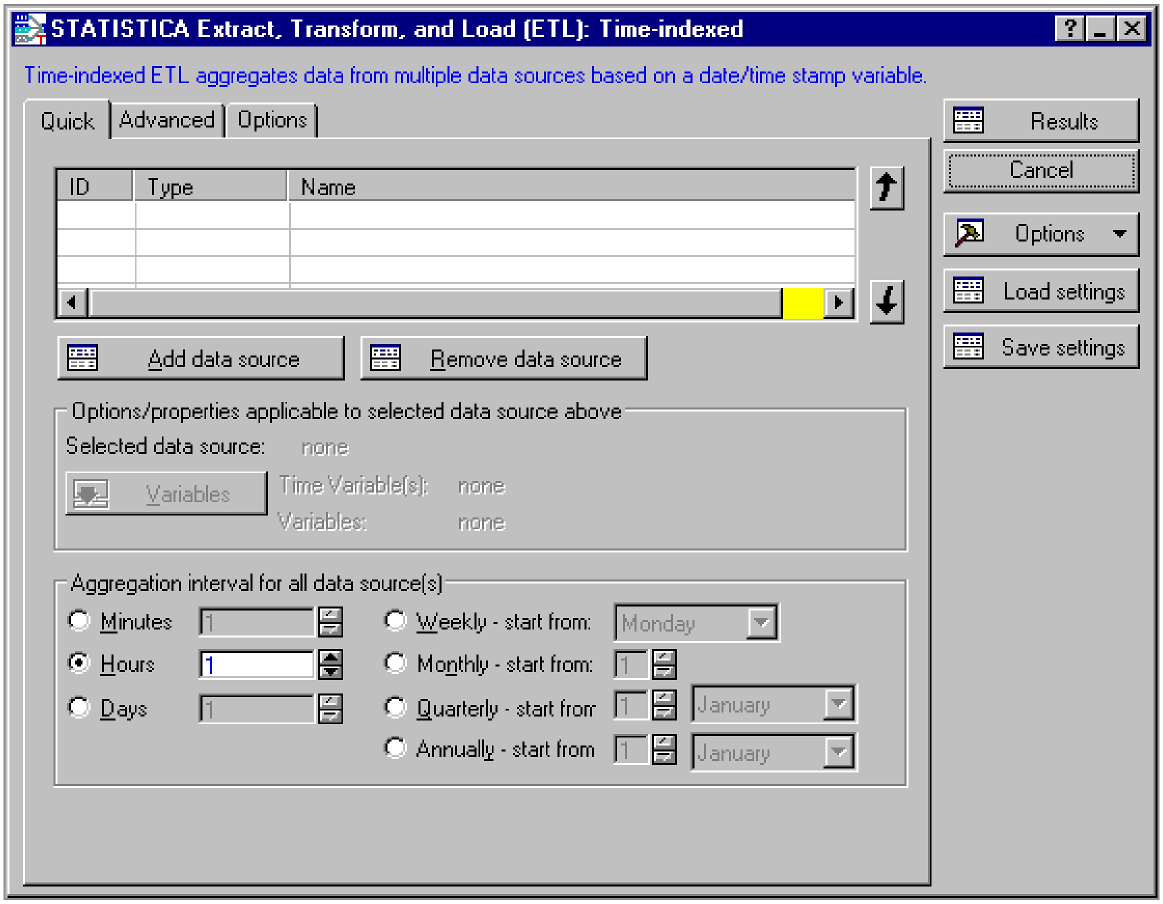
1. On the **Home** tab in the File group, click the Open arrow.
2. To display the Open a Statistica Data File dialog box, select **Open Examples** from the drop-down menu.
3. Double-Click the **Datasets** folder, select `MicrosoftPrices.sta` and `OraclePrices.sta`, click the **Open** button.

   Both data files contain the following columns (variables):

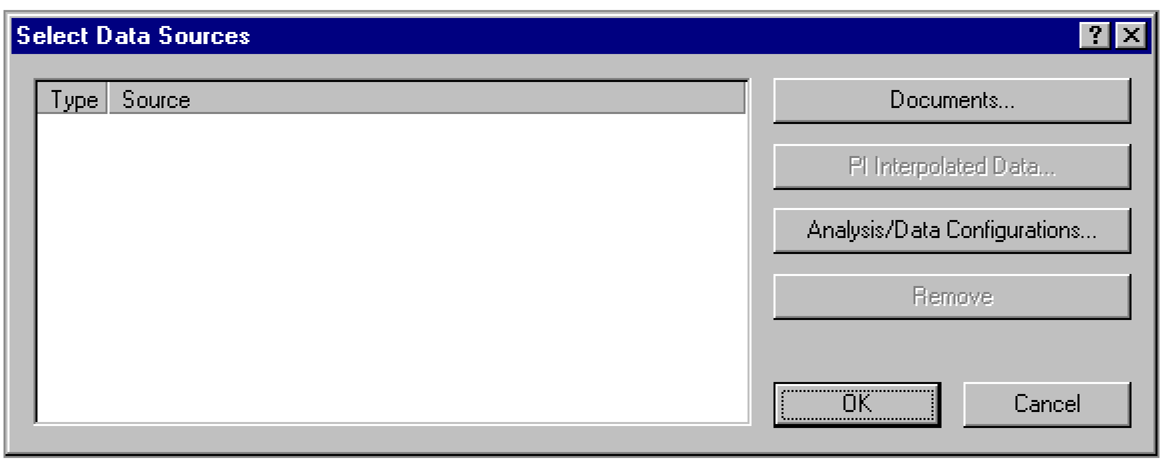
   - **DATE** - the day on which a trade takes place
   - **OPEN** - opening price for the day, first trade of the day
   - **HIGH** - the highest price of the day
   - **LOW** - the lowest price of the day
   - **CLOSE** - closing price for the day
   - **LOW** - the lowest price of the day, last trade of the day
   - **VOLUME** - the daily number of traded shares of a security

   However, they have different date ranges: Microsoft - 10/22/2007-01/04/2008; Oracle-10/18/2007-12/28/2007. In order to compare the data, the ranges must be aligned.
4. Select the **Data** tab.
5. In the **Manage** group, click **External Data**, and select **Time-indexed Process Data**

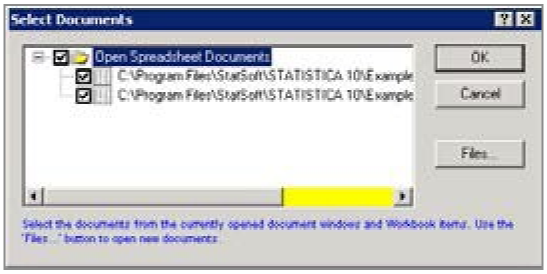
from the **Extract, Transform, and Load (ETL)** submenu. The Statistica® Extract, Transform, and Load (ETL): Time-indexed Startup Panel is displayed.



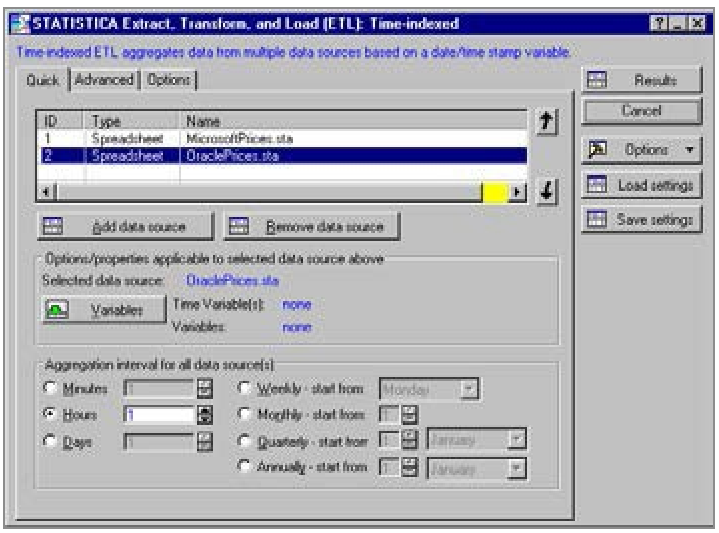
6. To display the Select Data Sources dialog box, click the **Add data source** button.



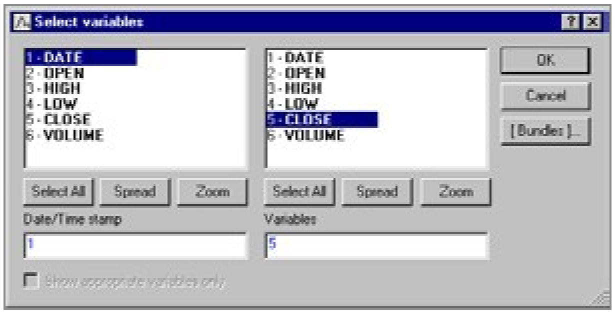
7. To display the Select Documents dialog box, click the **Documents** button.
8. Select the **Open Spreadsheets Documents** check box to select both data files (`MicrosoftPrices.sta` and `OraclePrices.sta`).



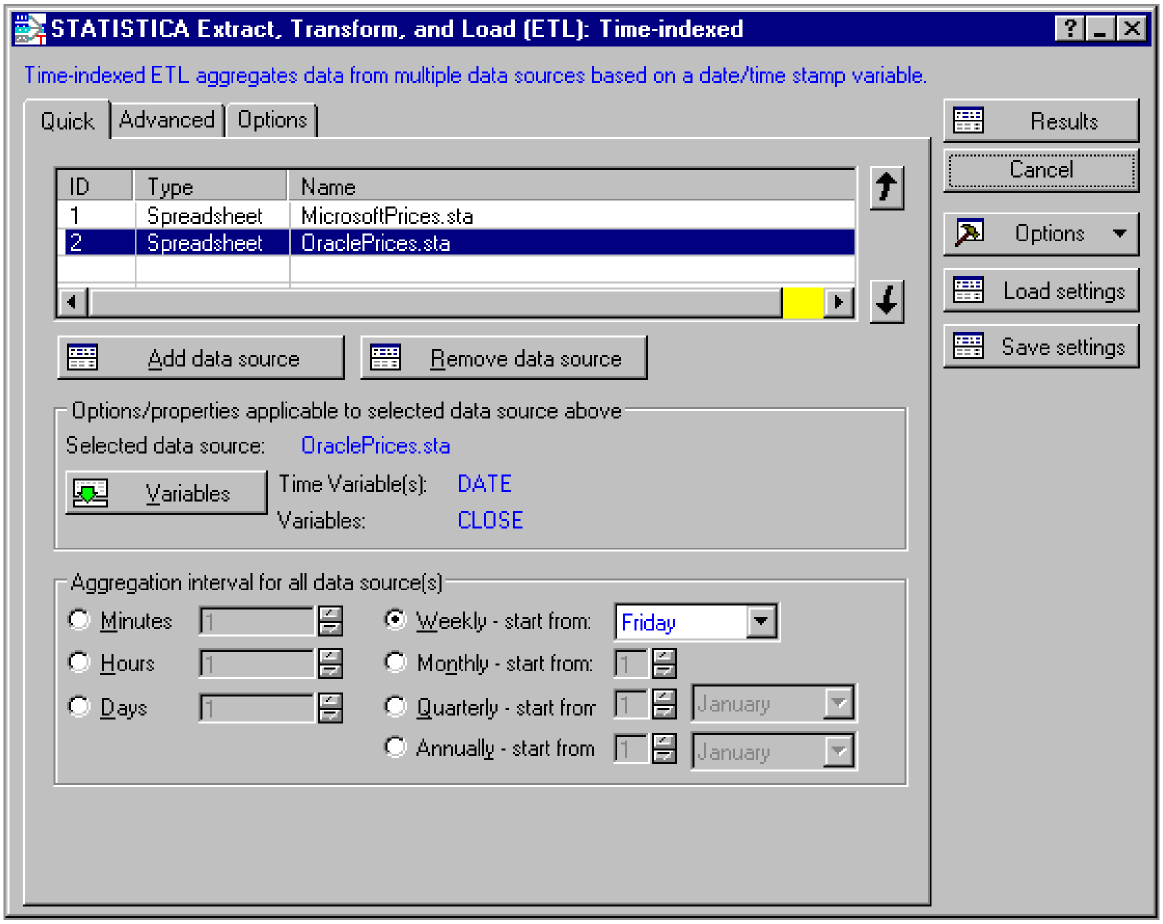
9. In the Select Documents dialog, click **OK** button.
10. In the Select Data Sources dialog box, click OK button. The Statistica Extract, Transform, and Load (ETL): Time-indexed Startup Panel appears.



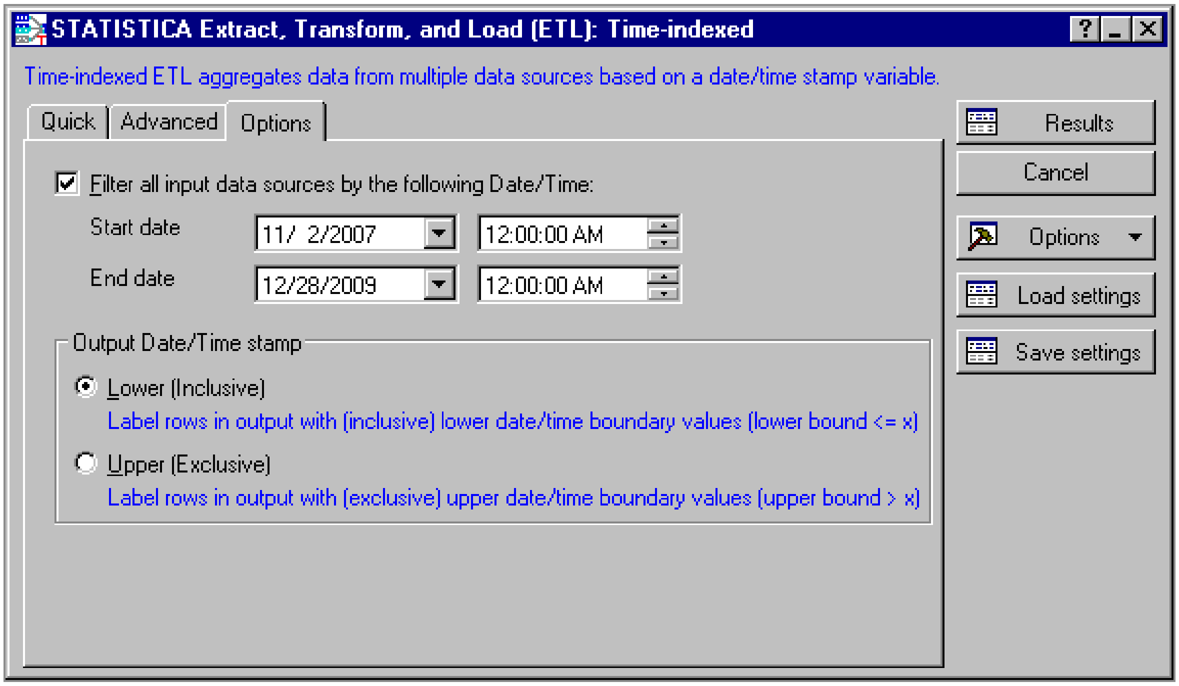
11. To display the Select variables dialog box, select `MicrosoftPrices.sta` in the file list at the top of the dialog box, and click the **Variables** button.
12. Select **DATE** from the **Date/Time stamp** list, and select **CLOSE** from the Variables list.



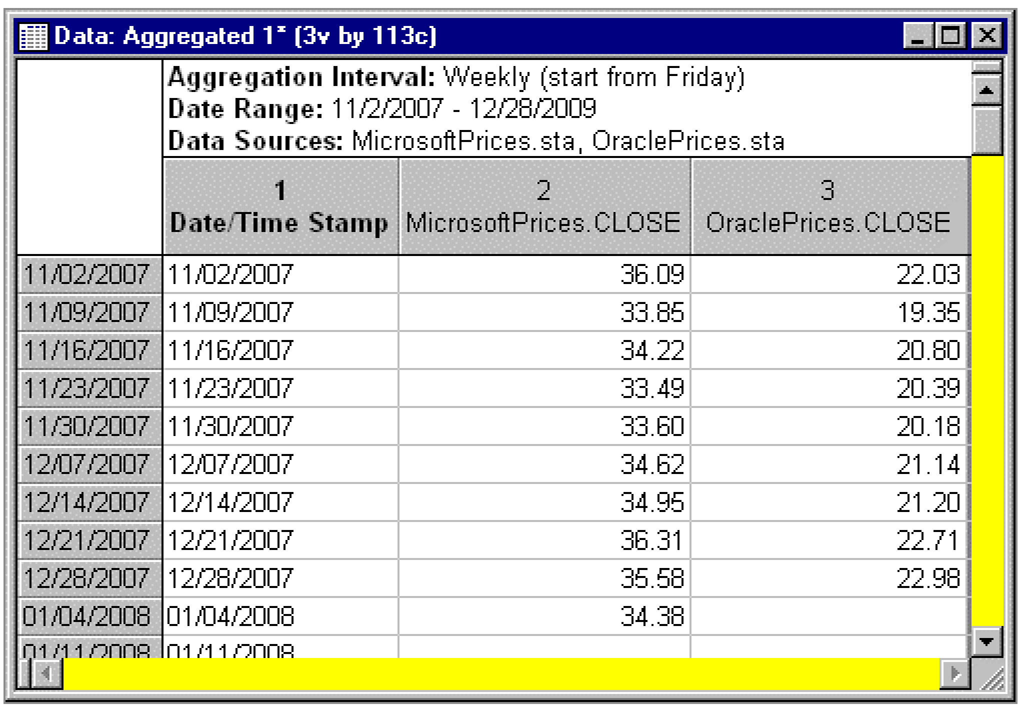
13. To display the Select variables dialog box, select `MicrosoftPrices.sta` in the file list at the top of the dialog, and click the **Variables** button.
14. Select **DATE** from the **Date/Time stamp** list, and select **CLOSE** from the Variables list.
15. To close this dialog box, click the **OK** button and return to the Statistica® Extract, Transform, and Load (ETL): Time-indexed Startup Panel.
16. Select `OraclePrices.sta` in the file list. Click the **Variables** button, and select **variable 1** from the **Date/Time stamp** list and **variable 5** from the **Variables** list. Click **OK** button.
17. In the **Aggregation interval for all data source(s)** group box, select the **Weekly option** button, and change the **start from field** to **Friday**.



For additional date/time options, select the **Options** tab. Select the Filter all input data sources by the following **Date/Time** check box. To limit the data that is returned from both of the selected data files, enter 11/2/2007 in the **Start date** field and 12/28/2007 in the **End date**field. This returns eight weeks of data (Friday to Friday).



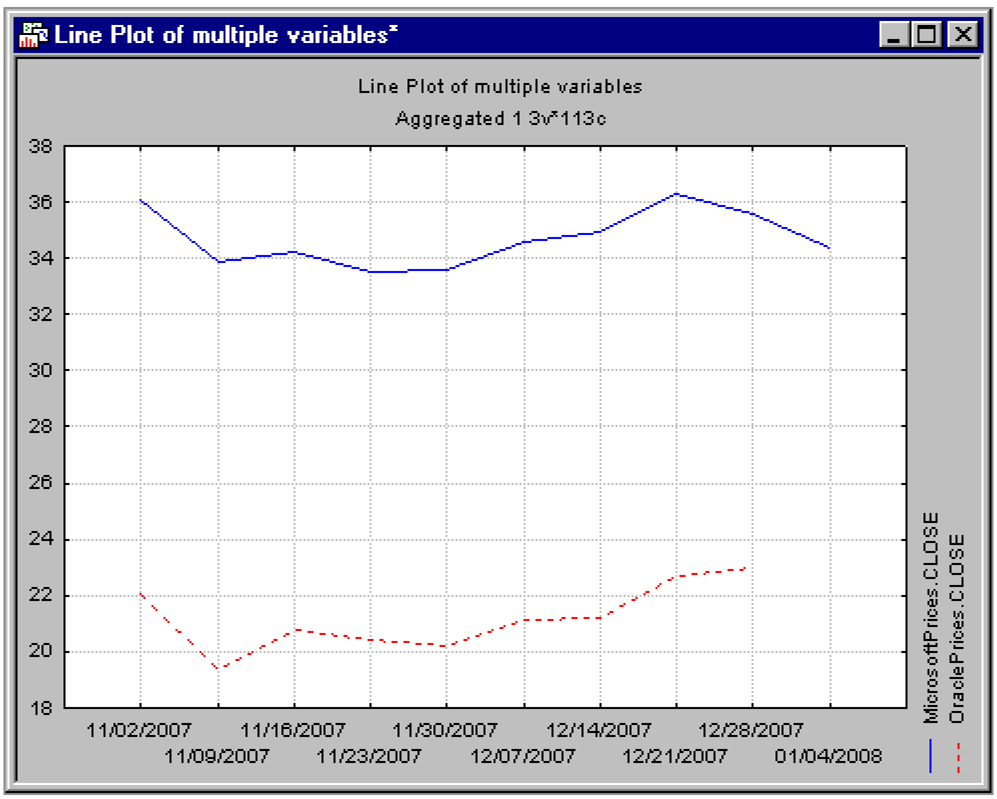
18. To merge the data into a spreadsheet, click the **Results** button.



The two data files are now aligned weekly by date for the range 11/2/2007 to 12/28/2007. The daily closing Microsoft prices are aggregated as means, while the weekly closing Oracle prices are unchanged. The Results spreadsheet displays date/time stamps as cases names so that they can be used for graphing the aggregated and aligned data.

19. Select the **Graphs** tab.
20. To display the 2D Line Plots - Variables dialog box, in the **More** group, click **2D** and select **Line Plots (Variables)**.
21. Click the **Variables** button.
22. In the variable selection dialog box, select variables **2** and **3**. Click **OK** button.
23. In the 2D Lineplots - Variables dialog box, select **Multiple for the Graph type**, and click **OK** button.

The following image shows the resultant graph plotting Microsoft and Oracle prices.



Enterprise Installations

Example 1: Statistica Enterprise Server - Download/Offload Analyses from/to Servers

Statistica Enterprise Server extends the capabilities of the Statistica platform, turning several standalone workstations into a powerful, enterprise-wide collaborative-intelligence system.

One of the key features of Statistica Enterprise Server's client-server architecture is that it enables you to utilize server-side resources to run multiple, possibly time-consuming, or repetitive statistical analyses (offload tasks to the server) while at the same time freeing the local system for other tasks that require immediate attention.

This can be achieved using either a Web browser (thin client) or desktop version of Statistica (thick client, Statistica Enterprise Server client).

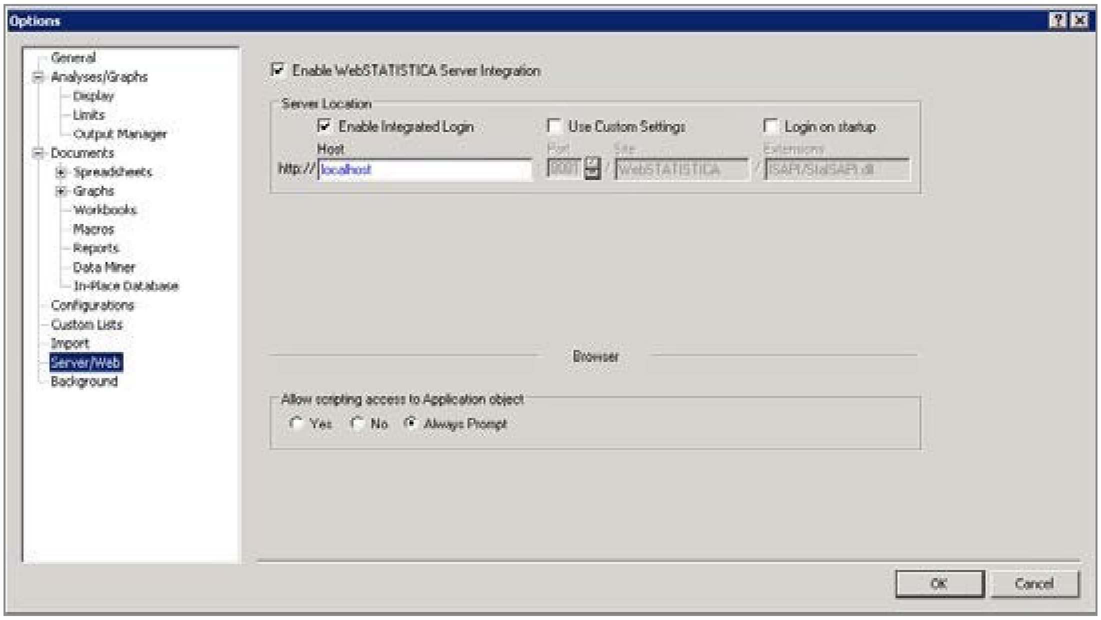
While the former allows access to Statistica Enterprise Server using only a browser, the latter requires Statistica installation on your computer. Statistica Enterprise Server's tight integration with the Statistica application provides common user experience and workflow for both client and server-side operations, a generally more feature-rich and responsive user interface, and all the additional components and tools of desktop Statistica.

Offloading an analysis (or a custom script) to Statistica Enterprise Server

1. Ensure that Statistica Enterprise Server integration is enabled.
2. To display the Options dialog box, select the **Home** tab, and in the **Tools** group, click **Options**.
3. In the tree view, select **Server/Web** menu option.

4. Select the **Enable Statistica Enterprise Server Integration** check box.

   The only required parameter is Statistica Enterprise Server's network path (and connection settings, if they are different from the default). Ask your network administrator for these values. It is possible to Enable Integrated Login if it is supported and enabled on the server; otherwise you need to enter your user name and password when logging in to Statistica Enterprise Server.



5. Specify the options on this tab, click **OK** button. The Server tab is now added to the ribbon bar.

6. In the **User** group, click **Log In** button, and enter your **user name** and **password** if requested. On successfully establishing a connection, the options on the **Server** tab are available.

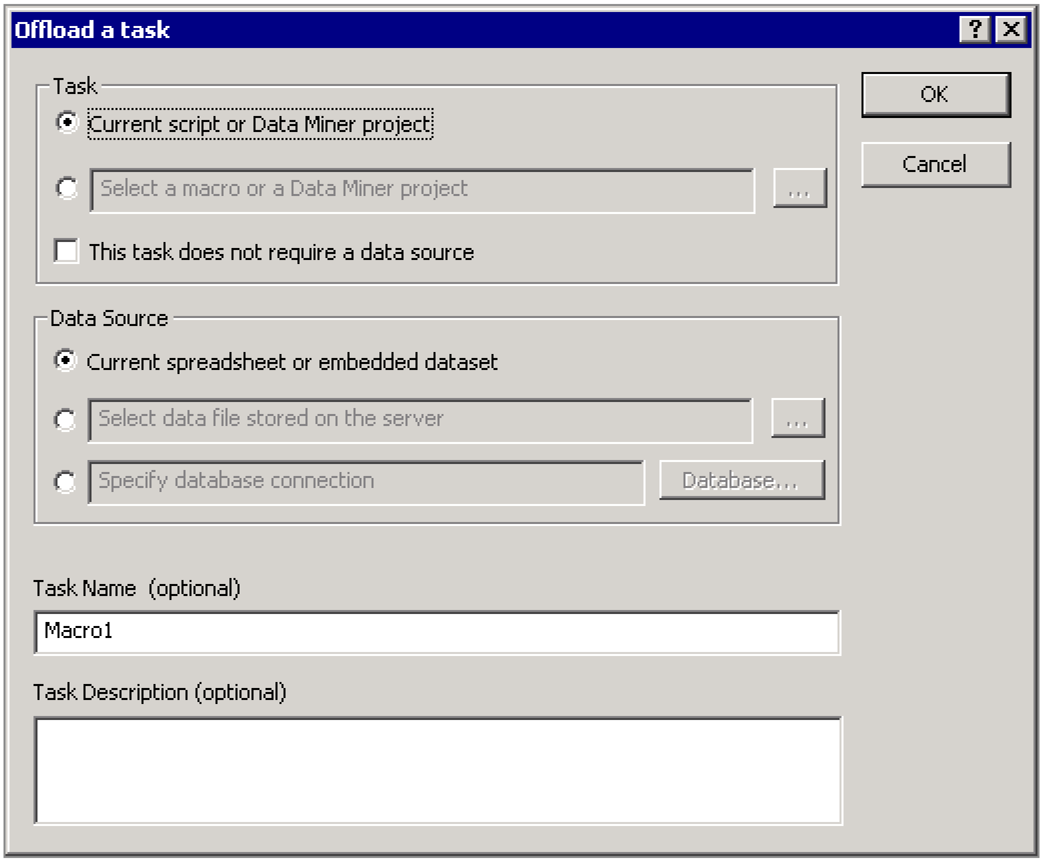
   The **Open**, **Save**, and **Save As** commands in the **File** group are used to upload a currently open file to the server or download a file and open it locally. There are also explicit options in the Transfer group to Download File to and Upload File from specific folders on the server and the client.

> **Note:** As real-world examples of time- or resource-consuming analyses are usually based on large data sets and/or involve iterative algorithms represented by Statistica components that are not included in all configurations of Statistica.

But even in a situation where a single analysis is quick and not resource-intensive, you might need to run a fairly complicated, time-consuming sequence of tasks, possibly scheduled at certain time intervals.

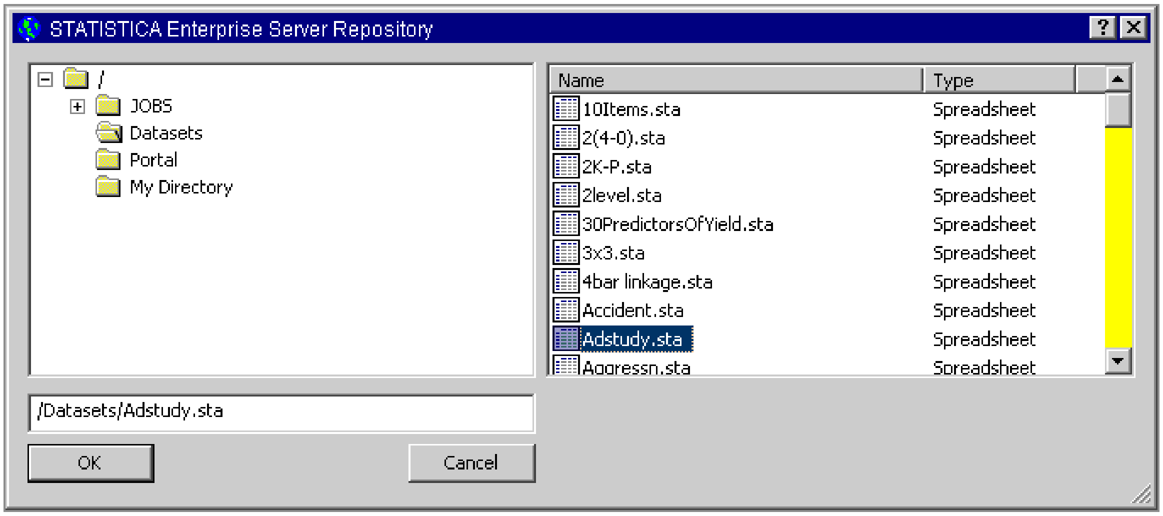
In this case, the Statistica Enterprise Server scheduling facilities can be used after you have created and uploaded a custom script that represents the required tasks (for example, by combining the macros recorded during a Statistica session).

7. Record a sample analysis macro; for example, complete the steps described in Example 2: ANOVA.
8. After completing the example, in the ANOVA Results dialog box, click the **Options** button, and from the drop-down list, select Create Macro.
9. In the New Macro dialog box, accept all defaults, and click **OK** button.
10. Test the generated macro by running it (press F5) to ensure that it produces results as expected.
11. To ensure that the macro has focus, click the macro code window.
12. On **Server** tab in the Tasks group, click Offload to display the Offload a task dialog box.



13. To offload a script or a Data Miner project, select a task and optionally a data set on which the task operates. The data set is an optional component since Data Miner projects have their data sets embedded and macros might explicitly load data sets or may not require them.
14. An open active data set (`Adstudy.sta`) and an open Statistica Macro (our sample analysis) is available. The default settings of the options in the offload a task dialog box specifies to use them for offloading.

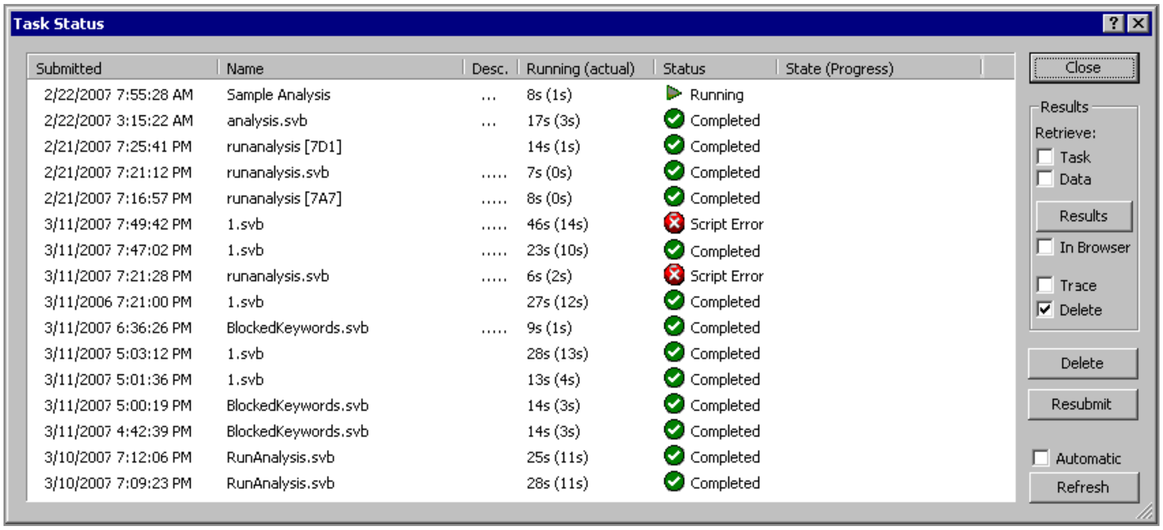
    This option is useful since it gives you the advantage of central server-side storage, which is beneficial in the case of large data sets (possibly dynamically updated) that are used by multiple users.
15. Reference a server-side data set; to display Statistica Enterprise Server Repository dialog box, in the Data Source group box, select the **Select data file stored on the server** option button.



The directory structure in the tree view of the dialog box represents the Statistica Enterprise Server Repository (possibly abridged according to your particular permissions).

16. Click **Datasets** folder in the left pane, and select `Adstudy.sta` in the right pane (or you can enter the path in the edit box at the bottom of the dialog).
17. In Statistica Enterprise Repository dialog box and in Offload a task dialog box, Click **OK** button.

    The task is submitted to the server and files are uploaded if needed. You can switch to other activities, while periodically monitoring the status of offloaded tasks. Statistica submits the task to the server, uploading files if needed.
18. To display Task Status dialog box; in Tasks group, click **Status** button. The following illustration shows a Task Status dialog box containing several offloaded tasks.



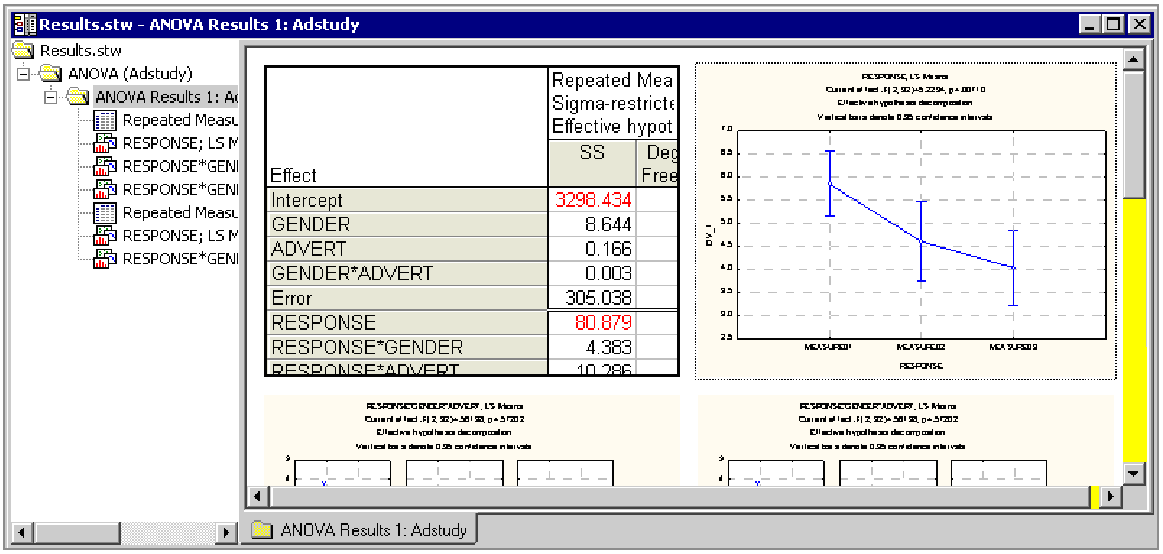
19. To update the task list manually, click **Refresh** button.
20. To automatically update the task list, select **Automatic** check box in the lower-right portion of Task Status dialog box. Tasks go through Pending and Running states to either Completed or Script Error.
21. If your task fails; to view additional information about the failure, double-click the task entry. When the error is fixed (for example, SVB script or Data Miner workspace is updated), select the failed task and click **Resubmit** button.
22. Retrieve the results, after the task completes successfully.

> **Note:** Since the results are located on the server, they are available from any Statistica client workstation if you are logged in under the same credentials.

23. The Results group box contains a **Task** check box and a **Data** check box to retrieve the task source and the data set (if applicable) back to the client. When the **In Browser** check box is selected, the results are opened in the browser, switching to a thin client.
24. This option is useful if the results are expected to be significant in size; for example, if the analysis generates many data sets and/or graphs, you can search through them in the browser and select only the specific results you want to retrieve to your desktop. Trace report provides a diagnostic report of task execution.

25. To save disk space on the server, delete task results that are not needed. A message is displayed every time results are requested asking if the results must be deleted after retrieval (unless the **Delete task after retrieval** check box is cleared). To delete the results, click **OK** button.

26. Retrieve the results after the task is completes and close Task Status dialog box. Results are equivalent whether run locally or on the server.



Example 2: Using Statistica in Regulated Environments

In a regulated environment, analyses conducted for GxP (Good Manufacturing Practices, Good Clinical Practices, Good Laboratory Practices) applications are ones that impact consumer safety such as in clinical trials, manufacturing, and quality control.

When a business conducts analyses for a GxP application, regulatory bodies recommend that the company be able to prove that the results of the validated analysis system (for example, Statistica) are under control. Statistica, through its audit trail and spreadsheet/report locking features, offers the tools you need to meet this regulatory requirement.

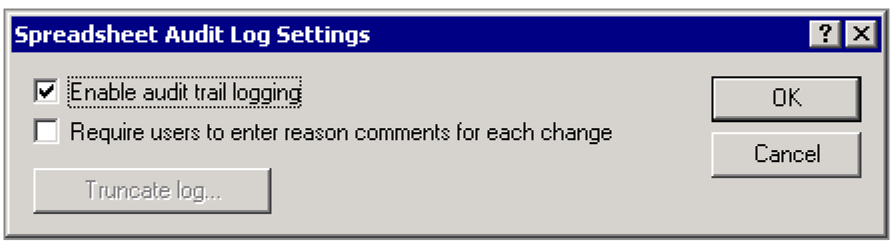
In order to meet traceability requirements for GxP applications, there are at least three concerns:

- control of the input data being submitted to the analysis (such as knowing who made what change, at what time, for what reason; and the old values and new values)
- control of the results tables and graphs (for example, demonstrate that they were not altered in any way after they were created),
- traceability between the version of the input spreadsheet and the results outputs. Statistica provides this information through its Spreadsheet Audit Trails and GxP Reports functionality.

Control of Input Data

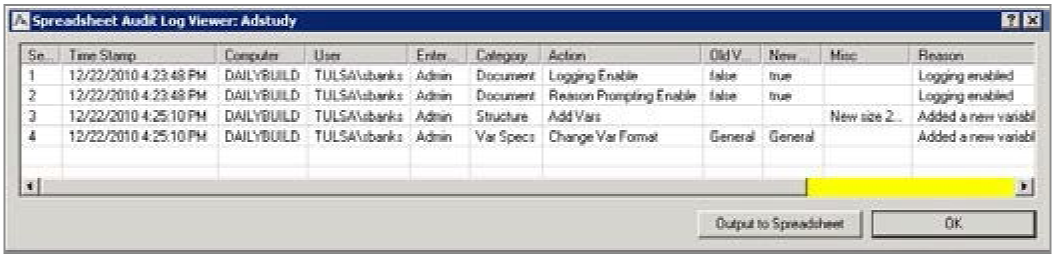
Enable Audit Trail Logging

1. Open a Statistica Spreadsheet.
2. To display Spreadsheet Audit Log Settings dialog box; select **Tools** tab, click **Audit Trail** button, and select **Settings** from the drop-down list.
3. To enable audit trail logging for the current spreadsheet, select **Enable audit trail logging** check box.

   When spreadsheet audit trail logging is enabled, the spreadsheet is automatically set to direct mode, such as changes made to the spreadsheet are immediately written to disk. When audit trail logging is enabled, changes to the data file cannot be undone.
4. To require users to explain each change made to the spreadsheet, select **Require users to enter reason comments for each change** check box.

   The **Truncate log** button is available only if audit trail logging is specified, and there is a current **Spreadsheet Audit Log Viewer** attached to the spreadsheet.



5. To truncate the spreadsheet log and delete all existing entries, click **Truncate log** button.
6. You are prompted to confirm this action before the current entries are deleted. Once the log is truncated, the truncate action is recorded in the newly truncated log file.
7. In Spreadsheet Audit Log Settings dialog box, click **OK** button, and audit trail logging is enabled.
8. The Enter reason for change dialog box is displayed immediately; to enter the reason for enabling the logging function. Enter a comment, and click **OK** button.
9. Right-click in the header of the last variable in the spreadsheet, and select **Add Variables** from the shortcut menu.
10. In Add Variables dialog box, accept all defaults, click **OK** button. The Enter reason for change dialog box is displayed.
11. You must enter a comment and click OK button before the change is made.

    When audit trail logging is enabled, every change made to the spreadsheet is documented, and when the **Require users to enter reason comments for each change** check box is selected, user comments are stored and displayed in the Spreadsheet Audit Log Viewer.
12. To display Spreadsheet Audit Log Viewer dialog box, on **Tools** tab, click **Audit Trail** button and select **View Log**.

    The log viewer displays a grid of information regarding the audited actions including the sequence number, time of change, the computer used to make the change, user information, the nature of the change, and the reason for the change.

    Column widths in the log grid can be increased and decreased using standard Windows techniques. The Spreadsheet Audit Trails are saved and embedded into each respective spreadsheet.

Password encryption vs. locking

A spreadsheet can be password encrypted so that it cannot be opened without the correct password. Only users who know the password can open the spreadsheet. Once a password encrypted spreadsheet is opened, it can be modified.

Alternatively, locking a spreadsheet makes portions of the spreadsheet read-only, enabling you to prevent changes to some or all aspects of the spreadsheet. The spreadsheet can be opened by anyone, but locked portions cannot be altered.

Both the password encryption options and spreadsheet locking facilities can be used simultaneously.

Password Encrypt a Spreadsheet

1. Open a Statistica Spreadsheet.
2. To display the Document Properties dialog box, click **Start** button in the upper-left corner of the ribbon bar, and from the drop-down menu select **Properties** .
3. Select **Password** tab.

4. Enter password in **Document Password** text box, and click **OK** button. The Password dialog box is displayed.
5. Re-enter the password to confirm it. Passwords are context- sensitive. A dialog box is displayed where you can choose to save the changes.

6. In Password dialog box, click **OK** button, and close the data file.
7. To encrypt the password, click **Yes** button.

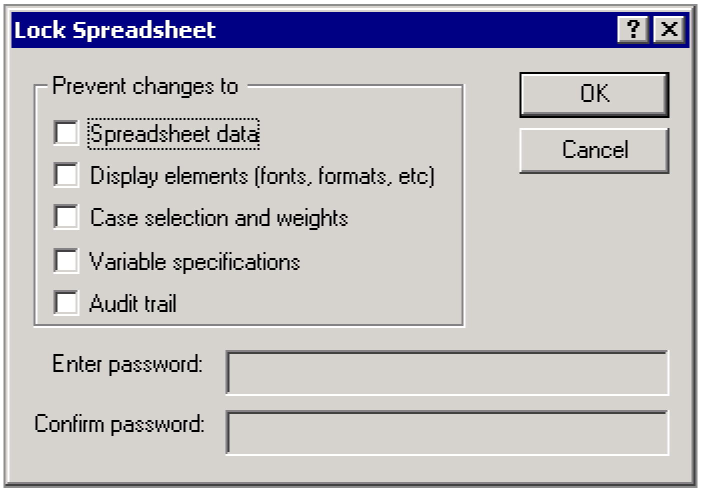
   The next time anyone attempts to open this spreadsheet, the Password dialog box is displayed. The correct password must be entered before the spreadsheet opens.

Lock a Spreadsheet

In order to meet compliance requirements, it is necessary to have control of the reliability of input data. Using the spreadsheet locking options, you can prevent changes to all spreadsheet features, from the appearance of the data (such as display elements, variable specifications) to the actual data and any case selection conditions or weights that are defined for the spreadsheet. Of course, sometimes changes have to be made (for example, when data are incorrectly entered). The Statistica Spreadsheet Audit Trail facility, when enabled, will record each change made to the spreadsheet.

With Statistica Enterprise products, only users with System Administrator permissions can modify Spreadsheet Audit Trail settings. For more information, see the Electronic Help for Statistica Enterprise facilities.

1. With a spreadsheet open, select **Tools** tab. Click Locking to display the Lock Spreadsheet dialog box.



You can specify which aspects of the spreadsheet that you want to lock. When users try to change a locked feature, a message is displayed, informing them that the spreadsheet is locked.

2. To prevent changes to the actual data present in the spreadsheet, select **Spreadsheet data** check box.

   Users are unable to change the data values and the missing data code. They are also unable to perform any data management operations that affect the spreadsheet (for example, change the data type or the length for text variables). If this check box is cleared, users are able to edit the data (for example, by updating queries and Spreadsheet Formulas or by simply typing in new values).

3. To prohibit the modification of fonts and formats used in the spreadsheet, Select **Display elements** (fonts, formats) check box.

   Options for changing the font size, color, type, and style (such as bold, underline) are dimmed. The options for applying spreadsheet layouts (select **Format** tab and click **Layouts** button in the Spreadsheet group) are unavailable.

4. To prevent users from changing case selection conditions and case weights for the locked spreadsheet, select **Case selection and weights** check box.

   Users are not able to toggle the use of selection conditions or change the currently defined selection conditions. Most options on **Selection** tab of the Spreadsheet Case Selection Conditions dialog box are dimmed; however, options on the other tabs of that dialog box (for example, creating subsamples, applying formats to selection conditions) are still available. Options on the Case Weights dialog box are unavailable.

5. To prevent changes to the variable specifications, select **Variable specifications** check box (for example, measurement type, missing data code, display format, long variable name).

   Users are able to view the individual Variable specification dialog box (double- click the variable header) and the Variable Specifications Editor; however, options for changing these specifications are dimmed.

6. To prevent changes to the audit trail settings, select **Audit trail** check box.

   Users are unable to modify the audit trail settings.

7. Enter password to use when locking and unlocking the spreadsheet.

8. Confirm the password (which is context sensitive), and click **OK** button.

   Although a password is not required, it is strongly recommended. If a password is not entered and confirmed, any user can unlock spreadsheet features by simply clearing the selected check boxes.

   > **Note: :** If locks are defined, you must enter the correct password before locks can be changed or modified.

Now try making changes in the spreadsheet; a message is displayed informing you that the operation cannot be completed because the spreadsheet is locked.

Controlling Results and Traceability

To meet compliance requirements, another step is to ensure that reported results are under control. Statistica provides options for creating GxP reports. In GxP mode, all results are sent to a report window, and the window is locked. All options for removing results (Cut, Extract - Original, Clear) and adding results (Paste, Insert) are disabled.

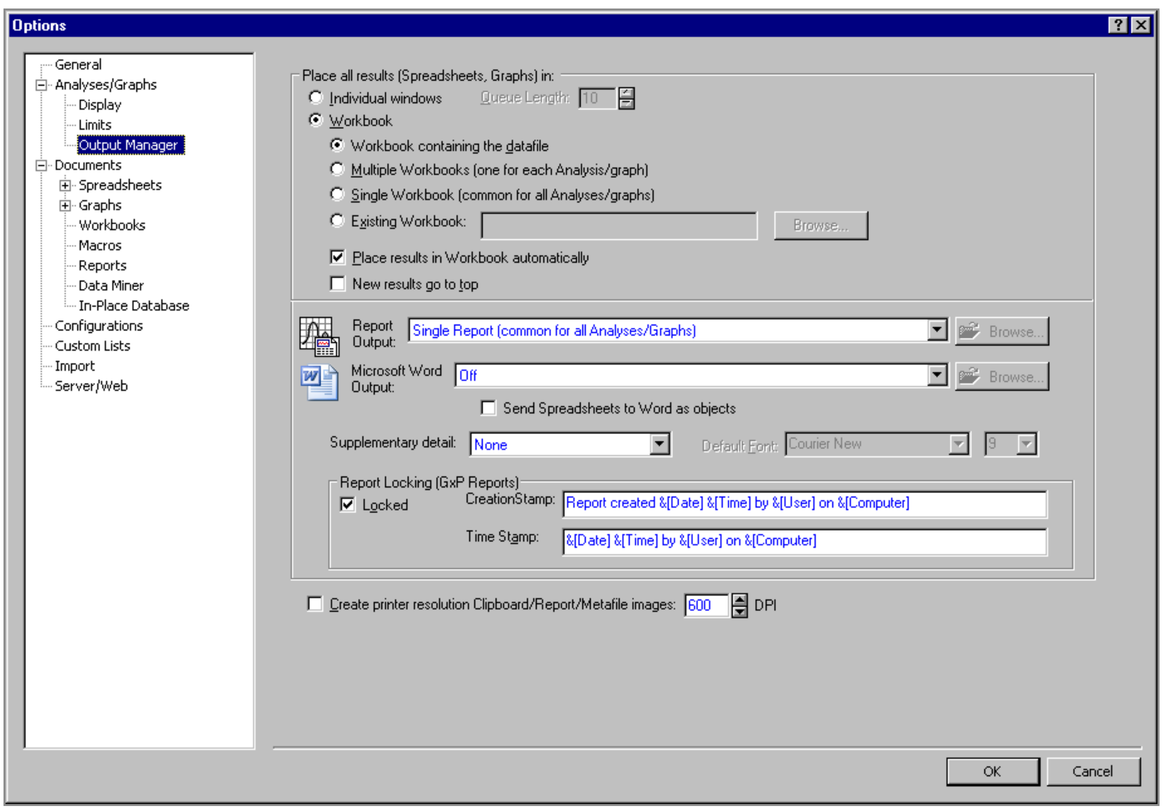
Statistica can also include a creation date in all reports as well as a time stamp for all results that are added from results dialogs boxes. The appearance and content of the creation date and time stamp are completely configurable and can include user and computer information in addition to the time and date. Thus, in GxP mode, you can know when the results were created and by whom. You can also be certain that results are not removed.

An additional feature of GxP mode is a traceability option. When running in GxP mode, Statistica verifies whether spreadsheet audit trails are enabled. If they are, Statistica includes the spreadsheet name and version number in the report. Sometimes version numbers are not available, for example, if audit trails are not enabled or the results are created from an In-place Database connection. When that is the case, Statistica provides an explanation for why a version number is not available.

Creating a GxP Report

1. Select **Home** tab.
2. To display the Options dialog box; in the Tools group, click **Options** button.
3. In the tree view, select **Output Manager**, located under **Analyses/Graphs**.
4. From the Report Output drop- down list, select either **Send to Multiple Reports** (one for each Analysis/Graph) or **Single Report** (common for all Analyses/ Graphs).
5. To make the Report Locking (GxP Reports) options available and to ensure that documents cannot be removed from the report, select **Locked** check box.

   Options pertaining to reports such as Cut, Paste, Delete, Extract are disabled.



6. To include a creation stamp at the top of the file, you can accept the default format

in the CreationStamp field, or enter your own.

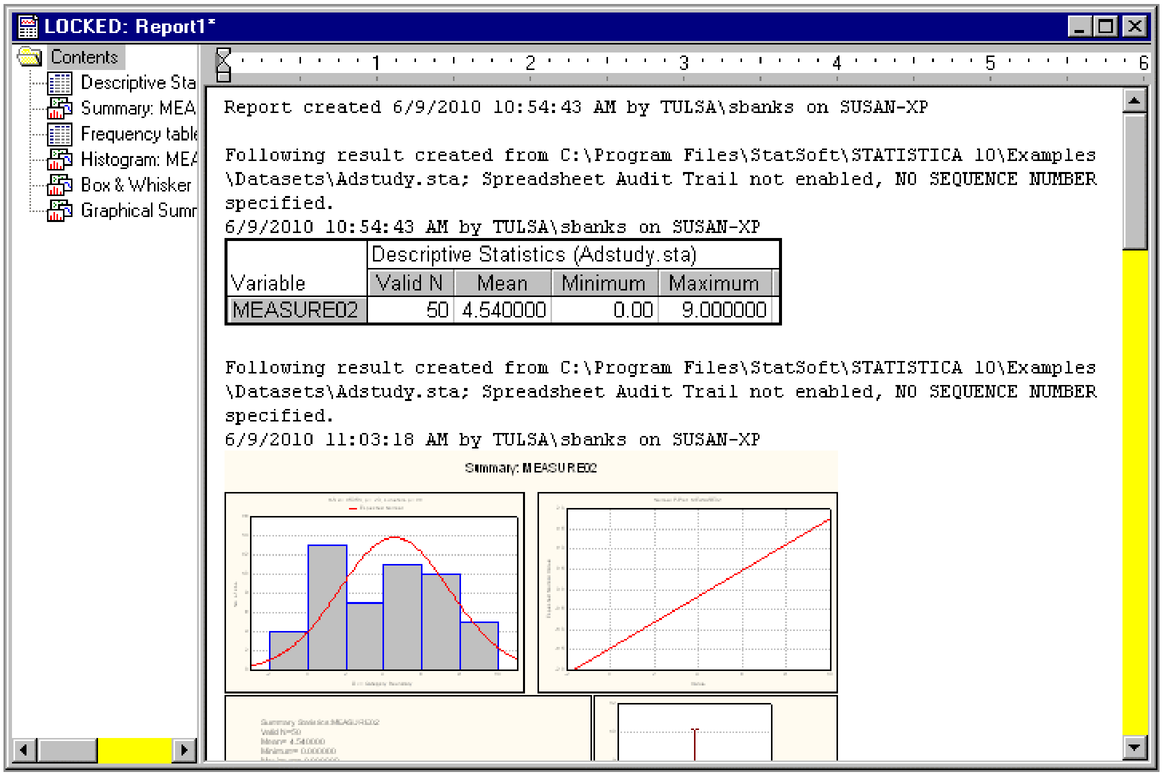
The following codes can be used in this field: &[Date], &[Time], &[User], and &[Computer]. Any text you enter is displayed as is.

7. To include a time stamp above each object as it is added to the report, you can accept the default format in the Time Stamp field, or enter your own.

   The following codes can be used in this field: &[Date], &[Time], &[User], and &[Computer].

8. In Options dialog box, click **OK** button, and now perform any analysis;

   For example, use Basic Statistics to create a quick Descriptive Statistics summary spreadsheet. When you click the Summary button, the results are sent to a locked report that lists the creator, date, time of the analysis.



Example 3: Statistica Enterprise

Statistica Enterprise products extend the functionality of Statistica applications by offering collaborative work, central administration, system level customization, and other features necessary when using Statistica applications as part of the enterprise-level computer systems.

Statistica Enterprise Manager is a component of the Statistica Enterprise system. Users can configure various aspects of the Enterprise system including user administration, system view organization, database connection maintenance, data configurations, and analysis configurations using Statistica Enterprise Manager.

For this example, let us:

1. Create a new user
2. Create a new group
    a. Assign permissions to the group
    b. Add the user (Refer, Create a New User) to the group
3. Create a system view node
4. Create a new database connection
5. Create a data configuration
6. Create an analysis configuration
7. Run the analysis configuration

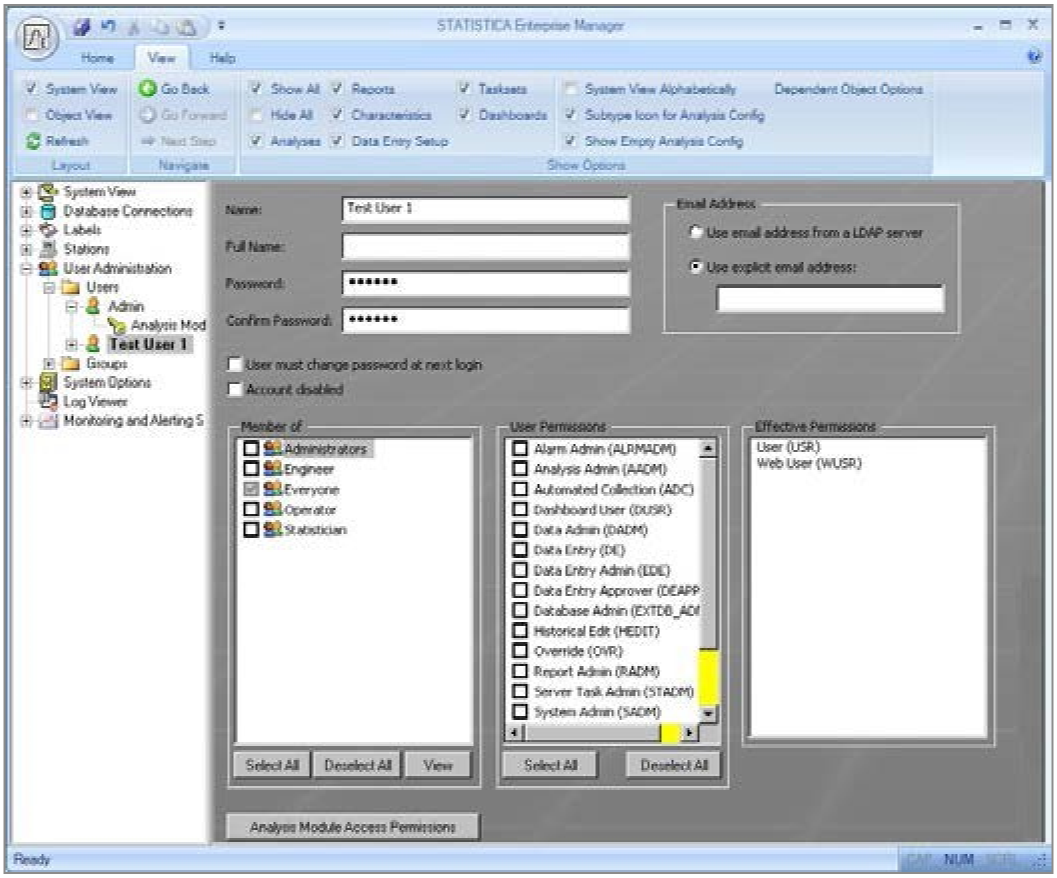
System View vs. Object View

In Statistica Enterprise Manager, on **View** tab, select either **System View** or **Object View**. In **System View**, objects, for example, data configurations and analysis configurations, are shown as child nodes. In **Object View**, objects are shown as child nodes within their respective categories. For this example, System View must be selected.

1. **Create a New User**
    a. Launch the **Enterprise Manager**.
    b. Login as Admin user.
    c. In the tree view (the left pane), click the **plus** sign next to the **User Administration** node.
    d. Select the **Users** folder.
    e. To display the options to create a new user, in the properties page (the right

pane), click **New User** button.

f. In the **Name** text box, enter **Test User 1**, and define password. Confirm password.



g. To save the changes, Click **Commit Changes** button located at the top of the application on the Quick Access toolbar. A message is displayed that the user doesn’t have permission to login.

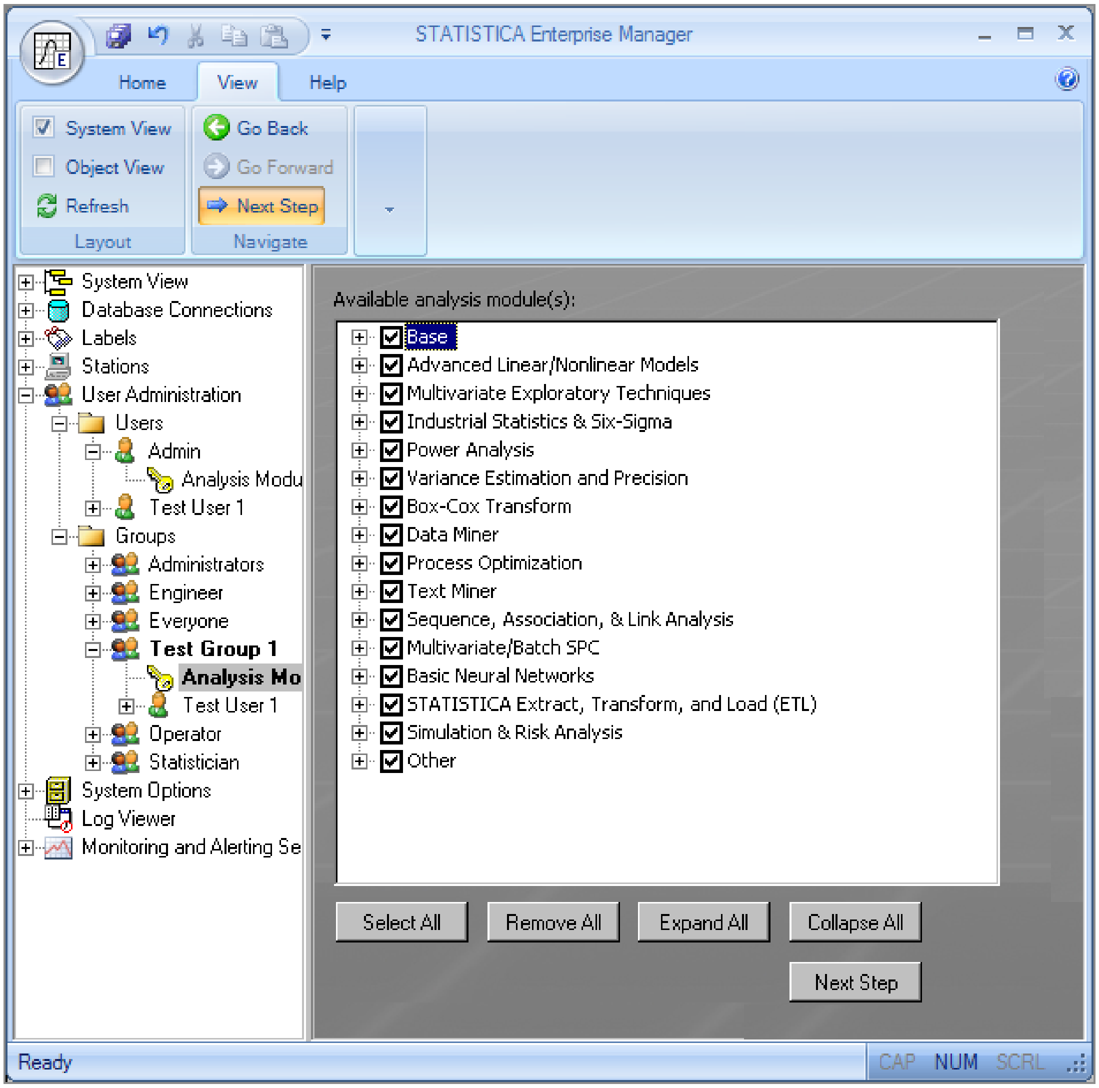
h. Click **Yes** button to continue.

Let us create a group, give the group permissions, and assign the new user to that group to allow the user to have permission to log on to the **Enterprise Manager**. With this method, any permission changes need to be applied to the group instead of the individual users, making maintenance of users in Statistica Enterprise easier.

2. **Create a New Group**

   a. In the **User Administration** node, select **Groups** folder.

b. To display the options to create a new group, in the Properties page, click **New Group** button .
c. In the **Name** text box, enter **Test Group 1**.
d. To add the previously created user to the group, in the Group Members frame, select the check box adjacent to **Test User 1**.
e. In the Group Permissions frame, select **Analysis Admin (AADM)** check box and **Web User (WUSR)** check box.
f. In the tree view, click the **plus** sign adjacent to the **Test Group 1** node.
g. Select Analysis modules.



h. To select all of the modules in the Available analysis module(s) list, in the Properties page, click **Select All** button. This gives users of this group permission to log on to both Web and desktop Statistica and run all of the available analyses and reports.

i. To save the changes, click **Commit Changes** button.

We have now created the necessary user and group security to run analyses and reports. When creating the data, analysis, and report configurations in the next steps, we can assign this group to those objects to allow only users within the group to run them.

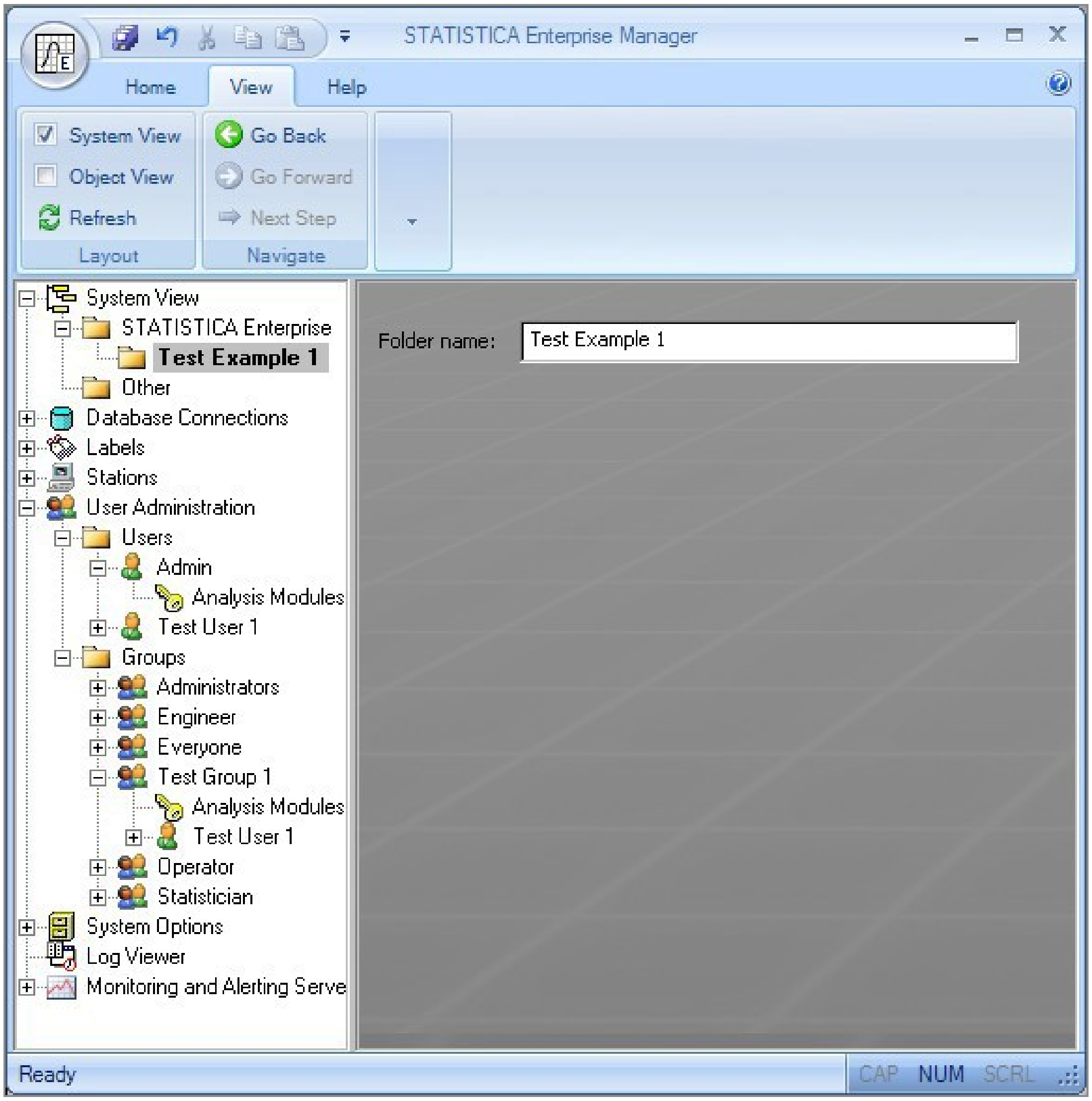
3. **Create a System View Node**

Create a System View node to hold this example's data, analyses, and report configuration.

a. In the tree view, click the **plus** sign adjacent to the **System View** node.

b. Right-click on the **Statistica Enterprise** folder, and from the shortcut menu, select **New Folder**.

c. In the **Folder name** text box, in the Properties page, enter **Test Example 1** as the new folder's name.



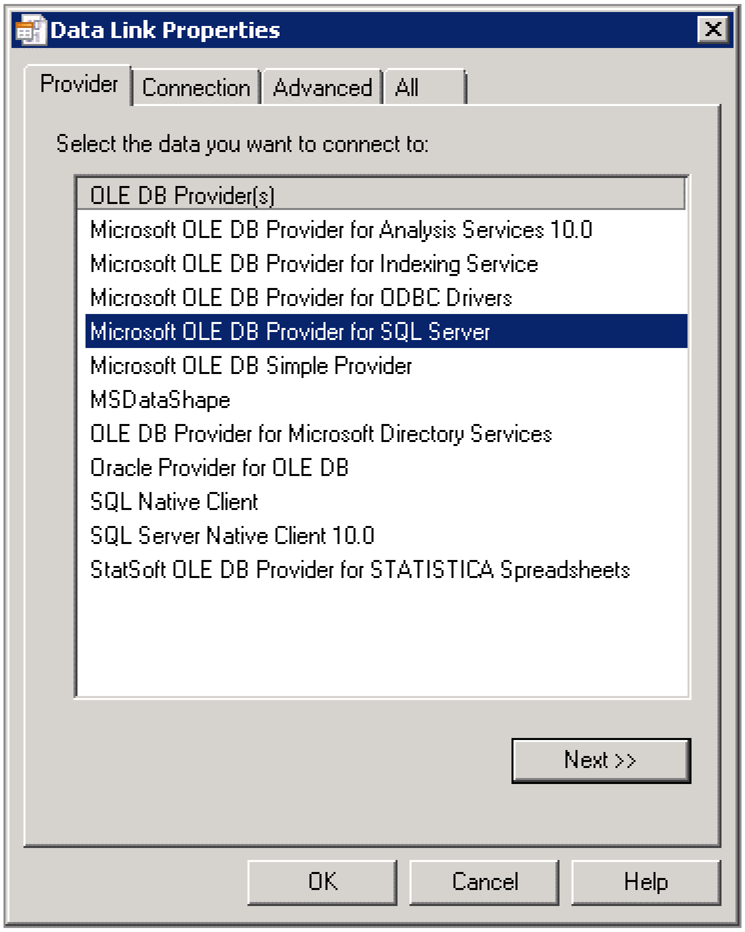
d. To save the change, click **Commit Changes**.

This folder can now be used to house the data, analyses, and report configurations.

4. **Create a New Database Connection**

    a. Right-click **Database Connections** node in the tree view, and from the shortcut menu.

    b. To display Data Link Properties dialog box, select **New Database Connection**.



    c. Use the **Northwind** sample database installed with Microsoft SQL Server.

    d. Select Microsoft OLE DB Provider for SQL Server. To display Data Link Properties dialog box-**Connection** tab, click **Next** button.

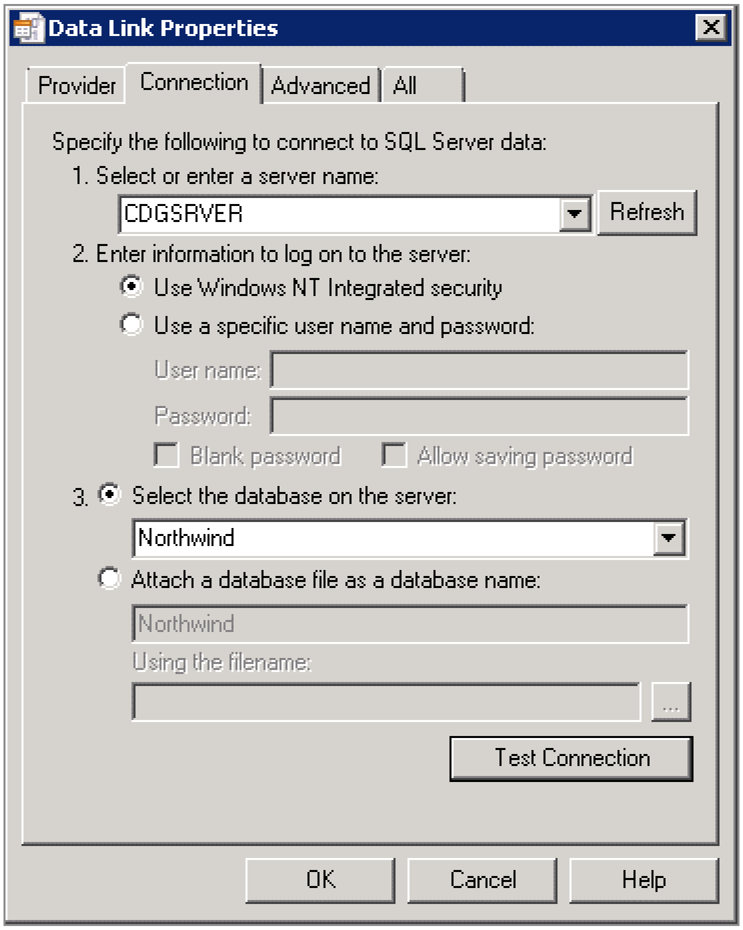
    e. Select a server from the **Select or enter a server name** drop-down list.

    f. Select the **Log on** option button appropriate to your SQL Server **Northwind** database installation.

g. Select either the **Use Windows NT Integrated security** option button, or select the **Use a specific user name and password** option button.

h. Enter **User name** and **Password**.

i. Select **Northwind** from the **Select the database on the server** drop-down list.



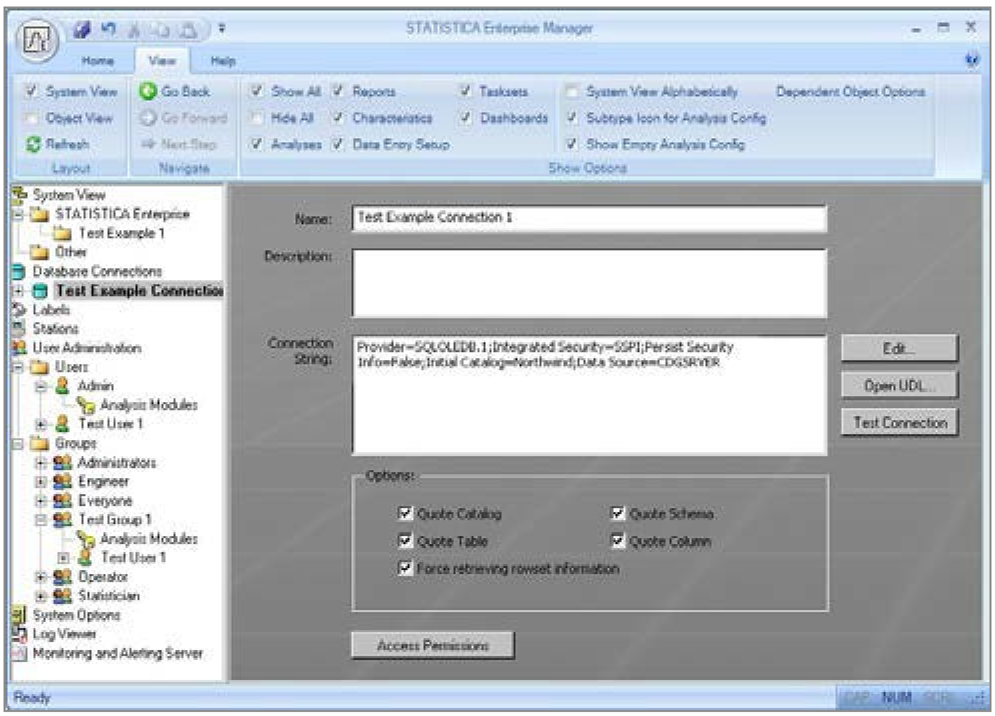
j. To attempt a connection to the specified data source, click **Test Connection** button .

A prompt is displayed to acknowledge that the Test connection is succeeded. If it does not succeed, check your access permissions to the file and ensure that the settings are correct. For example, spelling errors and case sensitivity can cause failed connections.

k. Click **OK** button.

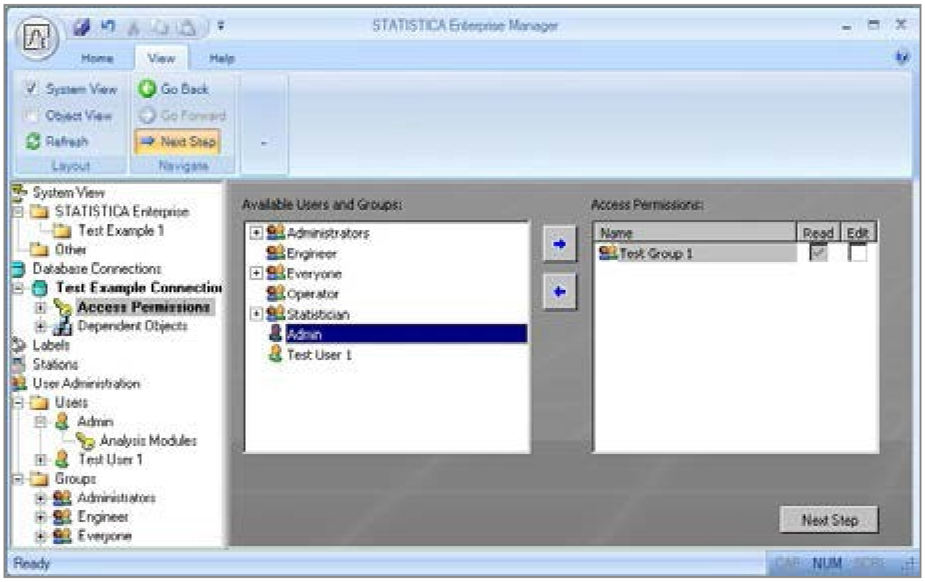
l. In the Data Link Properties dialog box, click OK button.

m. In the resulting properties page, in **Name** text box, enter **Test Example Connection 1**.



n. Click **Access Permissions** button.

o. To move **Test Group 1** to the Access Permissions list; from the list of Available Users and Groups, select **Test Group1**, and click **Top arrow** button.



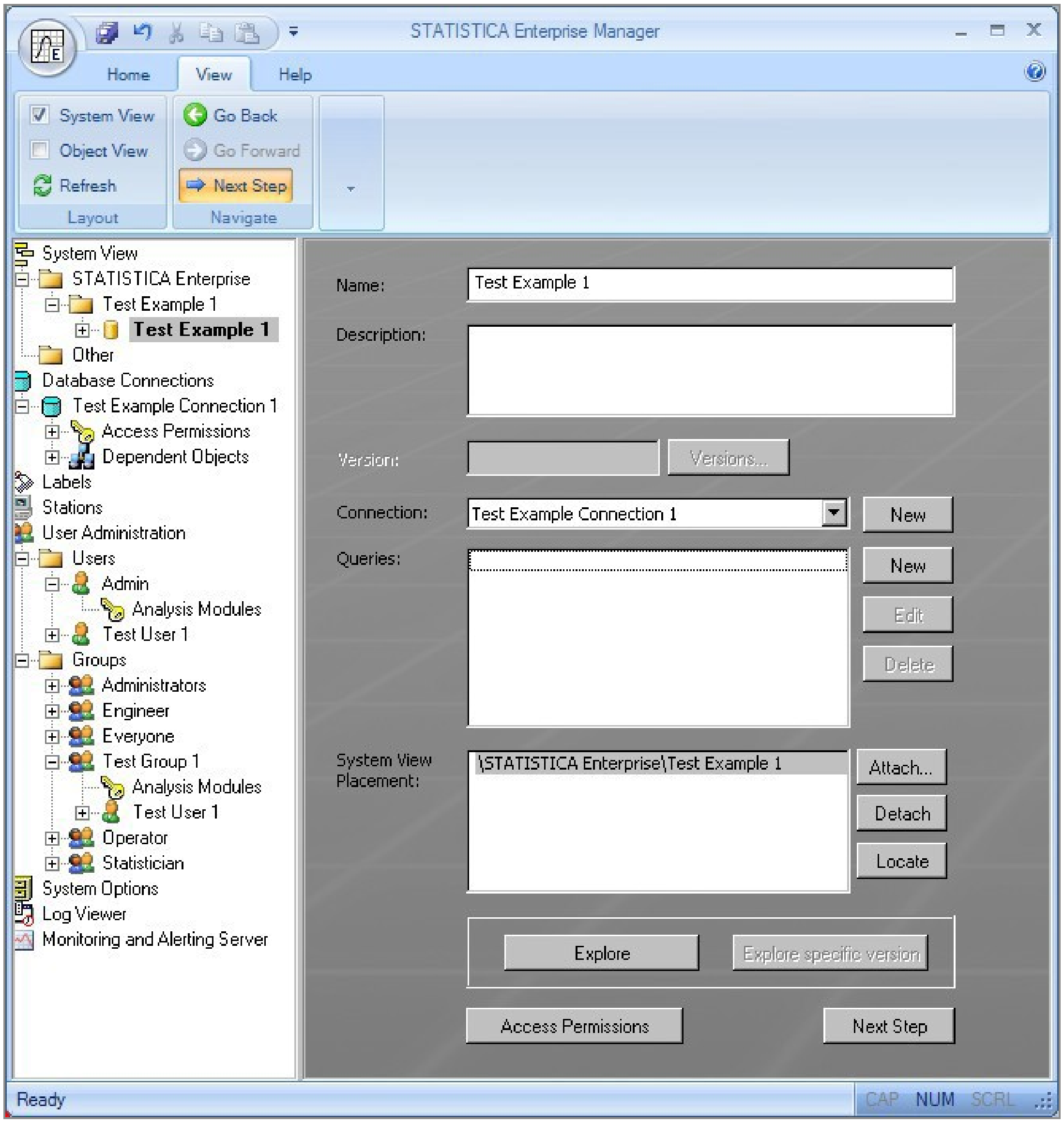
p. Click **Commit Changes** button. The database connection is now created.

5. **Create a Data Configuration**

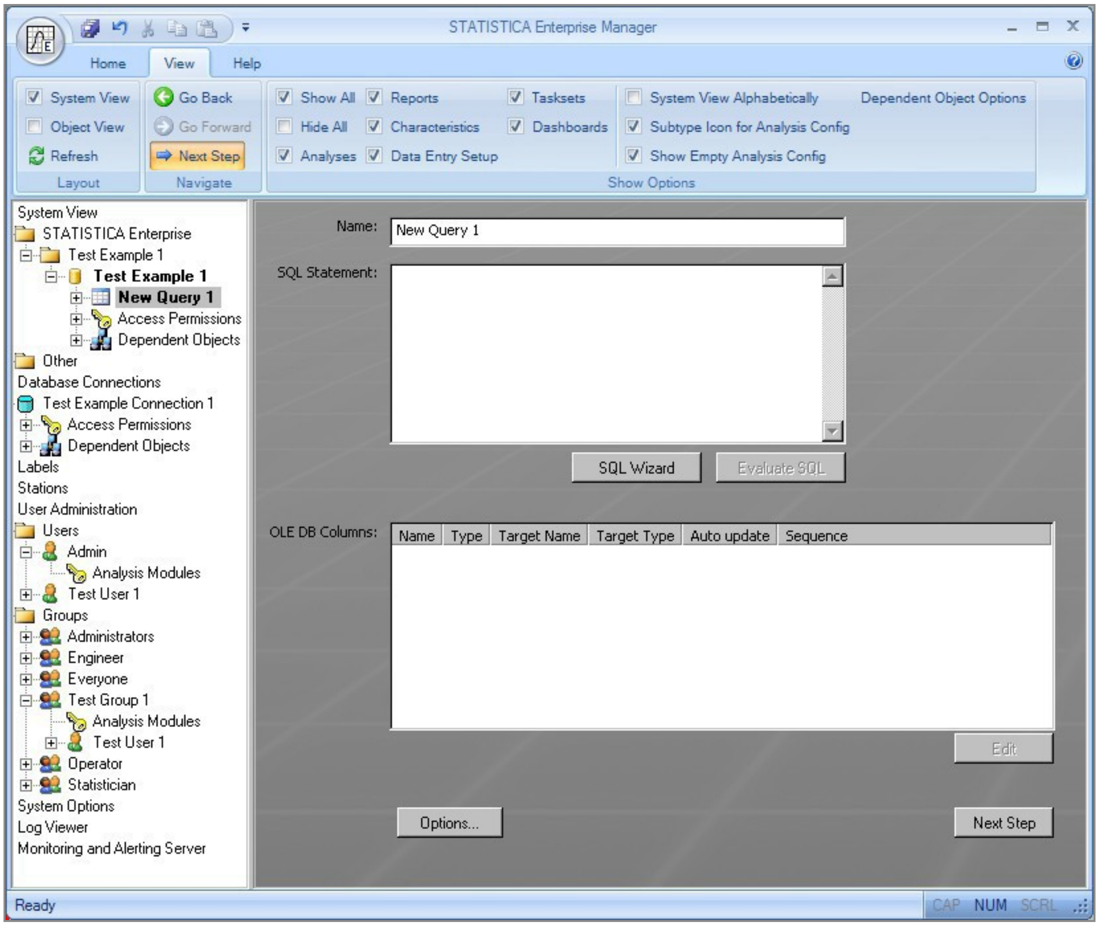
   a. Right-click **Test Example 1** folder in the tree view.

   b. From the shortcut menu, select **New Data Configuration**.

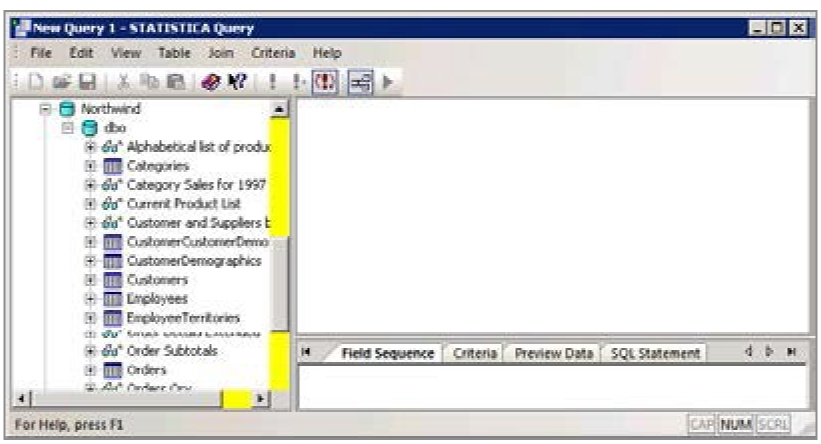
   c. In the Properties page, in **Name** text box, enter **Test Example 1**. Click arrow next to the Connection field, and from the drop-down list, select **Test Example Connection 1**.



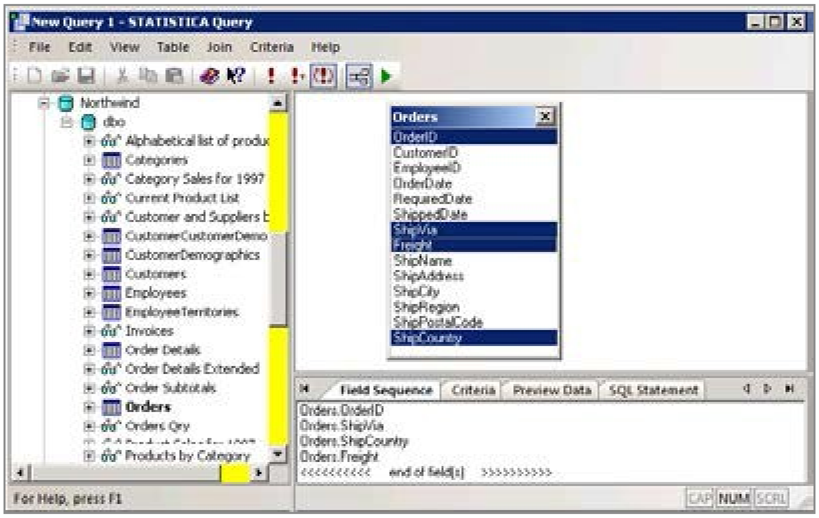
d. To display the new query options, click **Next Step** button.



e. To display the New Query dialog box, click **SQL Wizard** button. This opens Statistica.

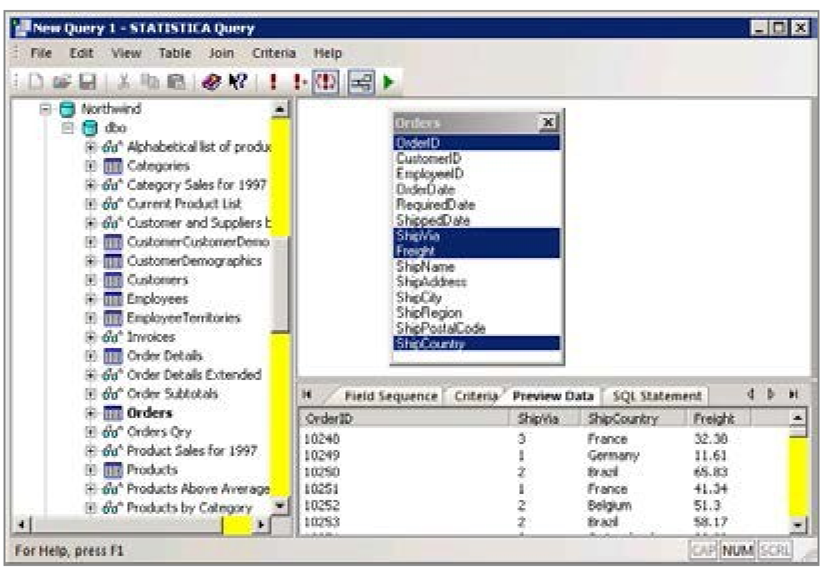


f. Drag the **Orders** table from the left pane into the editor viewer (the upper-right pane), and then select, in the following order, the **OrderID**, **Ship Via**, **ShipCountry**, and **Freight fields**.

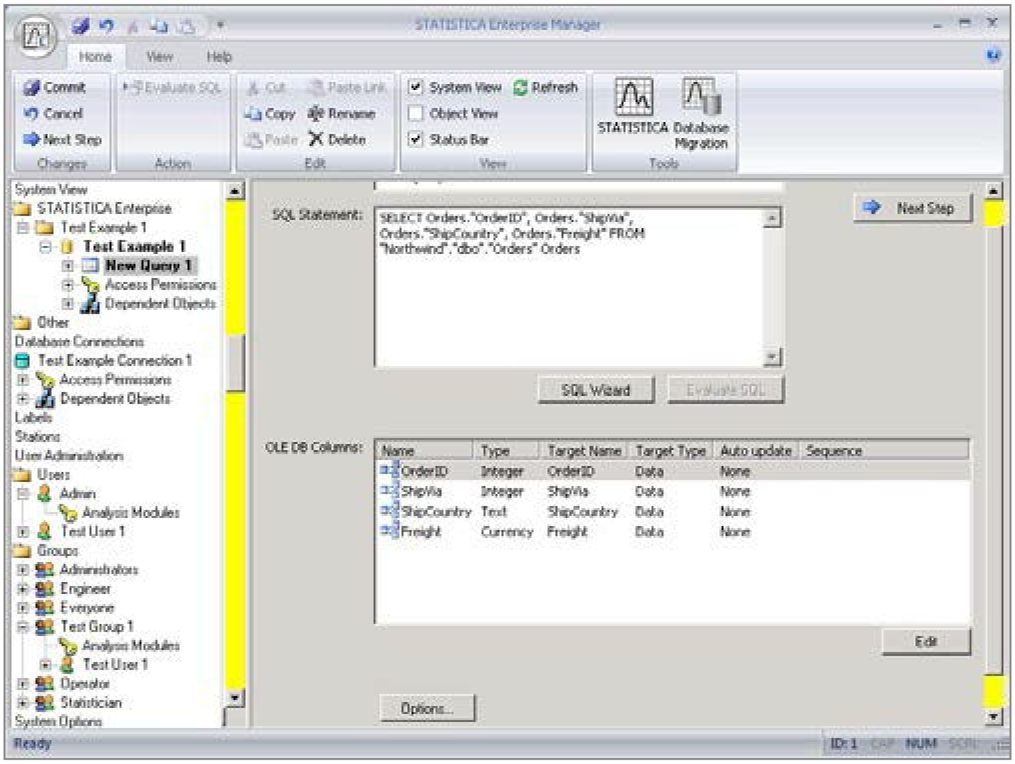


g. In the query properties view (lower-right pane), select the **Preview Data** tab.

h. Click **Refresh toolbar** button (the red exclamation mark). This tests the query to ensure that values are retrieved from the defined query.



i. To submit this query back to the data configuration, click **Return Data to Statistica toolbar** button (green arrow) .



j. Click **OrderID** row to highlight it.

k. To display options to edit the **OrderID** column, click **Edit** button.

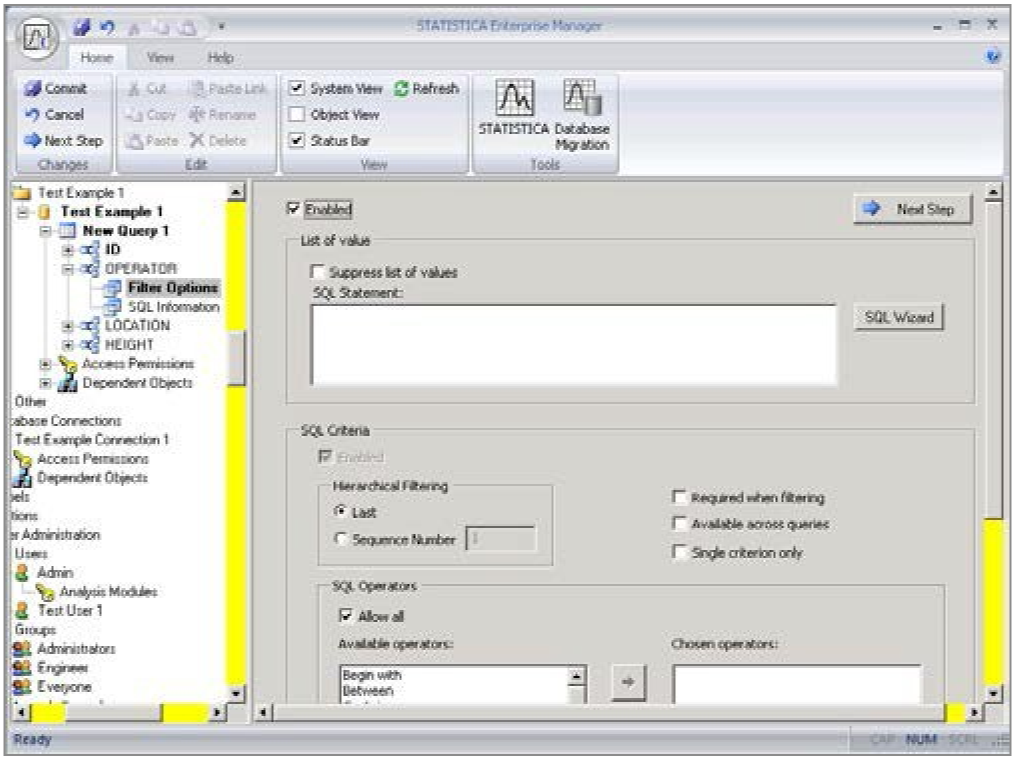
l. Click **Auto Update** arrow, and from the drop-down list, select **First update** column. You can detect changes in the **OrderID** column. This enables you to detect changes in the OrderID column. In addition, the column is sorted.

m. To edit the **ShipVia** column, click **Next Step** button.

n. To display the filtering options, click **Filtering** button.

o. To allow filtering on the **ShipVia** column, select **Enabled** check box.

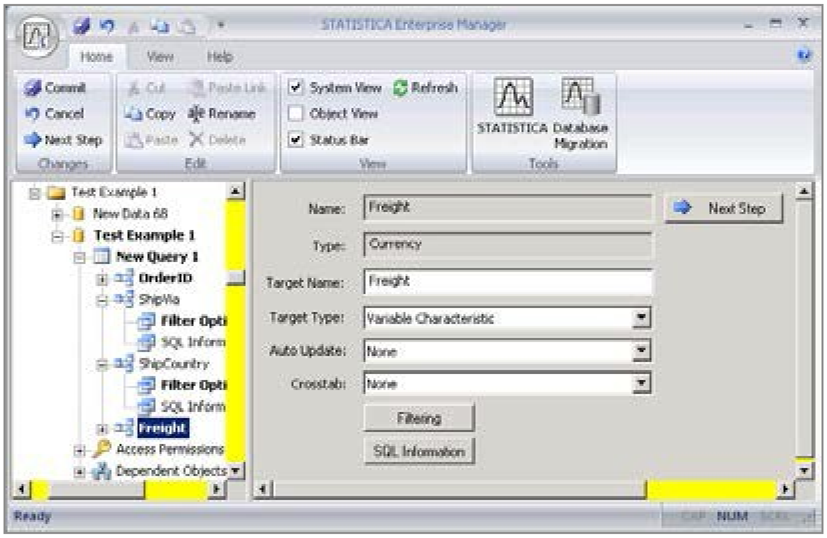
p. To return to **ShipVia** column editing options, click **Next Step** button , and to edit **ShipCountry** column, click **Next Step** button.



q. To display the filtering options, click **Filtering** button, and to allow filtering on the **ShipCountry** column, select **Enabled** check box.

r. To return to the **ShipCountry** column editing options, click **Next Step** button , and to edit the **Freight** column, click **Next Step** button.

s. Click **Target Type** arrow, and from the drop-down list, select **Variable Characteristic**. This option makes this column available to perform packaged SPC analyses (this column contains the data to be analyzed).



t. To display the Access Permissions options for this object, click **Next Step** button.

u. To move **Test Group 1** to the Access Permissions list; from the list of Available Users and Groups, select **Test Group 1**, and click **toparrow** button..

v. This data configuration is executable (but not editable) by the users of **Test Group 1**.

w. To commit this new data configuration to Statistica Enterprise Manager, click **Commit Changes** button.

6. **Create an Analysis Configuration**

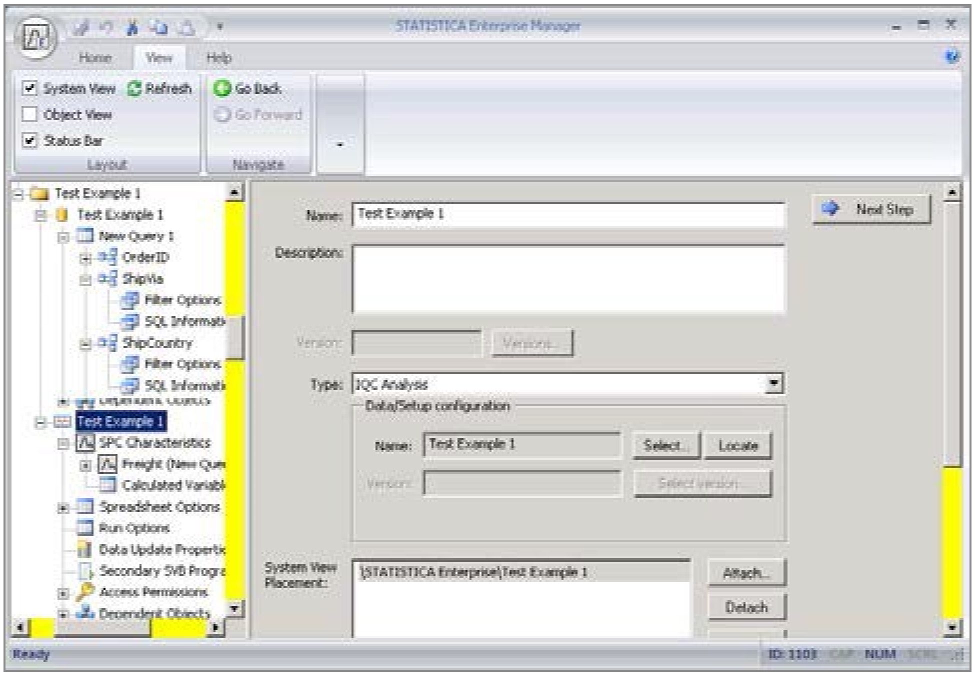
   a. Data configuration is defined to extract data from the **Northwind** database, an analysis configuration to analyze the data needs to be created.

   b. In the tree view, right-click **Test Example 1** folder.

   c. To display **Select a Data Configuration** dialog box, and from the shortcut menu, select **New Analysis Configuration**.

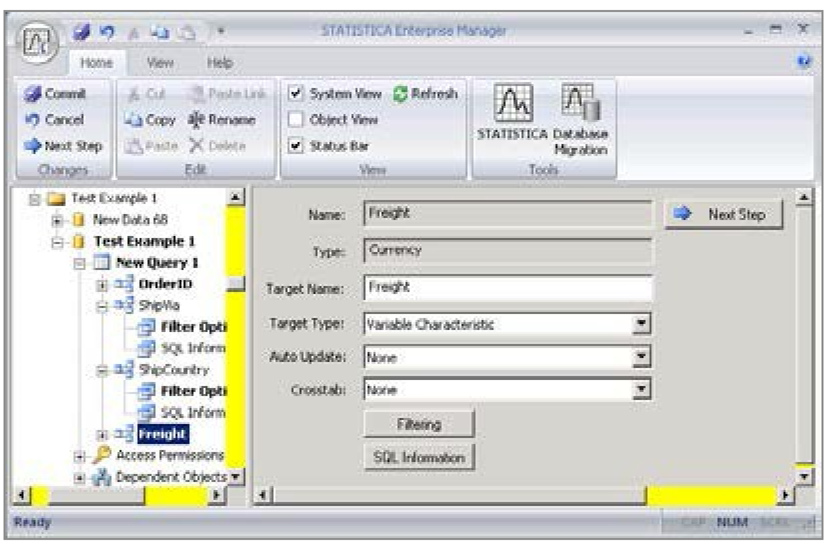
   d. Select **Test Example 1** object, and click **OK** button.

   e. If a dialog box is displayed with the statement: When selected, this option replaces the permissions of this Analysis with those of the selected Data, click **OK** button.



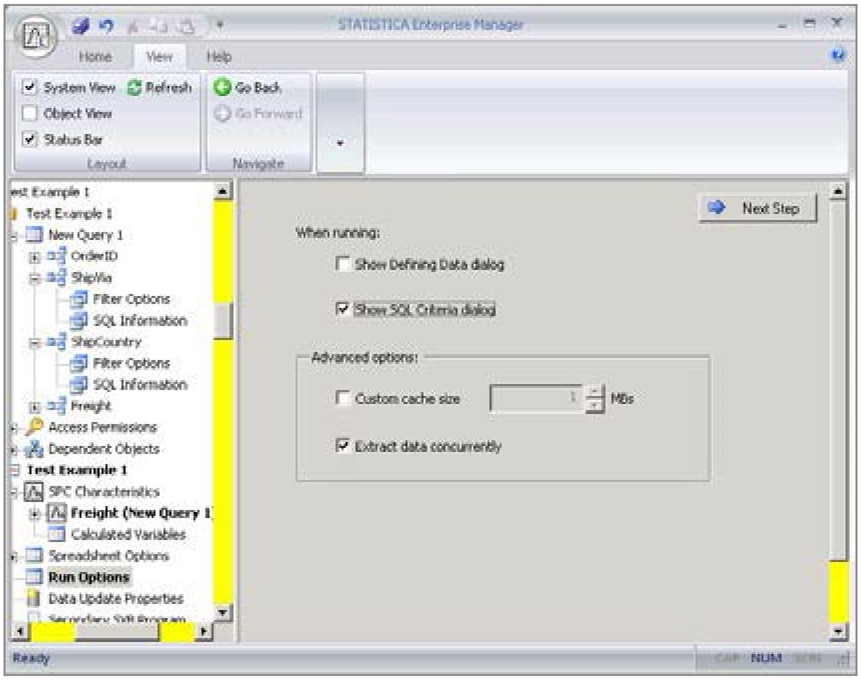
f. To continue creating the analysis configuration, click **Next Step** button (leaving the default name the same as the data configuration for expediency only).

g. To continue editing the analysis configuration, click **Next Step** button again.



h. In the Properties page for the SPC Characteristics - **Freight** column, change the Chart Type to Individuals & Moving Range (as shown in the above illustration).

i. No other SPC options need to be configured, so **select the Run options** node in the tree view, and **select the Show SQL Criteria dialog** check box in the Properties page.



j. This option specifies that Statistica prompt for filtering on those columns that have Filter options in the data configuration (if, when defining the Filter options, they were set to Required when filtering, this step would not be required as it would always force a filtering prompt when running – in this example it was not required to force filtering).

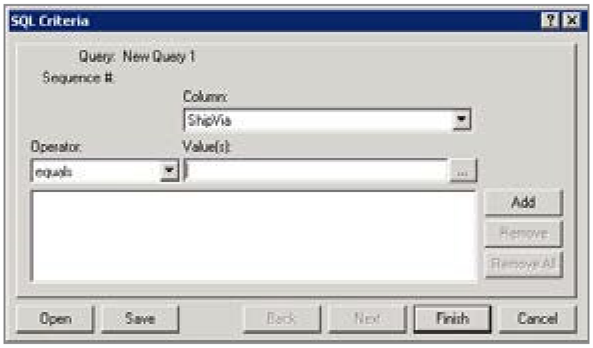
k. To save this analysis configuration to Statistica Enterprise, click **Commit Changes** button.

7. **Run the Analysis Configuration**

a. Close the Enterprise Manager, and log on to Statistica as the **Test User 1**.

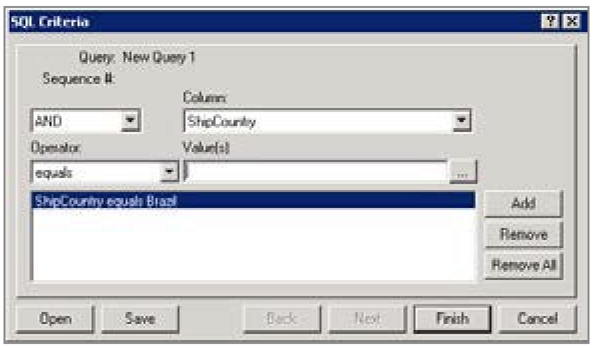
b. To display the Run Analysis or Report dialog box, Select **Enterprise** tab, and in the **Enterprise** group, click **Run Analysis/Report** button (this dialog box might be displayed automatically depending on your configuration).

c. To display SQL Criteria dialog box, select **Test Example 1** analysis, and click **OK** button.

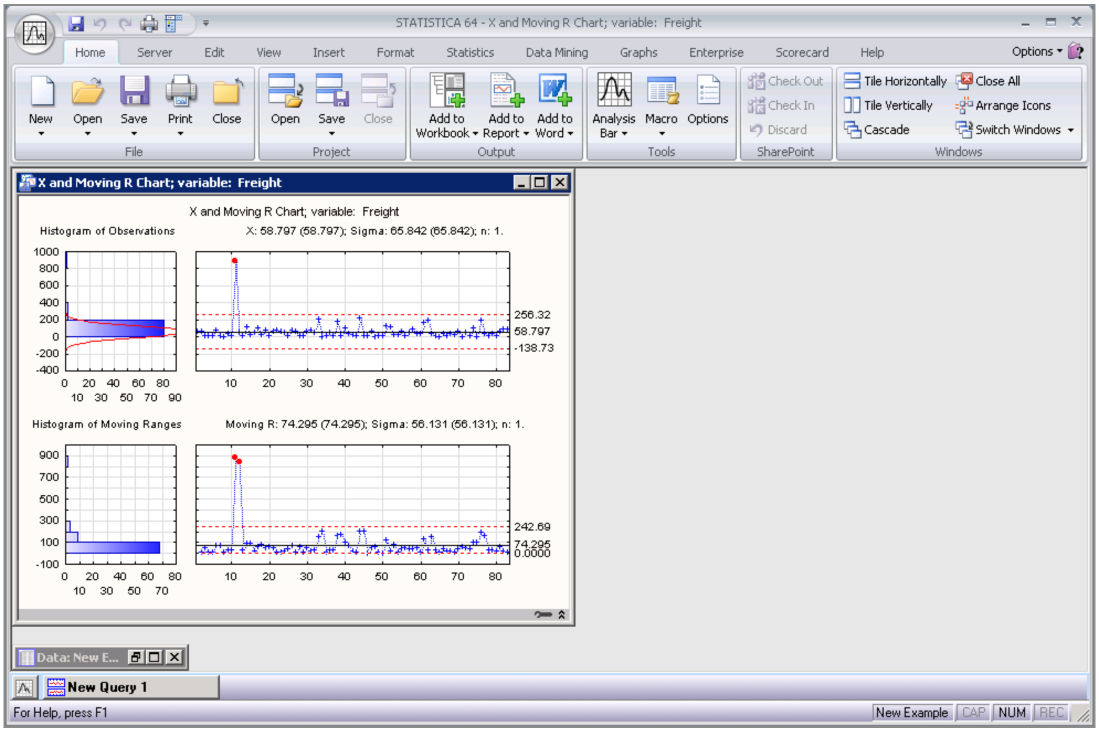


d. Click Column arrow, and select **ShipCountry** from the drop-down list.

e. To display the Value of ShipCountry dialog box (contains the list of available ShipCountry values), click **Browse** button. Select **Brazil** and click **OK** button.



f. To complete the filtering step, extract the data, and perform a packaged analysis on the Freight column, click **Finish** button.

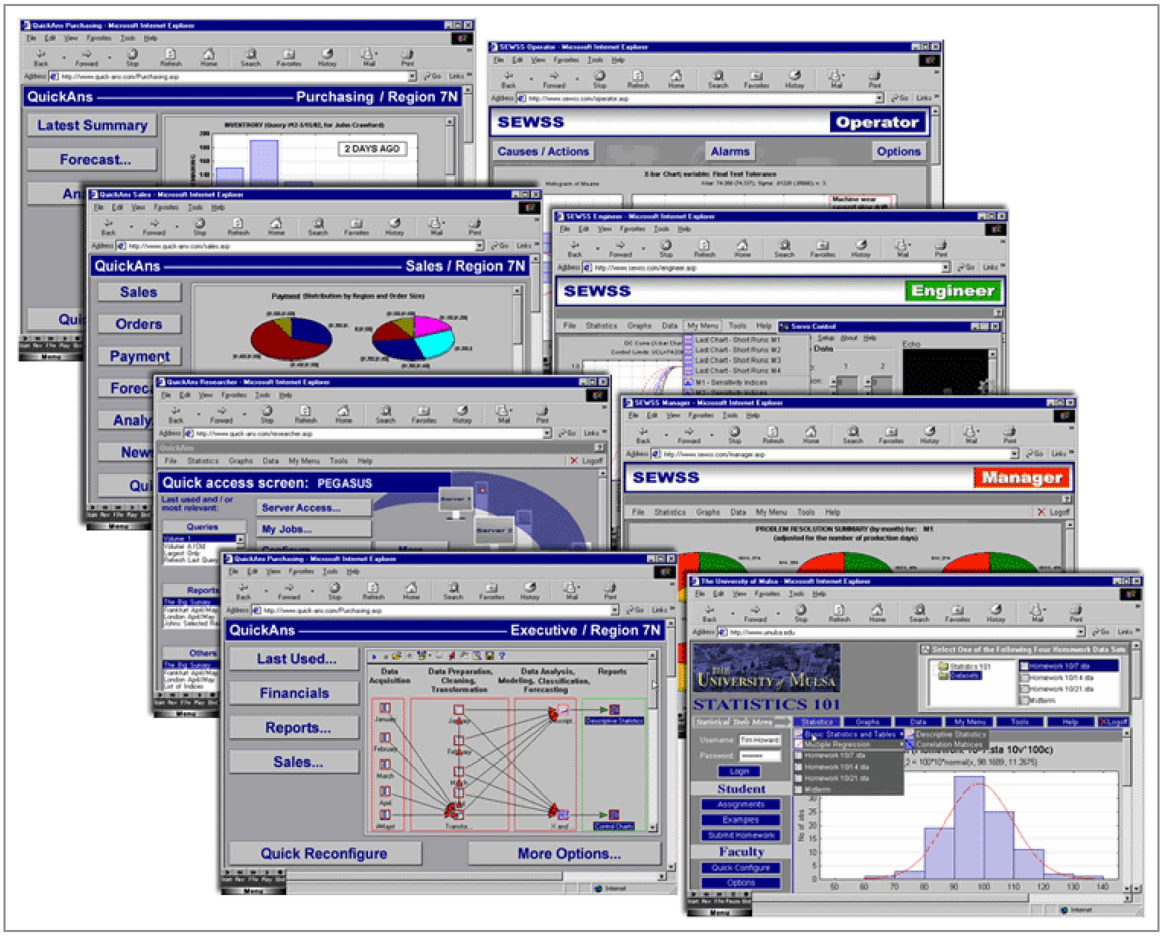


Custom User Interfaces

This simple example illustrates how to enable and run an analysis configuration using the standard Statistica user interface and output components. However, one of the major strengths of Statistica Enterprise is the ease of creating custom user interfaces (for example, for different categories of users depending on their roles in the organization, expertise, or data access privileges).

You can easily create a customized user interface at any degree of complexity, from highly simplified ones, for example, one that contains only three options:

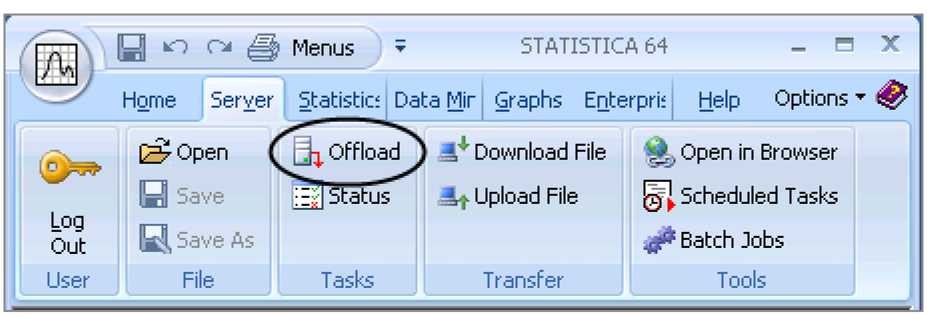
to very elaborate user interfaces of virtually unlimited flexibility:



Please refer to the Statistica Enterprise documentation (Electronic Manual) for more details and examples.

The Statistica Enterprise Server Option

Statistica Enterprise Server provides all of the functionality described in this example and also enables offloading tasks to the server and remote access using a browser interface.



User Interface General Features

The Statistica system can be controlled in several ways.

The following sections summarize the features of the main alternative user interfaces of Statistica:

- Interactive interface
- Statistica Visual Basic
- Web browser-based interfaces
- Microsoft Office Integration

However, note that:

- Many aspects of these user interfaces do not exclude each other; thus, depending on your specific applications and preferences, you can combine them;
- The customizable Quick Access Toolbar and classic menus can be used to integrate the alternative user interfaces and, for example, to provide quick access to macro (Visual Basic) programs or commonly used files; and
- Almost all features of these alternative user interfaces can be customized (leading to a different appearance and behavior of Statistica); it is generally recommended that you customize your system in order to take full advantage of Statistica's potential to meet your preferences and optimal requirements of the tasks that you need to accomplish.

Alternative Access to the Same Facilities: Custom Styles of Work

Even without any customization, the default settings of Statistica offer alternative user interface means and solutions to achieve the same results.

This alternative access principle present in every aspect of its user interface enables Statistica to support different styles of work. For example, most of the commonly used tools can be accessed alternatively:

- From the ribbon bar or the classic menus
- Via keyboard shortcuts
- By using the clickable fields on the status bar
- Via the custom Quick Access toolbar (user-defined toolbar with buttons and special controls, which can include macros and commands)
- From the shortcut menus associated with specific objects (cells, workbook icons, parts of graphs), which are displayed by right-clicking on the item.

It is suggested that you explore the alternative user interface facilities of Statistica before becoming attached to one style or another.

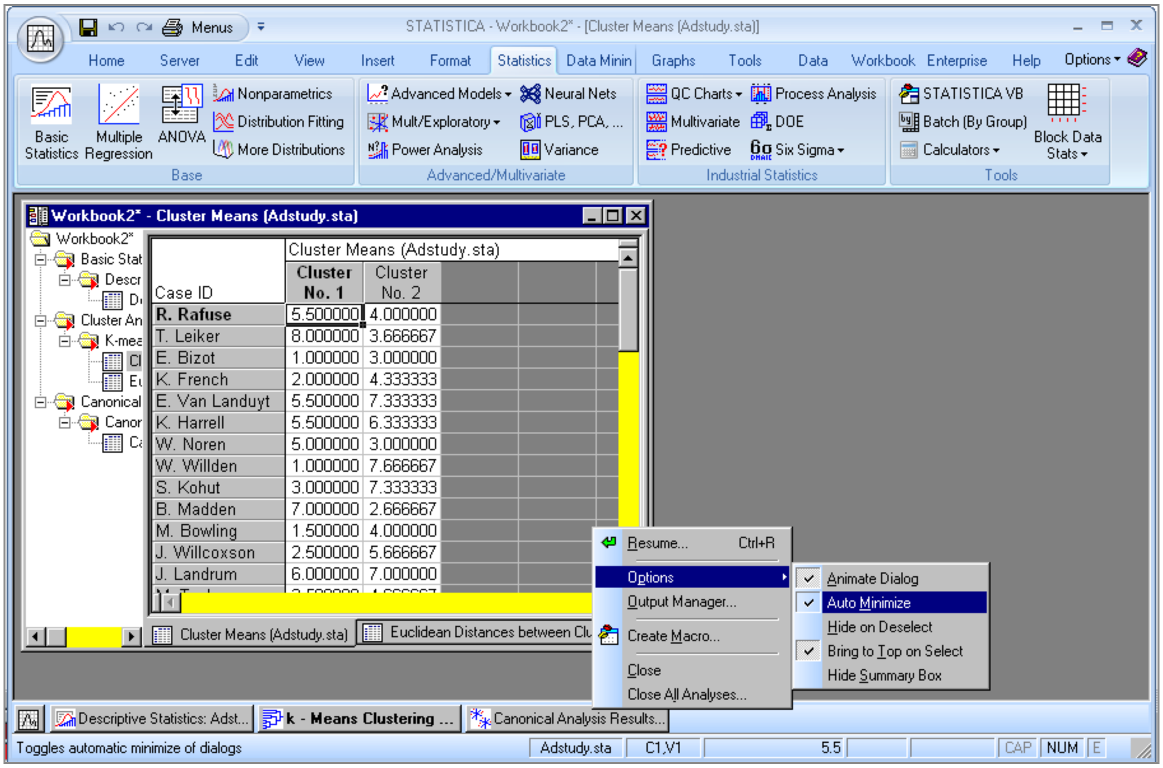
Multiple Analysis Support

You can have several instances of Statistica open at the same time.

Each of them can run the same or different types of analyses (traditionally called modules), such as Basic Statistics, Multiple Regression, ANOVA.

Moreover, in one Statistica instance, multiple analyses can be open simultaneously. They can be of the same or a different kind (for example, five Multiple Regressions and two ANOVAs), and each of them can be performed on the same or a different input data file (multiple input data files can be opened simultaneously).

Individual analyses – functional units of your work. In order to facilitate taking advantage of this multitasking functionality, your work with Statistica is organized into functional units called analyses that are represented with buttons on the analysis bar at the bottom of the application window (above the status bar, see the following illustration, where Descriptive Statistics, Cluster Analysis, and Canonical Analysis are running simultaneously). Consecutive buttons are added as you start new analyses. A variety of options are provided to control (and/or permanently configure) this aspect of Statistica.



By default, when you select specific output from a results dialog, the output (a spreadsheet or a graph) is displayed and the dialog is automatically minimized into its respective analysis button at the bottom of the screen. Click that button (or press CTRL+R) to display the dialog again and resume the analysis.

A selection of options pertaining to analysis management are available on the shortcut menu (accessed by right-clicking on an analysis button on the analysis bar) related to each respective analysis button (as shown above).

A useful hint for those with large screens. If you have a large screen, you can turn off the default minimization of the analysis dialogs and take advantage of the fact that most of these dialogs are small and, thus, can remain on the workspace without interfering with the viewing of analysis results. You can adjust this option either for a particular analysis (clear the Auto Minimize command on the analysis button shortcut menu, shown in the previous image), or globally for the entire program [select **Analyses/Graphs** in the tree pane of the Options dialog (accessible by selecting the **Tools** tab and clicking **Options**), and clear the **Auto minimize dialogs when displaying output** check box].

When you run multiple analyses and the Statistica workspace becomes cluttered, you can hide all windows related to specific analyses (or close them altogether via the analysis button shortcut menu command **Close All Analyses**). You can also open new Statistica instances, which offers another simple way to organize and manage your work.

Interactive User Interface

Main components of the interactive user interface of Statistica. Although the interactive user interface of Statistica is not the only one available, in most cases it is the easiest and most commonly used. Many components of this user interface can be seen in the Statistica application window.

First, similar to most software programs, tabs, menu bars and various toolbars are displayed at the top of the window. These are customizable and displayed in the most appropriate manner for your tasks.

At the bottom of the window, the analysis bar (containing minimized analysis/graph dialogs) and the status bar are displayed. Additionally, shortcut menus are available when you right- click in appropriate places.

Data files can be displayed in spreadsheets, workbooks, reports, or individual windows. Results spreadsheets or graphs can be displayed in workbooks, reports, or individual windows. Note that additional documents (such as Word or Bitmap images) can also be displayed in spreadsheets, workbooks, or reports. Finally, Statistica Visual Basic code is displayed in macro windows.

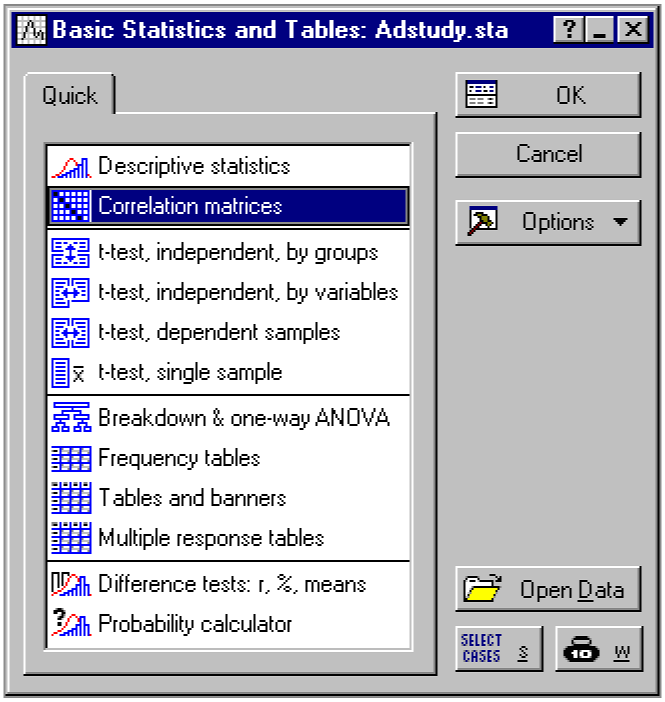
Normally you would not simultaneously see all of these facilities and tools at one time. You always have the ability to make the user interface of Statistica as simple or complex as your particular needs and comfort level demand.

Modules. While Statistica offers a variety of statistical and graphical procedures, each procedure can be performed in the same instance of Statistica. This means that, for example, it is possible to calculate residual statistics using options in the Multiple Regression module, then immediately use that output in the Factor Analysis or another exploratory module without first starting another instance of Statistica.

The Flow of Interactive Analysis

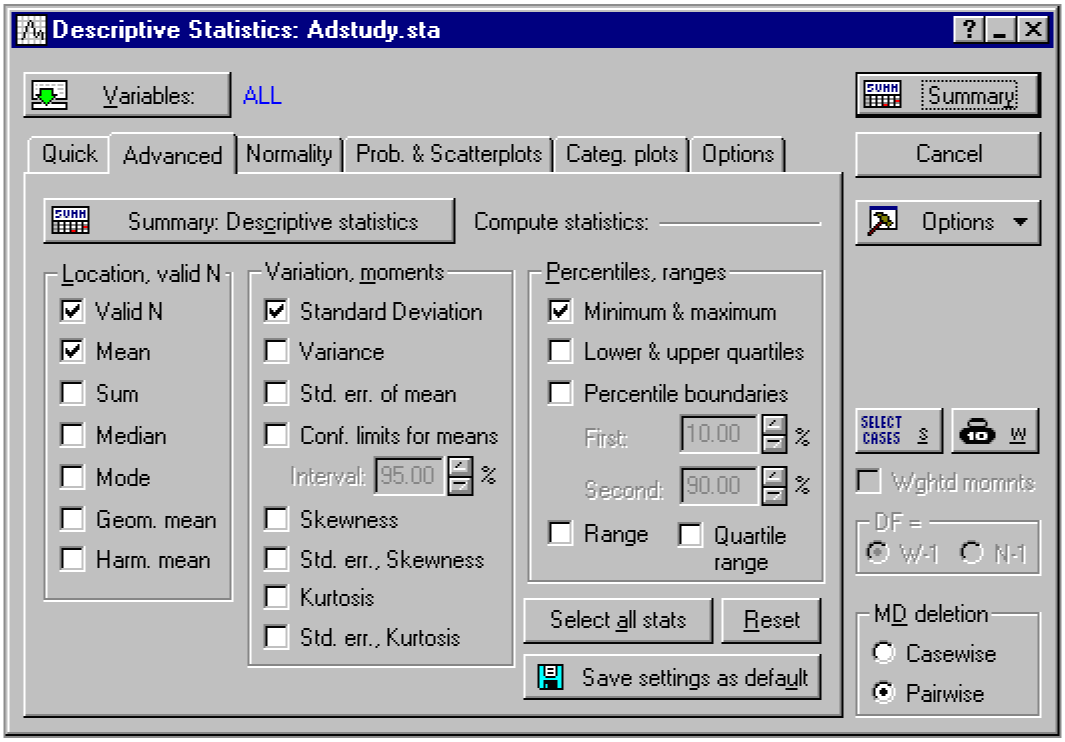
Startup Panel

When a statistical procedure is selected from the **Statistics**, **Data Mining**, or **Graphs** tabs, its respective Startup Panel is displayed (as shown below; **Basic Statistics** was selected from the **Statistics** tab - **Base** group to display the **Basic Statistics and Tables** Startup Panel).



Each Startup Panel contains a list of the types of analyses available in that particular module. Clicking anywhere outside the panel automatically minimizes it as a button on the analysis bar. If your system includes a high-resolution screen, you can change this default and keep the consecutive dialogs (in each analysis sequence) displayed on the workspace.

Analysis specification and output selection (results) dialogs. When the desired analysis is selected in the Startup Panel, the analysis specification dialog is displayed, in which you select the variables to be analyzed and other options and features of the task to be performed. Often, these dialogs contain several tabs that group the options, analyses, and/or results in logical categories to make it easier to locate specific features.



In some simple analyses (such as **Descriptive Statistics**, shown in the illustration above), the analysis specification dialog also serves as an output selection dialog where you can specify the type and format of the output (for example, specific spreadsheets or graphs). Most analyses, however, have a separate analysis specification dialog and results dialog.

Spreadsheet facilities for scenario (what-if) analyses and customized appearance. Statistica provides you with the capability to append supplementary information about variable measurement types and case states to your spreadsheets.

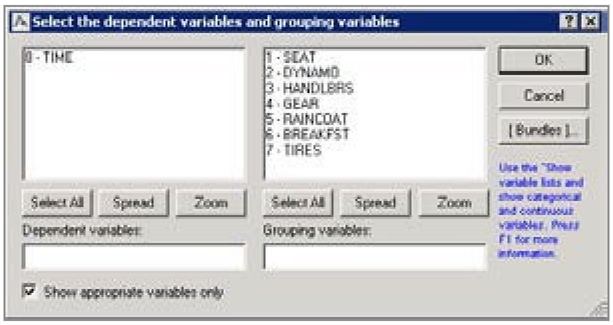
This metadata can be used to create a more comprehensive description of your data set, facilitate what-if types of exploratory analyses, and customize the appearance of cases in graphs.

Case states and brushing. You can assign case states to cases in order to customize the appearance of points in graphical displays, thus making it very easy to identify influential and interesting points.

A wide selection of symbols and colors is available to customize the appearance of selected points. Not only can case states be assigned in the spreadsheet before a graph is created, they can also be assigned interactively in the graph via the **Brushing** facilities (accessible by clicking the **Brushing** button  in the **Customize Graph** group on the **Edit** tab when a graph is displayed).

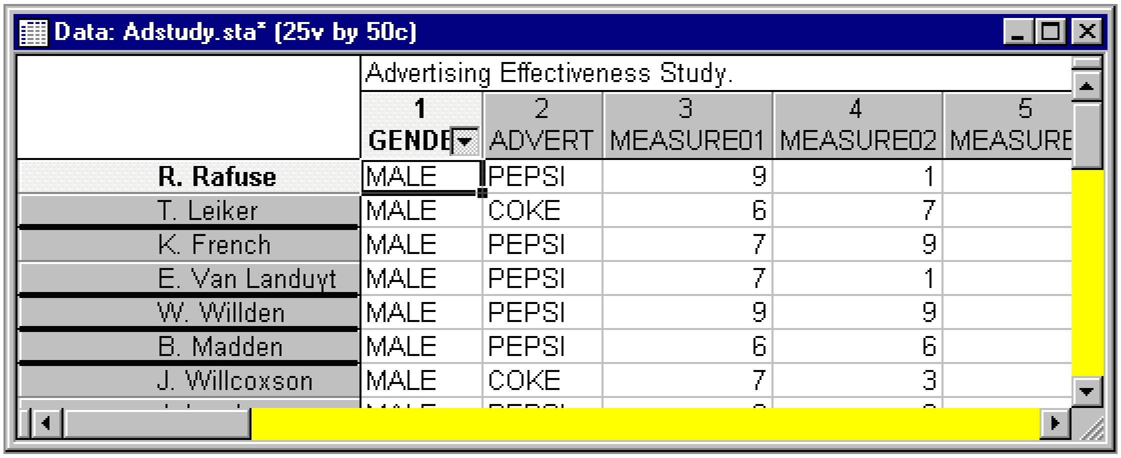
The case states assigned in the graph propagate back to the spreadsheet. The ability to assign case states in either the spreadsheet or graph further facilitates the exploratory visual analysis of data.

Measurement types and automatic variable pre-screening. The modeling or measurement type of a variable can be explicitly defined in order to indicate what analyses and graphs are appropriate for such a variable. These measurement types will map directly to subsequent analyses and graphs, identifying appropriate variables in each case (for example, variables of type categorical will be present within the list of categorical predictors available in a Factorial ANOVA).



In all variable selection dialogs (such as the one shown above), the **Show appropriate variables only** option is provided, which enables you to pre-screen or filter variables according to their **Measurement Type** (specified in the **Variable** specification dialog, accessible by double- clicking on a variable header in a spreadsheet); if that type is **Auto**, then the **Automatic variable pre-screening and classification** options (located in the **Analysis/Graph** options pane of the Options dialog, accessible by selecting the **Tools** tab and clicking **Options**) determine how Statistica will automatically determine the **Measurement Type**.

Auto filtering (cloaking variables and cases). Filtering (accessible by selecting the **Data** tab and clicking **Auto Filter** in the **Transformations** group) is a quick and easy way to display a specific portion of the data in your spreadsheet without sorting the data or creating a subset. When a variable is filtered, only the values that meet the specified criteria are displayed in the spreadsheet. Cases that do not meet the criteria are hidden from sight but not removed from the spreadsheet (for example, in the spreadsheet shown below, only the cases for GENDER = MALE are displayed).



Although hidden, they are still available for statistical and graphical analyses.

Output. As described in more detail in Chapter 4 – Five Channels for Output From Analyses and as illustrated in Example 1: Correlations (page 11) and Example 2: ANOVA (page 27), the consecutive output spreadsheets and graphs are displayed in workbooks by default. These workbooks can be saved and later reopened, making it easy to return to specific results as needed.

Additionally, you can send all output to an analysis report (see page 120), which produces an easily organized (via the report tree), formatted, and printed report of a specific analysis. You can also choose to send all results, regardless of what analysis it comes from, to a single report. Lastly, the output can be directed to separate windows.

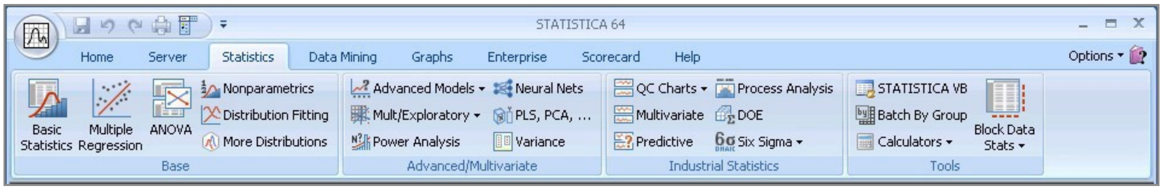
To specify output options for a single analysis or session, click the **Options** button 

in the analysis or graph specification dialog and select **Output** to display the Analysis/Graph Output Manager dialog box.

To access global output options, select the **Tools** tab. Click **Options** to display the Options dialog, and select **Output Manager**. Or, select the **Home** tab and click **Options** in the **Tools** group. For more information, see the Electronic Manual.

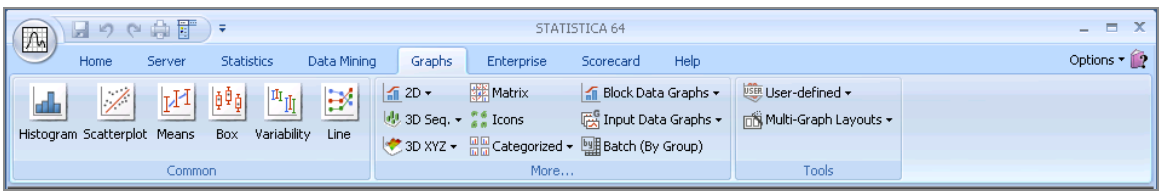
Features of Analyses

Statistica provides direct access to all statistical analyses via the **Statistics** tab:



and the **Data Mining** tab:

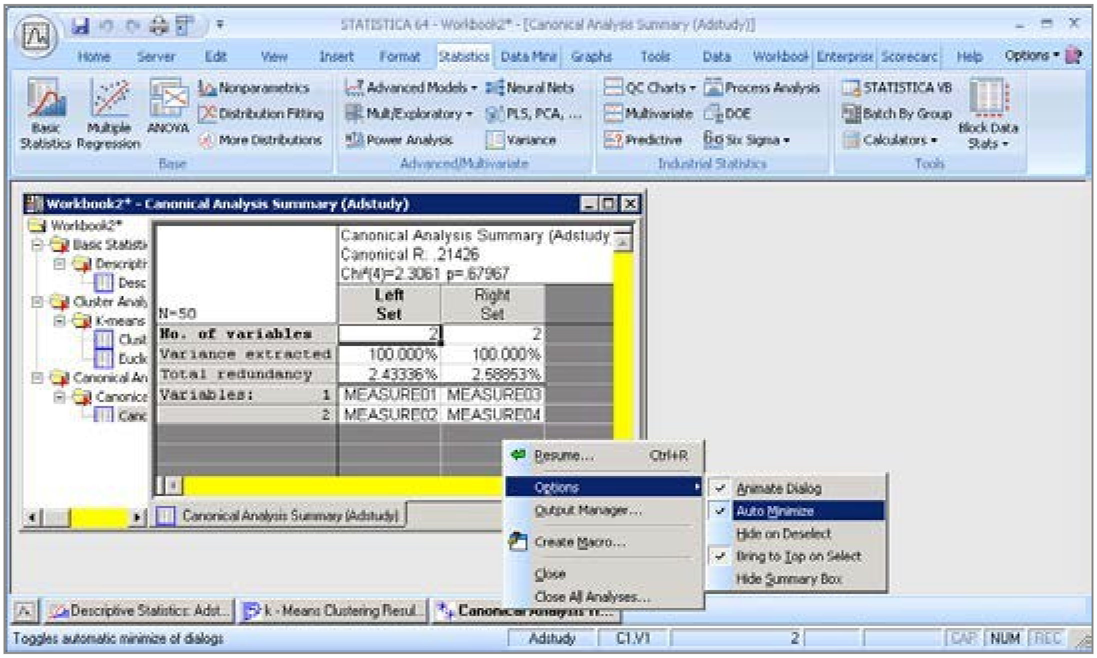
and provides direct access to all graphical analysis dialogs via the **Graphs** tab:



These tabs are never disabled, such as they are available whenever any input data document is open.

The **Statistics** and **Data Mining** tabs provide access to all available analysis types within Statistica. The **Graphs** tab provides direct access to a variety of commonly used graph types (for example, scatterplots, histograms, means/error plots, etc.) as well as hierarchical access to all graph types in Statistica including **2D Graphs**, **3D Sequential** and **XYZ Graphs**, **Categorized Graphs**, **User-defined Graphs**, **Block Data Graphs**, **Input Data Graphs**, and **Multi-Graph Layouts**. Comprehensive discussions of all the various types of statistics and graphs offered by Statistica are available in the glossary of the Electronic Manual.

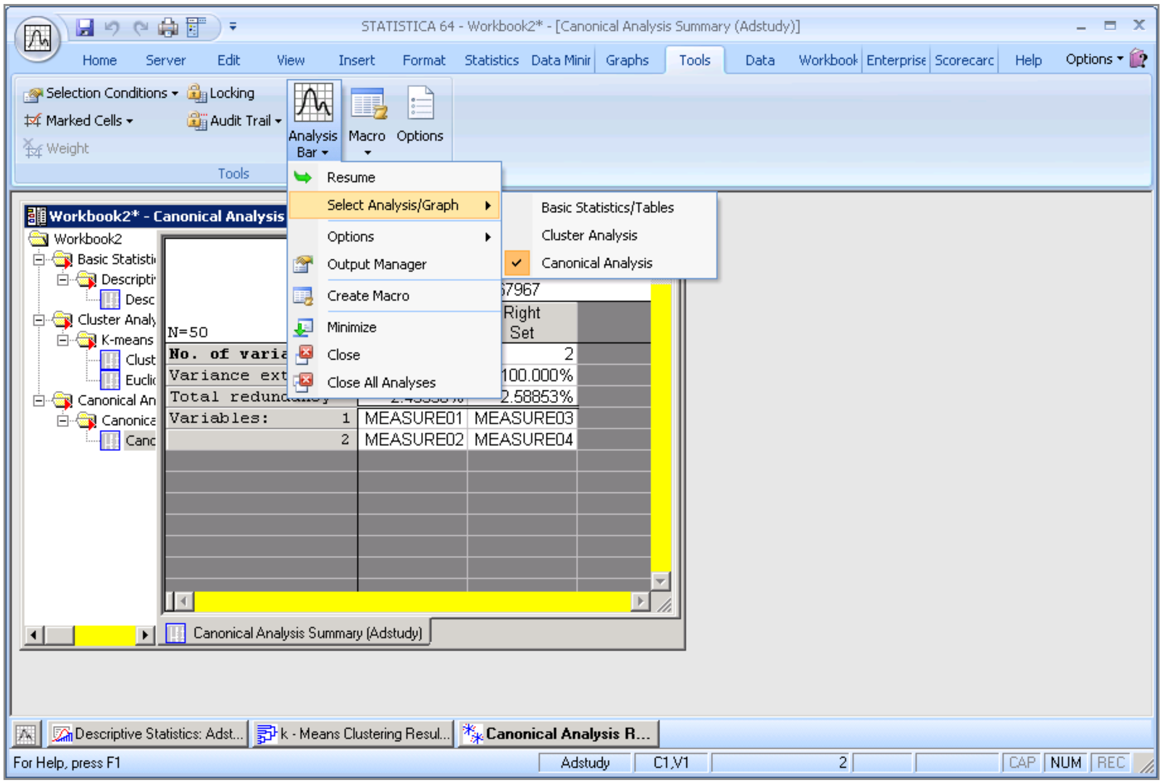
Using the analysis bar. To take advantage of Statistica's multitasking functionality (for more information, see Multiple Analysis Support), Statistica analyses are organized as functional units that are represented with buttons on the analysis bar at the bottom of the application window (above the status bar, see the next illustration, where Descriptive Statistics, Cluster Analysis, and Canonical Analysis are running simultaneously). Consecutive buttons are added as you start new analyses.



Minimizing dialogs (and a hint for users with large screens). Depending on your preferences, you can choose to minimize all analysis dialogs when you select another window in Statistica or another application. By default the Auto Minimize command is selected; however, when your screen is large enough to accommodate several windows, it is recommended that you clear this command.

This keeps the analysis dialogs on screen while the respective output created from these dialogs is produced, thus enabling you to use the dialogs as “toolbars” from which output can be selected. Refer to Multiple Analysis Support to adjust this command.

Continuing analyses/graphs. It is easy to continue an analysis or graph (such as to change the focus to the current dialog for a particular analysis). Select the **Tools** tab, click **Analysis Bar**, and select **Resume** from the drop-down menu; or press CTRL+R; or click the analysis/graph button on the analysis bar. When multiple analyses are running, you can also select the specific analysis from the **Select Analysis/Graph** submenu.



Hiding windows. To further facilitate the organization of windows from various analyses, you can hide all windows associated with a particular analysis when that analysis is deselected: select the **Tools** tab, click **Analysis Bar**, and from the **Options** submenu, select **Hide on Deselect**. By default, this command is not selected. Note that this command only applies when the results are sent to individual windows; see the discussion of the **Output Manager** for more details on managing output from analyses. In addition, there is a command on the **Home** tab in the **Windows** group to close all document windows: click **Close All** (or press CTRL+L on your keyboard), and a command on the **Tools** tab to close all analyses: click **Analysis Bar** and select **Close All Analyses** from the drop-down menu.

Bringing windows to the top. On the **Tools** tab click **Analysis Bar**, and from the **Options** submenu select **Bring to Top on Select** to activate (bring to the top of Statistica) all windows associated with a particular analysis when that analysis is selected, replacing whatever dialogs were on top.

This command also facilitates the organization of individual windows from various analyses. By default, this command is selected. Note that this command only applies when the results are sent to individual windows; see the discussion of the **Output Manager** for more details on managing output from analyses.

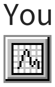
Hiding the summary box. By default, a summary box is located at the top of certain results dialogs (such as **Multiple Regression Results**) and contains basic summary information about the analysis. You can hide an individual summary box by clicking the button in the lower- right corner of the summary box. You can also suppress the display of all summary boxes globally by selecting the Tools tab, clicking Analysis Bar, and selecting Hide Summary Box from the Options submenu.

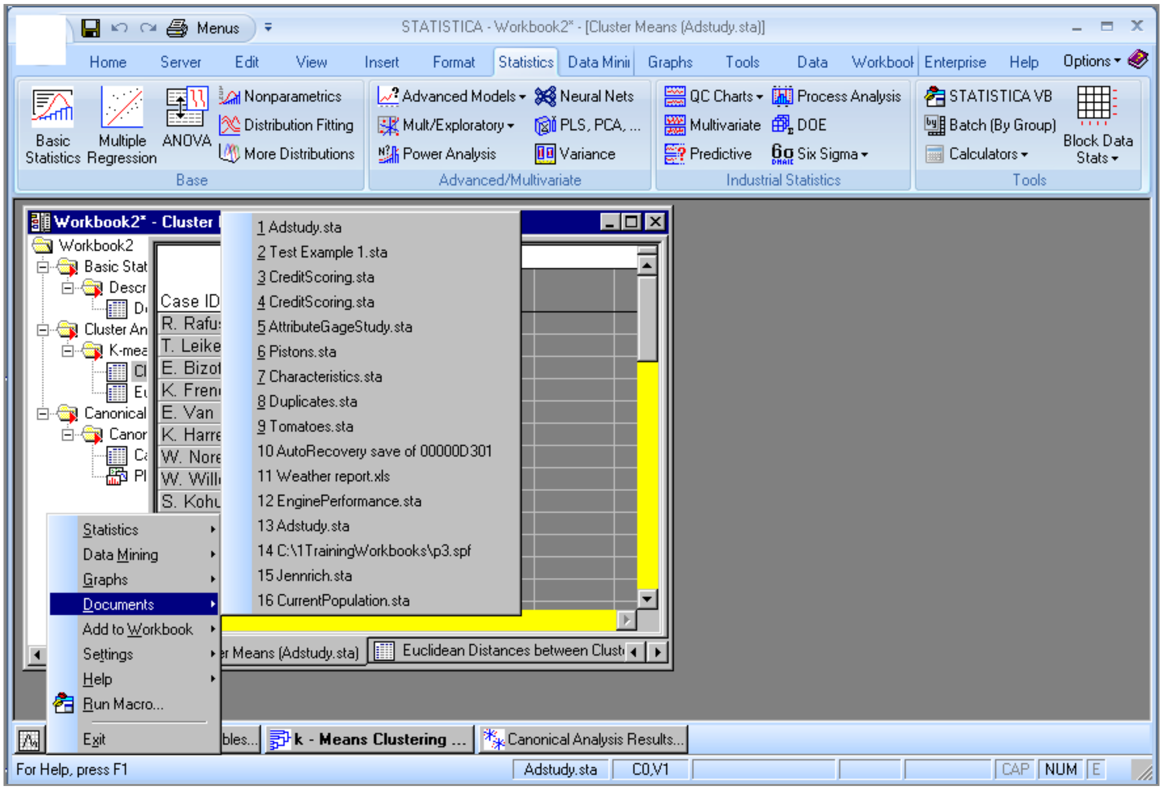
Document Types

Statistica uses seven principal document types.

- Workbooks
- Spreadsheets (multimedia tables)
- Reports
- Graphs
- Macros (Statistica Visual Basic programs)
- Statistica Project Files
- Data Miner Recipes Project Files (see page 51)

Using these seven document types, you can manage data of various types, perform data entry and analyses, generate graphs of the highest quality, develop custom applications of any degree of complexity, and create custom-formatted reports.

You can quickly access the most recently used documents. Click the Statistica Start menu  (in the lower-left corner of the screen) and select **Documents**.



In the **General** options pane of the **Options** dialog (accessible by selecting the **Tools** tab and clicking **Options**), you can specify how many recently used documents to display (the default is 16). For more detailed information about each document type, see the overviews for workbooks, spreadsheets, reports, graphs, and macros; for further information, see the Electronic Manual.

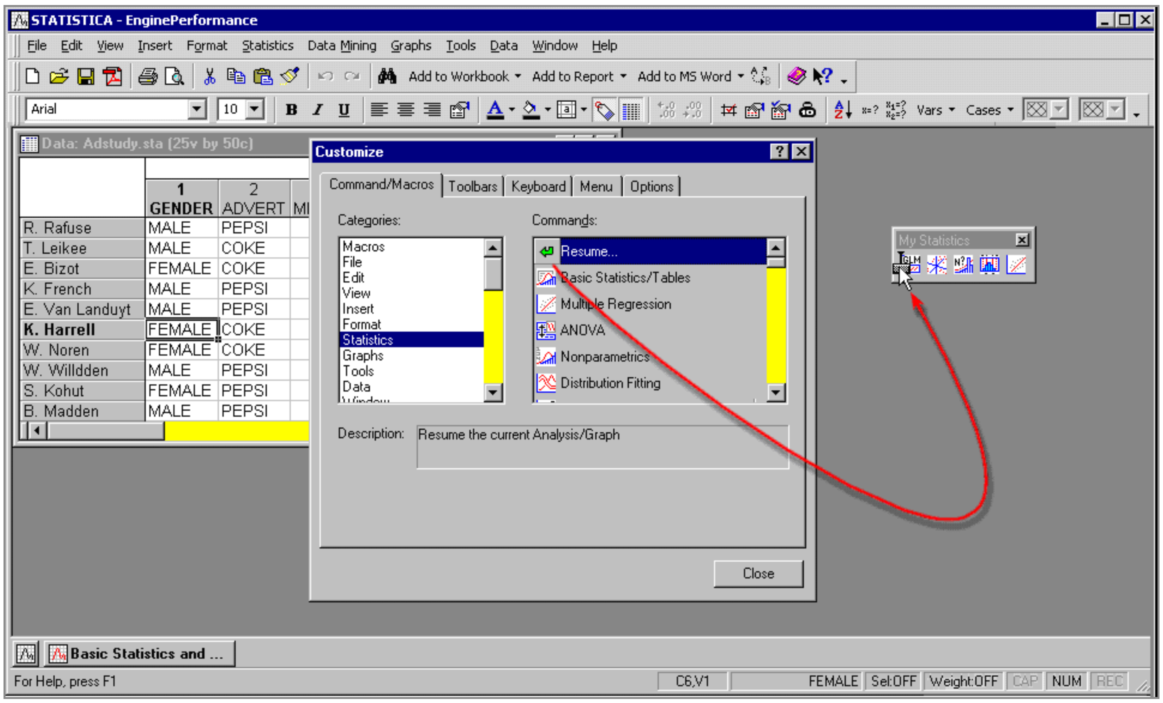
Tabs related to types of active document windows. Each of the main types of Statistica document windows (see page 110) manages data in a different way and, thus, offers different customization and management options. These differences are reflected in the tabs that accompany each type of window. Menu commands and buttons for each of the main types of documents are described in detail in the Electronic Manual.

The tabs that are available when workbooks are open depend on the type of document that is currently selected in the workbook. Therefore, when you are editing a spreadsheet, graph, report, or macro within a workbook, the tabs relevant for that document type are available.

When you select an "empty node" in the workbook tree pane, by default, the **Workbook** tab is displayed.

User-defined toolbars. In addition to the variety of toolbars provided on the Statistica classic menus (on the ribbon bar, click the  icon in the upper-left corner to display the classic menus), you can also create user-defined toolbars. These toolbars can include any command available in Statistica, as well as special controls (such as font name, font size, graph styles, etc.). The toolbars can be given any name and can be designated to open depending on the active document type. Also, you can customize all toolbars (including existing toolbars) by adding commands and special controls.

To create a toolbar (or edit an existing one) use the options on the **Toolbars** tab of the **Customize** dialog box, accessible by selecting **Customize** from the **Tools** menu. Customizing a toolbar is as easy as dragging commands from the dialog box to the toolbar, as shown in the illustration below.



Shapes and locations of toolbars can be easily adjusted (for example, all toolbars can be docked or free floating). All of these options make it possible for you to create unique toolbars that provide you with a very specialized user interface. The Electronic Manual includes simple-to- follow, step-by-step instructions on how to make customizations. Specifically, see Create a New Toolbar in the Electronic Manual for more details.

The Quick Access toolbar located at the top of the ribbon bar can be customized as well; see Customize Quick Access Toolbar in the Electronic Manual.

User-defined menus. Customizing the classic menus is equally easy and can be performed using the **Menu** tab of the Customize dialog box.

Statistica Visual Basic and Controlling Statistica from Other Applications

The industry standard Statistica Visual Basic language (integrated into Statistica) provides an alternative user interface to the entire functionality of Statistica, and it offers incomparably more than just a supplementary application programming language that can be used to write custom extensions.

Statistica Visual Basic takes full advantage of the object model architecture of Statistica and can be used to access programmatically every aspect and virtually every detail of the functionality of Statistica.

Even the most complex analyses and graphs can be recorded into Visual Basic macros and later be run repeatedly or edited and used as building blocks of other applications. Statistica Visual Basic adds an arsenal of more than 14,000 new functions to the standard comprehensive syntax of Visual Basic, thus comprising one of the largest and richest development environments available.

Controlling Statistica from other applications. One of the features that makes the Statistica Visual Basic environment so powerful is the ability to integrate and manipulate various applications and their environments within a single macro. For example, you can record or write a Statistica Visual Basic program that computes predictions via the Statistica Time Series module and execute that program from within an Excel spreadsheet or a Word document. The exchange of information between different applications is accomplished by exposing those applications to the Visual Basic programs as Objects. So, for example, you can run statistical analyses in the Statistica Basic Statistics module from a Visual Basic program in Excel by declaring inside the program an object of type Statistica.Application.

Once an object has been created, the Visual Basic program then has access to the properties and methods contained in that object. Properties can be mostly thought of as functions, methods can be mostly thought of as subroutines that perform certain operations or computations inside the respective application object. You can call Statistica procedures directly from many other applications and programming languages (for example, C++, Java, and others).

Web Browser-Based User Interface: Statistica Enterprise Server

In addition to the two basic types of user interfaces described in the previous sections, the entire Statistica family of products also optionally offers a browser-based user interface, where all interactions with the application involving querying databases, data management operations, data analysis, or data mining, as well as generating reports and collaborative work, can be performed without having any Statistica application installed on the local computer, using only a browser. This alternative user interface requires that a Client-Server version of the respective Statistica application be installed.

Statistica Enterprise Server is a highly scalable, enterprise-level, fully Web-enabled data analysis and database gateway application system that is built on distributed processing technology and fully supports multi-tier Client-Server architecture configurations. Statistica Enterprise Server exposes the analytic, query, reporting, and graphics functionality of Statistica through easy-to-use, interactive, standard Web interfaces. Alternatively, it enables users of the desktop version (“thick client”) to offload computationally intensive analytics and database operations to the Server. It is offered as a complete, ready-to-install application with an interactive, Internet browser-based (“point-and-click”) user interface (“thin client”) that makes it possible for users to interactively create data sets, run analyses, and review output. However, Statistica Enterprise Server is built using open architecture and includes .NET-compatible development kit tools (based entirely on industry standard syntax conventions such as VB Script, C++/C#, HTML, Java, and XML) that enables IT department personnel to customize all main components of the system or expand it by building on its foundations, for example, by adding new components and/or company-specific analytic or database facilities.

As mentioned, Statistica Server is provided with an Internet browser-based user interface (in the form of simple-to-navigate and easy-to-use dialogs) enabling you to specify analyses and review results.

However, tools are provided to customize these dialogs and easily set up new user interfaces or to add new functions. For example, a simple dialog with only three buttons can be created in the browser, and clicking each button runs a series of analyses and generates a detailed report. Statistica Enterprise Server applications add a new dimension and an endless array of possibilities to the entire line of Statistica Data Analysis, Data Mining, and Quality Control/Six Sigma software.

The system is compatible with all major Web server software platforms (for example, UNIX Apache, and Microsoft IIS), works in both Microsoft .NET and Sun/Java environments, and does not require any changes to the existing firewall and Internet/Intranet security systems.

For more information, please refer to Appendix A – Statistica Enterprise Server.

Microsoft Office integration

If Microsoft Office is installed on the same machine as Statistica, Excel spreadsheets can be opened directly within Statistica and used as a data source for analyses, and Word documents can be used as a destination for reports.

Excel as a data source. Statistica can open Excel documents in the Statistica workspace through the standard **Open** dialog. When an Excel workbook is selected, a dialog will be displayed that enables you to import the file into a standard Statistica Spreadsheet or to keep the document in Excel form, such as an Excel window within Statistica.

After the Excel document is opened, you have access to all the menus and toolbars that Excel supports. Thus, you can edit and update formulas, change the formatting, copy/paste, drag/drop – everything that you would normally do if you were within the Excel application.

The main strength in Excel integration is that the Excel documents can be used as a data source for analyses. Simply have the Excel document window selected when starting an analysis, and the analysis will source from the Excel document.

When initially running the analysis, Statistica will display a dialog in which you can specify what range of the Excel document should be used as the data source and if a particular row or column is to be used as variable names or case names. These settings are assigned to the Excel document so you will only need to specify them once.

Not only can Statistica use the Excel file as a data source, but auto updating can be specified as well. If you create an auto-updating graph and then change the Excel file by entering new data or re-evaluating formulas, the graph is also updated.

Word as a report destination. You can also open and edit Word documents within the Statistica workspace. Word documents can be opened using the standard Open dialog box, and when performing statistical analyses or creating graphs, output can be directed to a Word document. Any output that can be directed to a Statistica Report is capable of being directed to a Word document.

As with Excel, when the Word document is open, you have access to all the toolbars and menus that are supported within the Word application. You can perform any formatting and editing that Word supports within its application.

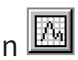
When sending spreadsheet analytical results to Word, Statistica will take advantage of Word's table editing facility and convert the spreadsheet into a table. For multi-page spreadsheets, you can control where to break the rows and columns.

These spreadsheets will be broken by columns such as will be allowed without exceeding the page width. All rows for a given set of columns will be rendered before the next set of spreadsheet columns is rendered in the Word document. This solution enables the presentation of spreadsheets in Word that are natively editable in Word, display the entire contents of the spreadsheet, and print and paginate correctly.

Six Channels for Output from Analyses

When you perform an analysis, Statistica generates output in the form of multimedia tables (spreadsheets) and graphs. There are six basic channels to which you can direct all output:

- Statistica Workbooks
- Stand-alone Windows
- Reports
- Microsoft Word
- The Web
- SharePoint or Statistica Document Management System (SDMS)

The first four output channels listed above are controlled by the options in the **Output Manager** (accessible by selecting **Output Manager** from the Start button  drop-down menu located in the upper-left corner of the ribbon bar, see for further details on both the global **Output Manager** in the Options dialog box and the Analysis/Graph Output Manager dialog box). There are a number of ways to output to the Web, depending on the version of Statistica you have. SharePoint is accessible from within Statistica, and SDMS is an additional product available from Statistica.

These means for output can be used in many combinations (for example, a workbook and report simultaneously) and can be customized in a variety of ways. Also, all output objects (spreadsheets and graphs) placed in each of the output channels can contain other embedded and linked objects and documents, so Statistica output can be hierarchically organized in a variety of ways. Each of the Statistica output channels has its unique advantages, as described in the following sections. More comprehensive overviews of each of the document types associated with the respective channels of output are included in Chapter 5 - Statistica Documents.

The auto save and recovery features. All Statistica documents (such as input spreadsheets, workbooks, reports, and macros) that accumulate the results of your work (for example, data entry, editing, or output collection) over an extended period of time support the **Auto Save** feature, which is configurable in the **General** options pane of the Options dialog box (accessible by selecting the **Tools** tab and clicking **Options**).

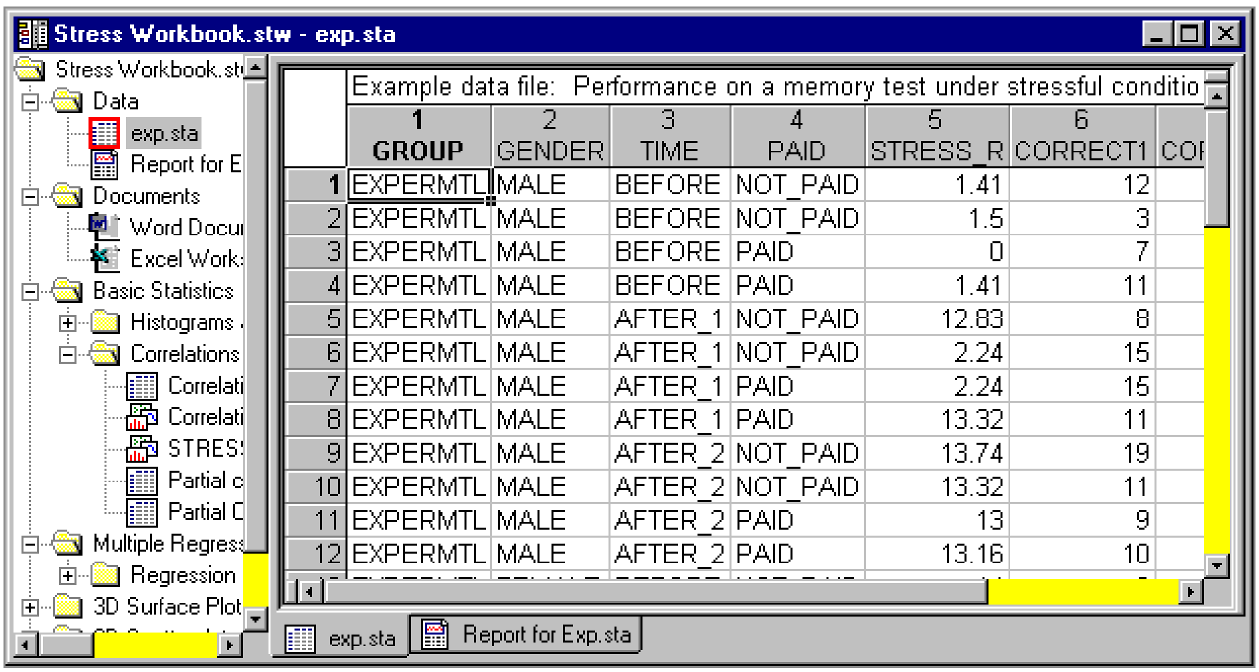
This facility automatically saves the contents of your work periodically (for example, every 10 minutes) and, thus, give you the option to retrieve data that otherwise could be lost in case of a power outage or a system failure.

Statistica Workbooks

Workbooks are the default way of managing output.

Each output document is stored as a tab in the workbook. For example, a Statistica Spreadsheet or Graph, as well as a Word or Excel document.

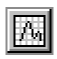
Documents can be organized into hierarchies of folders or document nodes (by default, one is created for each new analysis) using a tree view, in which individual documents, folders, or entire branches of the tree can be flexibly managed.



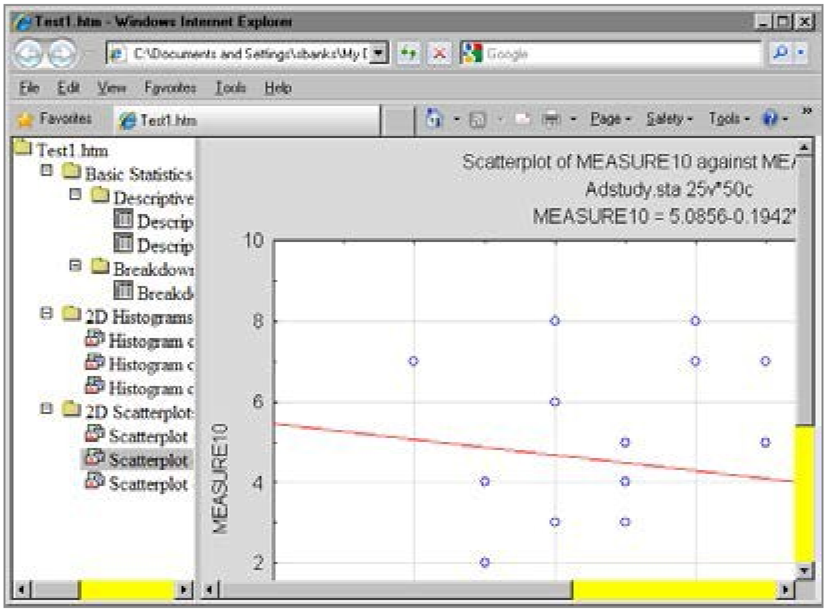
For example, selections of documents can be extracted (for example, drag-copied or drag-moved) to a report window or to the application workspace (such as the Statistica application background where they will be displayed in stand-alone windows). Entire branches can be placed into other workbooks in a variety of ways in order to build specific folder organization.

Technically speaking, workbooks are ActiveX document containers (see for information on ActiveX technology, see also the Electronic Manual). Workbooks are compatible with a variety of foreign file formats (for example, Office documents) that can be easily inserted into workbooks and in-place edited.

User notes and comments in workbooks. Workbooks offer powerful options to efficiently manage even extremely large amounts of output, and they may be the best output handling solution for both novices and advanced users. It might appear that one possible drawback is that user comments (for example, notes) and supplementary information cannot be as transparently inserted into the stream of the workbook output as they can in traditional, word processor style reports, such as Statistica Reports. . However, note that:

- All Statistica documents can easily be annotated, both a) directly, by typing text into graphs, tables, and reports, and b) indirectly, by entering notes into the **Comments** box of the Document Properties dialog box (accessed by selecting **Properties** from the Start button  drop-down menu located in the upper-left corner of the ribbon bar), and
- Formatted documents with notes and comments (in the form of text files, Statistica Report documents, WordPad or word processor documents, etc.) can easily be inserted anywhere in the hierarchical organization of output in workbooks. Moreover, such summary notes or comment documents can be made nodes for groups of subordinate objects to which the note is related to further enhance their organization.

Saving workbooks as Web pages. Workbooks can be saved as *.html (Web) files by selecting **Save As** on the **Home** tab in the **File** group from the **Save** menu, and in the Save As dialog box, choosing **Web Page (*.htm; *.html)** from the **Save as type** drop-down list. Saving as a Web page will create an *.html file in the specified directory that can be opened with standard internet browsers such as Microsoft Internet Explorer. When saving the workbook as a Web page, Statistica also creates a subdirectory that contains all the images referenced by the Web page.

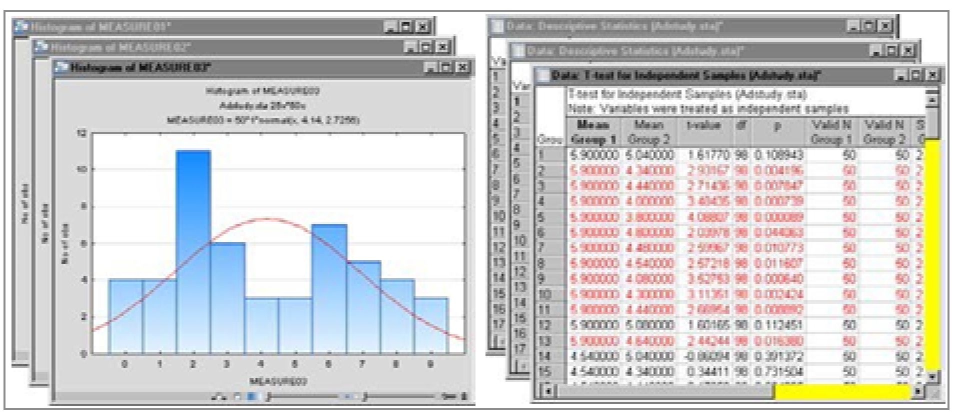


The Web page output contains an .html-based tree control that enables you to navigate and display the various workbook images, similar to the actual workbook.

Stand-Alone Windows

Statistica output documents can also be directed to a queue of stand-alone window.

The **Queue Length** can be controlled in the **Output Manager** options pane of the Options dialog box (accessible by selecting the **Tools** tab and clicking **Options**).



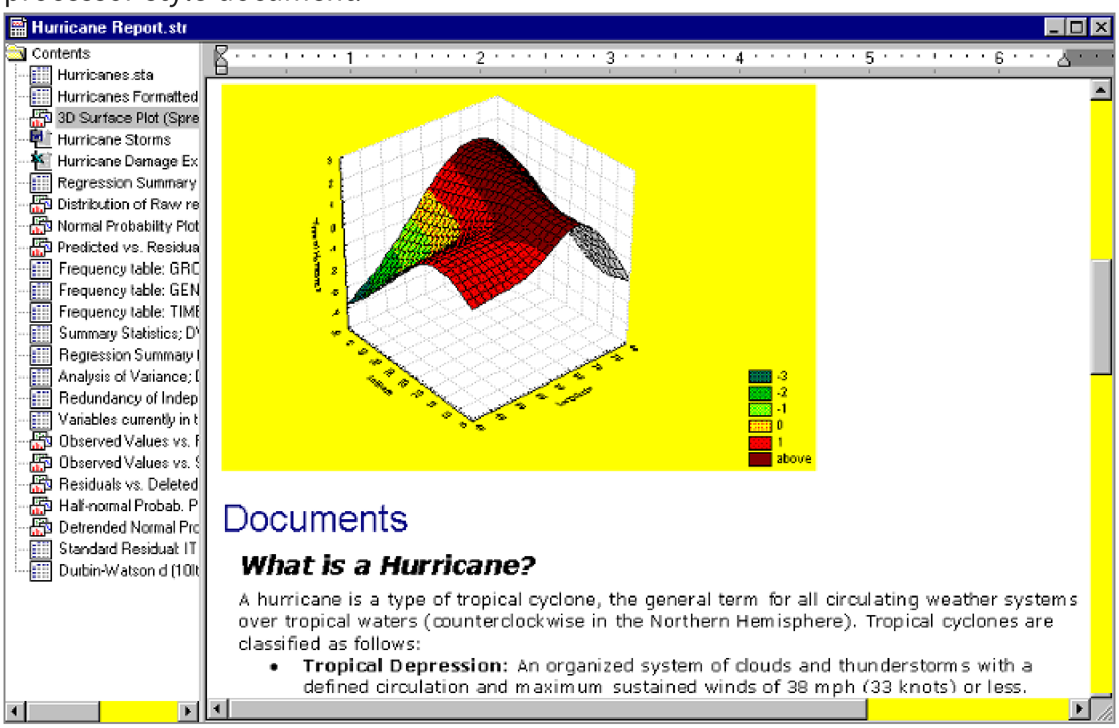
The clear disadvantage of this output mode is its total lack of organization and its natural tendency to clutter the application workspace (some procedures can generate hundreds of tables or graphs with a click of the button).

One of the advantages of this way of handling output is that you can easily custom arrange these objects within the Statistica application workspace (for example, to create multiple, easy to identify reference documents to be compared to the new output). However, note that in order to achieve that effect, you do not need to configure the output ahead of time and generate a large number of (mostly unwanted) separate windows that can clutter the workspace.

Instead, individual, specific output objects directed to and stored in the other two channels (workbooks and reports) can easily be dragged out from their respective tree views onto the application workspace as needed.

Reports

Reports (briefly introduced on page 119) in Statistica offer a more traditional way of handling output (compared to workbooks) as each object (for example, a Statistica Spreadsheet or Graph, or an Excel spreadsheet) is displayed sequentially in a word processor style document.



However, the technology behind this simple report offers you rich functionality. For example, like the workbook, each Statistica Report is also an ActiveX (see page 184) container whereeach of its objects (not only Statistica Spreadsheets and Graphs, but also any other ActiveX- compatible documents, for example, Word documents) is active, customizable, and in-place editable. Reports are stored in the STR file format, which is a Statistica extension of the Microsoft RTF (Rich Text Format, *.rtf) format. STR files share the RTF formatting information and additionally they include the tree view information (which cannot be stored in the standard RTF files). Report files are by default saved with the file name extension *.str, but they can also be saved as standard RTF files (in which case the tree information will not be preserved).

The obvious advantages of this way of handling output (more traditional than the workbook) are the ability to insert notes and comments “in between” the objects as well as its support for the more traditional way of quickly scrolling through and reviewing the output to which some users may be accustomed.

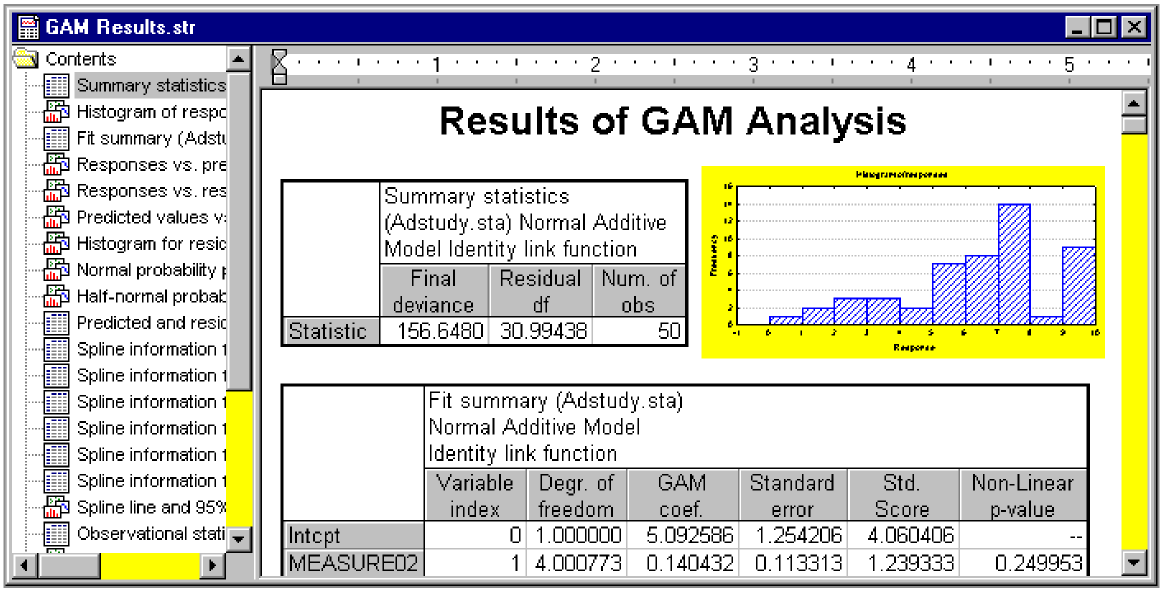
Also, only the report output includes and preserves a record of the supplementary information, which contains a detailed log of the options specified for the analyses (for example, selected variables and their labels, long names, etc., depending on the level of supplementary information specified in the Output Manager, see page 21).

The obvious drawback, however, of these traditional reports is the inherent flat structure imposed by their word processor style format, though that is what some users of certain applications may favor.

When performing an analysis, the ultimate goal is to create meaningful output in order to gain an understanding of the data. The manner in which the output is produced is important as well. Statistica offers a variety of methods to produce reports that accommodate the diverse needs of users.

Statistica Reports

Statistica Reports (for more information, see Reports) offer a more traditional way of handling output where each object (for example, a Statistica Spreadsheet or Graph, or an Excel spreadsheet) is displayed sequentially in a word processor style document.



However, the technology behind this simple editor offers you very rich functionality. For example, like the workbook (see Statistica Workbooks), the Statistica Report is also an ActiveX container (see or the Electronic Manual) where each of its objects (not only Statistica Spreadsheets and Graphs, but also any other ActiveX-compatible documents, for example, Excel spreadsheets) remains active, customizable, and in-place editable.

The obvious advantages of this way of handling output (more traditional than the workbook) are the ability to insert notes and comments in between the objects as well as its support for the more traditional way of quick scrolling through and reviewing the output to which some users may be accustomed (for example, the editor supports variable speed scrolling).

Also, only the report output includes and preserves the record of the supplementary information, which contains a detailed log of the options specified for the analyses (for example, selected variables and their labels, long names, depending on the level of supplementary information specified in the **Output Manager**).

The obvious drawback, however, of these traditional reports is the inherent flat structure imposed by their word processor style format, although that is what some users or certain applications may favor.

Reports from Workbooks

When you have a Statistica Workbook containing analyses output, you might decide you want to transfer it to a report.

Open a Statistica Workbook and select all of the files, such as select the first file, press the SHIFT key on your keyboard, and select the last file. Then, click **Add to Report** on the **Home** tab in the **Output** group. All the files in the workbook will be duplicated in a Statistica Report.

RTF (Rich Text Format) Reports

RTF (Rich Text Format) is a Microsoft standard method of encoding formatted text and graphics for easy transfer between applications. When reports are saved in Rich Text Format (*.rtf), all file formatting is preserved so that it can be read and interpreted by other RTF- compatible applications (for example, Word).

The Statistica Report format (.str) adheres to RTF conventions; however, saving reports in the default Statistica Report format ensures that the reports will be opened in Statistica, giving you complete access to the report tree.

In order to open a Statistica report in an RTF-compatible application, open the report, select the **Home** tab, click the **Save** arrow, and select **Save As** from the drop-down menu to display the Save As dialog box. From the **Save as type** drop-down list, select **Rich Text Files (*.rtf)**, enter a name in the **File name** field, and click the **Save** button. You can then open the file in any RTF- compatible application.

Acrobat (PDF) Reports

PDF is the acronym for Portable Document Format; it is the industry-standard format for storing textual and graphical data. PDF offers a graphically rich appearance and structure that makes it ideal for presentation purposes. Additionally, PDF documents can be viewed in both image and textual mode, such as you can either select data as a formatted image or as regular text.

PDF is platform independent, and most operating systems offer free PDF viewing applications (for example, Adobe Acrobat on Windows and Ghostscript on Linux).

PDF has been approved as an acceptable document storage format for regulated environments according to the FDA's 21 CFR Part 11.

To save a Statistica Report as a PDF file, open the report, select the **Home** tab, and then select **Save As PDF** from the **Save** menu. The Output Options dialog box is displayed, where you can choose whether to output spreadsheets as **Objects (as they are sized in the report window)** or **Full-sized Spreadsheets (on separate pages)**.

If you always want to output spreadsheets in the same manner, select the **Use the current setting and do not display this dialog again** check box. Click the **OK** button to close the

Output Options dialog box and display the Save report as PDF dialog box. Use the **Save in** field to select the appropriate location in which to save the document, enter a name in the **File name** field, and click the **Save** button. Statistica Reports, Spreadsheets, and Graphs can all be saved in PDF format.

These are not simplified PDF files (representing compressed bitmaps of the respective document page images) but full-featured PDF files that support such operations as selective copying of text information.

HTML Reports

You may want to post a Statistica Report or Workbook on the Internet for others to review. With Statistica, you can save reports and workbooks in HTML (an acronym for HyperText Markup Language) format. HTML uses tags to identify elements of the document, such as text or graphics.

Open a Statistica Report or Workbook, and select **Save As** from the **Save** menu (located on the **Home** tab in the **File** group) to display the Save As dialog box. From the **Save as type** drop-down list, select **Web Page (*.html; *.htm)** to save the file with an *.htm extension.

Graphs in the report or workbook are saved as *.png files in the same folder as the HTM file. You can save graphs as JPG files, instead. To do this, click **Options** (on the **Home** tab in the **Tools** group) to display the Options dialog box. Select either **Reports** or **Workbooks** in the tree view, according to which document you intend to send to an .htm document, select the **JPEG format** option button in the **Export HTML images as** group box, and click **OK**.

Microsoft Word

With Statistica, you can also route output directly to Word using the Office Integration features.

When Word is open within Statistica, Word toolbars and menus are also available through standard Active X Document interfaces technology. In Statistica, you can perform any formatting and editing that Word supports in its application.

When sending spreadsheet analytical results to Word, Statistica takes advantage of table editing facility in Word, and converts the spreadsheet to a table. For multi-page spreadsheets, you can control where to break the rows and columns. These spreadsheets will be broken by columns such as will be allowed without exceeding the page width. All rows for a given set of columns will be rendered before the next set of spreadsheet columns is rendered in the Word document. This solution enables the presentation of spreadsheets in Word that are natively editable in Word, displays the entire contents of the spreadsheet, and prints and paginates correctly.

As with standard Statistica Reports, Word documents can store and preserve the record of supplementary information (for example, selected variables, long names)

To send output to a Word document, use the options in the **Output Manager** (accessible by selecting **Output Manager** from the Start button drop-down menu located in the upper-left corner of the ribbon bar; or by selecting the **Home** tab, clicking **Options** in the **Tools** group, and selecting **Output Manager** in the Options dialog tree view). In the **Microsoft Word Output** drop-down list, select either **Multiple Word documents (one for each analysis/graph)**, **Common Word document (one shared for all analyses/graphs)**, or **[Select File]** to browse to a preexisting Word document.

Although Word documents do not provide the navigational tree of a Statistica Workbook or Report, the advantages in sending output to Word documents are many. By sending results to a Word document, you have all the word processing features of Word available. For example, you can attach templates to create customized documents, add tables of content and indices, track changes.

When inserting a large spreadsheet into a Word document, Statistica automatically detects how many variables can fit on each page and partitions the spreadsheet into several Word tables. If the spreadsheet uses case names, those names will be the first column in each table.

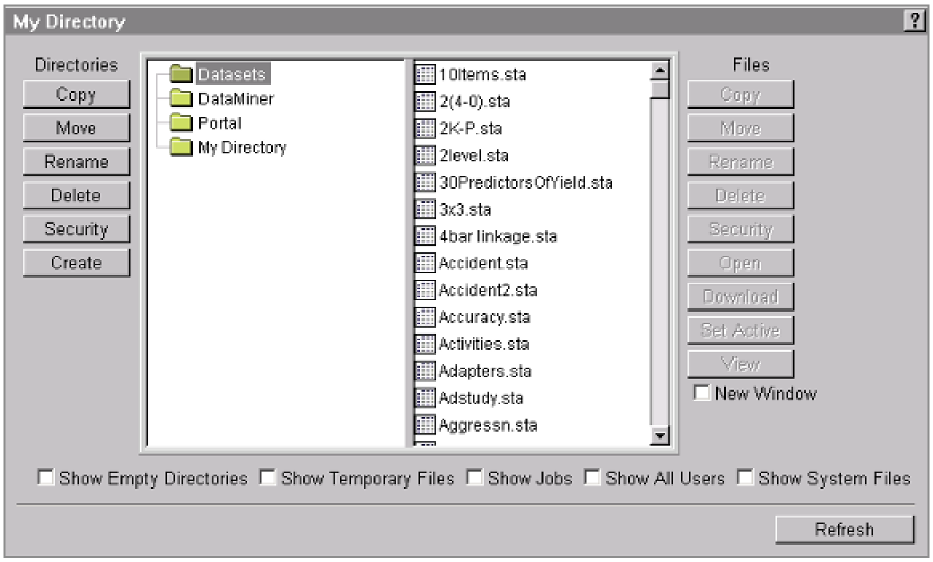
Additional benefits of sending results to a Word document include increased printing functionality (for example, printing to files, manual duplex) and the ability to save results as Web pages.

Output to the Web

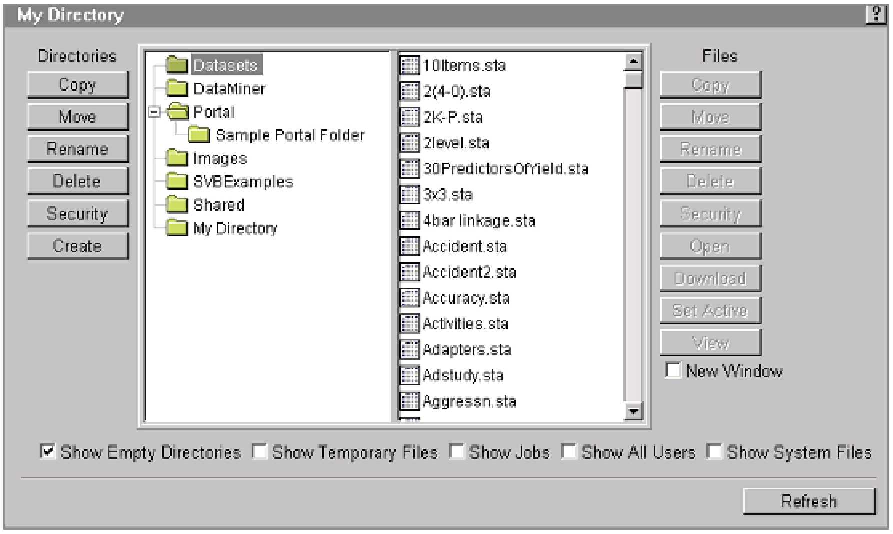
Knowledge Portal

Statistica Enterprise Server Reports, or any Statistica Reports (see HTML Reports), can be distributed through the Knowledge Portal. The Knowledge Portal enables you to publish Statistica documents (spreadsheets, graphs, reports, or workbooks) to the Internet. Users with limited Knowledge Portal permissions can then view those documents. You can control who can access these documents by setting permissions on the documents and directories using standard Statistica Enterprise Server repository tools.

To publish content in the Knowledge Portal, first create a directory in the Statistica Enterprise Server repository in the Portal folder: log on to the Statistica Enterprise Server as a user with Administrator rights, and from the **File** menu, select **My Directory Operations** to display the My Directory dialog box; the content will look similar to the following illustration.



To create a folder in the Portal directory to contain your reports, select the Portal folder, and then click the **Create** button to display the Explorer User Prompt dialog box. In the edit field, enter the new directory name of Sample Portal Folder, and click **OK**. A dialog box is displayed confirming that the directory/Portal/Sample Portal Folder was created. Click the **Show My Directory** button, and you will be returned to the My Directory dialog box. Select the **Show Empty Directories** check box, and then click the **Refresh** button. Expand the Portal directory by clicking the + next to that folder, and the new Sample Portal Folder is displayed.



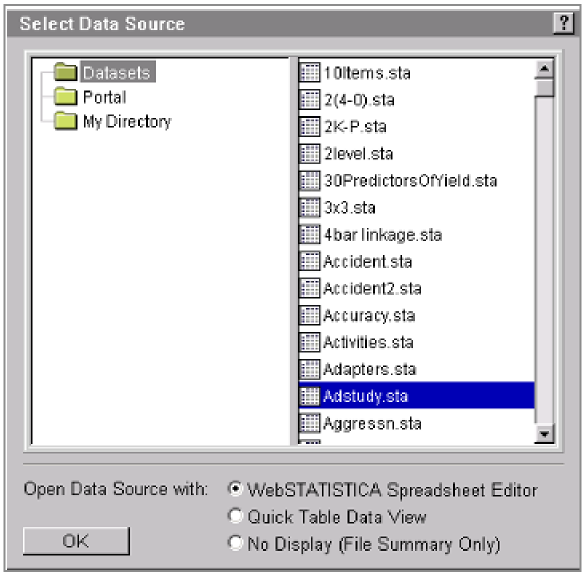
Note: You can control who can read and write to this folder by selecting the Sample Portal Folder, clicking the **Security** button, and using the options to set the user and group permissions for the folder appropriately.

Publishing Content from Statistica Enterprise Server

Now that the folder has been created, you can add analysis results to it for Portal users to view using either Statistica Enterprise Server or Statistica.

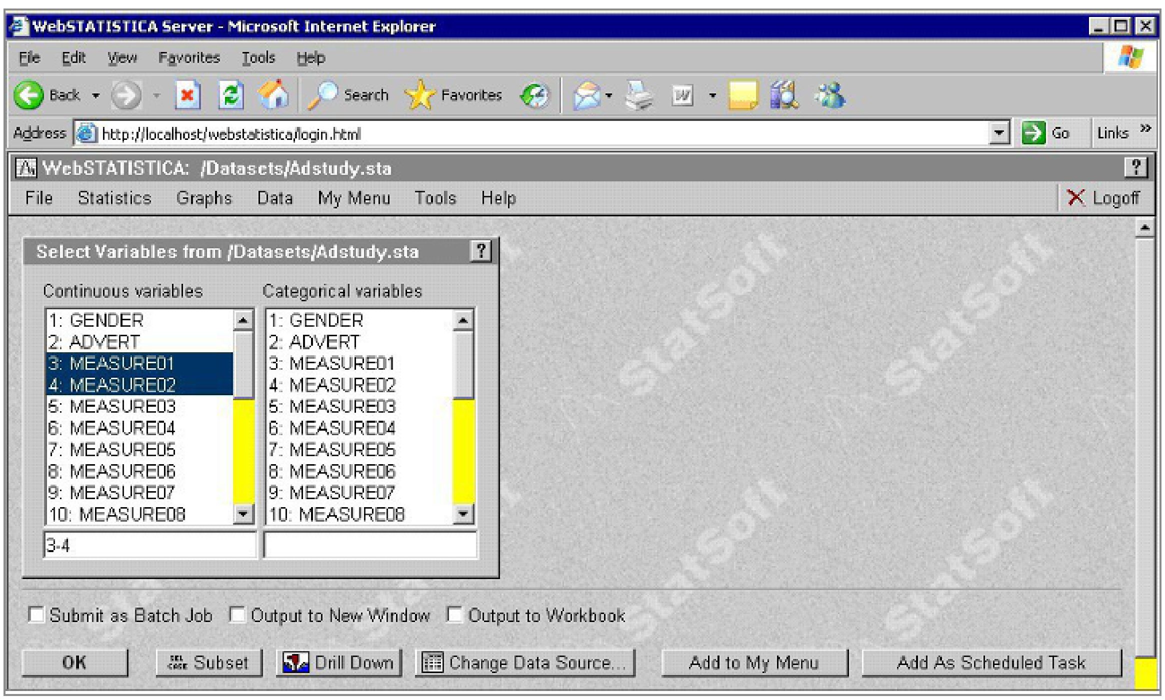
Procedure

1. In Statistica Enterprise Server, start with a typical analysis. From the **File** menu, select **Open Data Spreadsheet**.
2. In the Select Data Source dialog box, select the Datasets folder in the left pane, select the data file `Adstudy.sta` in the right pane, and click **OK**.

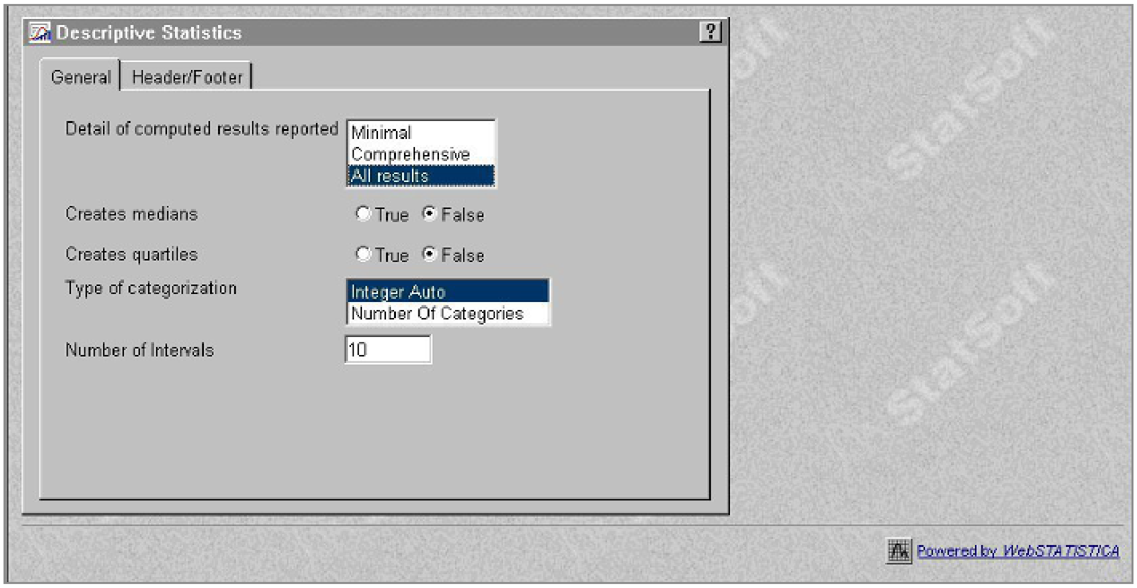


3. Close the resulting Spreadsheet Editor window (we won't need it in this example), leaving just the browser window displaying the active data source summary information for `Adstudy.sta`.

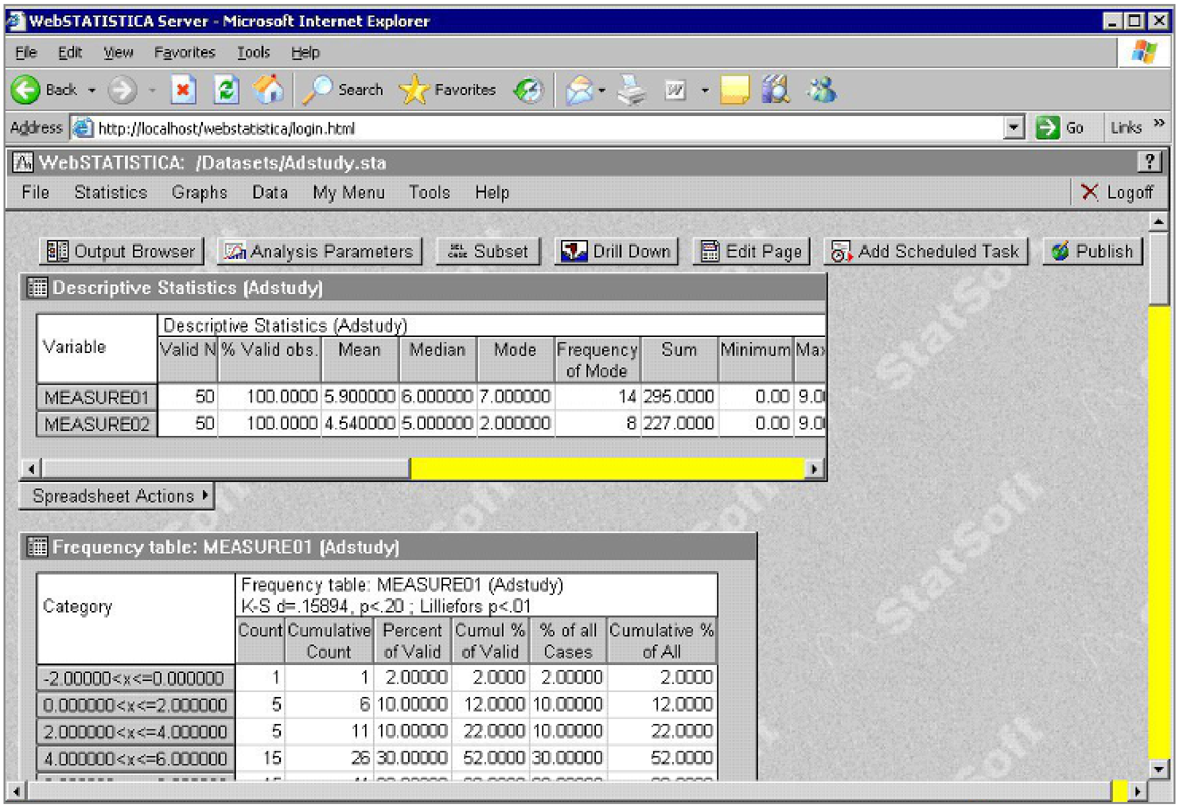
4. From the **Statistics - Basic Statistics and Tables** submenu, select **Descriptive Statistics** to display the variable selection dialog box and the **Descriptive Statistics** specifications dialog box. In the variable selection dialog box, select **MEASURE01** and **MEASURE02** in the **Continuous variables** column.



5. In the Descriptive Statistics specifications dialog box, select **All results** in the **Detail of computed results reported** field.



6. Click **OK** to display the results for this analysis, consisting of several spreadsheets and graphs.

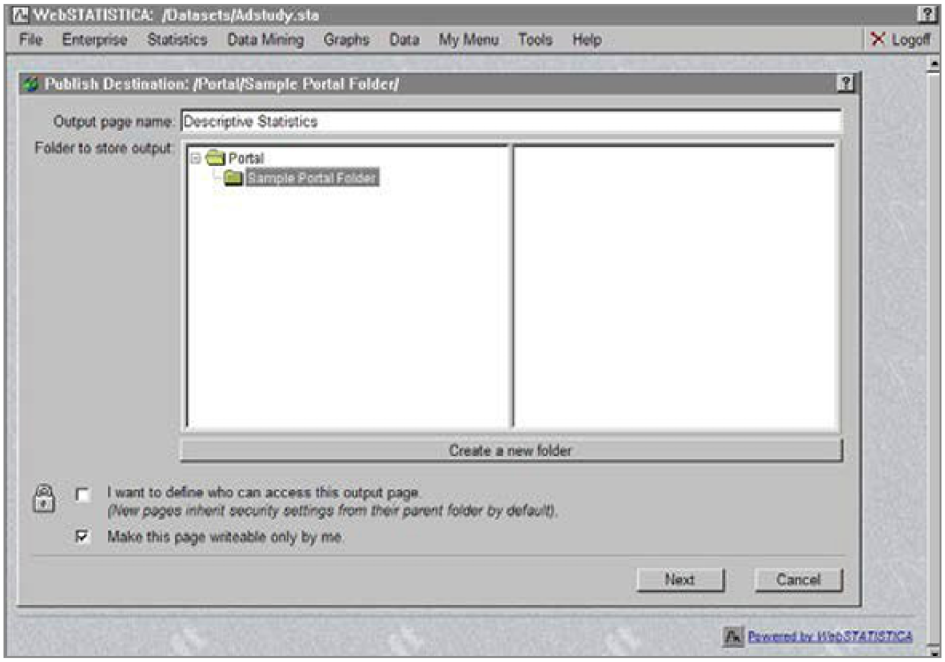


Variable	Valid N	% Valid obs.	Mean	Median	Mode	Frequency of Mode	Sum	Minimum	Max
MEASURE01	50	100.0000	5.900000	6.000000	7.000000	14	295.0000	0.00	9.0
MEASURE02	50	100.0000	4.540000	5.000000	2.000000	8	227.0000	0.00	9.0

Frequency table: MEASURE01 (Adstudy)
K-S d=.15894, p<.20 ; Lilliefors p<.01

Category	Count	Cumulative Count	Percent of Valid	Cumul % of Valid	% of all Cases	Cumulative % of All
-2.00000<x<=0.000000	1	1	2.00000	2.0000	2.00000	2.0000
0.000000<x<=2.000000	5	6	10.00000	12.0000	10.00000	12.0000
2.000000<x<=4.000000	5	11	10.00000	22.0000	10.00000	22.0000
4.000000<x<=6.000000	15	26	30.00000	52.0000	30.00000	52.0000

7. To publish this page so that other users can see it from the Knowledge Portal, click the **Publish** button in the upper-right portion of the window. The Publish Destination dialog box is displayed. Here you can select the Sample Portal Folder that you created. You also can control who can have access to this particular page by selecting the **I want to define who can access this output page** check box.



8. Click the **Next** button, and the page is saved to the selected destination.
9. Now, when a Knowledge Portal user logs on, they can see the new Sample Portal Folder in their output browser, from which they can select the newly added Descriptive Statistics page.

Publishing Content from Statistica Desktop Applications

With the Statistica Enterprise Server integration feature of desktop Statistica, you can also publish Statistica documents (spreadsheets, graphs, reports, and workbooks) to the Knowledge Portal directly from within the Statistica application.

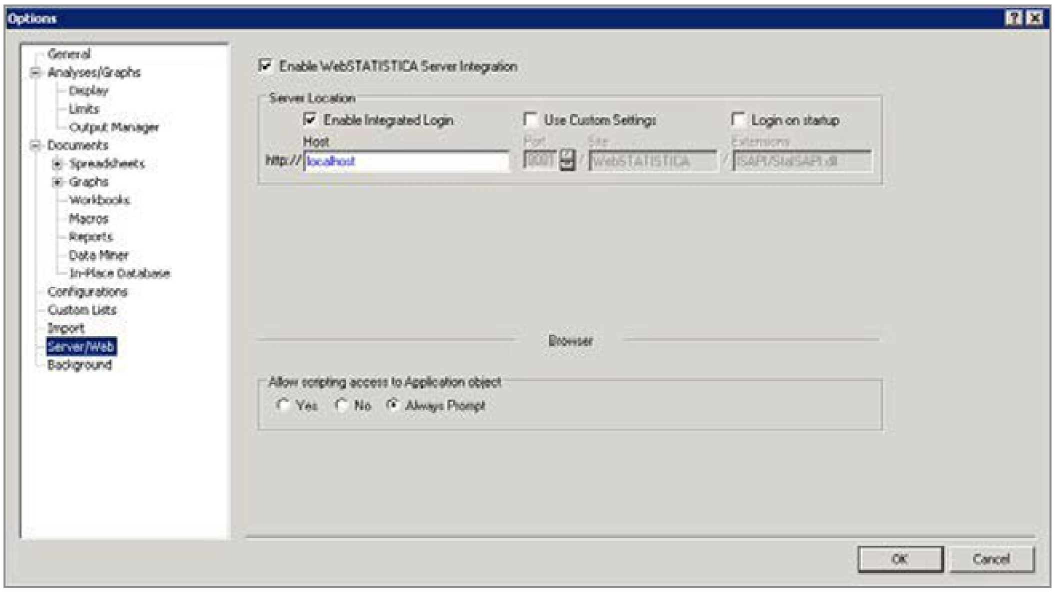
Before you begin

You must enable Statistica Enterprise Server integration.

Procedure

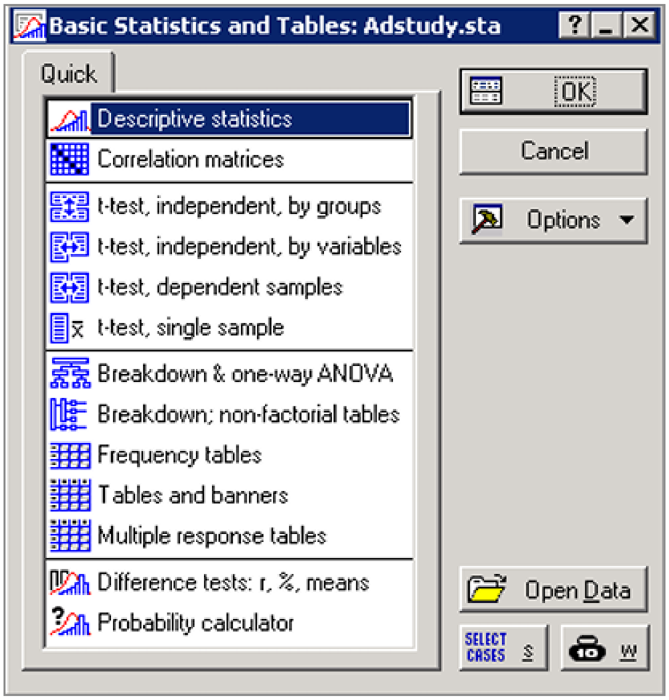
1. To display the Options dialog box, select the **Home** tab, and in the **Tools** group click **Options**.

2. Select **Server/Web** in the tree view, and in the options pane, select the **Enable Statistica Enterprise Server Integration** check box.
3. Then, specify the URL of the Statistica Enterprise Server and any optional custom configuration settings that may have been defined by your system administrator when installing Statistica Enterprise Server. In the following illustration, Statistica Enterprise Server has been installed on serverx23; the information in your dialog box is different depending on where Statistica Enterprise Server is installed on your network.

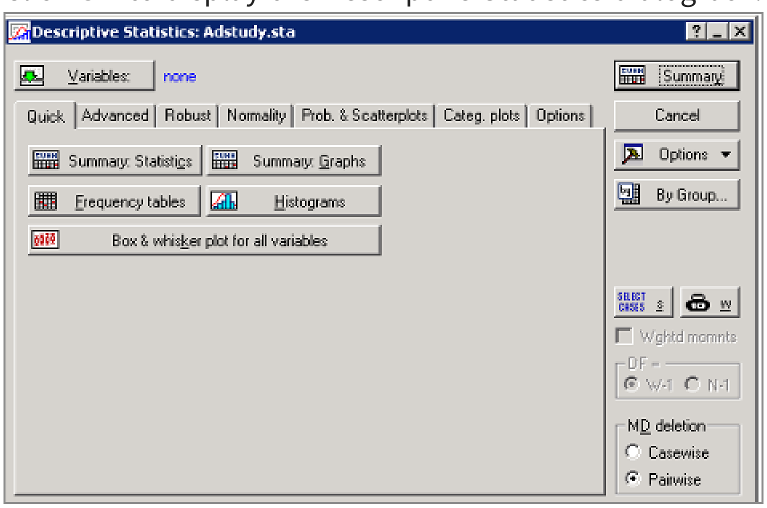


4. After you click the **OK** button in the Options dialog box, note that there is a now a **Server** tab displayed in Statistica next to the **Home** tab.
5. The available command on the Server tab initially is **Log In**; select that command. If you have enabled integrated log in (and your Windows account is enabled on the Statistica Enterprise Server), you can log in automatically. Otherwise, you are prompted for a Statistica Enterprise Server user name and password.
6. After you have logged in, the other commands are available on the Server tab. Create an analysis and upload the results to the Knowledge Portal.
7. Open the `Adstudy.sta` data file: select the **Home** tab, click the **Open** arrow, and select **Open Examples** from the drop-down menu; in the Open a Statistica Data File dialog, double-click on the Datasets folder, and then double-click on the `Adstudy.sta` file to open that spreadsheet for use in Statistica.
8. Select the **Statistics** tab, and in the **Base** group, click **Basic Statistics** to display the

Basic Statistics and Tables Startup Panel. Select **Descriptive statistics**.



9. Click **OK** to display the Descriptive Statistics dialog box.

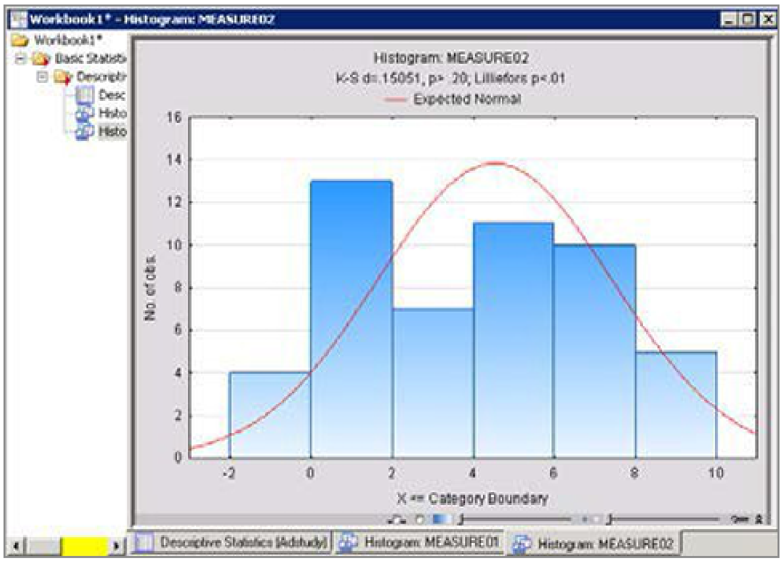


10. To ensure that all the output from this analysis will be sent to a workbook, click the **Options** button on the right side of the dialog box, and from the drop-down list, select **Output**. In the **Analysis/Graph Output Manager**, verify that the **Workbook** option button is selected in the **Place all results (Spreadsheets, Graphs) in** group box. Then click **OK** to return to the Descriptive Statistics dialog box.

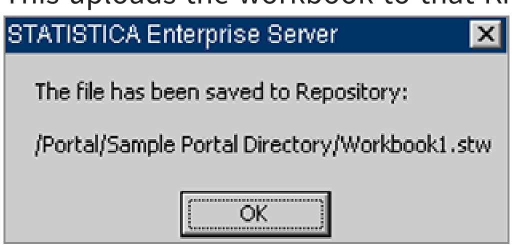
11. Click the **Variables** button to display the variable selection dialog box, select

MEASURE01 and **MEASURE02**, and click **OK** to return to the Descriptive Statistics dialog box. On the **Quick** tab, click the **Summary: Statistics** button to send those results to the workbook.

12. The Descriptive Statistics dialog box will be minimized so you can see the results; restore it by clicking the **Descriptive Statistics** button on the **Analysis Bar** in the lower-left of the screen. Now click the **Histograms** button to generate histograms for each selected variable. The analysis dialog box is minimized again, and the workbook is displayed.

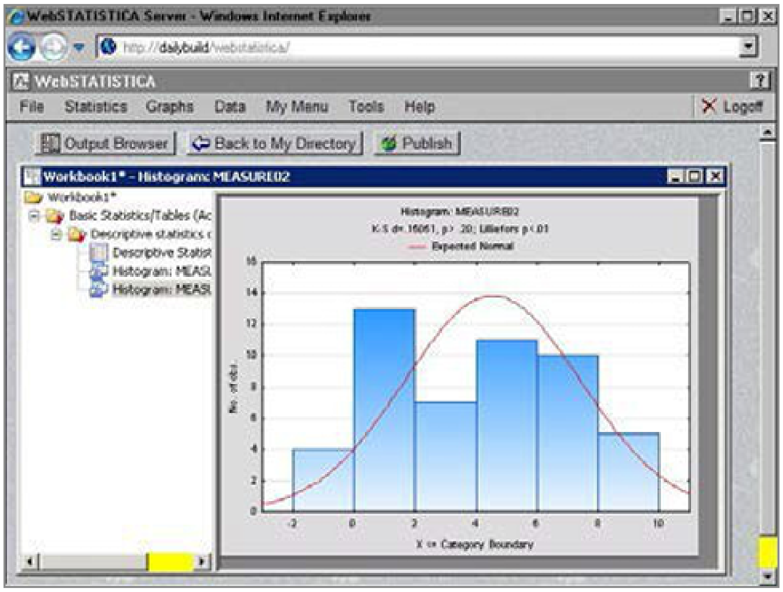


13. This is the document we want to publish to the Knowledge Portal. On the **Server** tab in the **File** group, click **Save As**. The Statistica Enterprise Repository dialog box is displayed, containing a list of folders you can reference in the Statistica Enterprise Server. Open the Portal folder, select Sample Portal Folder, and click the **OK** button. This uploads the workbook to that Knowledge Portal directory.



14. You can review the document from within Statistica by opening a browser window inside of the Statistica workspace. On the **Server** tab in the **Tools** group, select **Open in Browser**, and a new browser window is opened, and you can log on to the Statistica Enterprise Server.

15. From the Statistica Enterprise Server **File** menu, choose **My Directory Operations**; in My Directory, you can navigate to the Sample Portal Directory, and see the `Workbook1.stw` file that was uploaded. Select this file and click the **View** button, and the workbook will be opened within the browser.



SharePoint or Statistica Document Management System (SDMS)

With Statistica, you can also route output to either Microsoft SharePoint or to the Statistica Document Management System (SDMS).

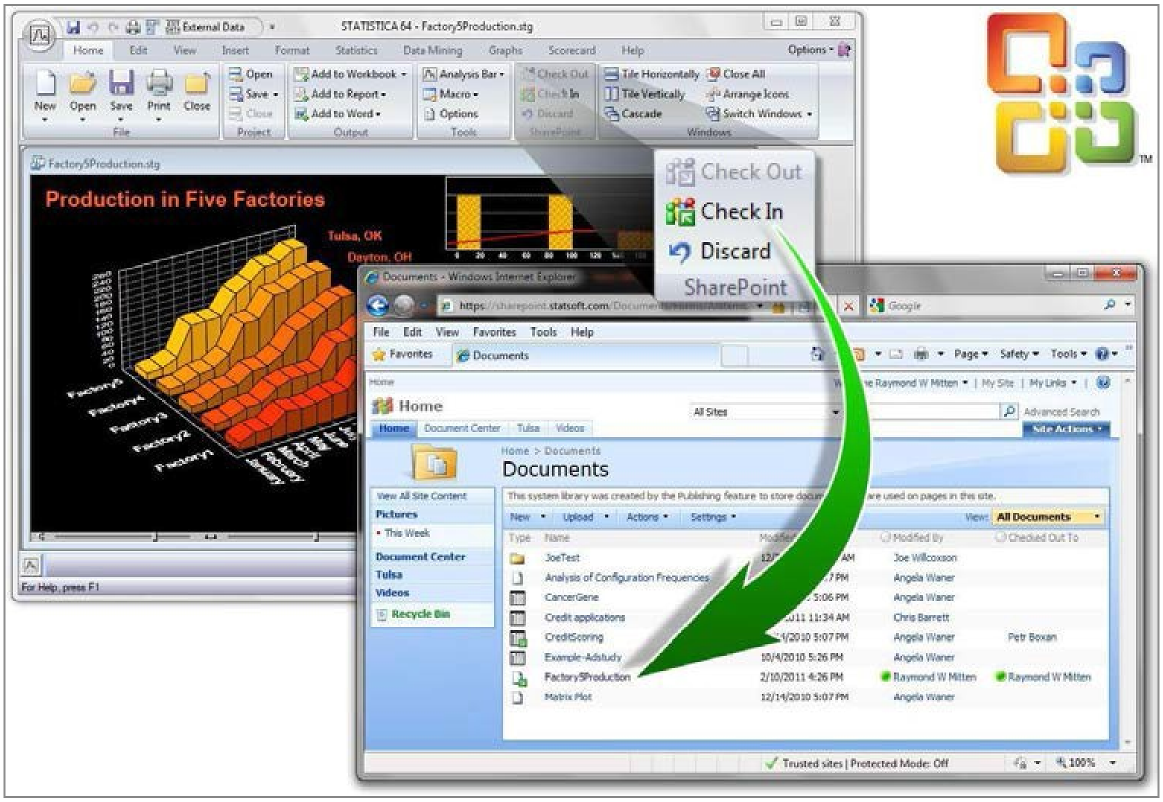
SharePoint

With Statistica SharePoint integration, you can open, check out, check in, and upload new Statistica files to SharePoint.

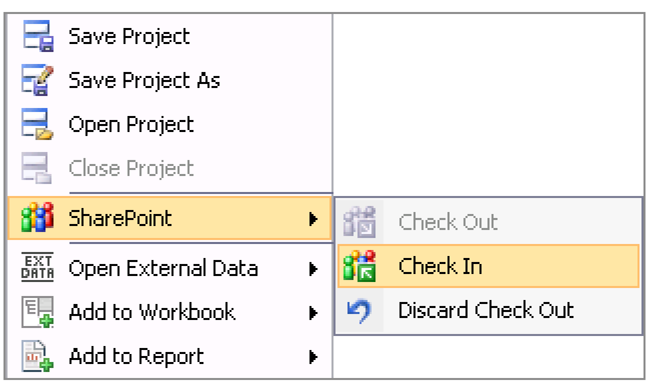
To open a document in Statistica that is located in SharePoint, select the **Home** tab. Click the **Open** arrow, and select **Open Document**. In the Open dialog box, in the **Look in** drop-down list, select the Web Folder to the SharePoint server location, and then navigate to the document you want to open. You will need to log on to SharePoint.

To save a Statistica document (spreadsheet, workbook, macro, etc.) to SharePoint, select the **Home** tab. Click the **Save** arrow, and select **Save As**. In the Save As dialog box, in the **Save in** drop- down list, select the Web Folder to the SharePoint server location, and then navigate to the location in which you want to save the document. You need to log on to SharePoint.

The SharePoint options **Check Out**, **Check In**, and **Discard** are located on the **Home** tab in the **SharePoint** group.



These options can also be accessed by clicking the **Start** button located in the upper-left corner of the ribbon bar. These options become available after you have opened a document from SharePoint.



Before using these options, you must first create a Web Folder to the SharePoint server location. To do this, click the **Start** button in the lower-left corner of the Windows taskbar, and click **Computer**. Right-click in any open area in the right pane of the Computer dialog box, and from the shortcut menu, select **Add a network location** to display the Add Network Location dialog box. Click the **Next** button.

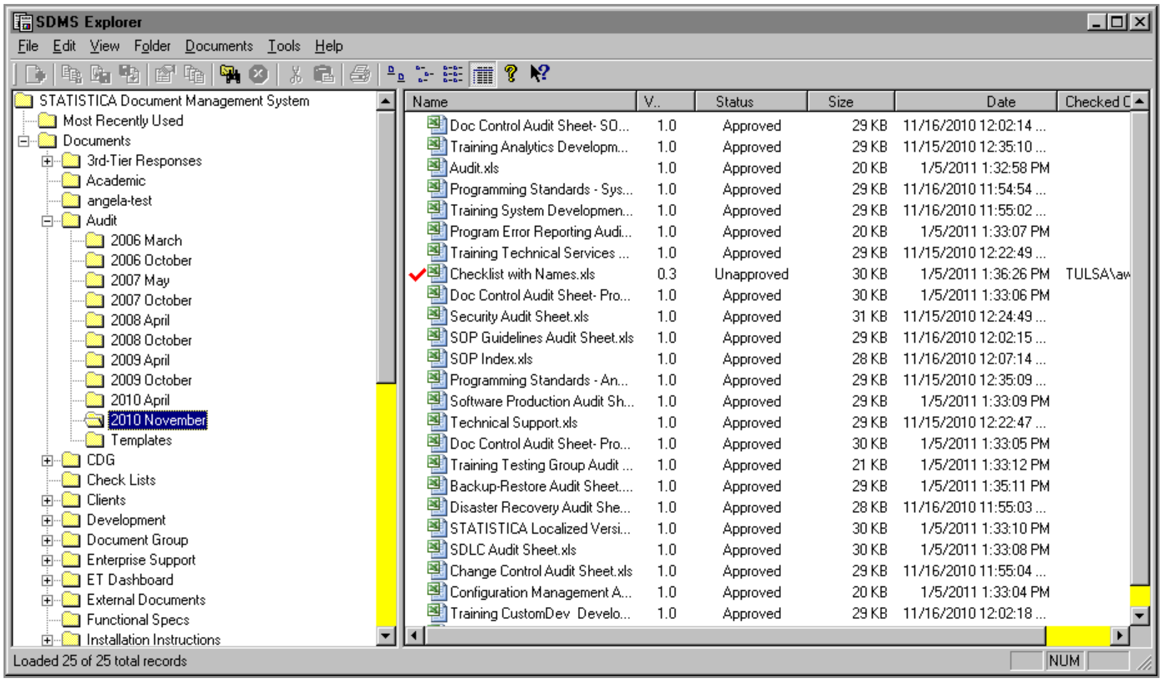
Double-click **Choose a custom network location**. In the Internet or network address field, enter the Web address of your SharePoint location: https://sharepoint..., or click the **Browse** button to browse to and select the location. Click **Next**.

Log on to SharePoint, and click **OK**. Enter a name for the Web Folder in the Type a name for this network location field, and click **Next**. You will see **Completing the Add Network Location** Wizard; select the **Open this network location when I click Finish** check box, and then click **Finish**. A Network Location Web Folder has been created in the Network Location section of Computer with the label you chose.

Statistica Document Management System (SDMS)

Statistica Document Management System (SDMS) is a complete database solution package for managing documents.

You can quickly, efficiently, and securely save documents of any type to a secure repository database using SDMS, and then manage them [for example, find them, access them, search for content, review, organize, edit (with trail logging and versioning), approve].



The intuitive user interface of SDMS makes it easy to perform all document management operations from any computer on your network or even via the Internet.

In the Statistica Document Management System, everything is documented and traceable. For example, documents are never deleted. When a document is edited, a new version of that document is created, properly authenticated, and annotated with electronic signatures.

Authorized users can be required to explicitly check out the documents from the repository and check the new versions into the repository with notes and documentation regarding the nature and purpose of the edits.

SDMS is specifically designed to ensure compliance with FDA 21 CFR Part 11 regulations and Sarbanes-Oxley legislation, as well as ISO 9000, 9001, 14001 documentation requirements.

Statistica Document Management System seamlessly integrates with all Statistica products, from desktop and network versions, to enterprise-wide installations such as Statistica Enterprise Server-based worldwide installations or Statistica Enterprise/QC (for process analysis and quality control/improvement). SDMS can also be used as a stand-alone system.

SDMS is highly configurable, and its functionality is compatible with other applications, so the system can be customized to accommodate your specific tasks and can be integrated seamlessly into existing systems for data and documents.

Statistica Documents

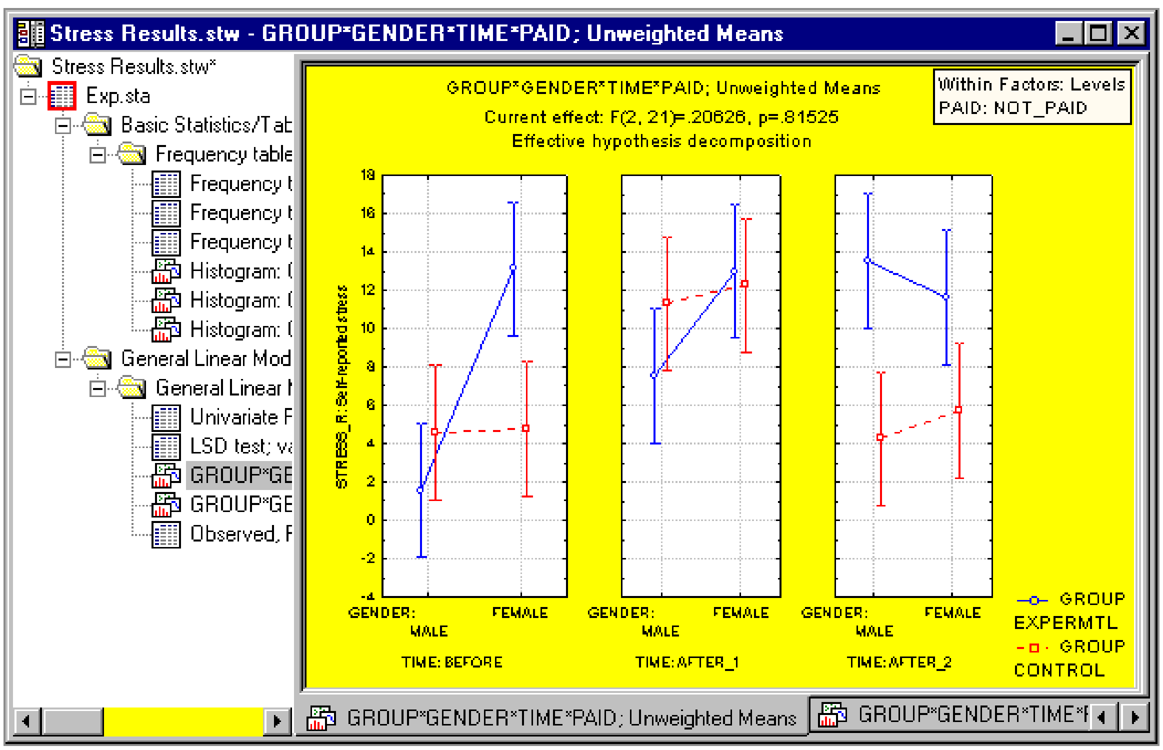
There are four types of statistica output documents.

- Workbooks
- Spreadsheets
- Reports
- Graphs

Workbooks

Workbooks are the default way of managing output.

They store each output document (for example, a Statistica Spreadsheet or Graph, as well as a Word or Excel document) as a tab.



Statistica Workbooks are optimized ActiveX containers that can efficiently handle large numbers of documents. The documents can be organized into hierarchies of folders or document nodes (by default, one is created for each new analysis) using a tree view, in which individual documents, folders, or entire branches of the tree can be flexibly managed.

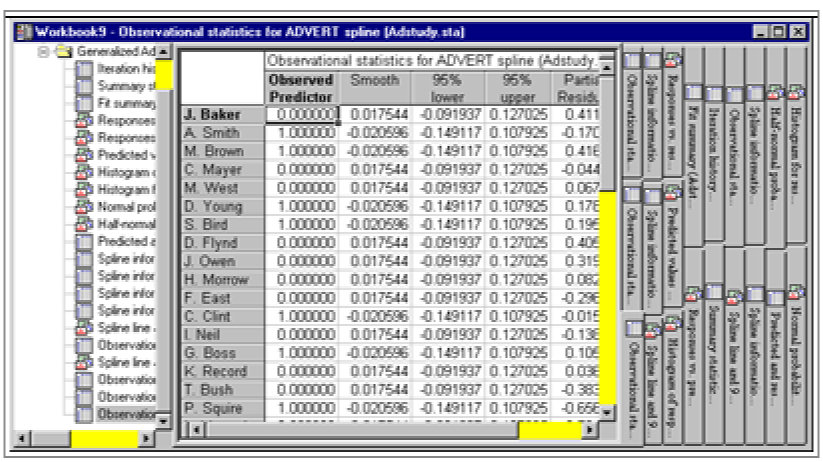
For example, selections of documents can be extracted (for example, drag-copied or drag-moved) to the report window or to the application workspace (such as the Statistica application background where they are displayed in stand-alone windows). Entire branches can be placed into other workbooks in a variety of ways in order to build a specific folder organization.

Each workbook contains two panels: an Explorer-style navigation tree on the left and a document viewer on the right.

The navigation tree (workbook tree) can be split into various nodes that are used to organize files in logical groupings (for example, all analysis outputs or all macros created for a project).

Tabs at the bottom of the document viewer (workbook viewer) are used to easily navigate the children of the currently selected node. You can move the tabs to the top, right, or left of the workbook viewer by right-clicking on one of the tabs and selecting a different location from the shortcut menu.

One advantage of the side placement of tabs is that multiple rows (rather than one long row) are provided. This makes it easy to select the desired tab.



Displaying tabs can also be suppressed to save space. Unlike many Explorer-style navigation and organization applications that only allow folders to have children, the Statistica Workbook allows any item in the tree to have children.

For example, you can add a spreadsheet to your workbook, and then add all the graphs produced using the data in the spreadsheet as children to the spreadsheet. A variety of drag-and-drop features and Clipboard procedures are available to aid you in organizing the workbook tree.

The workbook can hold all native Statistica documents including spreadsheets, graphs, reports, and macros. It can contain other types of ActiveX documents as well, including Excel spreadsheets, Word documents, and others. If you want to edit these documents, you can do so using the workbook viewer pane.

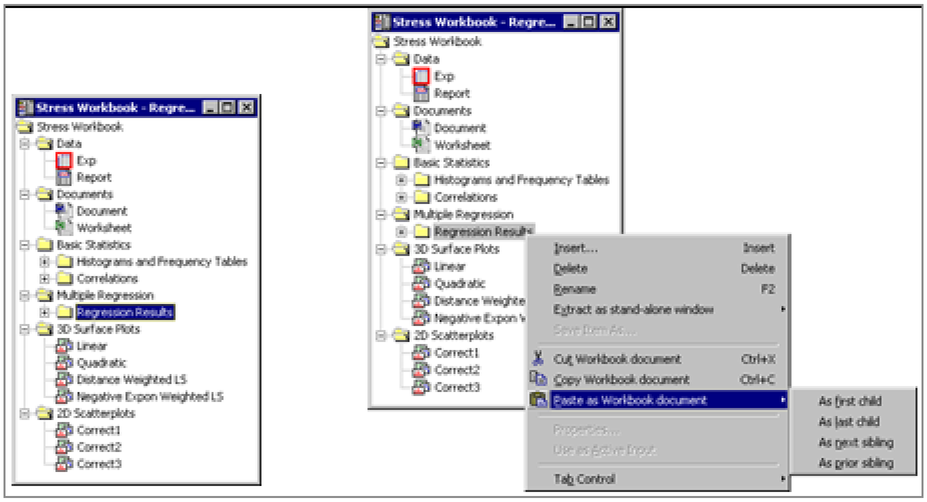
To edit a Word document, double-click on the object in the workbook tree. The Word document opens in the viewer, and the workbook menu bar merges with the Word menu bar giving you access to all of the editing features you need. Workbooks can also be used to store all output from a particular analysis.

Navigating the Workbook Tree

The workbook tree displays the organization of files and folders in the workbook, displayed in an Explorer-style format.
Items with plus signs next to them indicate folders or files that have children associated with them.

Procedure

1. To expand the tree for a particular folder or file, click the plus sign next to it. The workbook can support an unlimited number of levels, and individual items from the tree view or entire branches can be flexibly (interactively) managed. For example, dragging to copy or move between workbooks or reports, or using the shortcut menu, as shown in the second image.



2. To select a workbook item for review or editing, simply locate the file in the workbook tree and click on its associated icon.

   The document is displayed in the workbook viewer pane.

3. You can also navigate through the children of the currently selected node using the navigation tabs available by default at the bottom of the workbook viewer. You can easily move these navigation tabs to the top, right, or left of the workbook viewer. To do this, right-click on one of the tabs and select a different location from the shortcut menu or select the appropriate command from the Workbook tab, Tools group, Tab Control menu.

   > **Note:** Tabs at the top and bottom of the viewer scroll sideways, while multiple rows of tabs are used when tabs are placed to the left or right of the viewer.

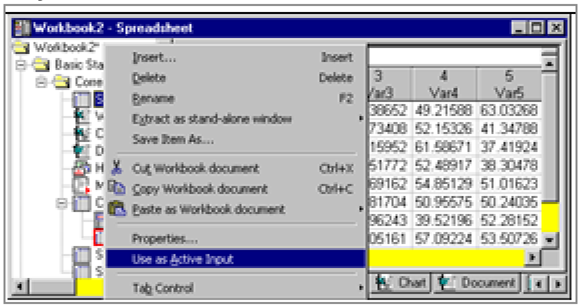
4. Items in the tree are identified by the icon next to them. The folder icon represents a folder that can contain a variety of documents and subfolders. The folder icon with a red arrow on it indicates that the script that produced the results in that folder has been attached to the folder.

5. You can now rerun or resume the analysis (for more details, see Statistica Visual Basic). The spreadsheet, report, macro, and graph icons represent Statistica Spreadsheet, Report, Macro, and Graph documents, respectively. The Data Miner icon represents a Data Miner workspace.

6. All non-Statistica documents are represented by their respective document icons. For

example, Word documents are represented by the  Word icon, and Excel spreadsheet files are represented by the  Excel spreadsheet icon.

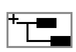
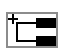
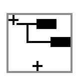
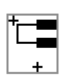
7. Commands for inserting, extracting, renaming, and removing items from the workbook tree are available from the workbook tree shortcut menu. Right-click anywhere in the tree to access these commands.



8. These commands are also accessible on the **Workbook** tab.

9. The workbook tree can be organized and modified using drag-and-drop features (as well as Clipboard procedures). Use keys on your keyboard to specify whether an item is to be moved or copied, and whether an item is to be inserted as a child (one level below) or as a sibling (on the same level).

   The following table illustrates four drag-and-drop options:

Action	Key Press	Cursor	Effect
Move Child	(none)		Move the first selected item one level below the second selected item.
Move Sibling	SHIFT		Move the first selected item directly below and on the same level as the second selected item.
Copy Child	CTRL		Copy the first selected item one level below the second selected item.
Copy Sibling	SHIFT + CTRL		Copy the first selected item directly below and on the same level as the second selected item.

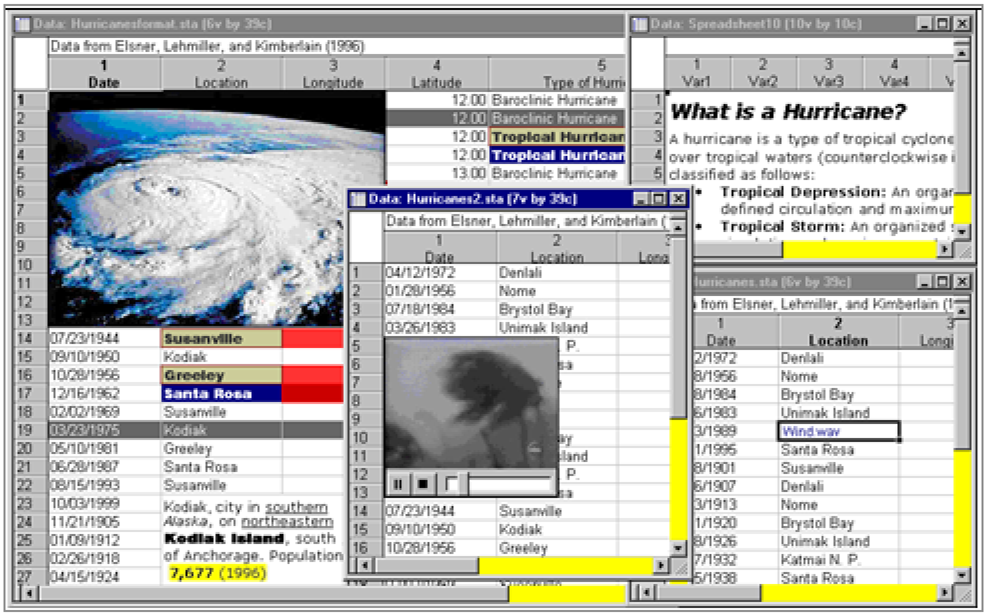
10. First, select the item that you want to move or copy. Drag the selection to its new location and drop it.

11. To select a single item, click on the item (for example, spreadsheet, graph, or report). To select a parent node and all of its children, click on the folder. Note that horizontal and vertical scrolling within the workbook tree can be utilized during a

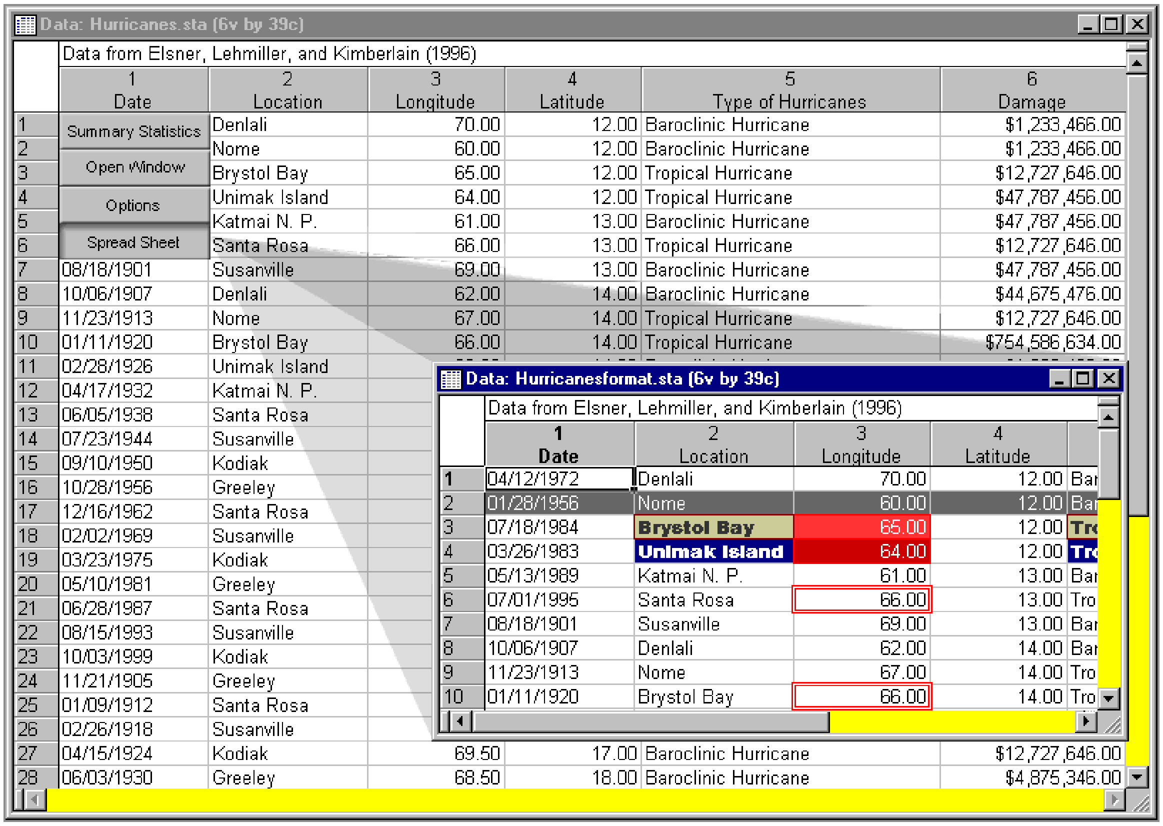
drag-and-drop operation.

Spreadsheets - Multimedia Tables

Statistica Spreadsheets are based on Statistica's proprietary multimedia table technology and are used to manage both input data and the numeric or text (and, optionally, any other type of) output. The basic form of the spreadsheet is a simple two-dimensional table that can handle a practically unlimited number of cases (rows) and variables (columns), and each cell can contain a virtually unlimited number of characters. Sound, video, graphs, animations, reports with embedded objects, or any ActiveX compatible documents can also be attached.

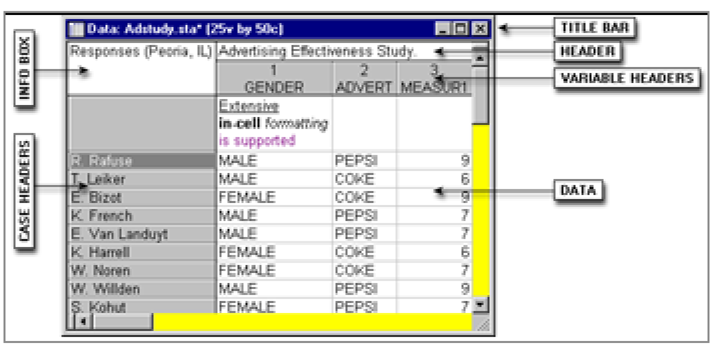


Because Statistica Spreadsheets can also contain macros and any user-defined user interface, these multimedia tables can be used as a framework for custom applications (for example, with a list box of options or a series of buttons placed in the upper-left corner), self-running presentations, animations, simulations.



Data file layout in spreadsheets. Statistica data are organized into cases and variables. If you are unfamiliar with this notation, you can think of cases as the equivalent of records in a database management program (or rows of a spreadsheet), and variables as the equivalent of fields (or columns of a spreadsheet). Each case consists of a set of values of variables, and the first column in the file can (optionally) contain names of cases.

The spreadsheet window comprises several basic components.



Title bar

The title bar displays the name of the spreadsheet followed by the spreadsheet extension (.sta). If the spreadsheet is an input spreadsheet, the title bar also displays the number of variables by number of cases (for example, 25v by 50c). In the image shown above, the title bar contains the text Data: Adstudy.sta (25v by 50c).

Info box

You can select the entire spreadsheet by clicking once in the lower-right corner (the mouse pointer will be the default arrow) of the info box, which is located in the upper-left corner of the spreadsheet window. To select the info box only (for formatting), click once in the upper-left corner of the info box (the mouse pointer will be an outlined plus sign). Double-click in the info box to enter or edit the text in the info box (for example, additional details about the spreadsheet). In the preceding image, the info box contains the text Responses (Peoria, IL).

Header

The header is located immediately above the variable headers at the top of the window. Double-click the header to enter or edit text information. To select the header only (for formatting), click once in the upper-left corner (the mouse pointer will be an outlined plus sign). Press CTRL+ENTER or ALT+ENTER to enter a new line (note that you need to extend the height of the field to see new lines that you are adding). In the preceding image, the header contains the text Advertising Effectiveness Study.

Case headers

These cells, located at the far left of the window, contain header information for each case. Double-click on any case header cell to enter or edit text information. To select the case header only for formatting, click once on the left side of the case header (the mouse pointer is an outlined plus sign). To select the case row for editing, click once on the middle or right side of the case header (the mouse pointer is an outlined plus sign with an arrow). To select a block of case headers, without selecting their respective rows, click on the left side of a case header and drag the mouse pointer to include all desired case headers.

To autofit the case headers, double-click on the far-right side of any case header (the mouse pointer is a cross with a double-headed arrow). In the preceding image, the case header cells contain the first initials and last names of the respondents in the study. Note that case headers are optional and you can choose not to display them. Select the **View** tab, in the **Display** group click **Display Options**, and toggle off the **Case Names** command. If they are not displayed, the case numbers are shown.

Variable headers

These cells, located at the top of each column, contain header information for each variable. To display details about an individual variable, double-click on the variable header cell.

To select the variable header only (for formatting) click once in the upper portion of the variable header (the mouse pointer is an outlined plus sign). To edit the variable column, click once in the lower portion of the variable header (the mouse pointer is an outlined plus sign with an arrow).

To autofit the variable column, double-click on the right side of the variable header (the mouse pointer will be a cross with a double-headed arrow). In the previous image, the first two variable header cells contain the text GENDER and ADVERT. You have the option to change how the variable header cells display information so that they show the column number associated with the variable, the variable long name, and/or an abbreviation of the display types for the variables in the spreadsheet. Each of these options is available on the **View** tab in the **Display** group; click **Variable Headers**.

Data (and in-cell formatting options)

The remainder of the spreadsheet contains data that pertain to the cases and variables and any optional attached or linked objects (multimedia objects, macros, custom user interface). Text in cells can be of practically unlimited length (in most Statistica configurations it is limited to 1,000 characters to protect against inadvertent pasting of unwanted large amounts of data into one cell). Text in cells can be extensively formatted including wrapping the text, different fonts, and font attributes.

Input vs. Output Spreadsheets

Statistica offers the ability to open and use many spreadsheets at the same time, allowing you to work with several different input data files simultaneously.

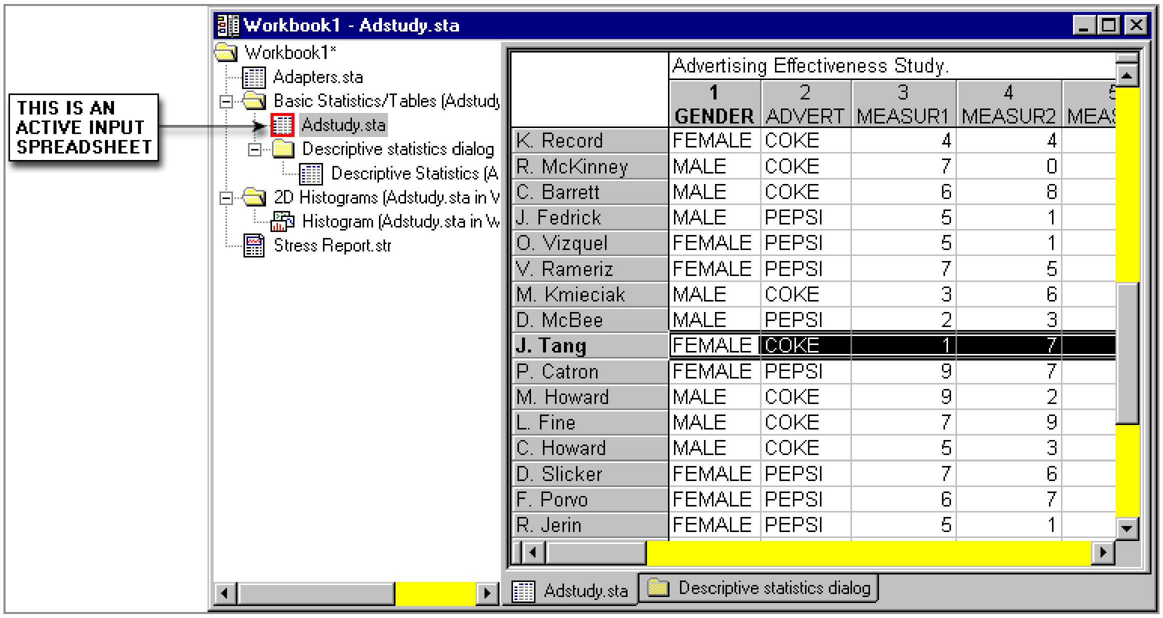
In addition to storing data, Statistica uses spreadsheets to display the numeric output from its analyses. Because Statistica makes no distinction in the features supported for an input spreadsheet (from which Statistica retrieves its data) and an output spreadsheet (where the results of an analysis are displayed), it is easy to use the results of one analysis as input data for further analyses.

Any spreadsheet opened from a disk file is automatically treated as an input spreadsheet, and any number of input spreadsheets can be open at a time. To avoid confusion, however, an output spreadsheet (containing the results of an analysis) is not automatically available as input data for analysis. It must first be designated as an input spreadsheet before being used for further analyses. Additionally, input spreadsheets report the number of variables and cases for that spreadsheet in the title bar. For example, if `Exp.sta` (88v by 48c) is in the title bar, it is an input spreadsheet; if `Exp.sta` is in the title bar, it is not an input spreadsheet.

To designate an output spreadsheet as an input spreadsheet, select the spreadsheet (such as ensure the spreadsheet has the focus). Then, on the **Data** tab in the **Mode** group, select the **Input** check box. Now you can begin an analysis, and Statistica will use the data from the specified input spreadsheet for the analysis. Note that if you switch back to another spreadsheet that has previously been designated as an input spreadsheet, it can still be used for analyses as well.

In a workbook, only one spreadsheet can be selected for analyses at a time, even if the workbook contains several input spreadsheets. This spreadsheet is called the Active Input spreadsheet, and its icon (in the workbook tree) is framed in red.

By default, when an output spreadsheet is designated as an input spreadsheet, Statistica automatically selects it as the Active Input spreadsheet. To select another input spreadsheet for active input, select the **Active Input** check box on the **Workbook** tab in the **Items** group, or select **Use as Active Input** from the workbook tree shortcut menu.

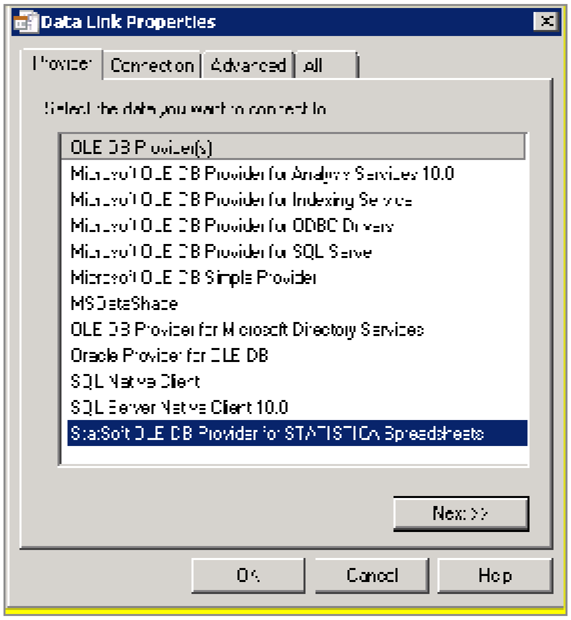


It is also possible to leave a stand-alone spreadsheet open but designate it as unavailable for analysis. To do this, select the spreadsheet, and clear the **Input** check box on the **Data** tab in the **Mode** group. Now Statistica automatically defaults to the most recently selected input spreadsheet for analysis, ignoring all spreadsheets that are not designated as input spreadsheets.

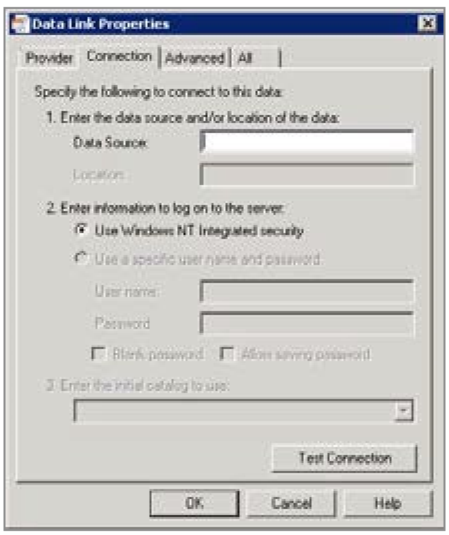
Statistica Spreadsheet OLE DB Provider

In addition to using spreadsheets as data sources for analyses in Statistica, spreadsheets can also supply data to other database-aware applications by using the Statistica OLE DB Provider for Statistica Spreadsheets. This OLE DB driver is installed with Statistica, and allows read- only access to data in Statistica Spreadsheets using the industry-standard Structured Query Language (SQL). You can access the OLE DB Provider at any point the system allows you to choose a database connection, using the standard Microsoft Data Link Properties.

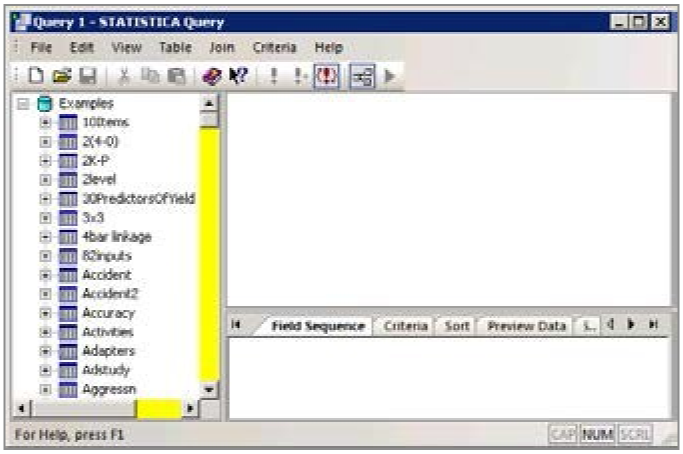
1. To access this functionality, select the **Data** tab. In the **Manage** group, click **External Data** and from the drop-down list, select **Create Query**. In the Database Connection dialog box, click the **New** button to display the Data Link Properties dialog box, where you select **Statistica OLE DB Provider for Statistica Spreadsheets**.



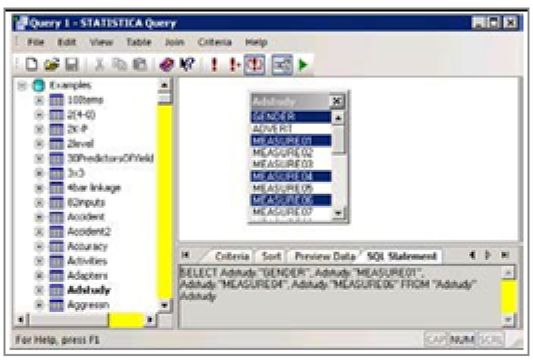
2. Click the **Next** button to display the **Connection** tab.



3. The **Data Source** field specifies the directory path where the spreadsheet is located. When creating the query, you can choose individual spreadsheet files within that directory. The following example uses Statistica Query, and has defined a connection to the Spreadsheet OLE DB, specifying the path of the Statistica Examples folder. Each spreadsheet within the folder shows up as a potential table.



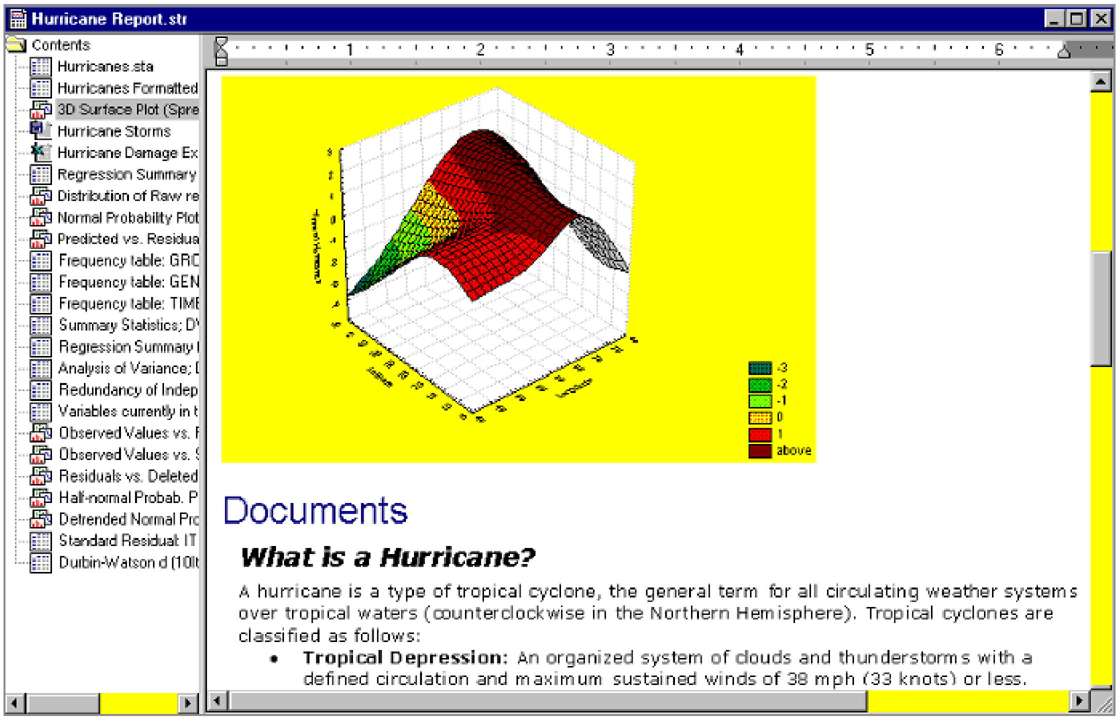
4. These spreadsheets can be referenced in FROM clauses, specific variable names selected as fields in SELECT clauses, and cases defined with WHERE clauses. Joins between multiple spreadsheets are supported as well, using standard JOIN clauses.



5. Using the **StatSoft OLE DB Provider for Statistica Spreadsheets** you can provide Statistica Spreadsheet data to any application (including Statistica itself) that can use the industry-standard OLE DB interface for querying data.

Reports

Reports (briefly introduced on page 119) in Statistica offer a more traditional way of handling output (compared to workbooks) as each object (for example, a Statistica Spreadsheet or Graph, or an Excel spreadsheet) is displayed sequentially in a word processor style document.



However, the technology behind this simple report offers you rich functionality. For example, like the workbook, each Statistica Report is also an ActiveX (see page 184) container whereeach of its objects (not only Statistica Spreadsheets and Graphs, but also any other ActiveX- compatible documents, for example, Word documents) is active, customizable, and in-place editable. Reports are stored in the STR file format, which is a Statistica extension of the Microsoft RTF (Rich Text Format, *.rtf) format. STR files share the RTF formatting information and additionally they include the tree view information (which cannot be stored in the standard RTF files). Report files are by default saved with the file name extension *.str, but they can also be saved as standard RTF files (in which case the tree information will not be preserved).

The obvious advantages of this way of handling output (more traditional than the workbook) are the ability to insert notes and comments “in between” the objects as well as its support for the more traditional way of quickly scrolling through and reviewing the output to which some users may be accustomed.

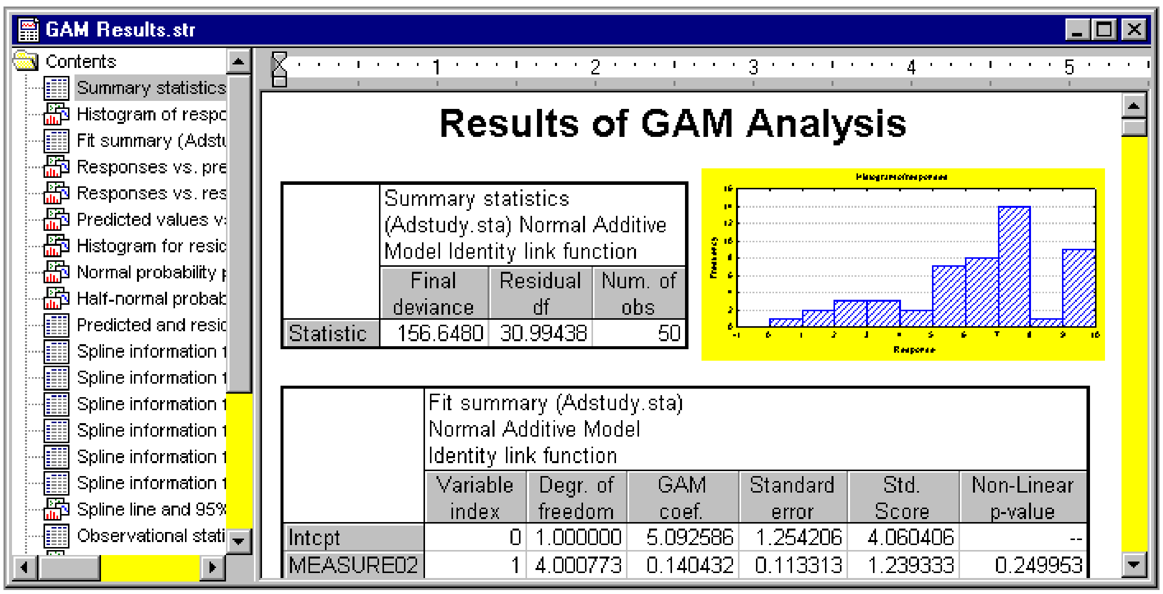
Also, only the report output includes and preserves a record of the supplementary information, which contains a detailed log of the options specified for the analyses (for example, selected variables and their labels, long names, etc., depending on the level of supplementary information specified in the Output Manager, see page 21).

The obvious drawback, however, of these traditional reports is the inherent flat structure imposed by their word processor style format, though that is what some users of certain applications may favor.

When performing an analysis, the ultimate goal is to create meaningful output in order to gain an understanding of the data. The manner in which the output is produced is important as well. Statistica offers a variety of methods to produce reports that accommodate the diverse needs of users.

Statistica Reports

Statistica Reports (for more information, see Reports) offer a more traditional way of handling output where each object (for example, a Statistica Spreadsheet or Graph, or an Excel spreadsheet) is displayed sequentially in a word processor style document.



However, the technology behind this simple editor offers you very rich functionality. For example, like the workbook (see Statistica Workbooks), the Statistica Report is also an ActiveX container (see or the Electronic Manual) where each of its objects (not only Statistica Spreadsheets and Graphs, but also any other ActiveX-compatible documents, for example, Excel spreadsheets) remains active, customizable, and in-place editable.

The obvious advantages of this way of handling output (more traditional than the workbook) are the ability to insert notes and comments in between the objects as well as its support for the more traditional way of quick scrolling through and reviewing the output to which some users may be accustomed (for example, the editor supports variable speed scrolling).

Also, only the report output includes and preserves the record of the supplementary information, which contains a detailed log of the options specified for the analyses (for example, selected variables and their labels, long names, depending on the level of supplementary information specified in the **Output Manager**).

The obvious drawback, however, of these traditional reports is the inherent flat structure imposed by their word processor style format, although that is what some users or certain applications may favor.

Reports from Workbooks

When you have a Statistica Workbook containing analyses output, you might decide you want to transfer it to a report.

Open a Statistica Workbook and select all of the files, such as select the first file, press the SHIFT key on your keyboard, and select the last file. Then, click **Add to Report** on the **Home** tab in the **Output** group. All the files in the workbook will be duplicated in a Statistica Report.

RTF (Rich Text Format) Reports

RTF (Rich Text Format) is a Microsoft standard method of encoding formatted text and graphics for easy transfer between applications. When reports are saved in Rich Text Format (*.rtf), all file formatting is preserved so that it can be read and interpreted by other RTF- compatible applications (for example, Word).

The Statistica Report format (.str) adheres to RTF conventions; however, saving reports in the default Statistica Report format ensures that the reports will be opened in Statistica, giving you complete access to the report tree.

In order to open a Statistica report in an RTF-compatible application, open the report, select the **Home** tab, click the **Save** arrow, and select **Save As** from the drop-down menu to display the Save As dialog box. From the **Save as type** drop-down list, select **Rich Text Files (*.rtf)**, enter a name in the **File name** field, and click the **Save** button. You can then open the file in any RTF- compatible application.

Acrobat (PDF) Reports

PDF is the acronym for Portable Document Format; it is the industry-standard format for storing textual and graphical data. PDF offers a graphically rich appearance and structure that makes it ideal for presentation purposes. Additionally, PDF documents can be viewed in both image and textual mode, such as you can either select data as a formatted image or as regular text.

PDF is platform independent, and most operating systems offer free PDF viewing applications (for example, Adobe Acrobat on Windows and Ghostscript on Linux).

PDF has been approved as an acceptable document storage format for regulated environments according to the FDA's 21 CFR Part 11.

To save a Statistica Report as a PDF file, open the report, select the **Home** tab, and then select **Save As PDF** from the **Save** menu. The Output Options dialog box is displayed, where you can choose whether to output spreadsheets as **Objects (as they are sized in the report window)** or **Full-sized Spreadsheets (on separate pages)**.

If you always want to output spreadsheets in the same manner, select the **Use the current setting and do not display this dialog again** check box. Click the **OK** button to close the Output Options dialog box and display the Save report as PDF dialog box. Use the **Save in** field to select the appropriate location in which to save the document, enter a name in the **File name** field, and click the **Save** button. Statistica Reports, Spreadsheets, and Graphs can all be saved in PDF format.

These are not simplified PDF files (representing compressed bitmaps of the respective document page images) but full-featured PDF files that support such operations as selective copying of text information.

HTML Reports

You may want to post a Statistica Report or Workbook on the Internet for others to review. With Statistica, you can save reports and workbooks in HTML (an acronym for HyperText Markup Language) format. HTML uses tags to identify elements of the document, such as text or graphics.

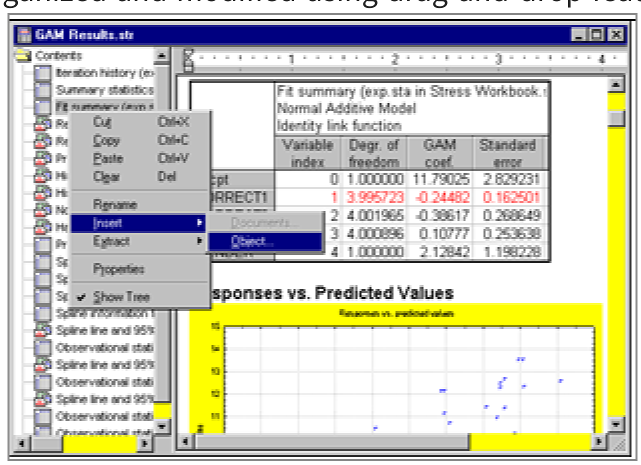
Open a Statistica Report or Workbook, and select **Save As** from the **Save** menu (located on the **Home** tab in the **File** group) to display the Save As dialog box. From the **Save as type** drop-down list, select **Web Page (*.html; *.htm)** to save the file with an *.htm extension.

Graphs in the report or workbook are saved as *.png files in the same folder as the HTM file. You can save graphs as JPG files, instead. To do this, click **Options** (on the **Home** tab in the **Tools** group) to display the Options dialog box. Select either **Reports** or **Workbooks** in the tree view, according to which document you intend to send to an .htm document, select the **JPEG format** option button in the **Export HTML images as** group box, and click **OK**.

Navigating the Report Tree

The report tree displays the organization of files in the report.
The files are displayed in an Explorer-style format; however, unlike workbooks that can support any number of levels, the report supports only one level of files. You can embed any type of Statistica document in a report, including spreadsheets, graphs, and analyses. In addition to Statistica document types, you can embed other types of ActiveX/OLE objects in a report, including Excel spreadsheets, Word documents, bitmap images, and others.

Procedure

1. To edit one of these types of embedded documents, double-click on the document. The file opens in the viewer, and the report toolbar merges with the toolbar from the embedded file's native application, giving you access to all of the editing features you need.
2. Items in the tree are identified by the icon next to them. The  spreadsheet,  macro, and  graph icons represent Statistica Spreadsheet, Macro, and Graph documents, respectively. The  Data Miner icon represents a Data Miner workspace. All non-Statistica documents are represented by their document icons. For example, Word documents are represented by the  Word icon, and Excel spreadsheet files are represented by the  Excel spreadsheet icon.
3. The report tree can be organized and modified using drag-and-drop features as well as Clipboard procedures. 

4. Commands for inserting, extracting, renaming, and removing items from the report tree are available from the report tree shortcut menu (accessed by right-clicking anywhere in the tree, as shown).

Graphs

Graphs represent another distinctive type of Statistica documents, and they offer rich functionality both in terms of the variety of ways in which graphs can be created in Statistica and in the selection of graph customization tools.

Similar to the other Statistica documents, graphs are ActiveX containers, which means that they can contain a variety of compatible documents (for example, Visio drawings, Adobe illustrations, Excel spreadsheets). Statistica Graphs are also ActiveX objects and, therefore, can be linked to or embedded into other compatible documents (for example, Word documents) where they can be in-place edited by simply double-clicking on them.

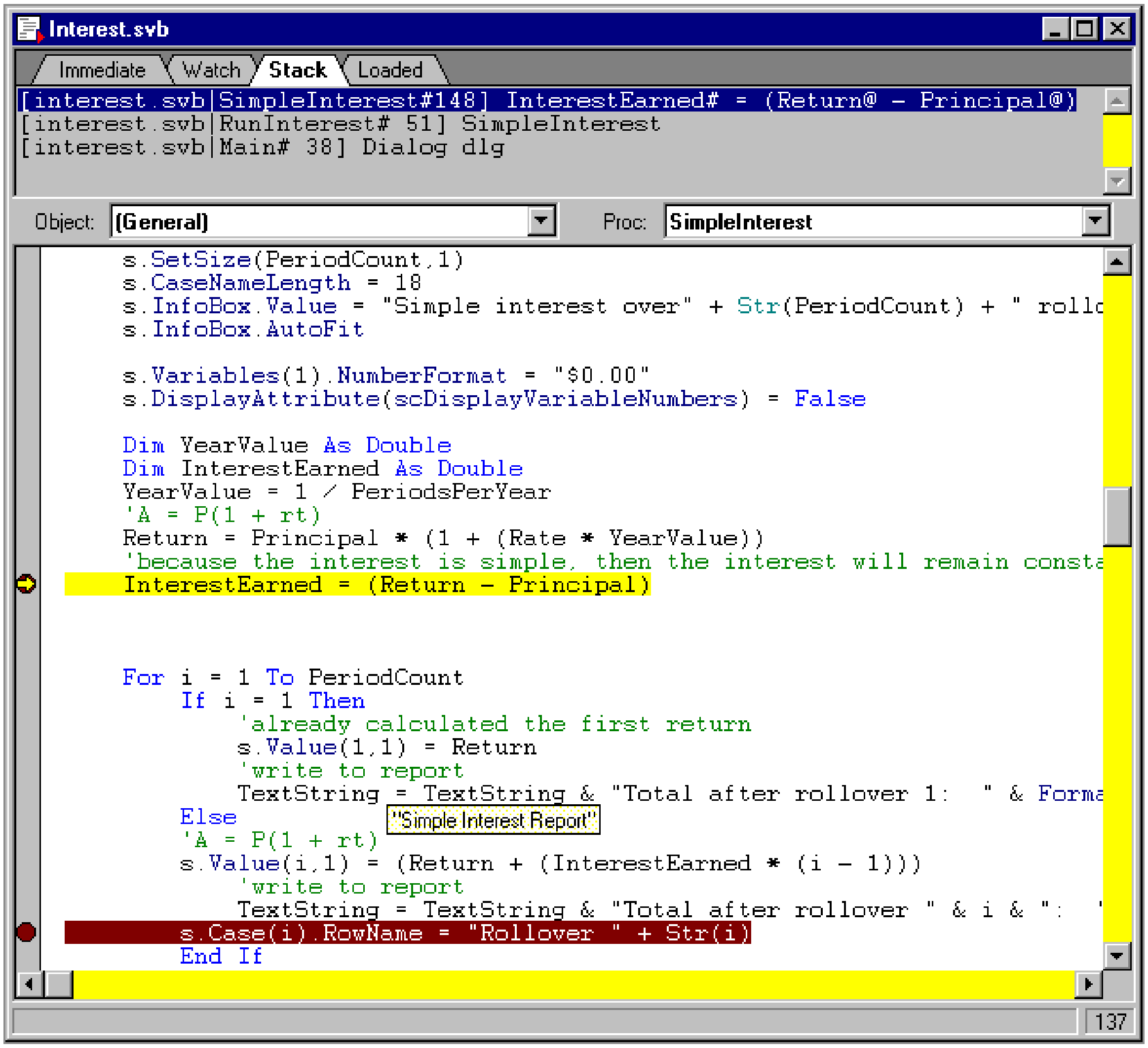
Macros - Statistica Visual Basic Programs

The industry standard Statistica Visual Basic (SVB) language (integrated into Statistica) offers another (alternative) user interface to the functionality of Statistica, and it offers incomparably more than just a supplementary application programming language that can be used to write custom extensions.

Note: Statistica Visual Basic is not Microsoft Visual Basic 6.0. Statistica owns and maintains the code for Statistica Visual Basic. SVB is compatible with Microsoft's VB.NET, Microsoft's Visual Basic for Applications (VBA), and also with Microsoft's Visual Basic 6.0 (VB6). SVB scripting language is unique in terms of its flexibility and compatibility, and it is also very powerful.

It provides access to Visual Basic for Applications (used for scripting Microsoft Office products) and access to the .NET Framework within the same file. Other APIs can also be accessed and leverage the flexibility of SVB such as, for example, Yahoo's Stock Quote API or Google Analytics API. SVB offers a powerful 64-bit solution for system integration, expansion, and custom development.

Statistica Visual Basic takes full advantage of the object model architecture of Statistica and is used to access programmatically every aspect and virtually every detail of the functionality of Statistica. Even the most complex analyses and graphs can be recorded into Visual Basic macros and later be run repeatedly or edited and used as building blocks of other applications. Statistica Visual Basic adds an arsenal of more than 14,000 new functions to the standard comprehensive syntax of Visual Basic, thus comprising one of the largest and richest development environments available.



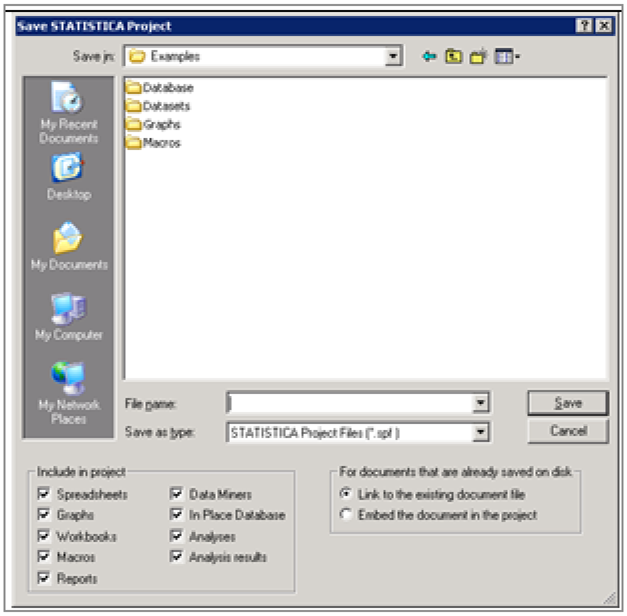
Statistica Macros can be saved in several formats, depending on how you intend to use them. You can also copy them to the Clipboard and paste them into other programs or documents.

Statistica Projects

When performing statistical analyses and working with Statistica documents, you will often have many different windows open, and even different analyses in different stages of progress.

Statistica provides a means for saving your workspace, including any analyses in progress. You can close Statistica at any point during an analysis, and when you later re-open the project, the previously opened files and in-process analyses will be restored.

To save a Statistica Project, select the **Home** tab, click the **Save** arrow in the **Project** group, and select **Save Project As** to display the Save Statistica Project dialog box.



In this dialog box, specify the path and file name of the Statistica Project file `.spf`. You can also specify what items to include in the project. All Statistica document types can be selected (Spreadsheets, Graphs, Workbooks, Macros, Reports, Data Miner projects, In-Place Database projects, Analyses, and Analysis results). For those Statistica documents that are already stored on disk, you have the option to either **Link to the existing document file**, or to store a copy of the document within the Statistica Project file (**Embed the document in the project**).

In addition to Statistica documents, project files will also save all in-progress analyses. The project file will store the recorded scripts that are automatically created when every analysis is run. When the project is re-opened, the scripts for the analyses are re-run against the original data and the analyses dialogs are made visible again in exactly the state they were when the project file was saved.

Project files are a convenient way to send in-progress analysis steps and results back and forth between users if you elect to embed the saved documents in the project file. One user can run analyses to a certain point, and then save the project file and pass it to another user, who can open the project file and continue exactly where the first user stopped the analyses.

Unless you configure it otherwise, Statistica will automatically display a prompt asking if you want to save a project file when quitting the program, and will automatically re-open the last-saved project file when starting. Thus, Statistica makes it easy to quit for the day and start the next session right where you left off.

Note: A project is a state of an instance of Statistica. Thus, projects are not like other documents in that you cannot open more than one project in a single instance of Statistica. A different project can be opened in a second instance of Statistica.

Graphs Overview

The most common application of graphs is to efficiently present and communicate information (typically, numerical data).

However, graphical techniques also provide powerful analytical tools for the exploration of data and verification of hypotheses.

A broad selection of graphics options

Statistica includes a comprehensive selection of graphical methods for both data analysis and the presentation of results. All graphs in Statistica include a broad selection of built-in, interactive analytic techniques and extensive customization tools that enable you to interactively control virtually all aspects of the display.

Also, flexible graphics management facilities are available that are used to integrate various graphical displays and to build dynamic links between applications (for example, using OLE- Object Linking and Embedding).

Comprehensive support for Visual Basic and other languages

Statistica graphical options can also be accessed programmatically (using built-in Statistica Visual Basic or other compatible languages), which creates practically unlimited possibilities for producing highly customized graphical displays.

These custom graphs can later be permanently added to Statistica's user interface (for example, assigned to buttons on toolbars or added to the menus).

General categories of graphs

The Statistica system offers a variety of methods in which graphs can be requested or defined.

They complement each other, providing a high level of integration between numbers (such as raw data, intermediate results, or final results) and graphical displays. For example, specialized graphs can be requested as part of the automatic output from statistical procedures, but they can also be requested via integrated tools to visualize virtually any combination of numbers (and/or labels) that are displayed or generated by Statistica.

Customization of Graphs

Interactive graph customization

The customization options in Statistica graphics include hundreds of features and tools that can be used to adjust every detail of the display and associated data processing. However, these options are arranged in a hierarchical manner, so those used most often are accessible directly via shortcuts by double-clicking or right-clicking on the respective element of the graph.

Permanent settings and automation options

The initial default settings of all of these features can be easily adjusted so that even the default appearance and behavior of Statistica graphs will match your specific needs and will require very little intervention on your part. Following are some of the ways to make these adjustments:

- **Options dialog:** Perhaps the most straightforward way to adjust the default appearance of graphs is by modifying the graph options in the Options dialog box (select the **Tools** tab and click **Options**). Most commonly used settings can be easily adjusted there (select **Display** or **Settings**, located under **Graphs**), and the results are reflected in the default styles that are used by the system and as such, they are automatically saved in the Statistica configuration file (for example, different settings can be used for different projects).
- **Graph style system:** All of the numerous features that affect the appearance of the graph (from as elementary as the color of the font in the footnote to as general as the global features of the graph document) can be saved as individual styles. These styles can be given custom names and later be reapplied using simple shortcuts (such as pressing a specific key combination or clicking a button on a custom toolbar). An intelligent system internally manages these thousands of styles and their combinations in Statistica and helps you achieve your customization objectives with a minimum amount of effort. All user-defined or modified styles are saved automatically in the Statistica configuration file. For example, different sets or systems of styles can be used for different projects.
- **User-defined graphs:** New types of graphs can be defined in a variety of ways and can be added to the menus, dialogs, or toolbars. If a custom graph that you intend to use repeatedly is not built from scratch but is based on one of the **Graphs** menu graphs and is produced by some combination of the existing graph customization

options, then adding it to the **Graphs** menu as a new type of graph is as simple as clicking the **Add As User-defined Graph to Menu** button on the **Options 2** tab of the graph specification dialog box. All user-defined graph specifications are saved automatically in the Statistica configuration file (for example, different sets of custom graphs can be used for different projects).

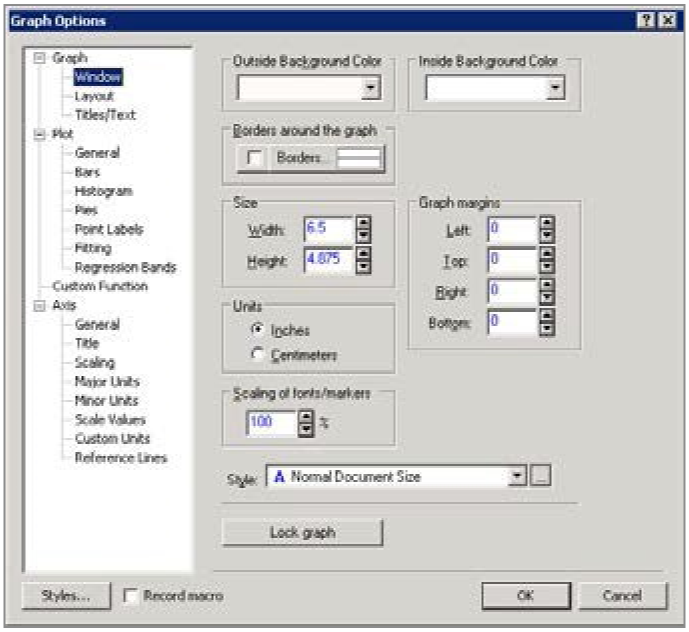
- **Statistica Visual Basic:** Finally, note that there are no limits to the level of customization your Statistica custom graphs can be, because Statistica Visual Basic (with all its powerful custom drawing tools as well as the Statistica-based library of graphics procedures) can be used to produce virtually any graphics or multimedia output supported by the contemporary computer hardware. Those custom developed displays or multimedia output can be assigned to Statistica toolbars, menus, or dialogs and become a permanent part of "your" Statistica application.

  The default settings of most graphs offered in Statistica follow the established conventions that are either explicitly described in the literature on statistical and technical graphing, or they represent standards that are commonly accepted by major scientific journals (for example, SCIENCE). However, practically all default settings of Statistica can be customized to meet specific requirements of unusual applications. Graphics facilities in Statistica were designed to play the role of flexible tools, capable of producing effects that go far beyond established patterns and templates.

Customizable Features

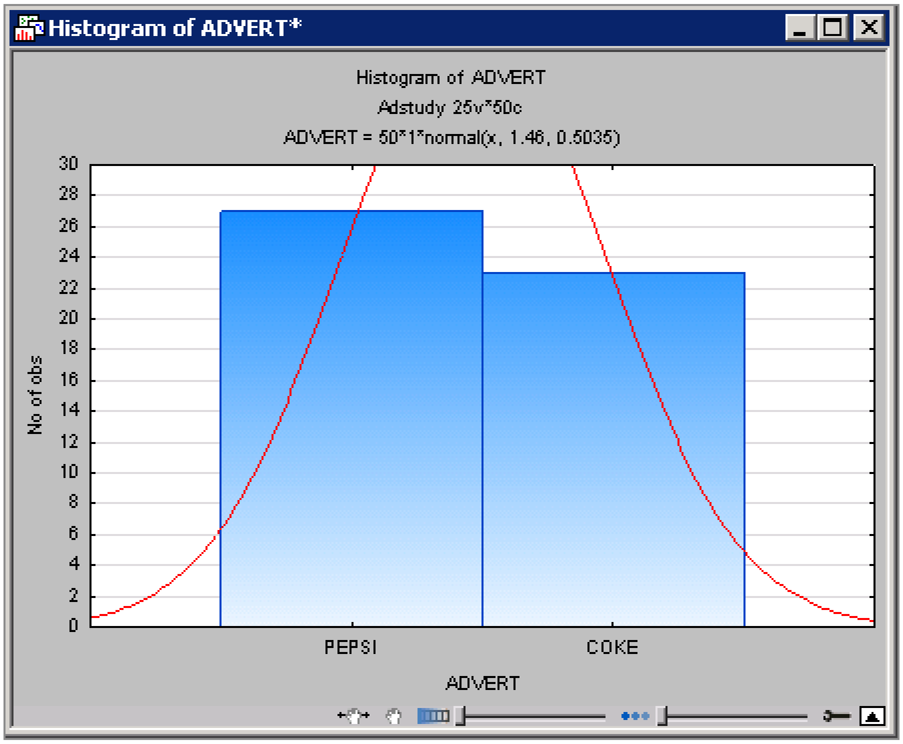
In addition to a comprehensive selection of standard statistical and technical graphs, Statistica includes numerous unique types of graphs and graph customization facilities.

The Graph Options dialog box, accessible by double-clicking in the background of a graph, or selecting the **Tools** tab and clicking **Graph** in the **Options** group, contains options that address all of the relevant customizable features for a particular graph. The options are grouped in clusters containing logically related items, and are an all-inclusive "superset" of graph shortcut options accessed by double-clicking specific graph features.

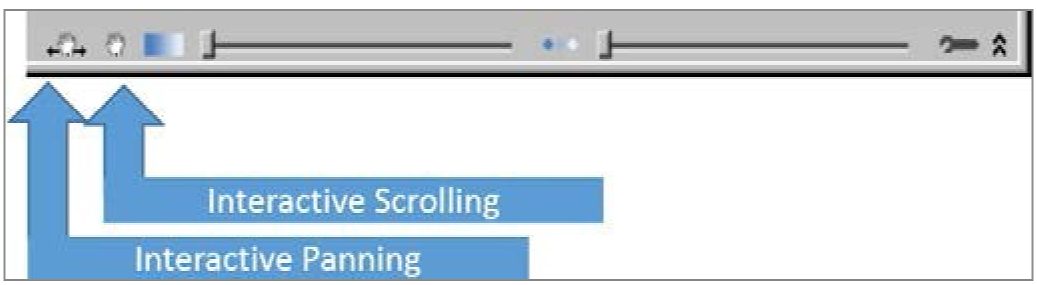


Located at the bottom of graphs, you'll find the interactive graphics controls, with which you can adjust the transparency of the plot areas and markers, and to scroll and pan in order to interactively scale the graph. More controls are located in 3D graphs to enable interactive rotation. Click the wrench icon adjacent to the sliders to display the Graph Options dialog box.

2D Graph

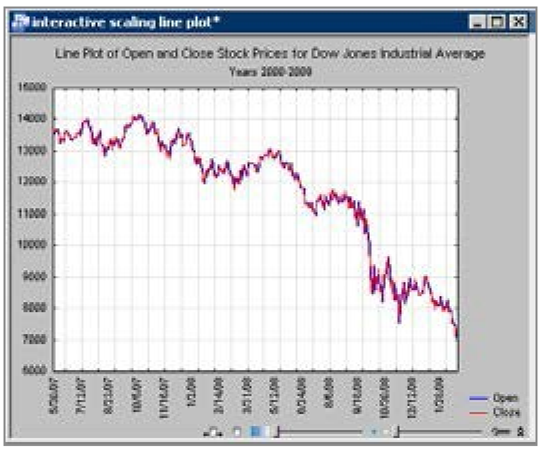


Enlarged image of Panning (scaling), Scrolling, and Transparency Controls

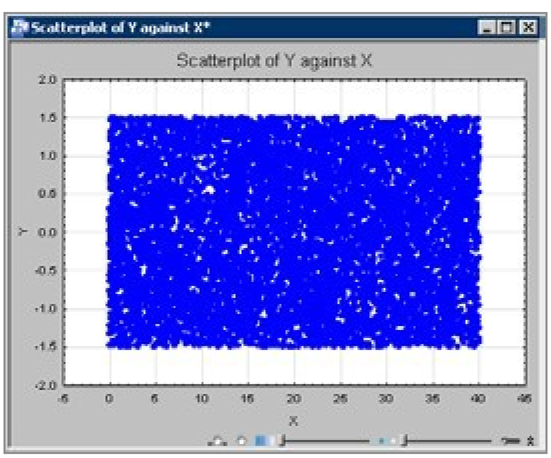


Section to be scaled is circled

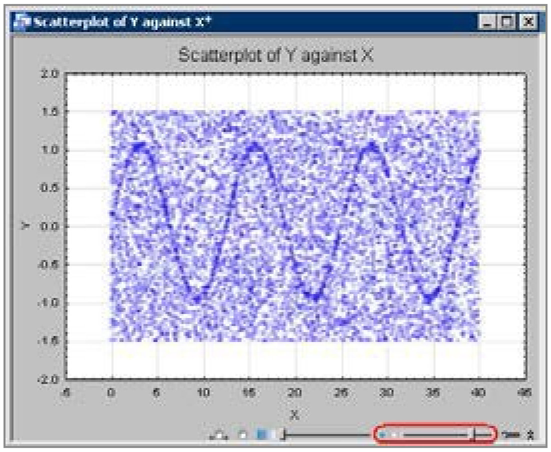
Scaled view of circled area



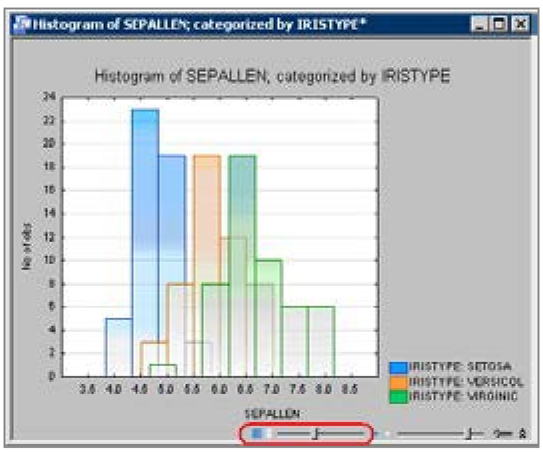
Scatterplot with dense concentration of data points



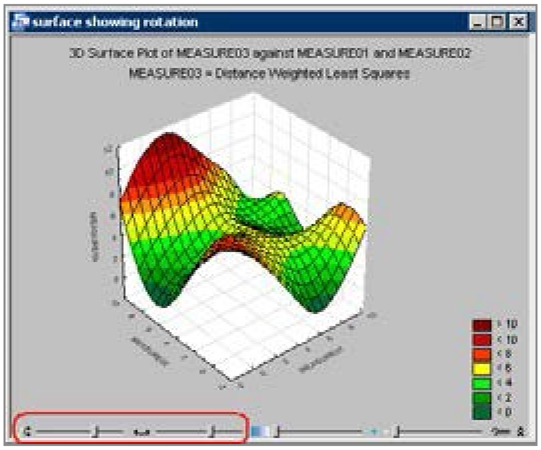
Transparency Control reveals hidden trends



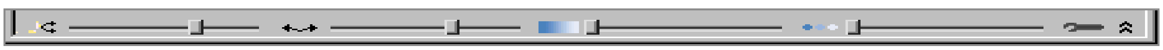
Plot Area Transparency Control circled; making plot areas transparent allows portions of the plot to overlap while still being visible



3D Graph; Rotation Controls circled



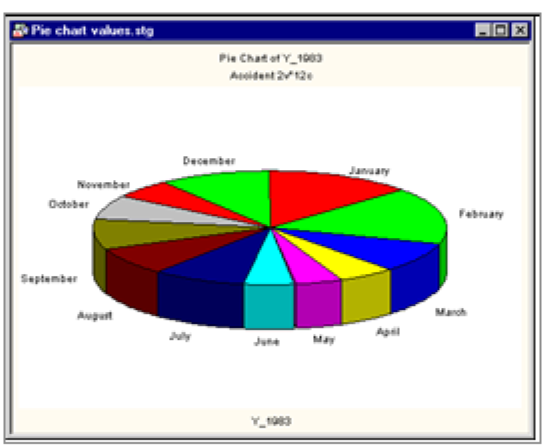
Enlarged image of Rotation and Transparency Controls



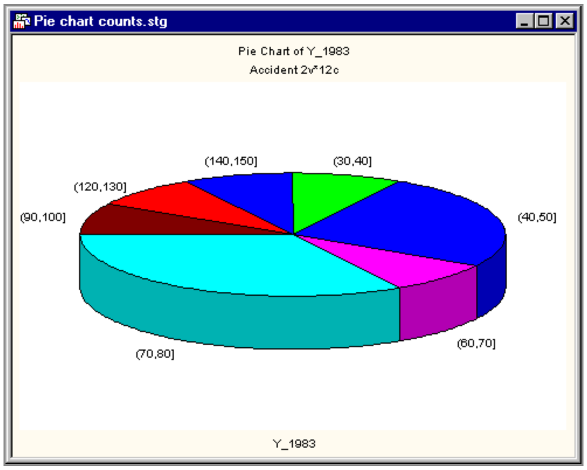
While Statistica statisticians designed most of the graph customization options, it is important to say that Statistica users have played a significant role in their creation. In fact, the selection of graphics options included in Statistica is the result of input from thousands of users who provided their comments in response to Statistica's inquiries. Many unique facilities of Statistica Graphs were introduced in response to users' ideas and requests. We at Statistica are very grateful for the input from our users.

As mentioned, there are various methods to specify Statistica Graphs. You could say that these methods represent different types of interfaces between numbers and graphs.

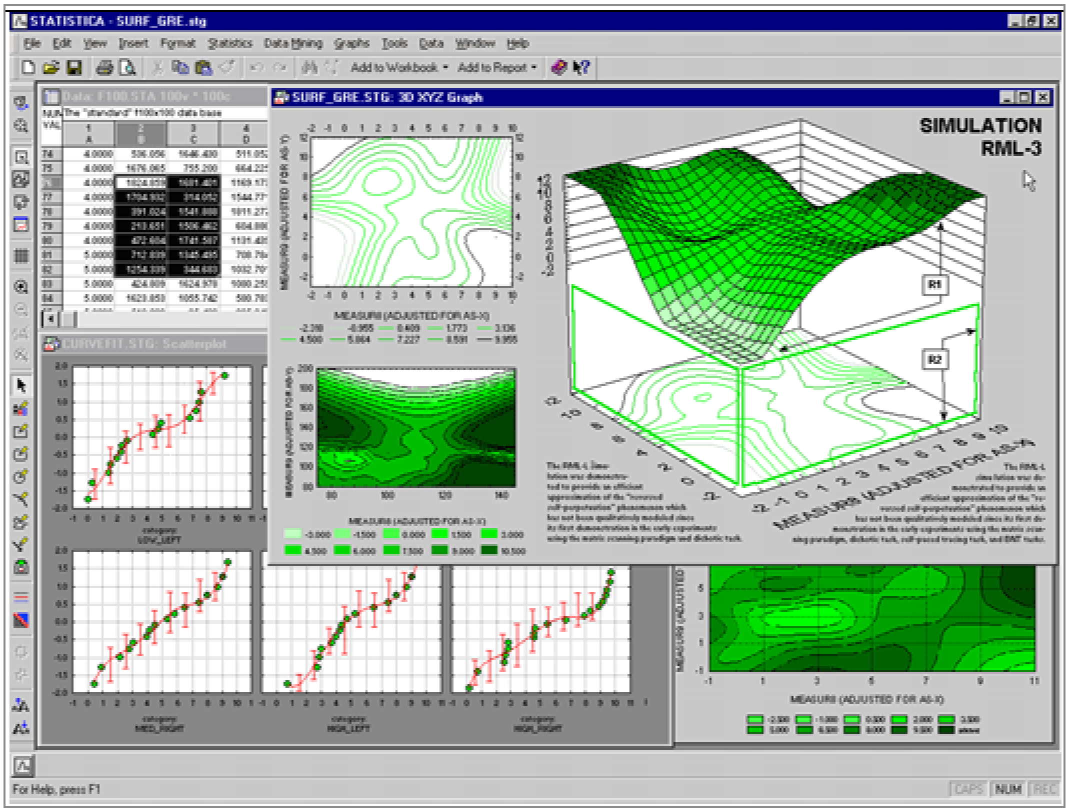
For example, the numbers represented in a pie chart can simply depict values of a spreadsheet column (for example, variable Sales) in the consecutive cases of the spreadsheet (for example, cases labeled: Year 2008, Year 2009, Year 2010, ..., etc.).



The numbers in a similar pie chart, however, can represent results of calculations. For example, the slices of the pie can represent relative frequencies of observations that belong to certain categories calculated by one of the histogram or frequency categorization procedures (for example, numbers of years when the Sales were below $10 million, between $10 and $20 million, and above $20 million).

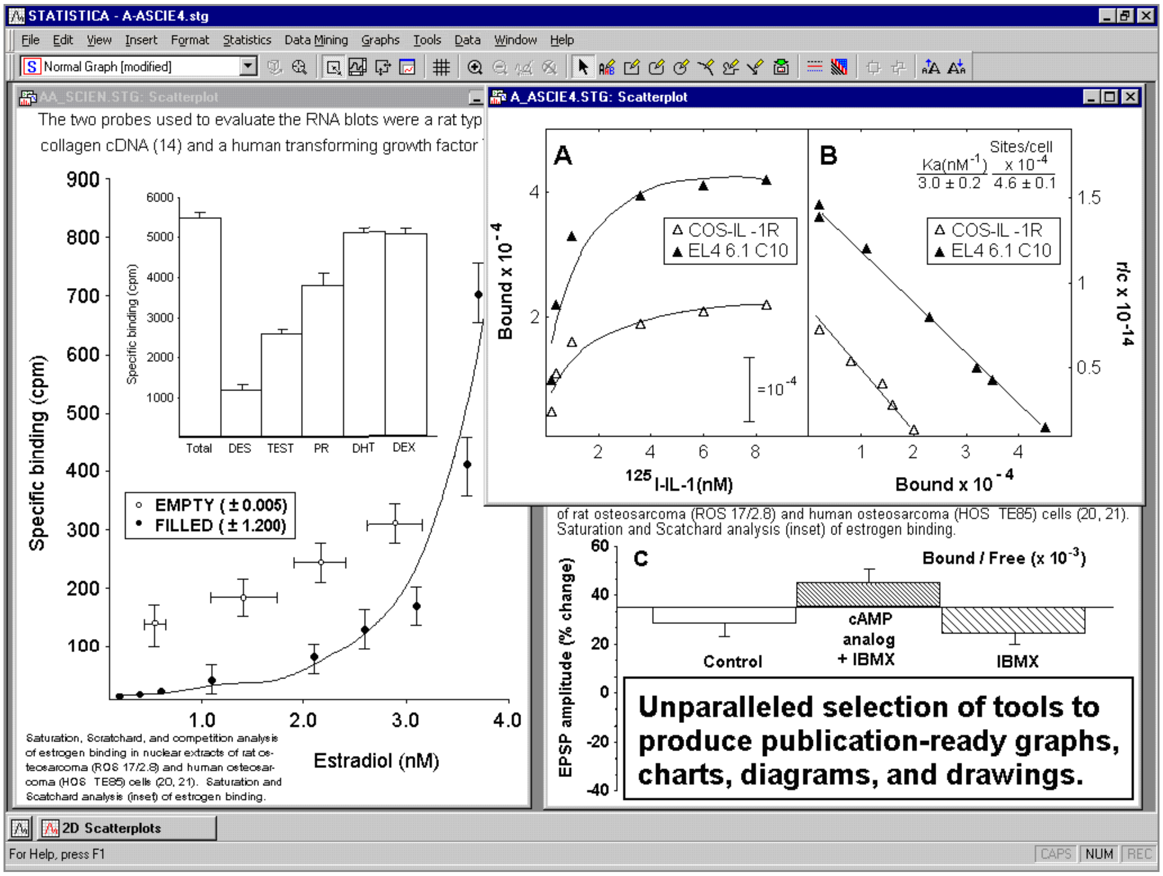


Regardless of the method that was used to create a graph (such as regardless of where the numbers represented in the graph were obtained or how they were calculated), all Statistica Graph customization and multigraphics management facilities can be used to change the appearance of the graph or integrate it with other graphs or documents.

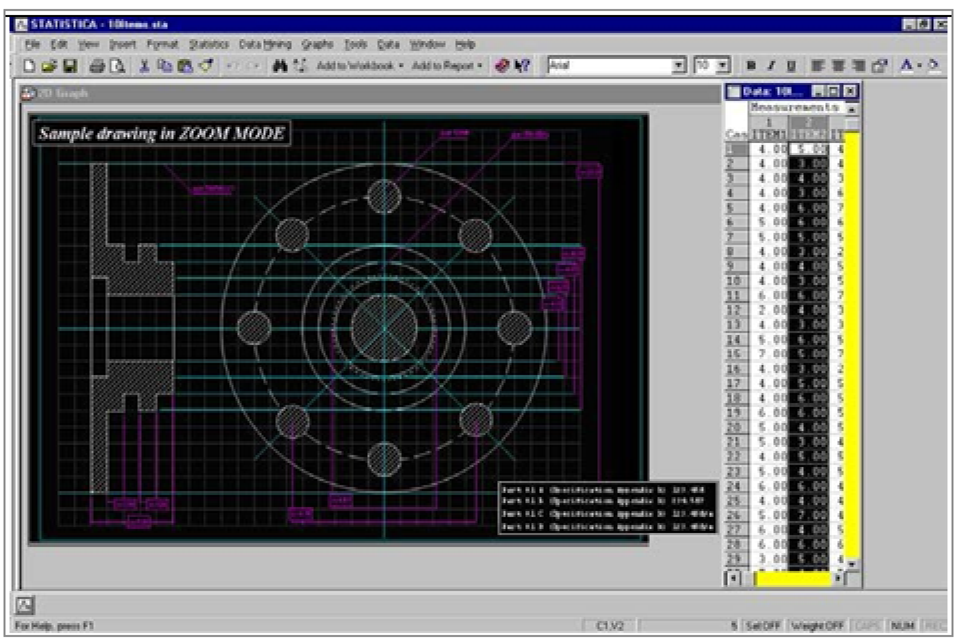


Also, all integrated analytic facilities that are accessible from within graphs in Statistica (such as function fitting, smoothing, rotation, brushing, analytical zooming, etc.) are available and can be applied to the graph regardless of the source of the numbers in the graph or the method that was used to create it.

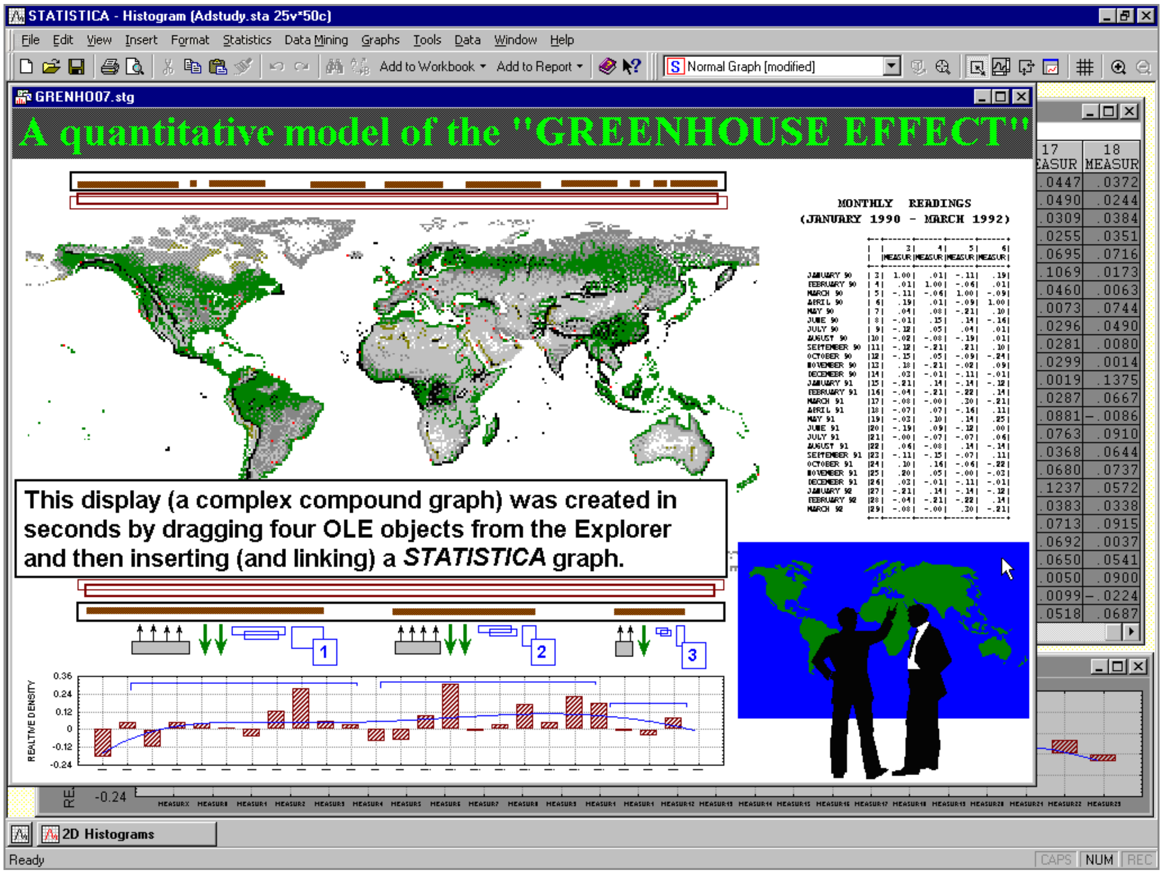
The graph editing facilities offered in Statistica enable you to create not only highly customized scientific and technical publication-ready displays:



and precise drawings:



but also presentation-quality diagrams, posters, business charts, and other displays:



that are designed to communicate information in an effective and attractive manner.

Graphs that are saved into files or that in any other way have been temporarily detached from the Statistica application (for example, copied to the Clipboard or linked to a document in another application) are complete “objects” (technically speaking, ActiveX objects, see page 184) that contain not only all customization features and other embedded objects, but also all data that are necessary to continue editing all aspects of the display or the analysis of its contents (fitting, smoothing).

Because Statistica Graphs are ActiveX objects, they can easily be linked to or embedded in other compatible documents (for example, Excel or Word documents), where they can be in-place edited by double-clicking on them. Statistica Graphs are also ActiveX containers and, therefore, can contain a wide variety of embedded or linked documents such as Visio drawings, Adobe illustrations, Excel spreadsheets, or Word documents. Moreover, Statistica supports hierarchies of embedded objects up to four levels.

General Categories of Graphs

In addition to the specialized statistical graphs that are available from the output dialogs in all statistical procedures, there are two general categories or classes of graphs both accessible from the **Graphs** tab, shortcut menus, and the Statistica Start button menu:

- Input data graphs and Graphs menu graphs, and
- Graphs of Block Data

The most important difference between these two general categories lies in the data that the graph types utilize for generating plots.

Input data graphs

Graphs of Input Data and their expanded version on the **Graphs** tab produce statistical summaries or other representations of the raw data in the current input data spreadsheet (typically for all the variables, or for subsets if case selection conditions are used).

If graphs of this general category are produced using a shortcut menu from within a spreadsheet of results that does not contain the actual data (for example, a correlation matrix), Statistica will still reach to the respective input (raw) data to produce the graph (for example, a scatterplot of the variables identified by the selected cell in the correlation matrix from which the shortcut menu was opened).

Graphs of Block Data

Graphs of Block Data, however, are entirely independent of the concept of input data or data file. They provide a general tool to visualize numeric values in the currently selected block of any spreadsheet (which can contain values from custom defined subsets of numerical output or arbitrarily selected subsets of raw data).

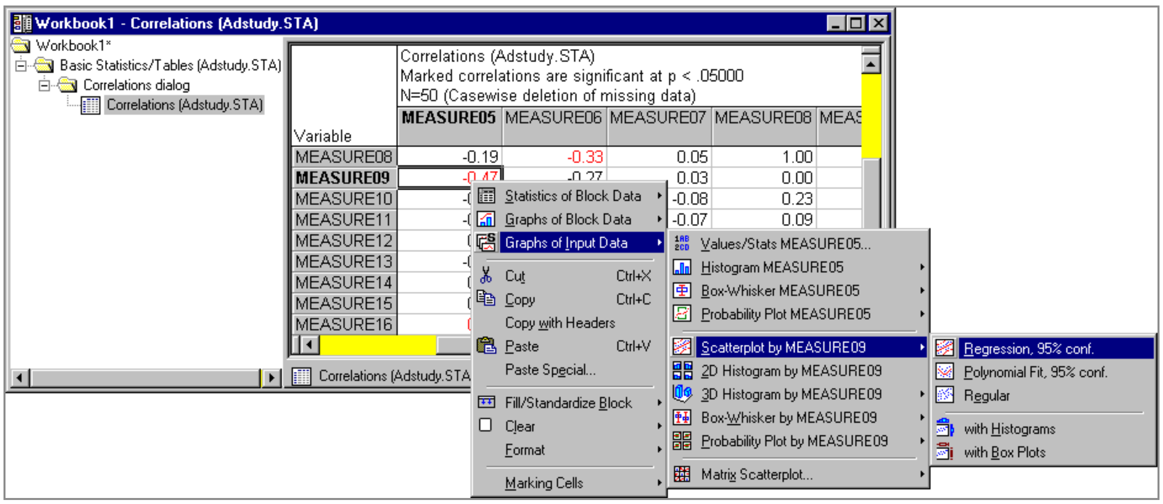
Common features of the two categories of graphs

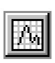
These two general categories of graphs offer the same customization options and the same selection of types of graphs. For example, you can create the same highly specialized categorized ternary graph from the input (raw) data set and from a custom defined block of values representing results of a particular test.

These two general categories of graphs will be briefly discussed in the next two sections, followed by a section on the **Graphs** tab, which contains an exhaustive selection of all graphs from the first category (input data graphs, often referred to as **Graphs** menu graphs), as well as access to **Graphs of Block Data** and other options.

Graphs of Input Data

The **Graphs of Input Data** option is available from the shortcut menu of all spreadsheets, and it offers quick and simplified access to the most commonly used types of graphs based on the current input data set.

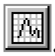


Note that all these graphs are also available on the **Graphs** tab, from the Statistica Start menu  on the status bar, or by clicking the **Graphs Gallery**  button on any graph specification dialog box. **Graphs of Input Data** do not offer as many options as the corresponding **Graphs** menu graphs; however, they are quicker to select because unlike **Graphs** menu graphs:

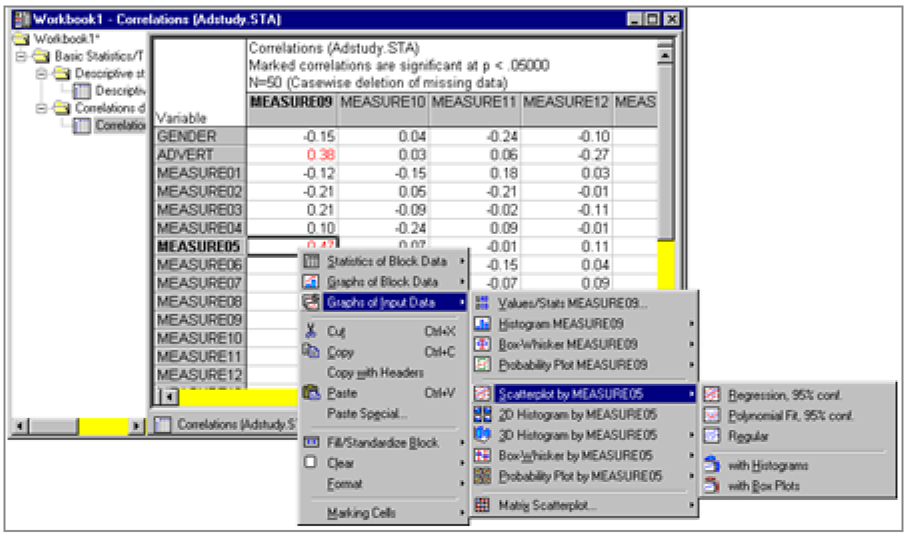
- **Graphs of Input Data** can be called directly from the spreadsheet shortcut menus,
- **Graphs of Input Data** do not require you to select variables (the variable selection is determined by the current cursor position within a spreadsheet), and
- **Graphs of Input Data** do not require you to select options from any intermediate dialog boxes (default formats of the respective graphs are produced).

Graphs of Input Data process data directly from the current input data file, and they take their cues as to which variables to use from the current cursor position (in any type of spreadsheet).

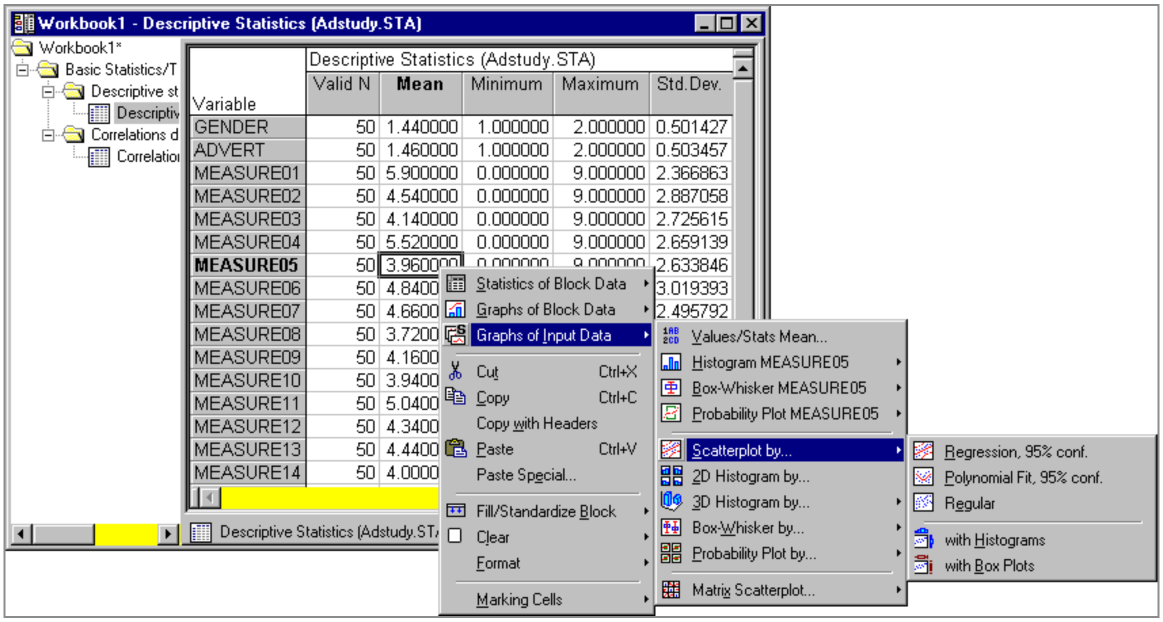
For example, if you right-click a single correlation in a results spreadsheet and create a **Scatterplot by...** graph, Statistica generates a 2D scatterplot using the original raw values of the two variables represented by that correlation (see the Introductory Example on page 11 for a more detailed example).

Although the most convenient way to select **Graphs of Input Data** is via the spreadsheet shortcut menu, you can also select them from the **Graphs** tab or the Statistica Start menu . Either method will display a submenu from which you can choose one of the statistical graphs applicable to the current variable (such as to the variable indicated by the current cursor position in the spreadsheet).

If the spreadsheet has a matrix format or a format where a cursor position indicates not one but two variables, then predefined bivariate graphs for the specified pair of variables will be directly available from the **Graphs of Input Data** submenus.



Otherwise, such as when the current cursor position indicates only one variable as in a table of descriptive statistics (as shown in the next illustration), and if you select any of the bivariate graphs in the menu, Statistica will prompt you to select the second variable. For example, if you select **Scatterplot by**, the Select second variable dialog box is displayed, where you specify by which variable Measure05 is going to be plotted.

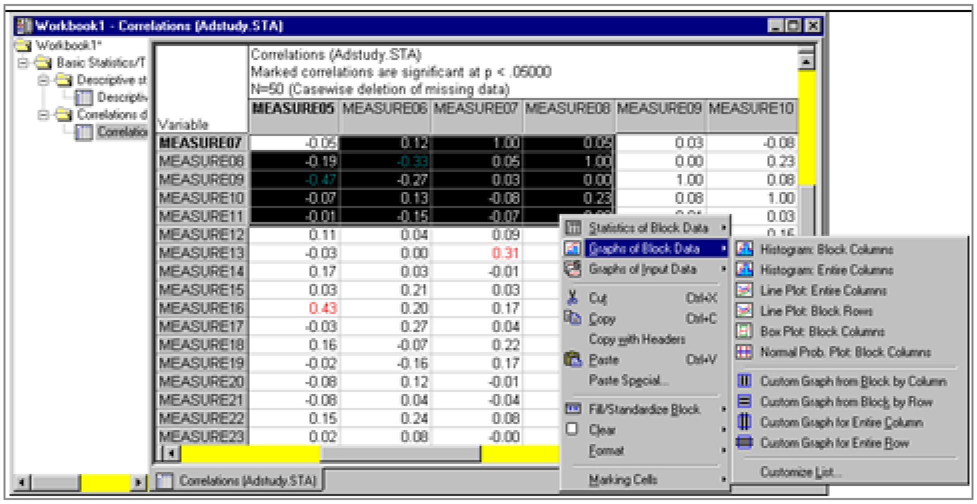


If more than one variable is indicated by a highlighted section (such as when a block is selected), then the **Graphs of Input Data** menu will apply to the first selected variable.

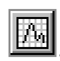
When generating **Graphs of Input Data**, Statistica takes into account the current case selection and weighting conditions for the variables that are being plotted. Note, however, that the case selection or weighting conditions need to be specified for the current spreadsheet (such as via the **Tools** tab **Selection Conditions - Edit** options and the **Tools** tab **Weight** options) and not just locally for an analysis (such as selected from the respective analysis/graph specification dialog boxes using the **Select Class** and **Weight** buttons). The latter conditions are ignored by the **Graphs of Input Data**.

Graphs of Block Data

Unlike **Graphs of Input Data**, **Graphs of Block Data** use the currently selected (continuous) block of data in the active spreadsheet to specify input data for the graph.

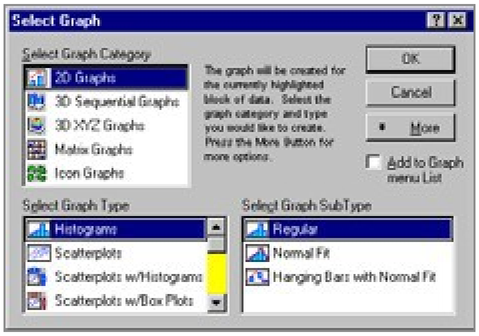


These graphs are entirely independent from the concept of input data. They process values (numbers) from whatever is currently selected in the block and ignore the meaning of those numbers. For example, the numbers can be raw data or values of correlation coefficients. These graphs offer an effective means of visualizing, exploring, and efficiently summarizing numeric output from analyses displayed in results spreadsheets (for example, histograms of Monte Carlo output scores in the SEPATH module, or a box plot of aggregated means from a multivariate multiple classification table in the ANOVA module).

Although the most convenient way to select **Graphs of Block Data** is through the shortcut menu associated with the block selected in a spreadsheet, **Graphs of Block Data** are also available from the **Graphs** tab or the Statistica Start menu . When creating **Graphs of Block Data**, you can select from default graphs (for example, **Histogram: Block Columns** or **Line Plot: Block Rows**), or you can create your own custom graphs for either the selected cells in the rows or columns, or of all cells in the selected rows or columns (such as going beyond the values that are selected in the block).

Default graphs. Using the default graphs (the first six commands on the **Graphs of Block Data** submenu, shown in the illustration above), you can create specified graphs with a single click.

Custom graphs. Select any of the four Custom Graph commands to display the Select Graph dialog, which provides a variety of options for creating customized graph.

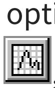


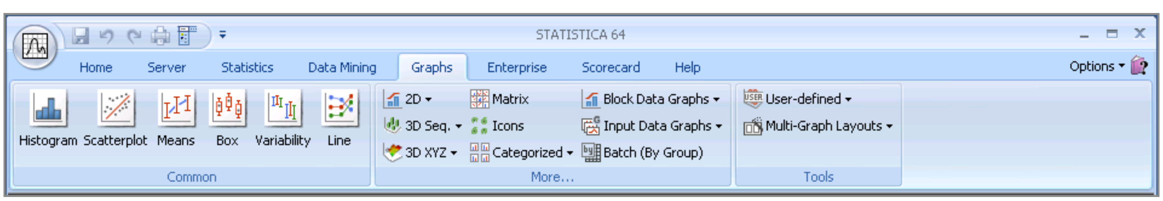
Customizing graphs. As with most features of Statistica, **Graphs of Block Data** are fully customizable. Select **Customize List** from the **Block Data Graphs** menu to display the Customize Graph Menu dialog box, which provides options to remove, rename, or edit the currently listed graphs as well as to add new (user-defined) graphs to the **Graphs of Block Data** menu.

For example, if you want to include a normal fit on the histograms created using **Histogram: Block Columns**, select **Histogram: Block Columns** in the Customize Graph Menu dialog box, click the **Edit** button, and switch the **Graph SubType** to **Normal Fit**. All subsequently created **Histogram: Block Columns** plots will include a normal fit to the data.

Graphs Menu Graphs

The **Graphs** tab provides a complete selection of all statistical graphs available in Statistica.

These options are available from not only the **Graphs** tab, but also the Statistica Start menu , and offer hundreds of types of graphical representations and analytic summaries of data.



Note: Unlike **Graphs of Block Data** (which are also included on this tab in order to offer a full complement of all graphical options accessible from a single control), all other graph types from the **Graphs** tab are not limited to the values in the current output spreadsheet. Instead, they process data directly from the current input spreadsheet, in the same way like **Graphs of Input Data**.

They represent either standard methods to graphically summarize raw data (for example, various scatterplots, histograms, or plots of central tendencies such as medians) or standard graphical analytic techniques (for example, categorized normal probability plots, detrended probability plots, or plots of confidence intervals of regression lines). When generating these graphs, Statistica takes into account the current case selection and weighting conditions for the variables selected to be plotted.

Graphs menu graphs include **2D Graphs**, **3D Sequential Graphs**, **3D XYZ Graphs**, **Matrix Plots**, **Icon Plots**, **Categorized Graphs**, and **User-Defined Graphs**. Note that the **Common** group on the **Graphs** tab includes the most commonly used types of graphs (**Histograms**, **Scatterplots**, **Mean/Error Plots**, etc.), and the **More** group contains a comprehensive list of all graph types.

Brushing a Graph and Case States

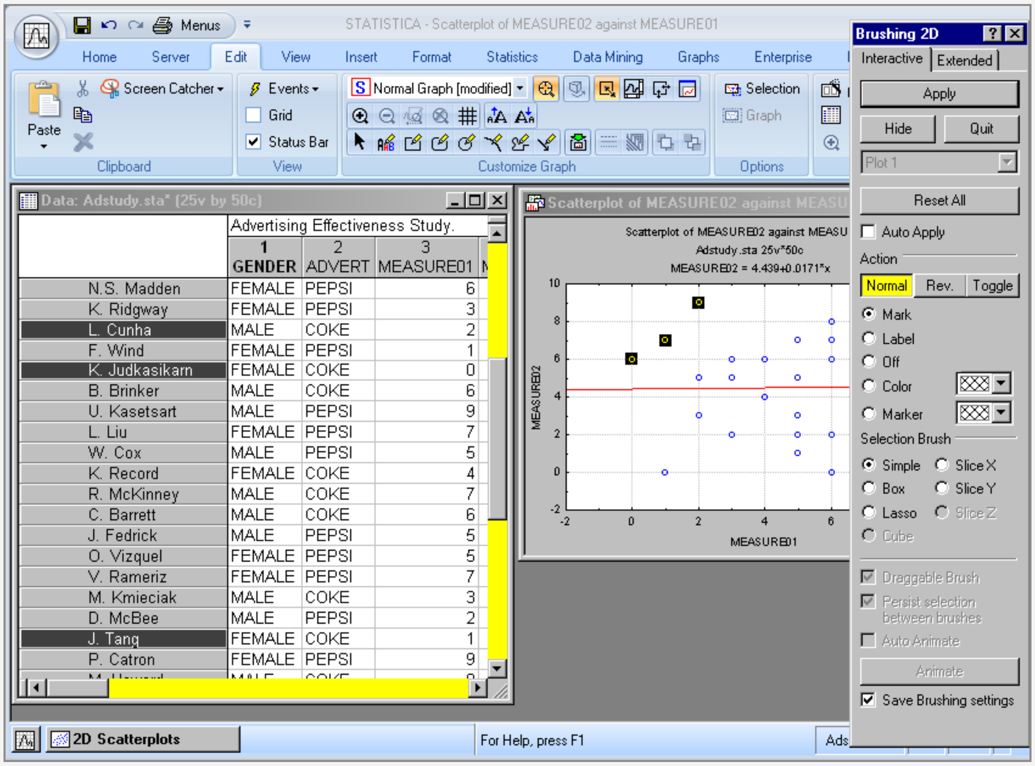
Graphs that are created from the **Graphs** tab are highly interactive with the spreadsheet from which they were created. You can identify and select points in the graph and specify them to be highlighted in the source spreadsheet, and vice versa.
In addition to selecting points in graphs and spreadsheets, you can identify properties of a case in a spreadsheet that will be used when the graph is created from that data. These properties include the point marker style and color, and whether the point is to be excluded from the graph and fit calculations.

Procedure

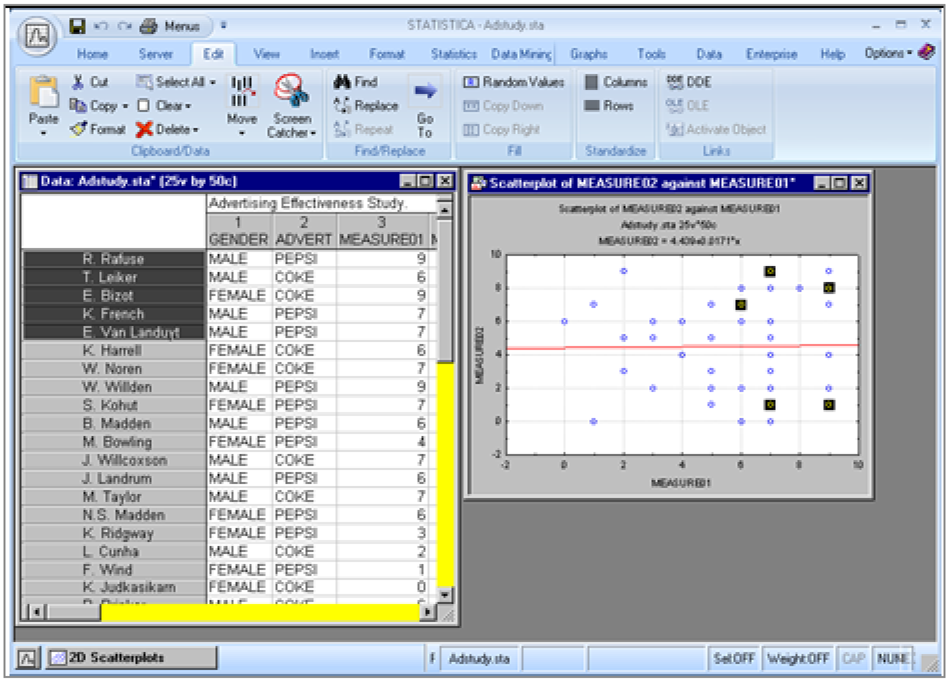
1. To start brushing within a graph, click the brushing button on the **Edit** tab in the **Customize Graph** group, or right-click in the background of a graph and select **Show Brushing** from the shortcut menu to display the Brushing dialog box.
2. With the default **Selection Brush**, which is **Simple**, you can draw a rectangle on the graph to select the points contained in the rectangle. The following illustration demonstrates this for the example data set `Adstudy.sta`, with a 2D scatterplot of

MEASURE01 by **MEASURE02**.

Note: The upper-left three points have been selected by the brushing tool, which highlights the points in the graph as well as the corresponding cases in the spreadsheet from which the graph was created.

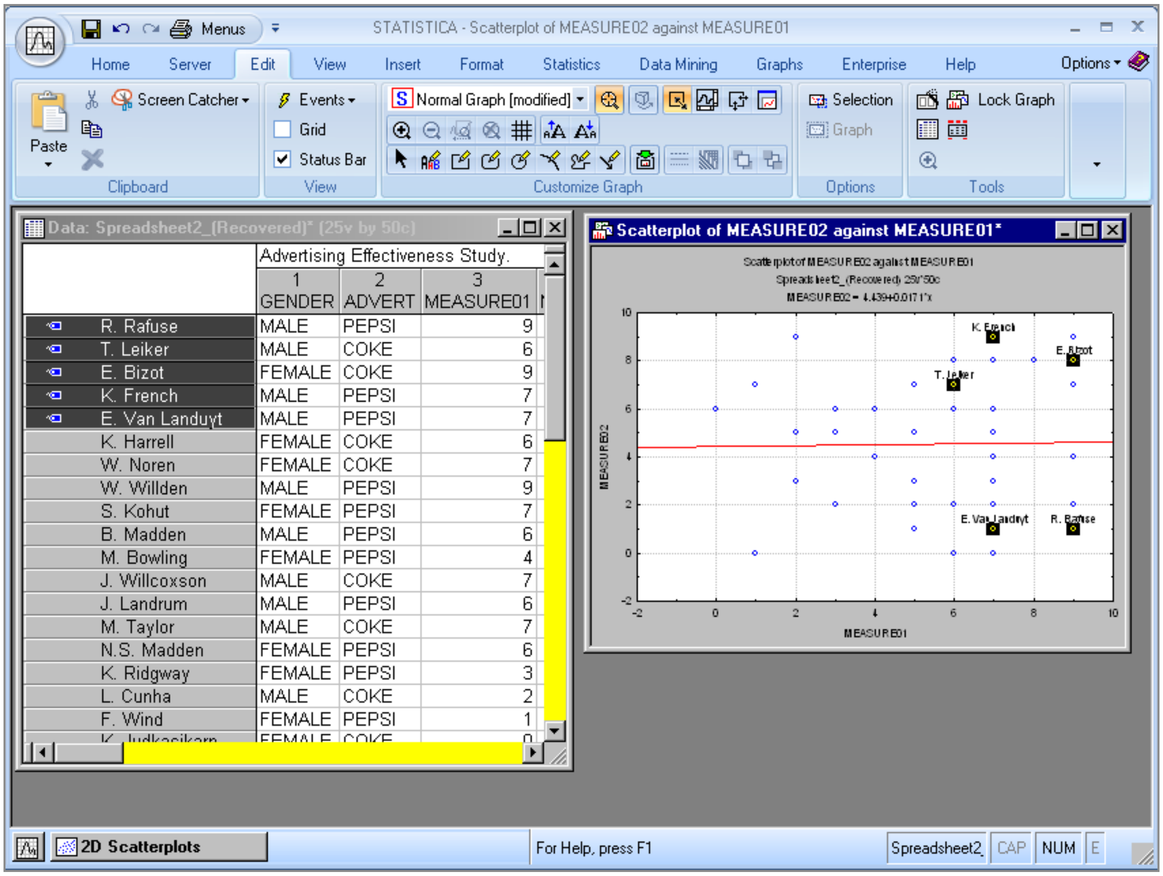


3. Alternatively, instead of using the **Brushing** facilities, you can select cases in the spreadsheet (click on the far-left side of the case name) and the corresponding points will be marked in the graph, as shown in the following illustration, where the first five cases in the `Adstudy.sta` spreadsheet have been selected.



4. You can specify spreadsheet case states from either a spreadsheet or a graph. In a Statistica Spreadsheet, right-click on a case name to display the shortcut menu, which contains commands including **Off**, **Label**, **Marked Points**, and **Case States**. Similar commands are available from the shortcut menu displayed when you right-click on the points in a graph.

5. The graph uses these options when displaying the points represented by this case. For example, if you select **Label**, the corresponding points are labeled. The spreadsheet cases are marked with a case state icon to indicate that the case points are labeled.



6. Right-click on a case name, and from the shortcut menu select **Case States - Edit Case States** to change the case marker and color. The selection of points is available for graph types other than Scatterplots. For histograms, brushing/selecting a histogram bar selects the corresponding points to that bar in the spreadsheet. This is true for the boxes in box plots.

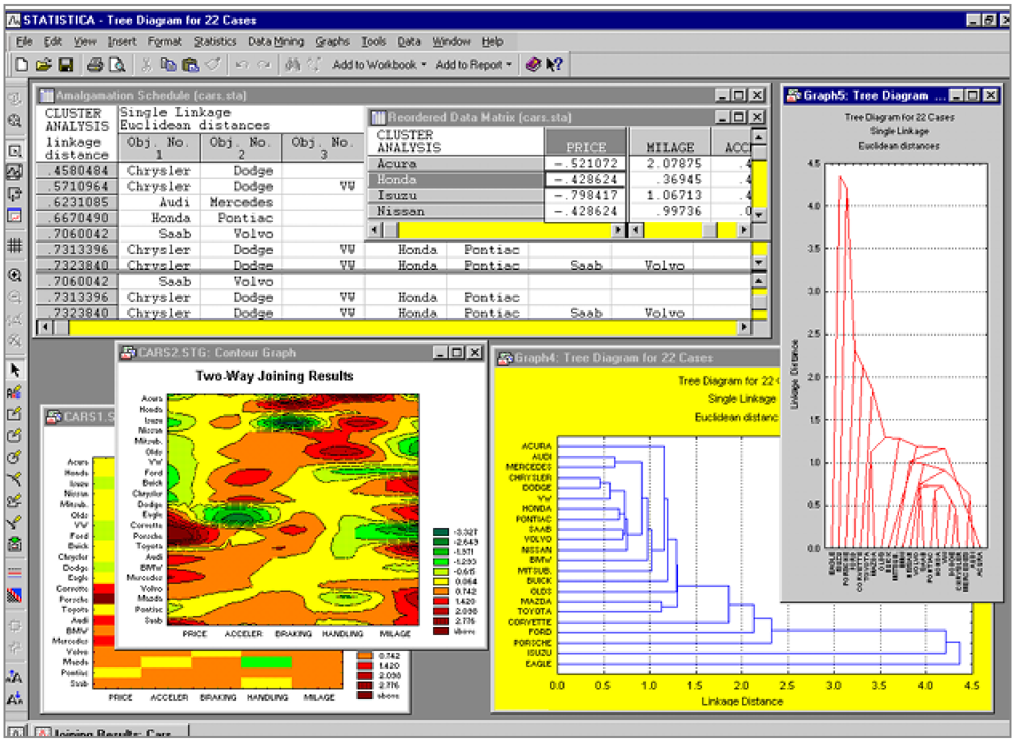
7. Using case states and brushing and selecting points is particularly useful with the **Hidden** and **Excluded** case states options. First, to make these options available, display the Options dialog box (select the **Tools** tab and click **Options**), and in the tree view select **Navigation / Defaults** located under **Spreadsheets**. Clear the **Combine Excluded and Hidden Case States into Off state** check box, and click the **OK** button.

8. Then, select the **Data** tab, and in the **Cases** group click **Cases**. From the **Case States** submenu, select **Hidden** to mark a case as hidden, such as the case will not be visible in graphs, but will be used in analyses. You can also right-click on a case name, and from the shortcut menu select **Case States - Edit Case States** to display the Case State dialog box, where you can select the **Hidden** check box.

9. Select **Excluded** to mark a case as excluded, such as the case is not used in the computations; however, the case is displayed in most graph types. The case point marker is displayed, but the case is removed from computations. The **Excluded** case state also works in conjunction with spreadsheet selection conditions; any case that has the **Excluded** case state set will be treated as if the case were excluded by selection conditions. Therefore, using graph brushing and case states is a convenient tool to interactively remove outliers and then rerun analyses with the points removed.
10. When the **Combine Excluded and Hidden Case States into Off state** check box is selected in the Options dialog box **Navigation / Defaults** options pane, the **Hidden** and **Excluded** options are replaced with the **Off** option. Select **Off** to mark a case as **Hidden** and **Excluded**; the point will be excluded from computations and from graphs.

Other Specialized Graphs

In addition to the standard selection of **Graphs of Input Data**, **Graphs of Block Data**, and **Graphs** menu graphs, other specialized statistical graphs that are related to a type of analysis (for example, cluster analysis results) are accessible directly from results dialogs (such as the dialogs that contain output options from the current analysis).



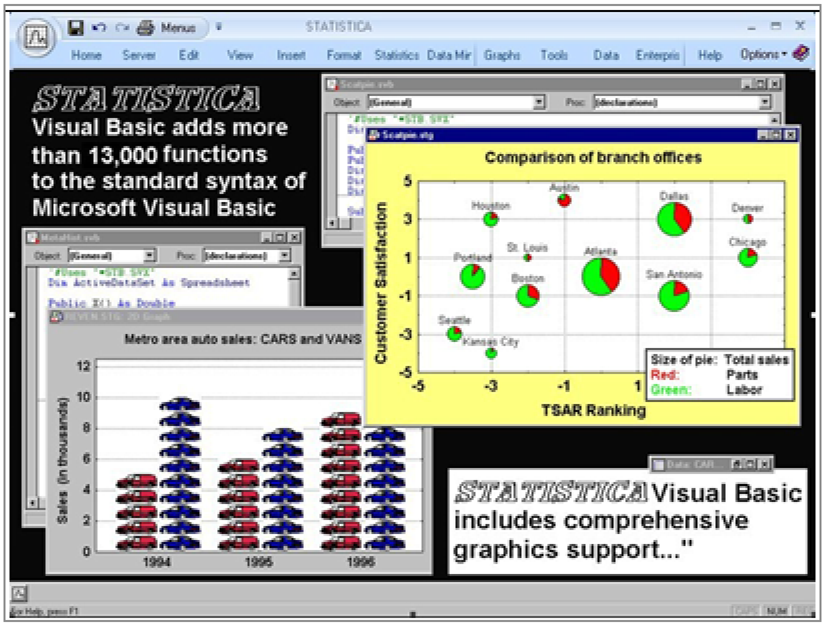
Creating Graphs Using Statistica Visual Basic

Statistica graphical options can also be accessed programmatically using the built-in Statistica Visual Basic (SVB) or other compatible languages.

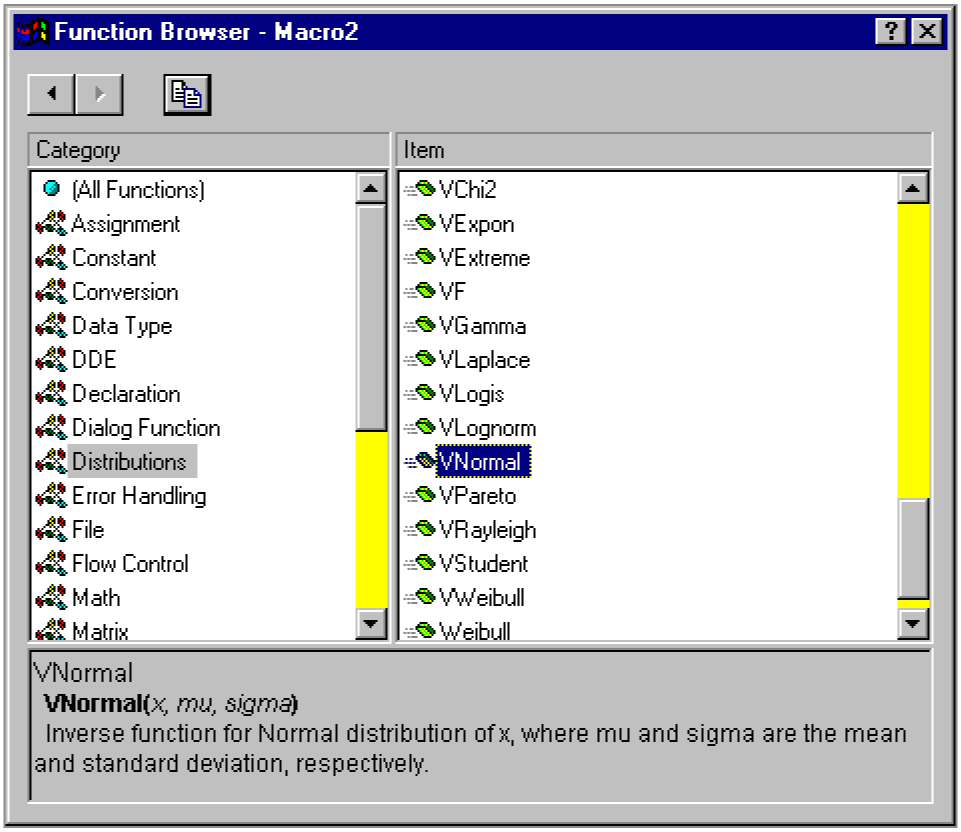
Therefore, there are no limits to customize your Statistica graphs, because SVB (with all its powerful custom drawing tools as well as the Statistica-based library of graphics procedures) can be used to produce virtually any graphics or multimedia output supported by the contemporary computer hardware.

Procedure

1. An application written in Statistica Visual Basic can operate on graphs in three ways:
    - Create a new graph and then modify, print, or save it
    - Access an existing graph and then modify it
    - Open an existing graph file and then modify, print, or save it
2. Every graph available in Statistica can be produced by Statistica Visual Basic and then customized using Statistica procedures or general options offered in this comprehensive language.



3. As with all other functions in Statistica Visual Basic, functions to access the graphics library of Statistica can be easily incorporated into Statistica Visual Basic programs using a hierarchically organized **Function Browser**. It contains short descriptions of all functions and options that can be inserted directly into the source code of your program.
 your program (such as into the


Function Browser - Macro2
Category
(All Functions)
Assignment
Constant
Conversion
Data Type
DDE
Declaration
Dialog Function
Distributions
Error Handling
File
Flow Control
Math
Matrix
Item
VChi2
VExpon
VExtreme
VF
VGamma
VLaplace
VLogis
VLognorm
VNormal
VPareto
VRayleigh
VStudent
VWeibull
Weibull
VNormal
VNormal(x, mu, sigma)
Inverse function for Normal distribution of x, where mu and sigma are the mean and standard deviation, respectively.

Customizing Statistica

Statistica offers the flexibility of fully customizable user interfaces and supports the necessary adjustment of the standard user interface to better suit your specific needs.

Statistica anticipates your needs in that it remembers various choices as you make them. For example, if you launch an analysis from the **Advanced** tab on an analysis specification dialog box, the **Advanced** tab is selected (instead of the **Quick** tab) the next time you display that dialog box.

Practically all aspects of the user interface can be customized starting with such elementary controls as the classic menus, Quick Access toolbar, and the keyboard. The process for customizing these screen components is quick and straightforward (for example, see the customizing the toolbar). You can set both global and local customizations for graphs, spreadsheets, workbooks, reports, etc., and maintain different configurations of Statistica (for a single user as well as for network users). You can also define entirely new user interfaces.

Customization of the Interactive User Interface

Statistica contains facilities to define entirely new user interfaces, including the Internet browser-based user interfaces.

However, all aspects of the default, interactive user interface can also be adjusted easily in a variety of ways. For example, you can add to the default options, simplify them, or keep changing them as your needs change.

Depending on the requirements of the tasks to be performed, as well as your personal preferences for particular modes of work and aesthetic choices, you can suppress all icons, toolbars, status bars, long menus, workbook facilities, drag-and-drop facilities, dynamic (automatic) links between graphs and data, 3D effects in tables, and 3D effects in dialog boxes; request sequential output with simple, paper-white spreadsheets and monochrome graphs; and set the system to automatically maintain no more than one simple report at a time.

Or alternatively, you can define elaborate local and global toolbars; take full advantage of all special tools and controls, icons, toolbars, macros (for example, assign particular tasks to specific new classic menu commands, the Quick Access toolbar, or keys), elaborate multimedia tables, workbook facilities, and drag-and-drop facilities; establish multiple dynamic (automatic) links between graphs and data and internal links between graphical objects; customize the output windows with colors, special fonts, and highlights; adjust the default graph styles and their display modes; and send the results to separate hierarchically organized workbooks to create an elaborate, multi-layered data analysis environment that facilitates the exploration of complex data files and allows you to compare different aspects of the output.

Customization of Documents

There is a variety of comprehensive, specialized tools to customize the layout and operation of Statistica documents.

For example, Statistica has a comprehensive system of managing defaults of every aspect of graphs and combining customizations into hierarchically organized styles. Similarly, you can create custom layouts and formats for spreadsheets (multimedia tables) and even customize events. For example, action taking place when you double-click on a table.

Local vs. Permanent Customizations

Many aspects of the appearance of Statistica can be adjusted from both the **View** and **Tools** tabs. Each of these two methods, however, has a different function.

View tab

The changes specified on the **View** tab affect the current appearance of Statistica (for example, hides the Status Bar) or the current document window (for example, spreadsheet grid lines).

Options dialog

The options available in the **Options** dialog (select the **Tools** tab and click **Options**) are used to adjust the permanent program defaults. Note, however, that the global options that are applicable to documents of a particular type (for example, a graph or a spreadsheet) do not change the current document. Instead, they can only be stored as program defaults that affect the creation of the next (such as new) document of the respective type.

For example, if you change the **Default Spreadsheet Layout** in the **Navigation / Defaults** options pane of the **Options** dialog box, you can see the new Spreadsheet Layout applied only when you create a new spreadsheet. However, these defaults do not affect any previously saved files because those spreadsheets are displayed with the specific appearance with which they were saved (use the options on the **View** tab to customize the existing objects).

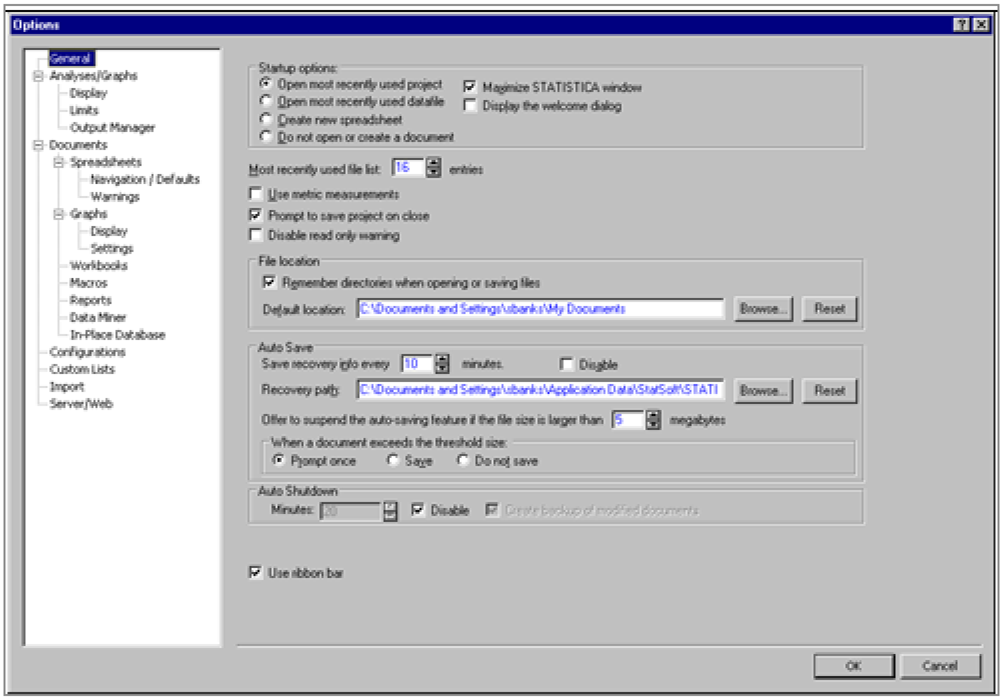
General Defaults

Customization of the general system defaults

The general default settings of Statistica can be adjusted with the options in the Options dialog box (select the **Tools** tab and click **Options**). They control:

- The general aspects of the behavior of Statistica (such as maximizing Statistica on startup, workbook and report facilities, file locations, custom lists, etc.),
- The way in which the output is produced (for example, in workbooks, reports, etc.),
- The general appearance of the application window (icons, toolbars, etc.), and
- The appearance of document windows.

The **General** options pane of the Options dialog box is shown in the following image.



All these and other general settings are accessible regardless of the type of document that is currently active (for example, a spreadsheet or a graph).

Switching between alternative sets of defaults (configurations)

Options are provided in the **Configurations** options pane of the Options dialog box that enable you to maintain libraries of settings and switch between them for different projects or users.

Graph Customization

Interactive graph customization

The customization options in Statistica graphics include hundreds of features and tools that can be used to adjust every detail of the display and associated data processing. These options are arranged in a hierarchical manner, so those used most often are accessible directly via shortcuts by double-clicking or right-clicking on a specific element of the graph.

Permanent settings and automation options

The initial default settings of all graph features can be easily adjusted so that even the default appearance and behavior of Statistica Graphs will match your specific needs and requires very little intervention on your part. Various aspects of Statistica Graphs can be permanently adjusted by using:

- the Options dialog box (select the **Tools** tab and click **Options**),
- the comprehensive system of graph styles,
- user-defined graphs, and
- Statistica Visual Basic.

There are no limits customizing your Statistica custom graphs, because Statistica Visual Basic (with all its powerful custom drawing tools as well as the Statistica-based library of graphics procedures) can be used to produce virtually any graphics or multimedia output supported by contemporary computer hardware. Those custom developed displays or multimedia output can be assigned to Statistica toolbars, menus, or dialog boxes and become a permanent part of your Statistica application.

Maintaining Different Configurations of Statistica

Statistica stores all program settings when you exit the program, and restores them the next time you start the application.

You can create different configurations of these settings by using the options in the **Configurations** options pane of the Options dialog box (select the **Tools** tab and click **Options**). With the configuration manager, you can save the current program state into a new or existing configuration, or you can restart Statistica using a different configuration.

Other options include the ability to import or export configurations to a separate file so they can be shared among Statistica installations.

Customized Configurations for Individual Users on a Network

The same principle described in the previous paragraph applies to network installations of Statistica. On a network, Statistica is installed in only one location (on a server), but each user can still configure Statistica differently because the setting configuration information is stored locally. Note that you need to choose **Network Installation** in the Statistica **Setup** program in order to install it properly on a non-local drive (network server). Note that a network version of Statistica is necessary to ensure its reliable operation when used by more than one user at a time or even one user if Statistica is not installed on the local system.

Statistica Visual Basic

The Statistica Visual Basic (SVB) language that is integrated into Statistica, is compatible with the industry standards and provides another user interface to the functionality of Statistica, and it offers incomparably more than just a supplementary application programming language that can be used to write custom extensions.

Statistica Visual Basic is not Microsoft Visual Basic 6.0. Statistica owns and maintains the code for Statistica Visual Basic. SVB is compatible with Microsoft's VB.NET, Microsoft's Visual Basic for Applications (VBA), and also with Microsoft's Visual Basic 6.0 (VB6). SVB scripting language is unique in terms of its flexibility and compatibility, and it is also very powerful. It provides access to Visual Basic for Applications (used for scripting Microsoft Office products) and access to the .NET Framework within the same file.

Other APIs can also be accessed and leverage the flexibility of SVB such as, for example, Yahoo's Stock Quote API or Google Analytics API. SVB offers a powerful 64-bit solution for system integration, expansion, and custom development.

SVB takes full advantage of the object model architecture of Statistica and is used to access programmatically every aspect and virtually every detail of the functionality of Statistica.

Even the most complex analyses and graphs can be recorded into Visual Basic macros and later be run repeatedly or edited and used as building blocks of other applications. SVB adds an arsenal of more than 14,000 new functions to the standard comprehensive syntax of Visual Basic, thus comprising one of the largest and richest development environments available.

Applications for Statistica Visual Basic Programs

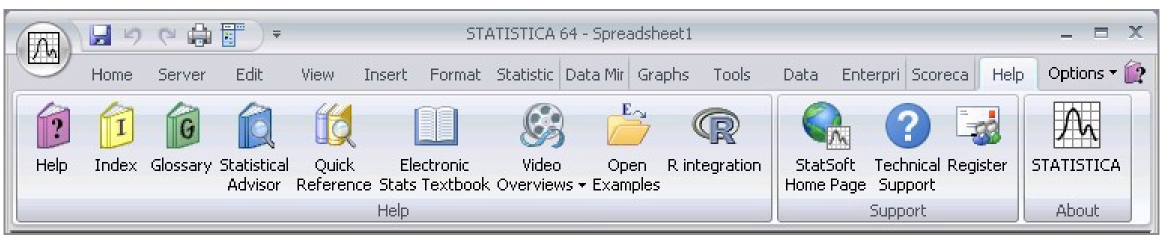
Statistica Visual Basic programs can be used for a wide variety of applications, from simple macros recorded to automate a specific (repeatedly used) sequence of tasks, to elaborate custom analytic systems combining the power of optimized procedures of Statistica with custom developed extensions featuring their own user interface. When properly licensed, scripts for analyses developed this way can be integrated into larger computing environments or executed from within proprietary corporate software systems or Internet or intranet portals.

SVB programs can also be attached to virtually all important events in a Statistica analysis such as opening or closing files, clicking on cells in spreadsheets. In this manner, the basic user interface of Statistica can be highly customized for specific applications (for example, for data entry operations).

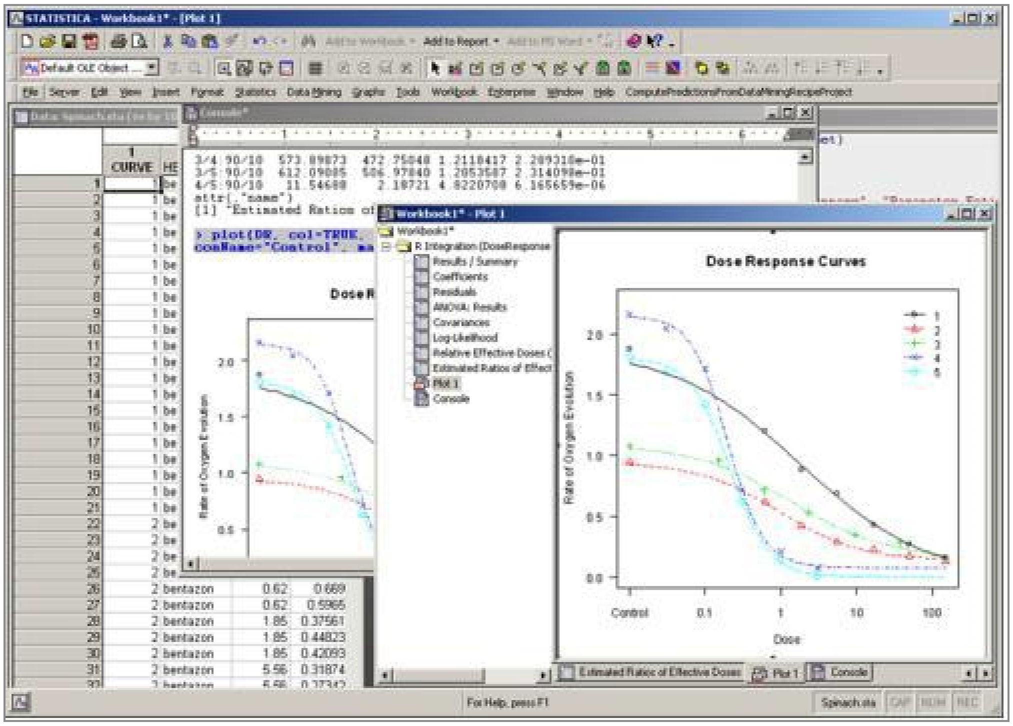
Several scripting languages are included in Statistica. You can select from SVB, Enhanced SVB, Statistica Visual Basic.NET, or R.

Enhanced Statistica Visual Basic is a superset of Statistica Visual Basic, and includes additional features. Statistica Visual Basic.NET features direct, native access to .NET Assemblies, such as not through COM Interop as would be required from standard SVB.

R is a programming language and environment for statistical computing. The R environment and its source code are freely available under the GNU GPL license. The R community maintains several centralized repositories that make hundreds of such packages readily available to all users over the Internet. Native R scripts can be run directly within Statistica, Statistica Enterprise, and Statistica Enterprise Server.



R output can be retrieved as native Statistica Spreadsheets and Graphs, and managed via highly flexible Statistica Workbook containers.



Using the R language requires that you have R installed on either the same computer running Statistica or a computer accessible from the Statistica Enterprise Server in order to use its specialized routines and capabilities to:

- Add new R-based modules
- Leverage Statistica's superior graphics, flexible spreadsheets, and convenient workbook containers for various document types to handle output from R
- Integrate R into Statistica Enterprise to make specialized R functionality available as reusable analysis templates for users not familiar with the R language, in a secure, role- based enterprise analysis system
- Add R-based analytic nodes to Statistica Data Miner, thus leveraging all R capabilities inside Statistica and Data Miner workspaces
- Build scalable R servers using Statistica Enterprise Server to handle security and load balancing, and to take advantage of multiple processor servers to run R for demanding and validated enterprise applications

Recording Statistica Visual Basic Macros

Analysis Macros, Master (Log) Macros, and Keyboard Macros

Statistica provides a comprehensive selection of facilities for recording macros, such as Statistica Visual Basic (SVB) programs, to automate repetitive work or to be used as a means to automatically generate programs for further editing and modification. The macro programs recorded by these facilities can be saved to be run or they can be used as the building blocks for more complex and highly customized Visual Basic application programs. Analysis Macros and Master Macros follow the identical syntax and can later be modified, but because of the different ways in which each of them is created, they offer distinctive advantages and disadvantages for specific applications.

Analysis macros

Simple Analysis Macros automatically record the settings, selections, and chosen options for a specific analysis. Note that the term analysis in Statistica denotes one task selected either from the Statistics, Data Mining, or Graphs tabs and can be very small and simple (for example, one scatterplot requested from the Graphs tab), or very elaborate (for example, a complex structural equation modeling analysis selected by choosing that option from the Statistics tab, and involving hundreds of output documents).

After selecting any of the statistical options from the **Statistics** or **Data Mining** tabs or graphics options from the **Graphs** tab, all actions such as variable selections, option settings, are recorded in the background. At any time you can transfer this recording (such as the Visual Basic code for that macro) to the Visual Basic Editor window. The **Create Macro** option is available from every analysis dialog box in the drop-down menu displayed by clicking the **Options** button or the shortcut menu accessed by right-clicking the analysis button when the analysis is minimized.

Master macros (logs)

You can record a Master Macro or Master Log of an entire session, which can consist of one or many analyses. This recording connects analyses performed with various analysis options from the **Statistics**, **Data Mining**, and **Graphs** tabs. However, unlike simple Analysis Macros, you can turn the recording of Master Macros on and off.

The Master Macro recording will begin when you turn on the recording. To start the recording, select the **Tools** tab, click **Macro**, and select **Start Recording Log of Analyses (Master Macro)**, and it will end when you stop the recording. To stop the recording, click

Macro, and select **Stop Recording**. In between these actions, all file selections and data management operations are recorded, as are the analyses and selections for the analyses, in the sequence in which they were chosen.

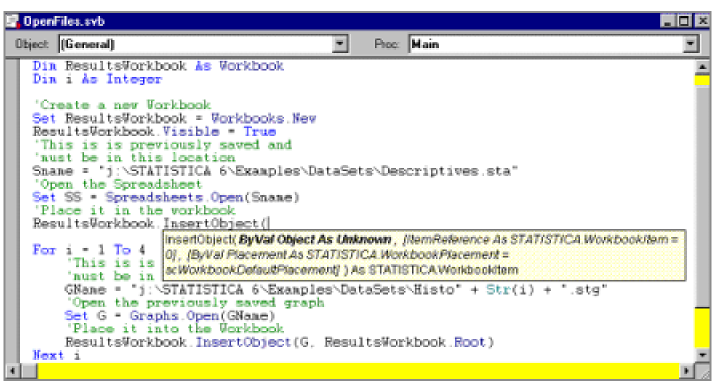
Keyboard macros

This type of macro recording stores the sequences of keyboard input. When you select the **Tools** tab, click **Macro**, and select **Start Recording Keyboard Macro**, Statistica will record the actual keystrokes entered via the keyboard. When you **Stop Recording**, a Statistica Visual Basic editor window opens with a simple program containing a single `SendKeys` command with symbols that represent all the different keystrokes performed during the recording session. Note that this type of macro is very simple in the sense that it will not record any context in which the recorded keystrokes are pressed and will not record their meaning, such as commands these keystrokes trigger, but this feature makes them useful for specific applications. For example, to automate entering text, such as titles, selection conditions.

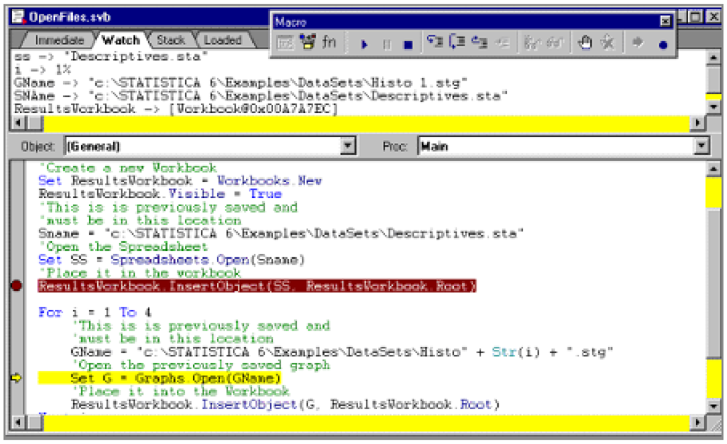
Statistica Visual Basic editor and debugger

Programs can be written from scratch using the Statistica Visual Basic professional development environment, which features a program editor with a powerful debugger with breakpoints and many facilities that aid in efficient code building.

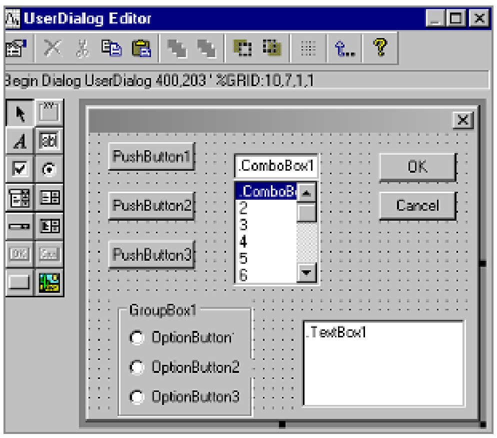
When editing macro programs by typing in Visual Basic commands or program commands specific to SVB, the editor displays type-ahead help to illustrate the appropriate syntax. Help on the members and functions for each class (object) is also provided in-line.



When executing a program, you can set breakpoints in the program, step through it line by line, and observe and change the values of variables in the macro program as it is running.



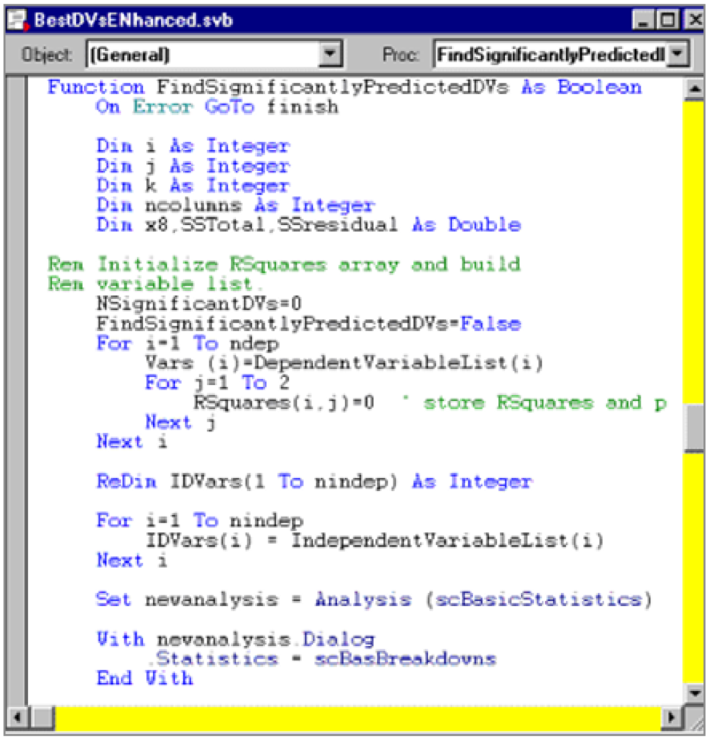
Also available is an interactive dialog editor that enables you to build dialog boxes.



To summarize, Statistica Visual Basic is not only a powerful programming language, but it represents a very powerful, professional programming environment for developing simple macros as well as complex custom applications.

Visual Basic from other applications

SVB programs can also be developed by enhancing Visual Basic programs created in other applications (for example, Excel) by calling Statistica functions and procedures.



Statistica Visual Basic Program Execution

Statistica Visual Basic programs can be executed from within Statistica, but because of the industry standard compatibility of SVB, you can also execute its programs from any other compatible environment (for example, Excel, Word, or a stand-alone Visual Basic language).

In practice, you would typically call Statistica functions from Visual Basic in another application.

When you run an SVB program or attempt to call Statistica functions from any other application, all calls to the Statistica specific functions (as opposed to the generic functions of MS Visual Basic) are executed only if the respective Statistica libraries are present on the computer where the execution takes place. That is, you must be a licensed user of the respective Statistica libraries of procedures. Note that this large library of Statistica functions (more than 14,000 procedures) is transparently accessible not only to Visual Basic, but also to calls from any other compatible programming language or environment, such as C/C++, C#, or Delphi.

Performance of Statistica Visual Basic programs

While the obvious advantages of Visual Basic (compared to other languages) are its ease of use and familiarity to a very large number of computer users, the possible drawback of Visual Basic programs is that they do not perform as fast as applications developed in lower-level programming languages such as C.

However, that potential problem does not apply to SVB applications, especially those that rely mostly on executing calls to Statistica's analytic, graphics, and data management procedures. These procedures fully employ Statistica technology and perform at a speed comparable to running the respective procedures in Statistica directly.

Structure of Statistica Visual Basic

Statistica Visual Basic consists of two major components:

- The general Visual Basic programming environment with facilities and extensions for designing user interfaces (dialogs) and file handling.
- The Statistica libraries with thousands of functions that provide access to practically all functionality of Statistica.

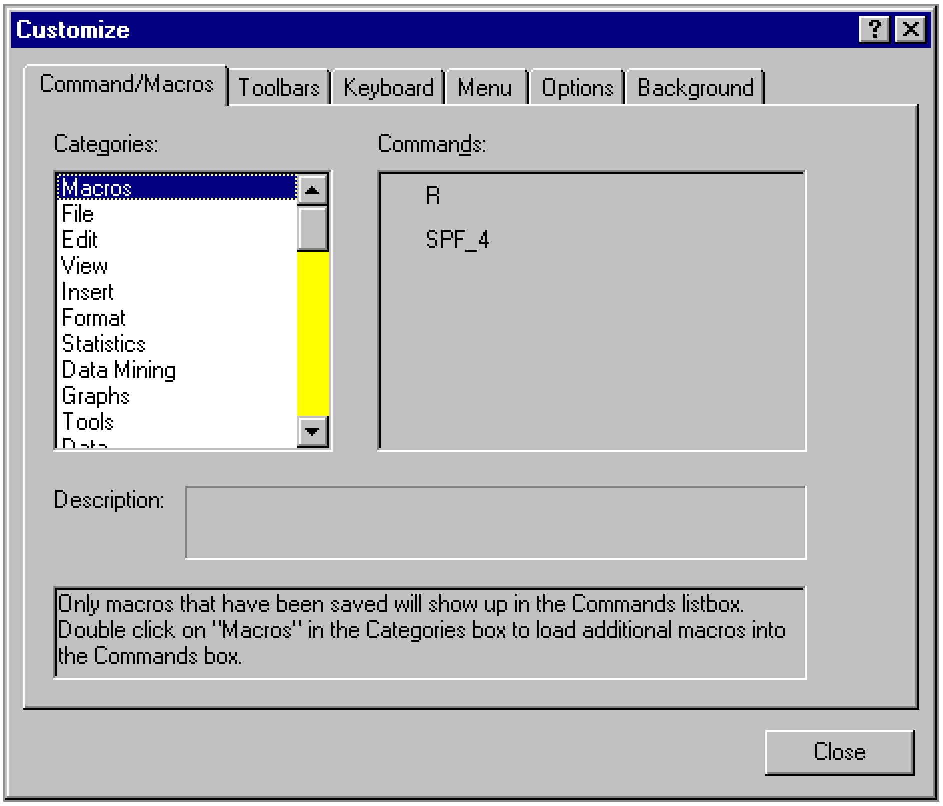
The Visual Basic programming environment follows the industry standard syntax conventions of the Microsoft Visual Basic Language; the few differences pertain mostly to the manner in which dialogs are created, and are designed to offer programmers/developers more flexibility in the way user interfaces are handled in complex programs. In the SVB programming environment, dialog boxes can be entirely handled inside separate subroutines, which can be flexibly combined into larger multiple-dialog programs; MS Visual Basic is form based, where the forms or dialogs, and all events that occur in the dialogs, are handled in separate program units.

Attaching Macros to Toolbars and Menus

A Statistica Visual Basic program can be saved and then attached to a custom classic menu/toolbar or to the Quick Access toolbar on the ribbon bar.
You can easily customize and extend the operation and appearance of Statistica with your own custom macros using this facility.

Procedure

1. To utilize these facilities, save the macro by selecting **Save As Global Macro** from the **File** menu.
2. To customize the menus and toolbars, select **Customize** from the **Tools** menu to display the **Customize** dialog box.
3. To add the macro to a menu or toolbar, choose the **Command/Macros** tab, and select **Macros** from the **Categories** list. All your global macros will be listed in the **Commands** section of the tab.



4. You can then select and drag the specific item from the **Commands** list onto any menu or toolbar.

> **Note:** As the mouse pointer hovers over a menu, the menu expands, and you can insert the item in any submenu.

5. After the macro is placed on the menu or toolbar while the Customize dialog box is displayed, you can right-click the macro and change the appearance and text of the item, as well as add icons.

Running Macros from a Command Line

Procedure

1. With Statistica, you can execute SVB programs from the command line by using the /RunMacro= command line parameter. The syntax is: `statist.exe /RunMacro=macroname` where macroname is the file name of the macro. If a full path is not specified, Statistica attempts to run the macro from the application's currently selected directory, which is Windows default behavior.
2. If the macro does not make the application or any document visible (through the `Application.Visible = True`, or similar document properties), the Statistica instance automatically shuts down when complete.
3. If the application is made visible, the application remains visible after the macro completes, and you need to shut down the program.

Example: Recording an Analysis

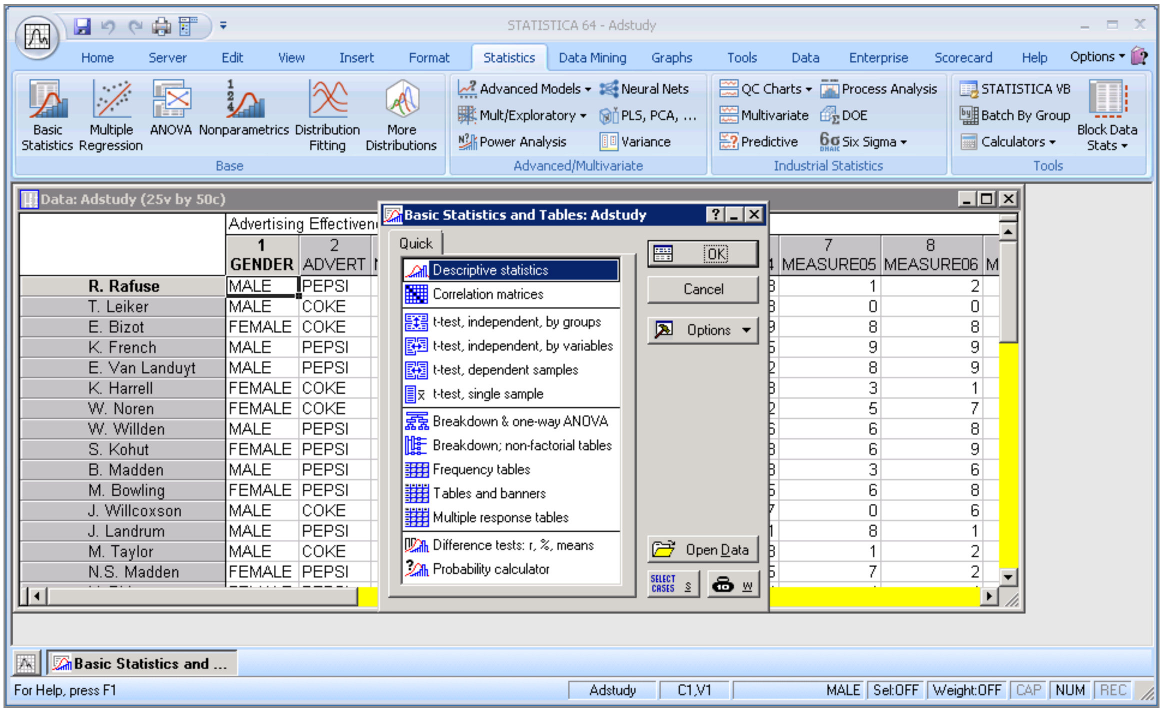
This example illustrates how to record an analysis into a script that can be executed to re-run the analysis.
Then the script will be edited and combined with another script to create a customized script that can run analyses on demand. Additionally, this example shows how you can use attached scripts to auto-update and re-run analyses from results workbooks.

Before you begin

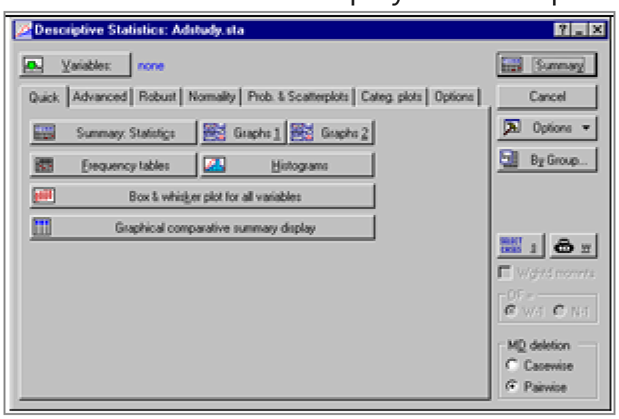
Open the example Adstudy data set.

Procedure

1. Select the **Home** tab, click the **Open** arrow, and select **Open Examples** to display the Open a Statistica Data File dialog box. Double-click on the Datasets file, and then open the Statistica data set `Adstudy.sta`.
2. Select the **Statistics** tab. In the **Base** group, click **Basic Statistics** to display the **Basic Statistics and Tables** Startup Panel. Select **Descriptive statistics**.

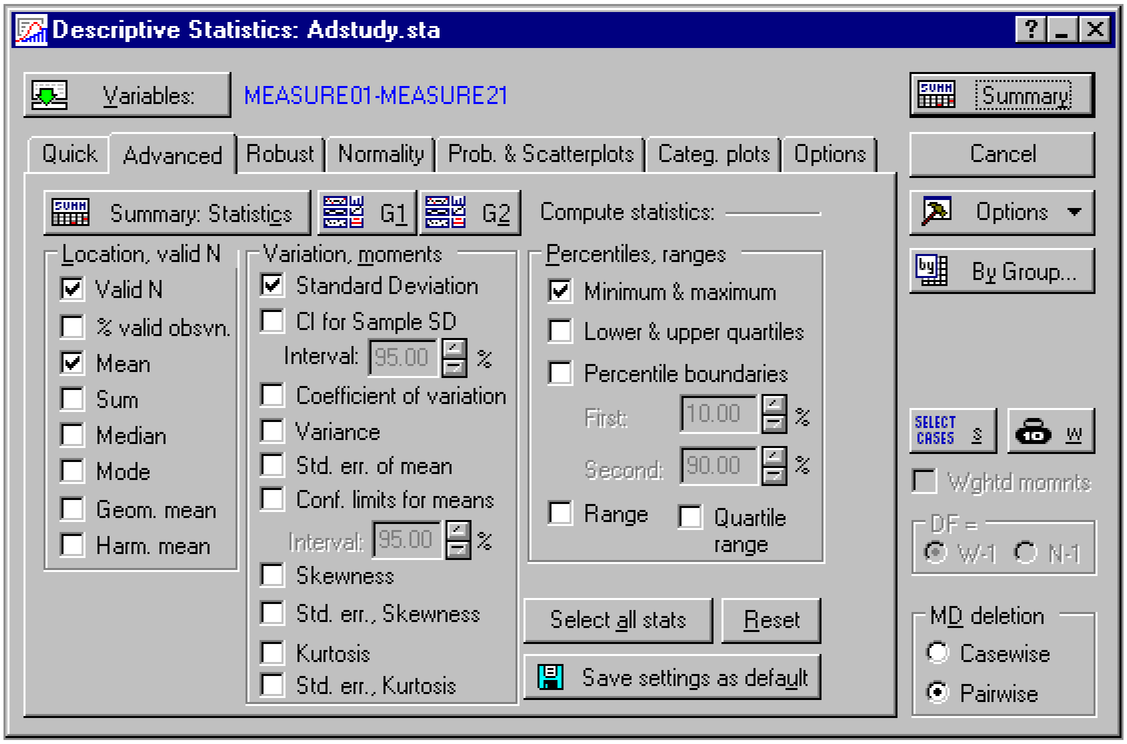


3. Click the **OK** button to display the Descriptive Statistics dialog box.

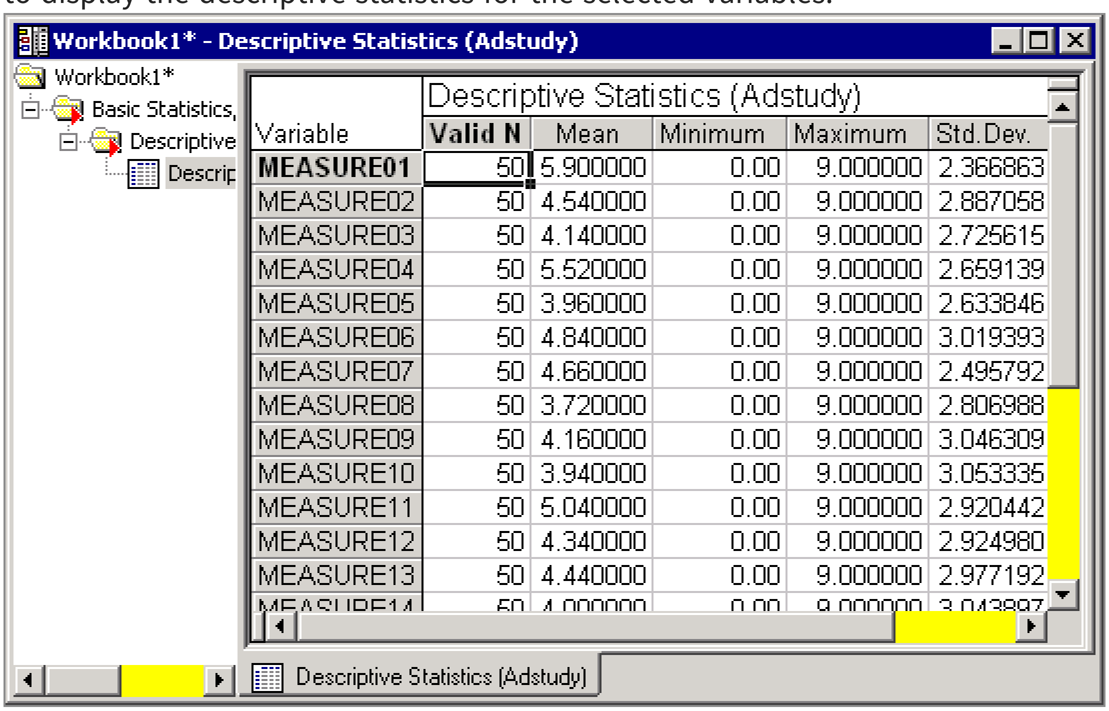


4. Click the **Variables** button to display the Select the variables for the analysis dialog box. Select variables MEASURE01 through MEASURE23 by clicking MEASURE01 and dragging to MEASURE23, and then click **OK**.

5. In the Descriptive Statistics dialog box, select the **Advanced** tab, and note the numerous options available.



6. For this example, we will leave all options at their default. Click the **Summary** button to display the descriptive statistics for the selected variables.

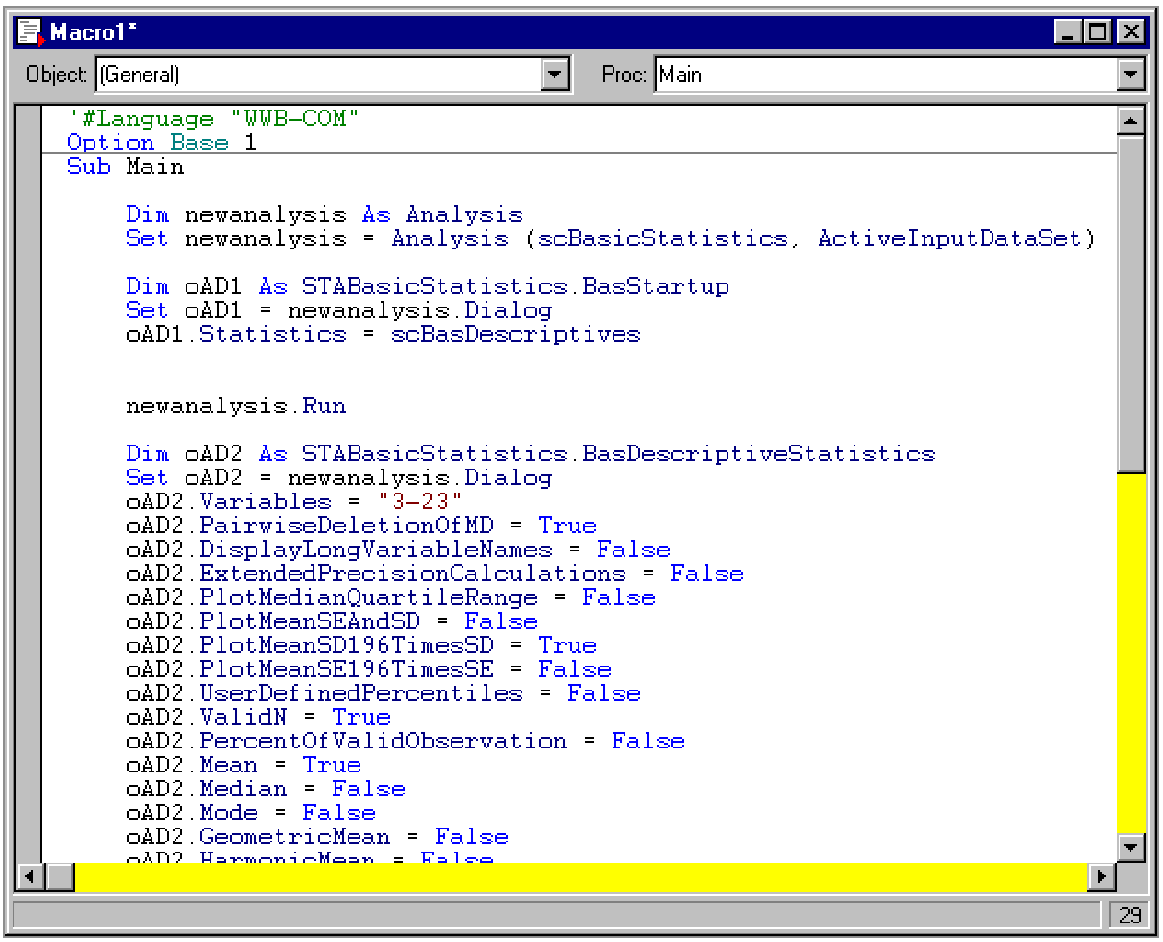


7. When you produce the results workbook, the Descriptive Statistics dialog box is automatically minimized so you can see the results. To restore the dialog, click the **Descriptive Statistics** button on the Analysis Bar in the lower-left of the screen.

8. While you are running this analysis, Statistica automatically records all the analysis steps behind the scenes. You can now produce a Statistica Visual Basic (SVB) macro to re-create this analysis.

9. In the Descriptive Statistics dialog box, click the **Options** Options button, and select **Create Macro** from the drop-down menu. The New Macro dialog box is displayed, where you can name the macro and enter a description. Leave all the entries at their defaults, and click **OK**.

10. An SVB macro window is displayed, containing the recorded Descriptive Statistics session.



11. To run this macro, select the **Debug** tab, and in the **Run** group, click **Run** (or press F5

on your keyboard). The exact Descriptive Statistics results that were generated in the initial analysis are reproduced.

12. Look at the SVB macro for a moment. Toward the top, one of the lines is: `Set new analysis = Analysis (scBasicStatistics, ActiveInputDataSet)`

    This tells the macro to run the Basic Statistics analysis, and use the active data set, that is, the spreadsheet that is currently selected when the macro runs.

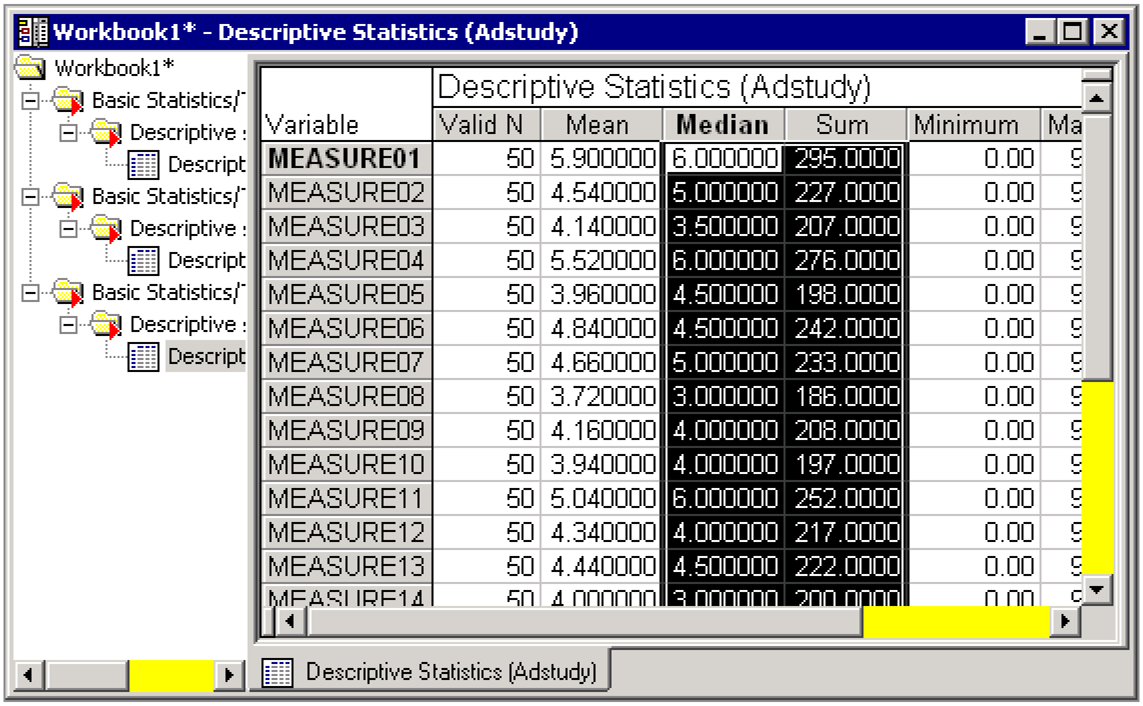
13. A few lines further down is a section that starts with: `Dim oAD2 As STABasicStatistics.BasDescriptiveStatistics` and under that are properties such as: `.PairwiseDeletionOfMD = True`

    These properties correspond to all the options that were available on the different tabs of the Descriptive Statistics dialog box.

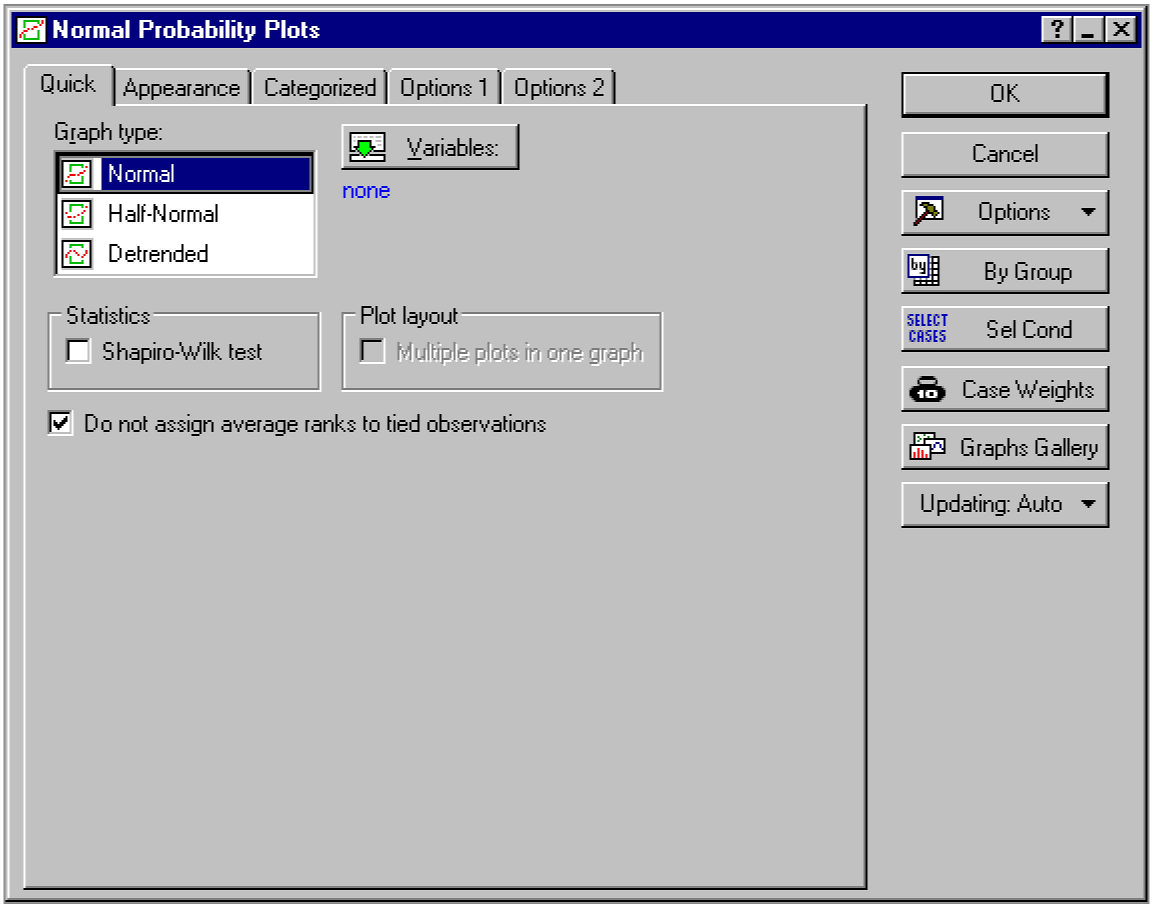
14. Every option in the dialog box is represented by a property, and all the current settings are recorded.

    ```
    .Median = False
    and
    .Sum = False
    and change these to:
    .Median = True and
    .Sum = True
    ```

15. Now, run the macro again by pressing **F5**. A new results spreadsheet will be added to the workbook, this time with new columns of Median and Sum:

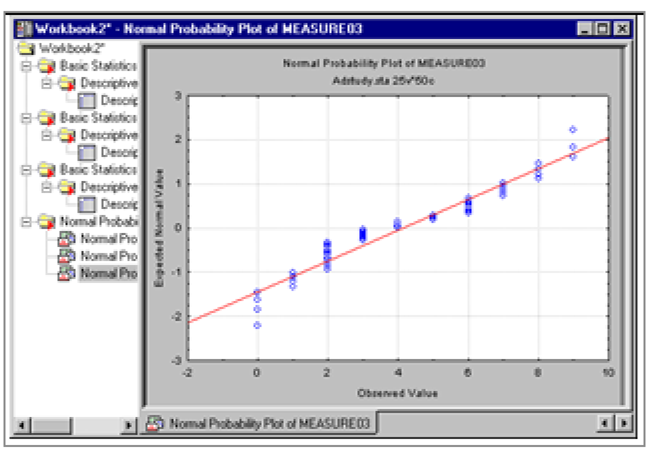


16. Let’s keep the macro window open and start a new analysis on the same sample data set. Select the Adstudy spreadsheet to bring it to the front. Select the **Graphs** tab, and in the **More** group, click **2D**. Select **Normal Probability Plots** to display the **Normal Probability Plots** dialog box.



17. Click the **Variables** button, and in the Select Variables for Probability Plot dialog box, select variables MEASURE01 through MEASURE03.

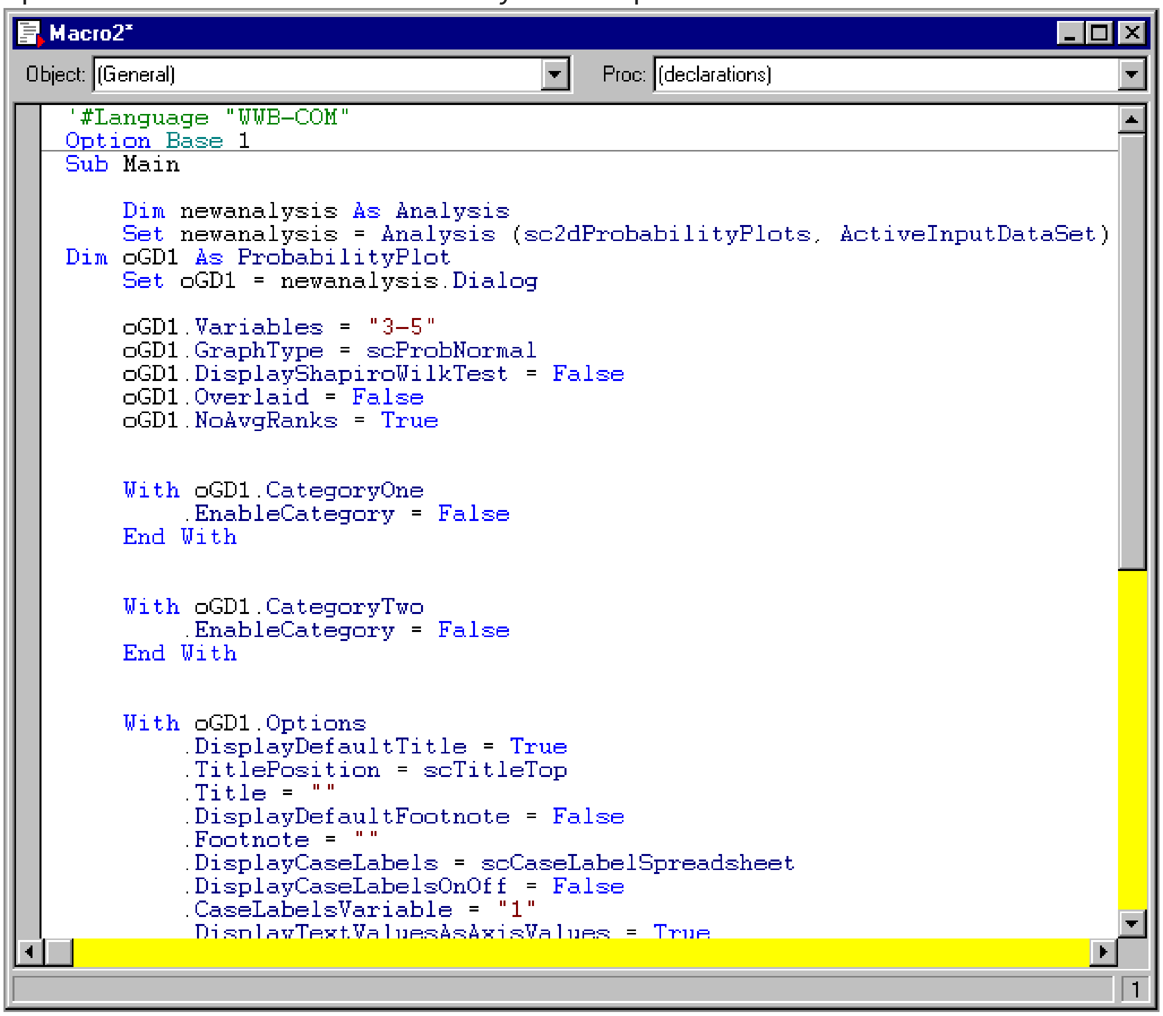
18. Click **OK** to close this dialog, and click **OK** in the Normal Probability Plots dialog box. Three Probability Plot graphs will be placed in the results workbook, one for each of the three variables that were selected.



19. The steps of the Probability Plot analysis were recorded just as they were for the Descriptive Statistics analysis.

20. To create a new macro with these steps, bring the Normal Probability Plot dialog box to the front by clicking that button on the Analysis Bar in the lower-left of the screen, click the **Options** 

button, and select **Create Macro** from the drop-down menu. In the New Macro dialog box, click **OK**, and a new SVB Macro window is opened with the recorded Probability Plot script.




```
'#Language "WWB-COM"
Option Base 1
Sub Main

    Dim newanalysis As Analysis
    Set newanalysis = Analysis (sc2dProbabilityPlots, ActiveInputDataSet)
Dim oGD1 As ProbabilityPlot
    Set oGD1 = newanalysis.Dialog

    oGD1.Variables = "3-5"
    oGD1.GraphType = scProbNormal
    oGD1.DisplayShapiroWilkTest = False
    oGD1.Overlaid = False
    oGD1.NoAvgRanks = True


    With oGD1.CategoryOne
        .EnableCategory = False
    End With


    With oGD1.CategoryTwo
        .EnableCategory = False
    End With


    With oGD1.Options
        .DisplayDefaultTitle = True
        .TitlePosition = scTitleTop
        .Title = ""
        .DisplayDefaultFootnote = False
        .Footnote = ""
        .DisplayCaseLabels = scCaseLabelSpreadsheet
        .DisplayCaseLabelsOnOff = False
        .CaseLabelsVariable = "1"
        .DisplayTextValuesAsAxisValues = True
```

21. As with the Descriptive Statistics analysis, all the options selected in the Probability Plot dialog box are specified as properties within the macro. For instance, to change this from a Normal Probability Plot to a Half Normal Probability Plot, locate the following line:

```
.GraphType = scProbNormal
and change it to:
.GraphType = scProbHalfNormal
```

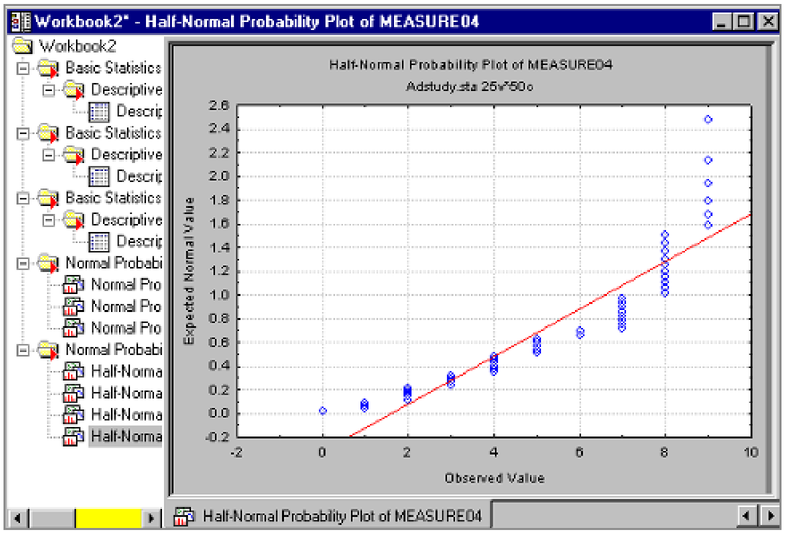
22. Also, expand the variables to include variable MEASURE04. To do this, find the following line: `.Variables = "3-5"`
23. This line corresponds to the variables selected for the plots. Since we selected MEASURE01 through MEASURE03, and these are variable numbers 3 through 5 from the data set, this string was recorded. To add MESURE04 (variable number 6), change this line to: `.Variables = 3-6`
24. Now run the macro by pressing **F5**. Four new graphs are produced as Half-Normal Probability Plots for variables MEASURE01 through MEASURE04.

    This example has demonstrated how you can run any analysis, and then create a macro of the analysis that can be edited and rerun. Additionally, this example has shown how these macros can be combined to develop macros that are more complex. This is the building block of creating your own powerful customized analyses using the SVB language.

Rerunning Analyses from Results Workbooks

In the previous example, you learned that all analyses in Statistica record the steps used to produce them, and these can be loaded into a macro that you can edit and run. When an analysis produces results that are placed in a workbook, Statistica automatically associates the recorded script's steps to the workbook folder that contains the results. With this you can either rerun the analysis or resume an analysis.

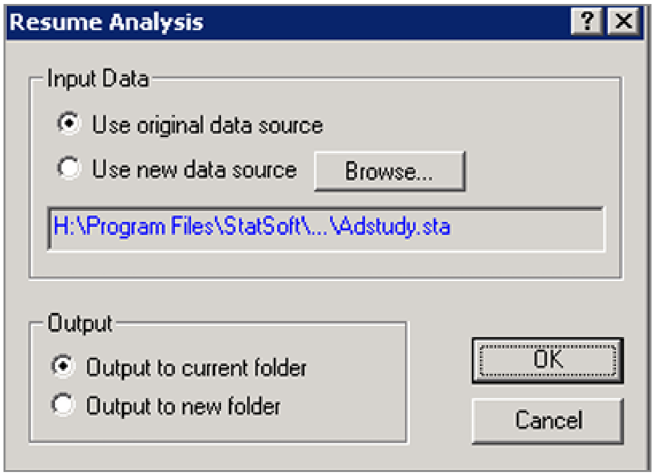
Thus far, we have produced several instances of running both Descriptive Statistics and Probability Plots. The results workbook looks similar to the following illustration.



Notice that there is a red arrow on each workbook folder. This is an indicator that the script that produced the results in that folder has been attached to the folder. This helps to rerun or resume the analysis.

Procedure

1. To rerun an analysis, right-click on one of the folders labeled **Descriptive statistics dialog**, and from the shortcut menu, select Re-run Analysis.
2. The Re-run Analysis dialog is displayed.
3. You can choose to **Use original data source** or **Use new data source**. The latter option gives you the powerful ability to create templates that can then be applied to new data sources. In addition to specifying the data source, you can choose to **Replace current folder contents** or **Output to new folder**.
4. Leave the default values, and click **OK**. You can see that the contents of the folder are briefly deleted and then added again as the analysis is rerun.
5. One purpose for this feature is the ability to update or rerun results from complex analyses if new data is entered into the spreadsheet. For instance, if the data in the open data file `Adstudy.sta` has been changed and the analysis is rerun, the new results are calculated with the new data.
6. Using the resume analysis functionality, you can bring an analysis back to the point before the results were generated, so that you can select different options or continue an analysis in progress.
7. Right-click the same **Descriptive statistics dialog** folder, and from the shortcut menu, select **Resume Analysis**. The Resume Analysis dialog box is displayed.

8. This dialog box also contains options to specify the input data source (original or new). The **Output** options for the new results are to **Output to current folder** (as if this is just an extension of the previous analysis) or **Output to new folder** (as if this is a brand new analysis).


9. Leave the default values, and click **OK**. The Descriptive Statistics dialog box is displayed, with all the options set to what was used when the selected output was created. Since the default was to **Output to current folder**, clicking the **Summary** button generates new output to the same folder.

ACTIVEX Objects and Documents - A Technical Note

The term ActiveX is used in different contexts, and its definitions stress different aspects of that concept.

Its use within Statistica, however, can be grouped into two general categories: ActiveX objects and ActiveX documents.

ActiveX objects

An ActiveX object is what was once referred to as an OLE (Object Linking and Embedding) object. At its heart is the Microsoft COM (Component Object Model) technology that makes it possible for objects to be accessed in a uniform manner.

Through the use of standard protocols, objects created in one application can be stored and edited in a different application. To support this functionality, the containing object needs to be an ActiveX object client, and the application that initially created the object needs to be an ActiveX object server. Statistica is both. As an ActiveX object client, you can embed and link objects from other applications in spreadsheets, graphs, and reports. As an ActiveX object server, you can embed and link spreadsheets and graphs into other applications.

ActiveX documents

ActiveX documents take the ActiveX controls one step further, in that they allow entire documents to be embedded into other applications. An ActiveX document container allows other application documents to be used within it, and an ActiveX document server allows its documents to be used within any ActiveX document container.

Again, Statistica does both. Statistica Workbooks are ActiveX document containers, and allow documents from other ActiveX servers to be displayed within the workbook. Examples of this are Word and Excel; these documents can be used directly from within a Statistica Workbook. Similarly, Statistica Spreadsheets, Graphs, and Reports are ActiveX document servers, and they also can be placed within any ActiveX document container such as Microsoft Internet Explorer.

Office integration and ActiveX documents. The ActiveX document technology has special application with Word and Excel documents. Statistica can open these particular documents natively in their own windows within the Statistica workspace. With office integration you can use Excel documents as data sources and Word documents as reports for analyses. When the documents are open in the Statistica window, the appropriate menus and toolbars for Excel/Word are available for use.

Statistica Query Overview

Statistica Query is a flexible tool for accessing data from external databases. It also includes information on retrieving data from OLAP Cube providers such as MS OLE DB Provider for Analysis Services or SAP Business Warehouse MDX.

Statistica Query is used to access data easily from a wide variety of databases (including many large system databases such as Oracle, MS SQL Server, Sybase) using Microsoft's OLE DB conventions. OLE DB is a powerful database technology that provides universal data integration over an enterprise network, from mainframe to desktop, regardless of the data type. OLE DB offers a more generalized and more efficient strategy for data access than the older ODBC conventions because it allows access to more types of data and is based on the Component Object Model (COM).

Statistica Query supports multiple database tables; specific records (rows of tables) can be selected by entering SQL statements, which Statistica Query automatically builds for you as you select the components of the query through a simple graphical interface and intuitive menu options and dialogs.

Therefore, an extensive knowledge of SQL is not necessary in order for you to create advanced and powerful queries of data in a quick and straightforward manner. Multiple queries based on one or many different databases can also be created to return data to an individual spreadsheet, and you can maintain connections to multiple external databases simultaneously.

Retrieval of External Data using Statistica Query

The steps necessary to retrieve external data using Statistica Query are outlined.

Procedure

1. Select the **Home** tab. In the **File** group, click the **Open** arrow. Select **Open External Data - Create Query** to display the Database Connection dialog box. You can also select the **Data** tab. In the **Manage** group, click **External Data and select Create**

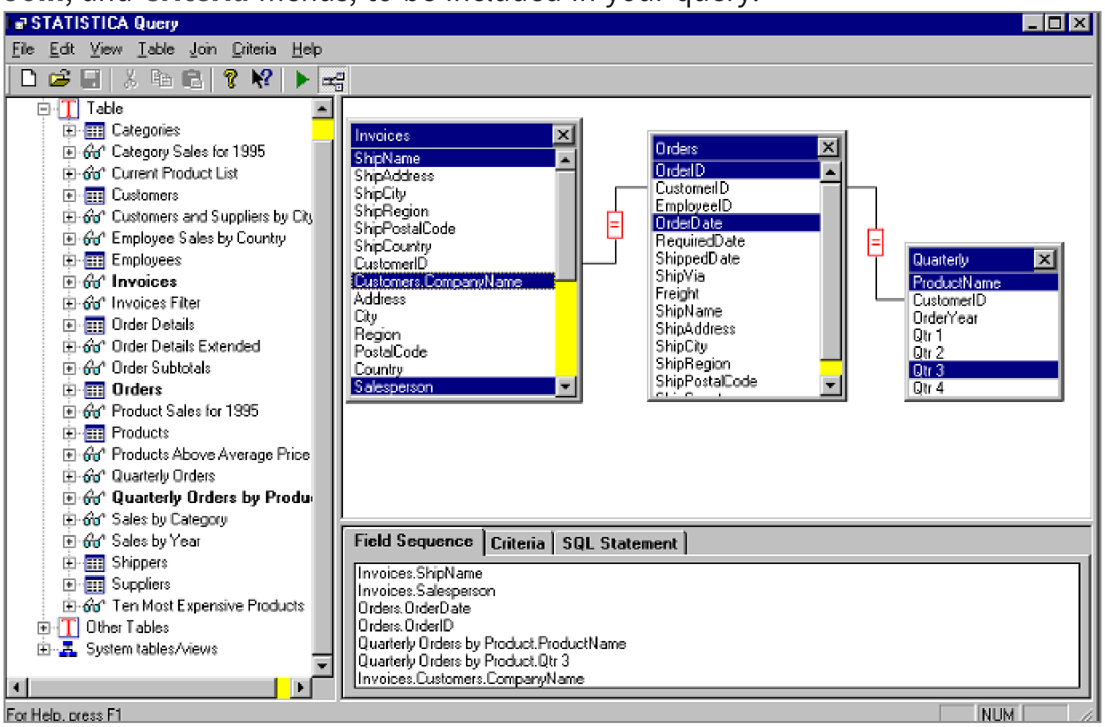
Query to display the Database Connection dialog box.

2. In the Database Connection dialog box, select a predefined database connection (the provider, data source location, and advanced settings of the server or directory on which the data resides).

3. If you have not already created the database connection, to do so click the **New** button in the Database Connection dialog box.

4. The Data Link Properties dialog box is displayed, which guides you through a step-by-step wizard to create a database connection. For specific documentation when you are using the Data Link Properties dialog box, press the **F1** key on your keyboard to display the **Microsoft Data Link Help**®.

5. After you select a database connection and click the **OK** button in the Data Link Properties dialog box, you have access to Statistica Query in which you can create a SQL statement by specifying the desired tables, fields, joins, criteria, using the **Table**, **Join**, and **Criteria** menus, to be included in your query.



6. After you have specified a query, select **Return Data to Statistica** from the **File** menu. The Returning External Data to Spreadsheet dialog box is displayed, in which you can specify the name of the query, where you want Statistica Query to put the data that the query returns, and additional options.

In-Place Processing of Data on Remote Servers

This is an the IDP Technology Option. The query facilities, when offered as part of the enterprise versions of Statistica are additionally enhanced by options to process data from remote servers in-place, that is, without having to import them and create a local data file.

This In-Place Database Processing (IDP) technology is particularly useful for processing extremely large data files where it can produce significant performance gains and enable Statistica users to process data files that exceed the storage capacity of the local device or even the Statistica Enterprise Server.

Technical note: The IDP technology is based on distributed processing architecture, where the queries are performed on the server side (using the server CPU resources) and the respective records sent to the Statistica computer where they are simultaneously and asynchronously processed as they become available.

OLAP Cubes

OLAP (On-Line Analytic Processing) is a generic term for a system that provides efficient access to summary data about very large databases.

Unlike ordinary relational databases, which organize data as a set of well-defined, two-dimensional tables, an OLAP data warehouse represents data at many levels of detail in multi-dimensional data sets known as cubes.

When a Statistica user wants to perform an analysis against data from an OLAP Cube, the data must be reduced to a two-dimensional form – cases and variables – that can be represented in a Statistica spreadsheet. The Statistica Query tool provides a graphical, drag-and-drop interface for specifying the dimensions and levels of detail that will be extracted from the cube to feed into the query. The “MDX” (Multi-Dimensional eXpressions) mode is triggered automatically when an OLAP data source is selected.

Customers who require OLAP integration will usually have sophisticated database support technicians through their in-house information technology department who can help design these queries. Because the configuration of the dimensions in an OLAP cube is determined by the customer’s database administrators, Statistica can provide only limited assistance in this area.

Large Database Files

Statistica products are designed for large-scale analytics; consequently, they integrate well with database systems designed for managing very large amounts of data, such as Teradata and others.

For example, Statistica can both extract data for analysis from Teradata, and it can also score results directly inside Teradata through deployment code created by Statistica Data Miner and applied to the Teradata as a user-defined function, which significantly accelerates processing of large amounts of data.

Programming Statistica from .NET

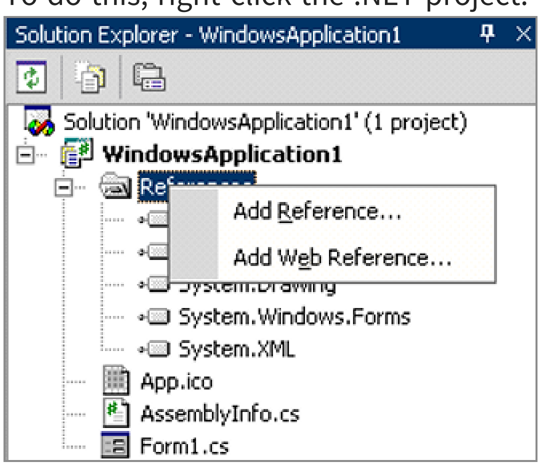
Virtually every aspect of Statistica is exposed as a set of COM interfaces that are registered on a machine when Statistica is installed. Since .NET-based languages cannot communicate with COM directly, a wrapper class called the COM Interop can be utilized to integrate the Statistica libraries into your .NET project. The COM Interop layer is created automatically by the Visual Studio .NET IDE when you import a COM interface. The COM Interop layer handles all of the details regarding interacting with the COM libraries in .NET. With the COM Interop layer in place, the Statistica COM interfaces behave like any other .NET object.

Adding Statistica Object Library into .NET Project

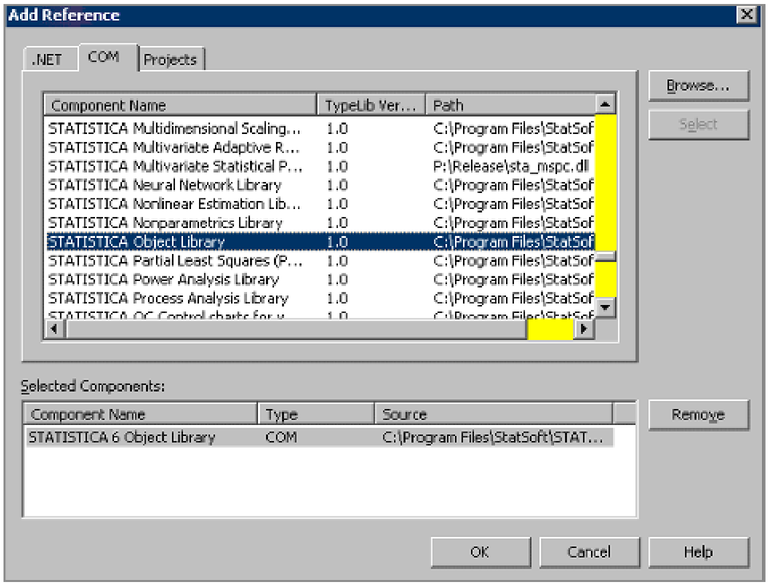
The .NET Interop layer is created automatically by adding the desired Statistica COM interfaces into your .NET project. Statistica Object Library is the base Statistica COM library.

Procedure

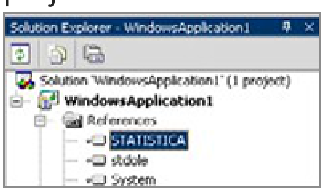
1. To add the Statistica Object Library to a .NET project, first select the desired .NET project in Solution Explorer, and then select **Add Reference** from the shortcut menu. To do this, right-click the .NET project.



2. The Add Reference dialog box is displayed. Select the **COM** tab. From the **Component Name** list, select **Statistica Object Library**, and click **OK**.

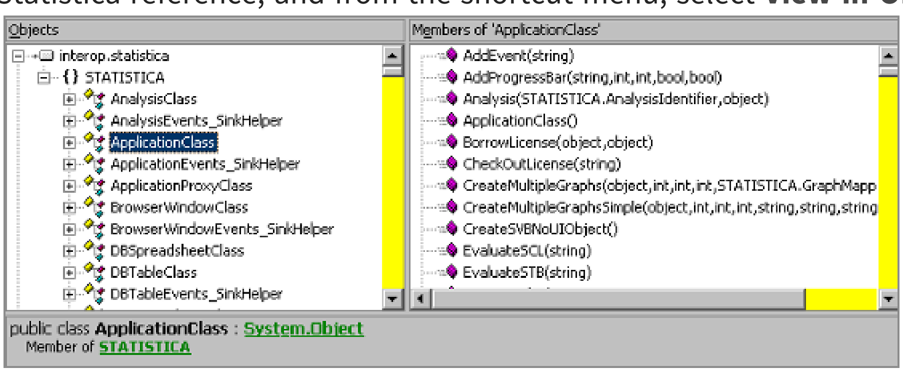


3. At this point, the necessary COM Interop library is created automatically. Under the project References node, you can now see the entry for Statistica.



4. The file `Interop.Statistica.dll` is also added to the project output directory. The Statistica COM Interop library is stored in this file.

5. To view the Statistica object library from your .NET project, right-click on the Statistica reference, and from the shortcut menu, select **View in Object Browser**.

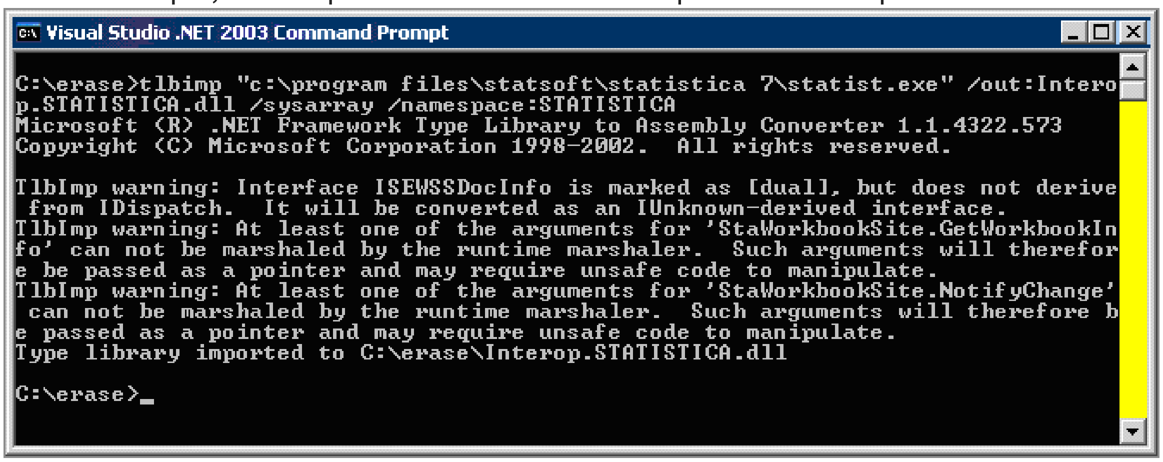


Manually Creating the COM Interop Library

It is also possible to create the COM Interop library manually and import it into your .NET project.
This gives you the ability to specify a different name for the Interop DLL as well as define a custom namespace. You can create an Interop using TLBIMP.EXE program.

Procedure

1. From a Visual Studio command prompt, execute `TLBIMP` with an initial parameter of the type library source.
2. In this example, the output DLL name and namespace are also specified.



3. There is reference to the file `STATIST.EXE` since that executable contains the Statistica Object Library type library.
4. After the Interop DLL is generated, you can add it to your .NET project by selecting **Add Reference** from the Solution Explorer, click the **Browse** button to select the newly created Interop DLL.

Support for Multiple Versions of Statistica

To support multiple versions of Statistica, it is necessary to maintain separate Statistica Object Library Interop DLLs for each version of Statistica you want to support. You can use the `TLBIMP` command to generate Interop DLLs against specific versions of `STATIST.EXE` and other DLLs. When distributing the application, ensure that the correct version of the Statistica Interop DLL is deployed with your .NET application.

Instantiating Statistica

Statistica can be incorporated into many different development environments because of its COM architecture.
When using Statistica from an external development environment, it is necessary to have a top-level object called the application object. The application object is the application itself and will contain other objects (for example, spreadsheets and graphs), but access to these other objects is restricted unless the application object is running.

Before you begin

Assuming you are using the default namespace Statistica, the interface you should declare your variable as is *Statistica.Application*.

Procedure

1. To create an instance of Statistica, set your variable equal to

   ```
   new Statistica.ApplicationClass().
   STATISTICA.ApplicationpApp=(STATISTICA.Application)
   new STATISTICA.ApplicationClass();
   pApp.Visible=true;
   ```

2. When an instance of the Statistica.ApplicationClass is created, a `STATIST.EXE` process will be launched. This is equivalent to launching Statistica from the Start menu. The Statistica instance is initially hidden but can be made visible. Since it is a separate process, all calls to this instance are made out of process.

The Library Version of Statistica

In addition to the Statistica.Application object, there is also a lighter-weight, higher-performance version of the object called Statistica.Library.

The Library version is licensed separately and therefore may not be available with your installation. It contains identical interfaces as the Statistica.Application library. Any existing code that uses the Application object can be replaced with the Library object.

The main restriction is that the Statistica user interface features are not available from the Library version. Therefore, in the previous example, if the Application object was instantiated as a new Statistica.LibraryClass, it would not be possible to make the object visible (and show the Statistica interface).

The Library version of Statistica is loaded in-process, which means accessing its COM interfaces is more efficient than using the Application version of the object (which is loaded out of process). Since it is loaded in-process, multiple versions of the library cannot be instantiated. Normally, you would only instantiate one Library object or one Application object in your program.

Statistica Enterprise Server

Statistica Enterprise Server is a highly scalable, enterprise-level, fully Web-enabled data analysis and database gateway application system that is built on distributed processing technology and fully supports multi-tier Client-Server architecture configurations.

Statistica Enterprise Server exposes the analytic, query, reporting, and graphics functionality of Statistica through easy-to-use, interactive, standard Web interfaces.

Alternatively, it enables users of the desktop version (thick client) to offload computationally intensive analytics and database operations to the Server. It is offered as a complete, ready-to-install application with an interactive, Internet browser-based (point-and-click) user interface (thin client) that makes it possible for users to interactively create data sets, run analyses, and review output.

However, Statistica Enterprise Server is built using open architecture and includes .NET-compatible development kit tools (based entirely on industry standard syntax conventions such as VB Script, C++/C#, HTML, Java, and XML) that enables IT department personnel to customize all main components of the system or expand it by building on its foundations, for example, by adding new components and/or company-specific analytic or database facilities.

As mentioned, Statistica Enterprise Server is provided with an Internet browser-based user interface (in the form of simple-to-navigate and easy-to-use dialogs) enabling you to specify analyses and review results. However, tools are provided to customize these dialogs and easily set up new user interfaces or to add new functions. For example, a simple dialog with only three buttons can be created in the browser, and clicking each button will run a series of analyses and generate a detailed report. Statistica Enterprise Server applications add a new dimension and an endless array of possibilities to the entire line of Statistica Data Analysis, Data Mining, and Quality Control/Six Sigma software.

The system is compatible with all major Web server software platforms (for example, UNIX Apache, and Microsoft IIS), works in both Microsoft .NET and Sun, Java environments, and does not require any changes to the existing firewall and Internet or Intranet security systems.

A Broad Choice of Analytic Facilities and Configurations

The Statistica Enterprise Server system is offered as a complete solution that includes the analytic functionality of any Statistica product or any combination of products, from Statistica Base to Data Miner applications.

The minimum installation of Statistica Enterprise Server software includes the analytic functionality of Statistica Base and a license for minimum 5 concurrent users.

Customers can either order a specific version of Statistica Enterprise Server including the analytic functionality that they require (for example, Statistica Base for 10 users), or they can add the Enterprise Server functionality (as described in this section) to some or all of the seats of the currently licensed Statistica product (for example, add the Enterprise Server functionality to 20 out of 50 existing licenses of Statistica Enterprise).

Functionality and Applications - The Advantages of Statistica Enterprise Server

A powerful, enterprise-wide collaborative-intelligence system

Another important way to take advantage of the Statistica Enterprise Server functionality is to use it as the core and natural extension of any of the Statistica enterprise systems (for example, Statistica Data Miner applications).

Specifically, Statistica Enterprise Server can act as the core of an enterprise-wide network system that enables the participants to work collaboratively and quickly share results (reports), as well as scripts of analyses or queries. User or group permissions (see the Technical Note on page 203) can be used by the administrators to manage access of specific groups of users to specific data or reports. The accessibility of its tools makes Statistica Enterprise Server a perfect system to facilitate collaborative projects of employees who are telecommuting or traveling.

Advantages of distributed processing, and multi-tier Client-Server architecture

Users cannot benefit not only from the collaborative work tools but also from the options to offload the computationally intensive or time-consuming tasks to the server computers. Specifically, because the most powerful multiprocessor CPUs and clusters of computers are usually used as servers, users can offload computationally intensive tasks, and, for example, run in the background queries that will scan terabytes of data on remote servers and perform time-consuming, long sequences of analyses or reports, while keeping the end users' computers completely free to do other tasks. Because of its distributed processing architecture, Statistica Enterprise Server scales in a highly efficient manner to take advantage of multi-processor CPUs and multiple computers and, therefore, users can take full advantage of multi-tier Client-Server architecture, where:

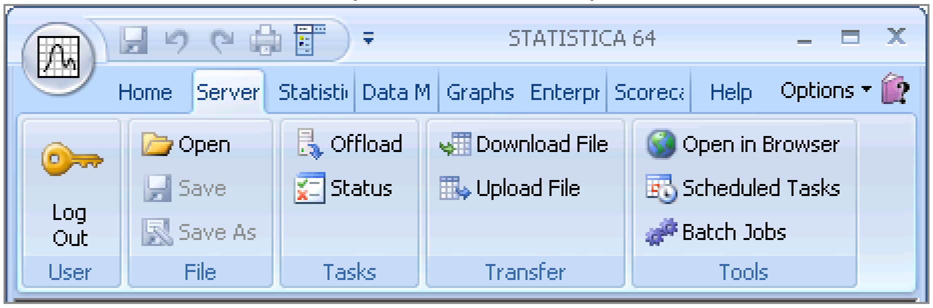
- Tier 1 is the user interface on the client computer (a plain browser or Statistica thick client, see Statistica Client),
- Tier 2 is the Statistica Enterprise Server software and the implementation of the business intelligence that it may contain (specific queries, scripts of custom/proprietary analyses, etc.), and
- Tier 3 is Statistica databases (for example, Statistica Data Warehouse) or other corporate repositories of data.

In the desktop version of Statistica, all computations are performed on the local computer, and resources of other computers are used only in the case when the In-Place Database Processing (IDP), interface to external databases is established. IDP is a technology that reads data asynchronously directly from remote database servers (using distributed processing if supported by the server), and bypasses the need to import data and create a local copy of the data set. Records of data are retrieved and sent to the Statistica computer asynchronously by the CPU of the database server, while Statistica simultaneously processes them using the CPU of the local computer.

When a Client-Server version of Statistica is used, the local computer drives only the user interface of Statistica, and all calculations are performed on the server. The Client-Server architecture offers obvious advantages when your projects are large (for example, computationally intensive or involving processing of extremely large data sets) and, thus, when they can be offloaded to the servers, freeing your local computer to perform other jobs.

Statistica Client

While no components of the Statistica system are necessary on the client computer (only a browser), having a copy of Statistica installed on the client side adds new possibilities. One could ask, Why would I want to use Statistica Enterprise Server if I have a copy of Statistica installed on my laptop? The answer is that having Statistica installed on the client computer enables you to take additional advantage of the multi-tier Client-Server architecture and work interactively with Statistica installed locally while offloading certain time-consuming tasks to the server machines and exchange data and output between all the three tiers. You can run Statistica Enterprise Server from within desktop Statistica and flexibly control the interaction between the two. A variety of options are available to share tasks between the desktop and server computer.



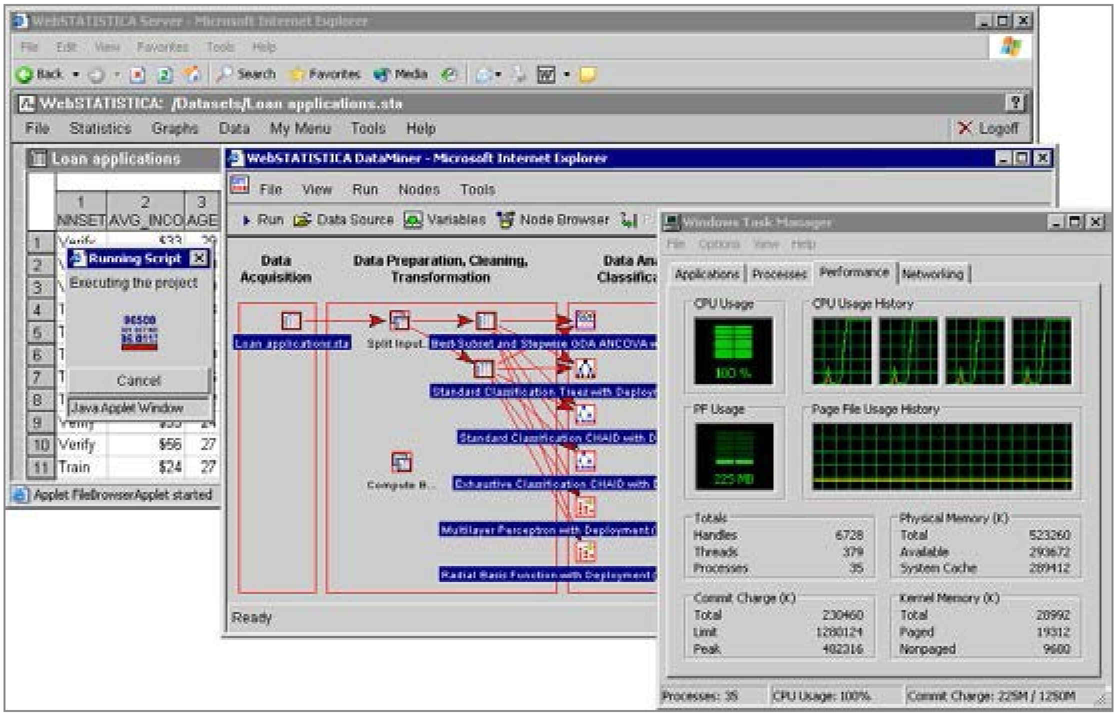
Also, when you review your Statistica Enterprise Server output in the browser, you have options to bring any or all output objects to your desktop computer for further processing. For example, a click on a small button placed optionally (depending on the user configuration) next to every output object (table or graph) sent to your browser by the Statistica Enterprise Server system will offer you the option to download that object (a Statistica table or a graph) to the client computer in its native Statistica format (in .sta or .stg file format) so you can work with it offline using the locally installed Statistica tools.

Advantages of Multithreading Technology

The Statistica Enterprise Server platform is built on advanced distributed processing and multithreading technology to support optimal management of large computational loads. This technology enables rapid processing of even very large and computationally intensive projects, taking full advantage of the multiple CPUs on the server, or even multiple servers working in parallel.

The following illustration shows a project running on a quad processor server, along with the server performance monitor demonstrating the full utilization of the resources of all four CPUs executing in the multithreading mode a single, computationally intensive Statistica Data Miner project.

In addition, the Statistica Enterprise Server architecture delivers a platform-independent, Web browser-based user interface, and provides an ultimate, large enterprise-level ability to manage projects or groups of users.



Ultimate scalability (parallel processing technology)

One of the unique features of the Statistica distributed processing technology is that it flexibly scales not only to take advantage of all CPUs on the current server computer (to support both multiple jobs/users and also individual, computationally intensive projects), but it also scales to multiple server computers (clusters). This unique feature is important, since it delivers significant performance gains. Statistica uses the parallel processing technology across separate hardware units (as some super-computers do) and, therefore, if you have, for example, three servers with four processors each, Statistica can run an individual project on all 12 processors (if the scale of that project warrants that mode of processing).

Statistica Enterprise Server User Interface

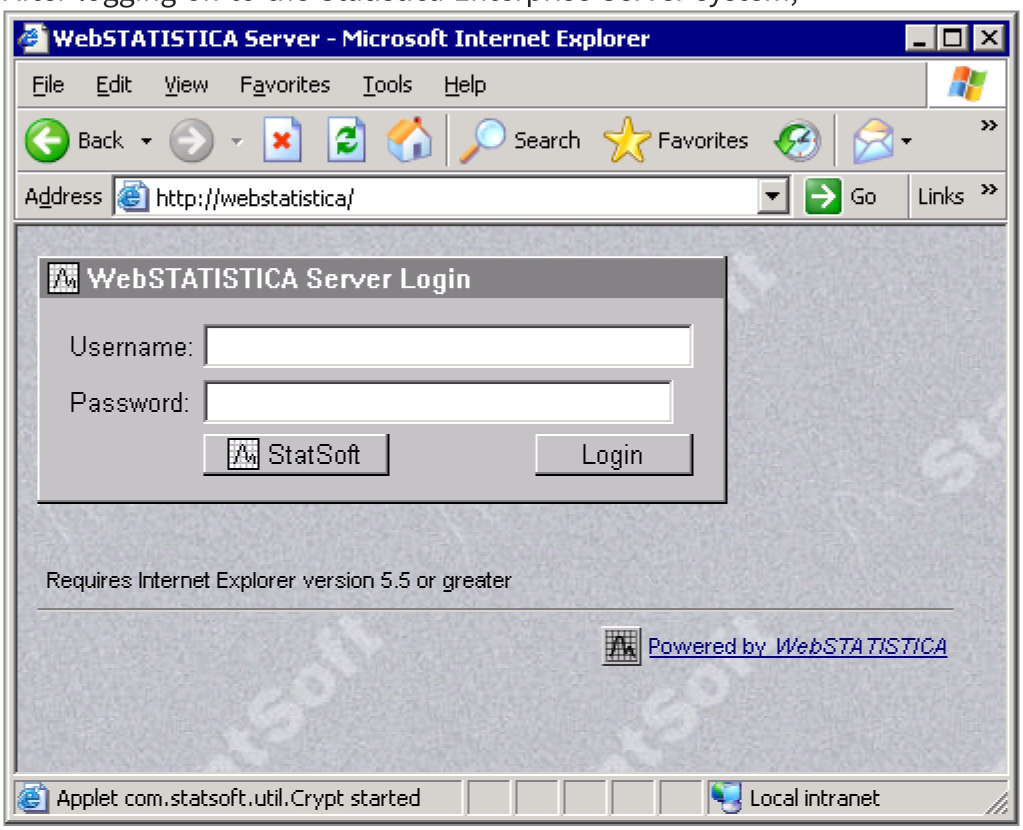
With the Statistica Enterprise Server implementation of Statistica, users can interactively run the program from the client machine in a Web browser interface that is similar to that available for the desktop installation. Therefore, the client side of the application (the "front end") can be run on any computer using only a browser.

However, the actual computations and other operations performed on the data remain on the (remote) server with its usually more powerful processors and storage resources (and they are managed using the optimized, multithreading and distributed processing architecture of the system for maximum performance).

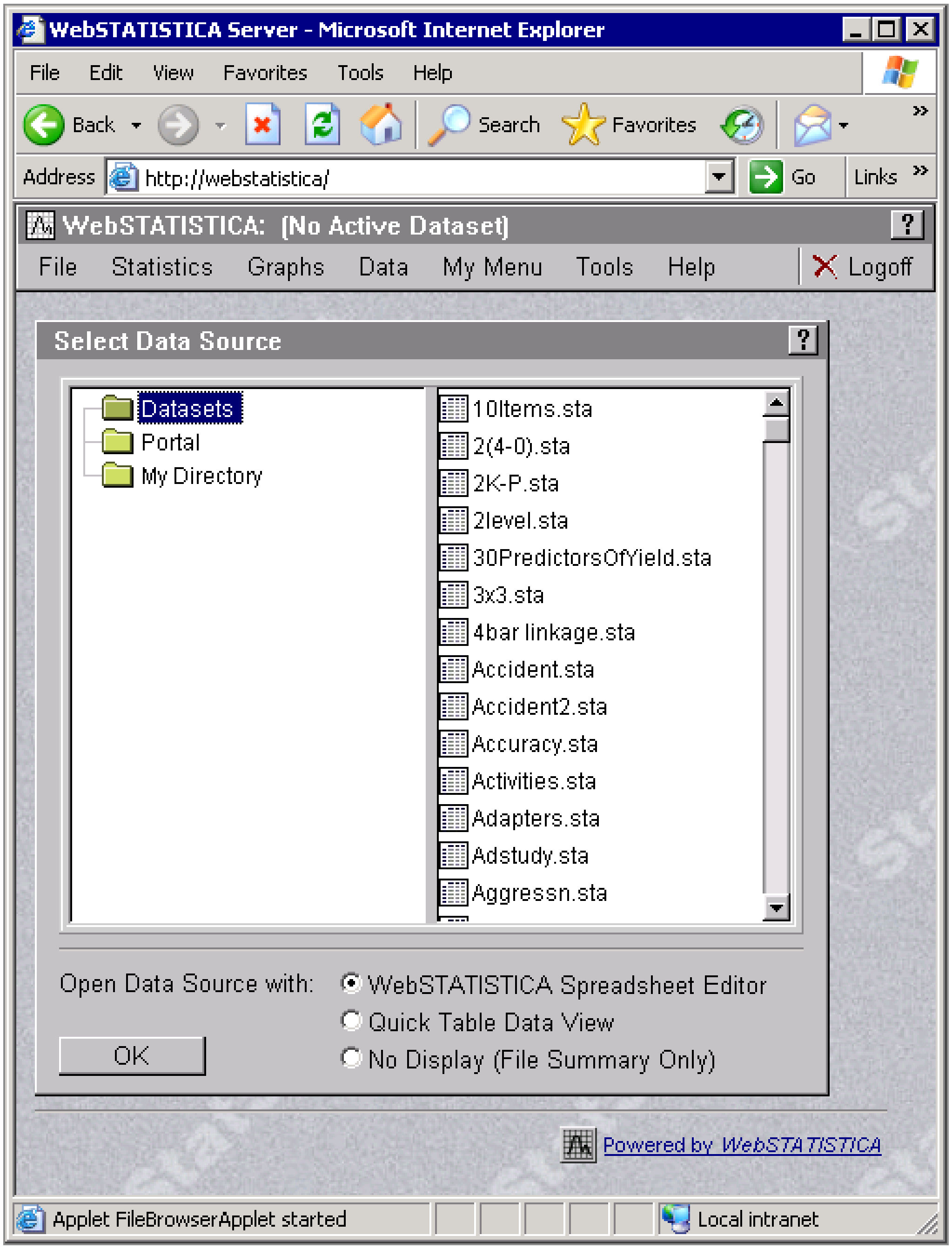
In essence, the user interface aspects of Statistica can be run by one or multiple users, while the server performs all computations and data operations, enforcing the proper security and access privileges applicable to the respective projects and classes of users, as designed by the network administrator.

Statistica Enterprise Server offers a straightforward user interface supporting a selection of interactive data analysis, data mining, quality control, database management, database query, and graph customization operations.

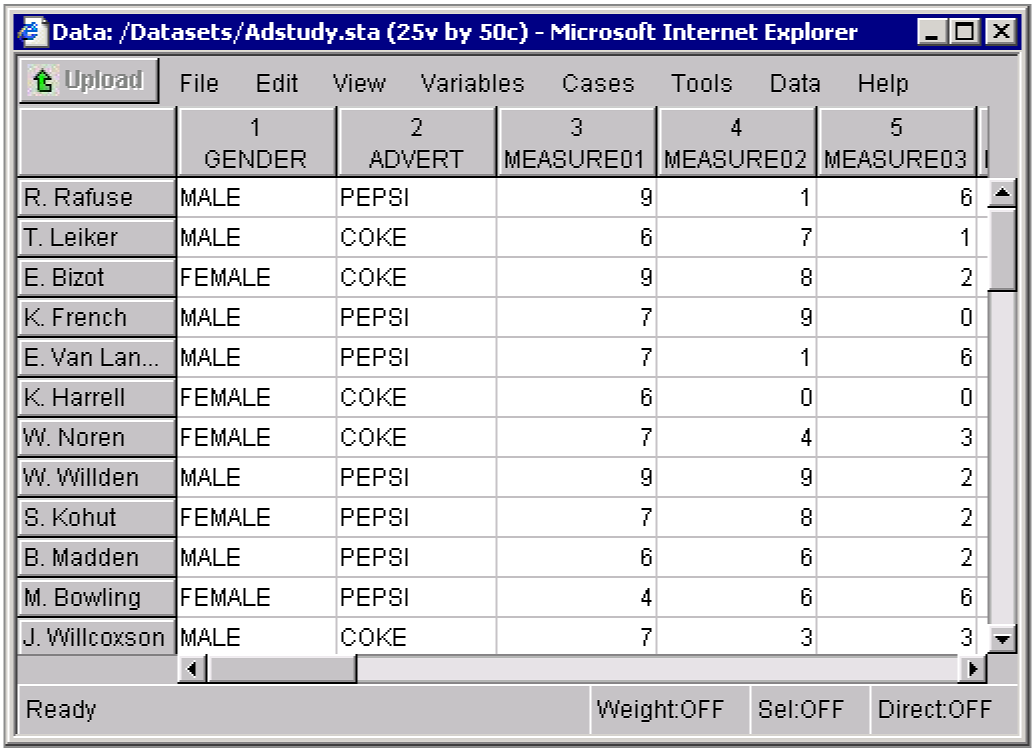
1. After logging on to the Statistica Enterprise Server system,



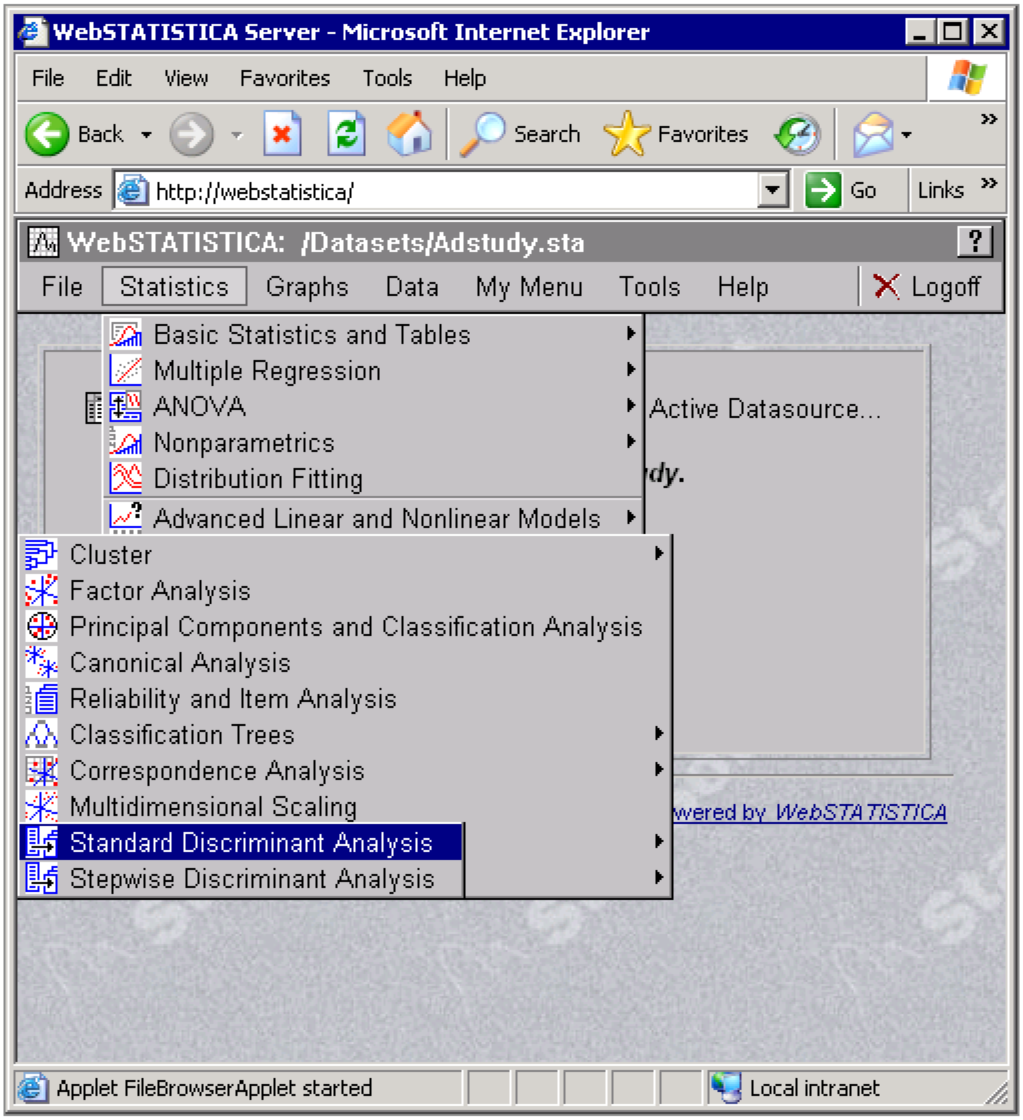
2. You can select a data source (a data set or a live database connection),



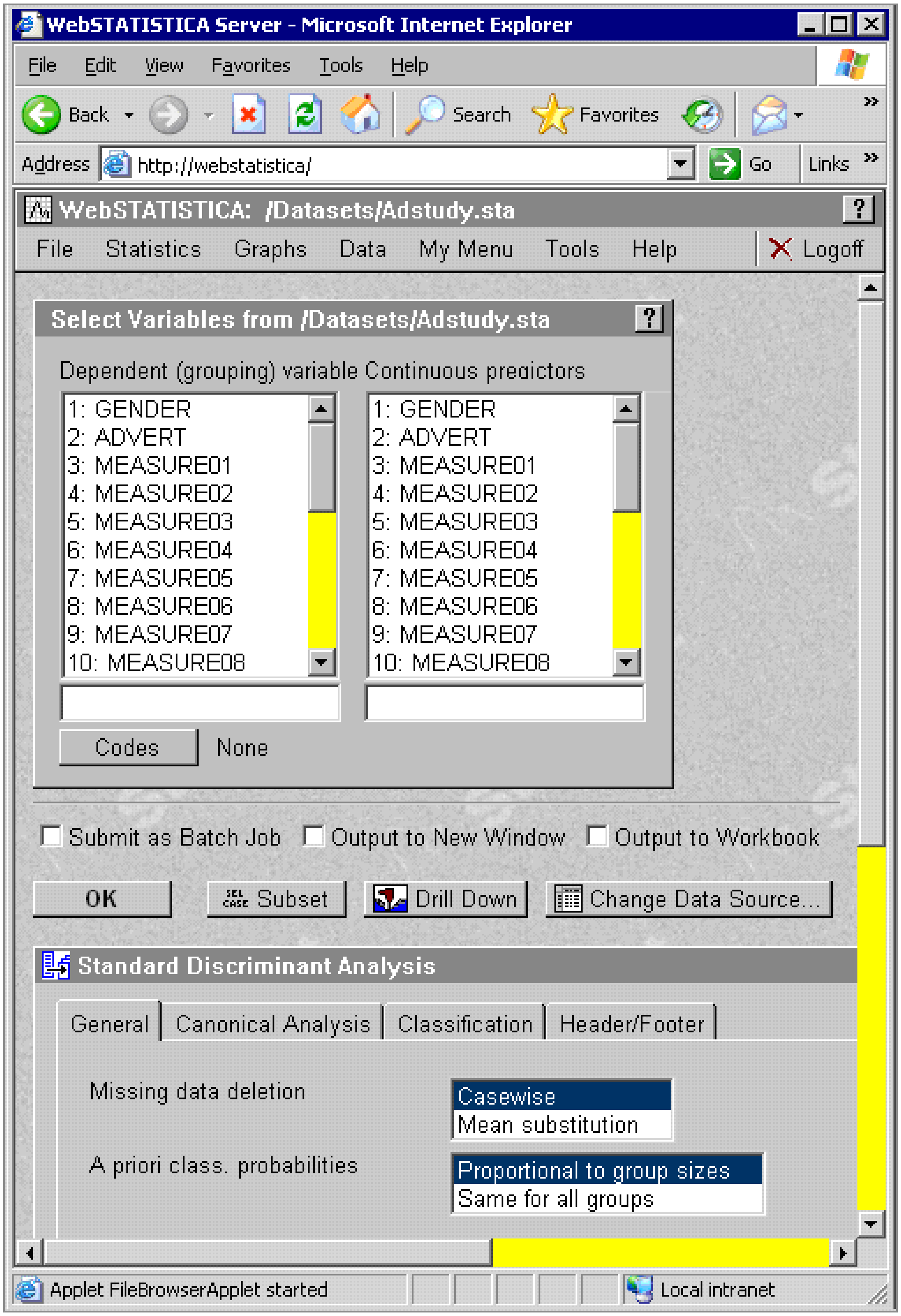
3. Review and edit the data in the interactive Spreadsheet Editor,



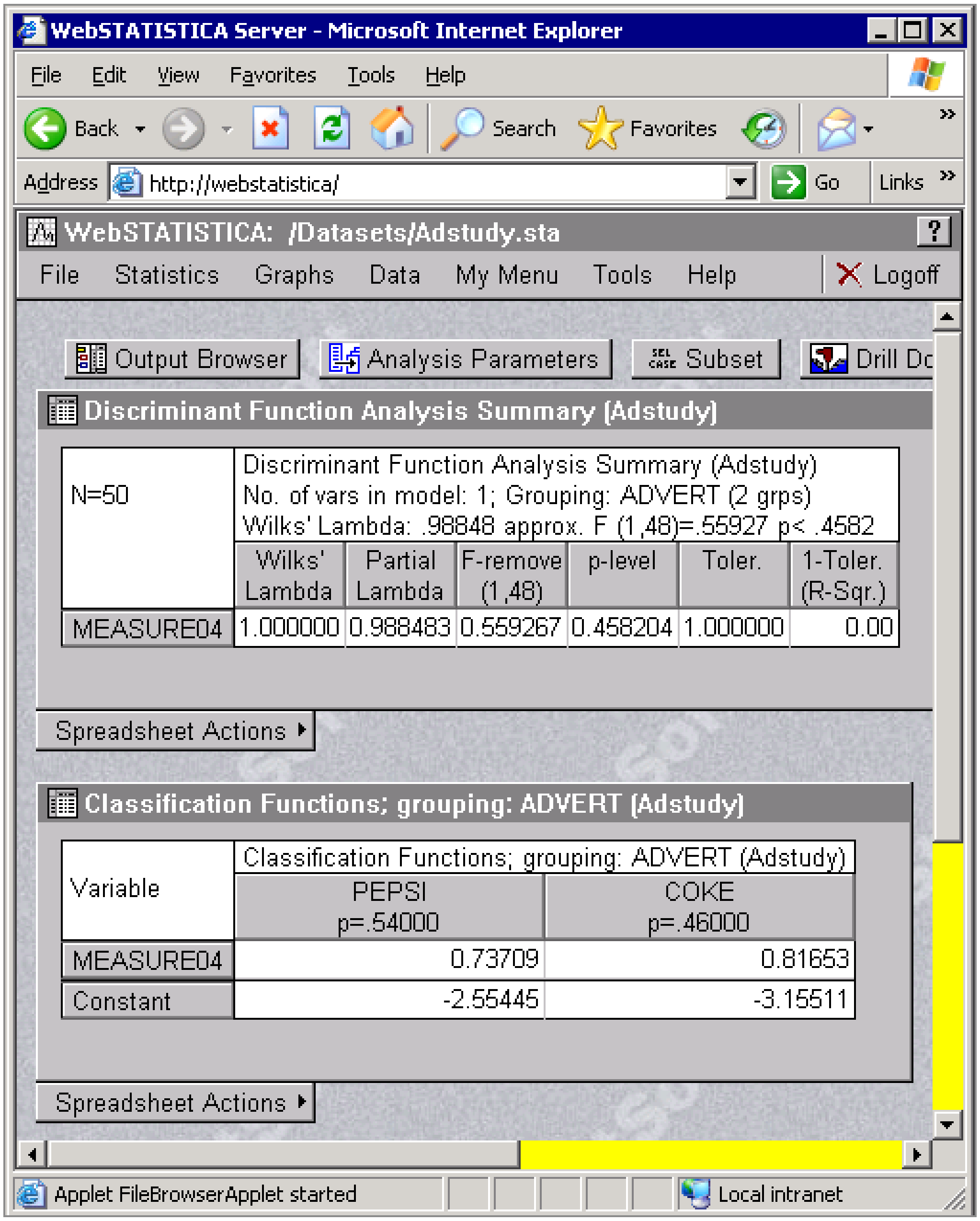
4. Select the analysis to be performed using the standard menu system (or a shortcut in the user-defined **My Menu**),

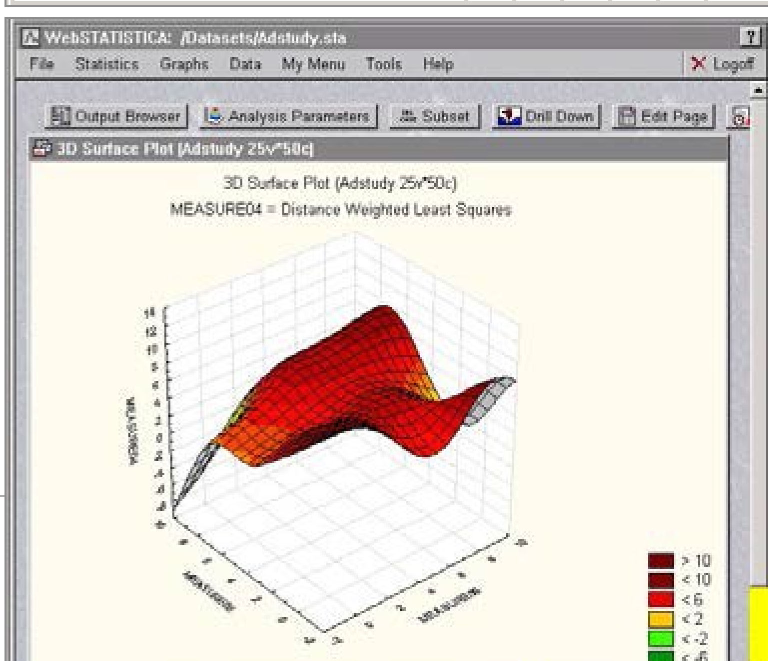


5. Select variables and specify optional analysis parameters,

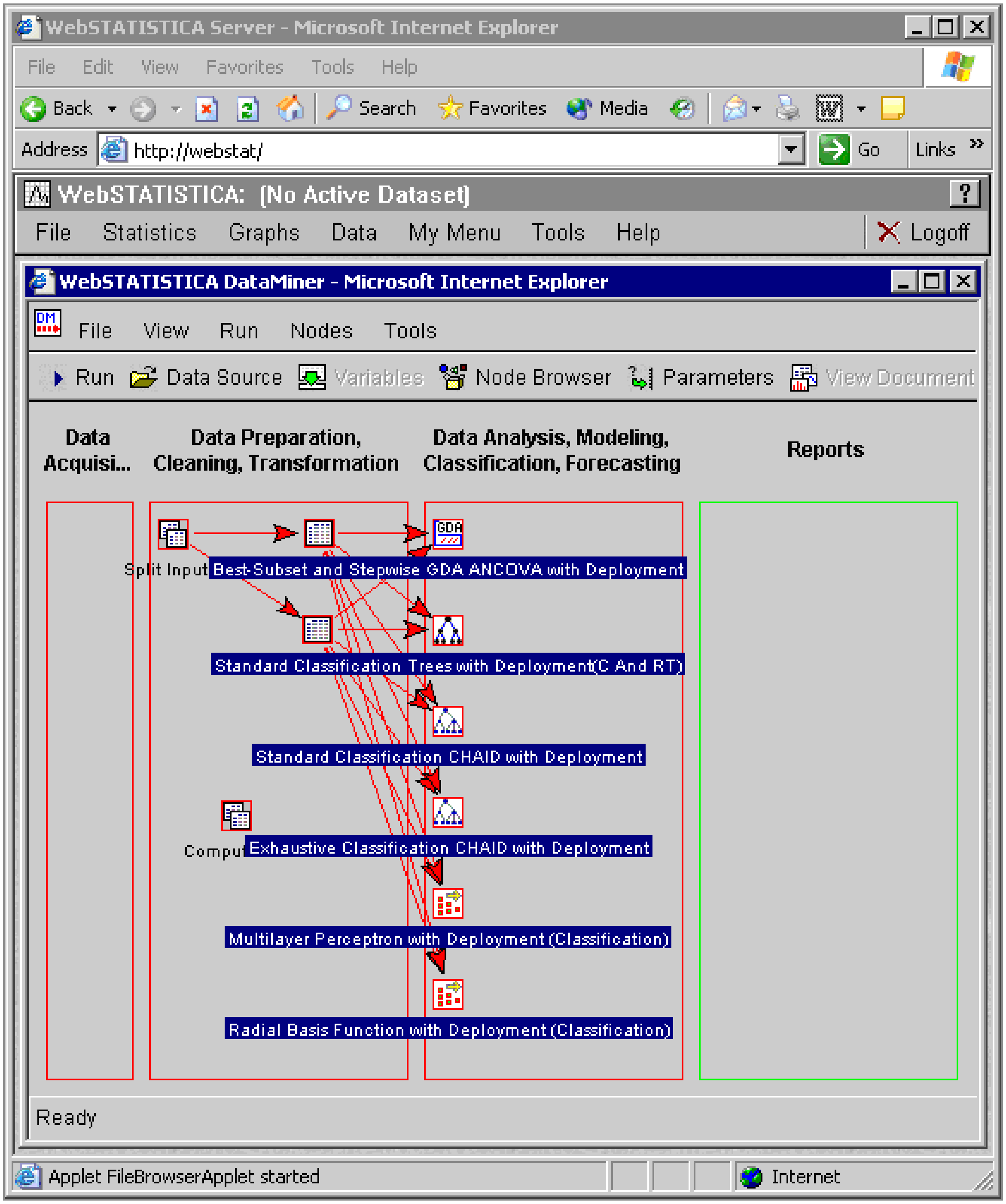


6. Finally, interactively review the output.


WebSTATISTICA Server - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://webstatistica/ Go Links
WebSTATISTICA: /Datasets/Adstudy.sta
File Statistics Graphs Data My Menu Tools Help Logoff
Output Browser Analysis Parameters Subset Drill Dc
Discriminant Function Analysis Summary (Adstudy)
N=50
Discriminant Function Analysis Summary (Adstudy)
No. of vars in model: 1; Grouping: ADVERT (2 grps)
Wilks' Lambda: .98848 approx. F (1,48)=.55927 p< .4582
Wilks' Lambda
Partial Lambda
F-remove (1,48)
p-level
Toler.
1-Toler. (R-Sqr.)
MEASURE04 1.000000 0.988483 0.559267 0.458204 1.000000 0.00
Spreadsheet Actions
Classification Functions; grouping: ADVERT (Adstudy)
Variable
Classification Functions; grouping: ADVERT (Adstudy)
PEPSI p=.54000
COKE p=.46000
MEASURE04 0.73709 0.81653
Constant -2.55445 -3.15511
Spreadsheet Actions
Applet FileBrowserApplet started
Local intranet


WebSTATISTICA: /Datasets/Adstudy.sta
File Statistics Graphs Data My Menu Tools Help Logoff
Output Browser Analysis Parameters Subset Drill Down Edit Page
3D Surface Plot (Adstudy 25v*50c)
3D Surface Plot (Adstudy 25v*50c)
MEASURE04 = Distance Weighted Least Squares
> 10
< 10
< 6
< 2
< -2

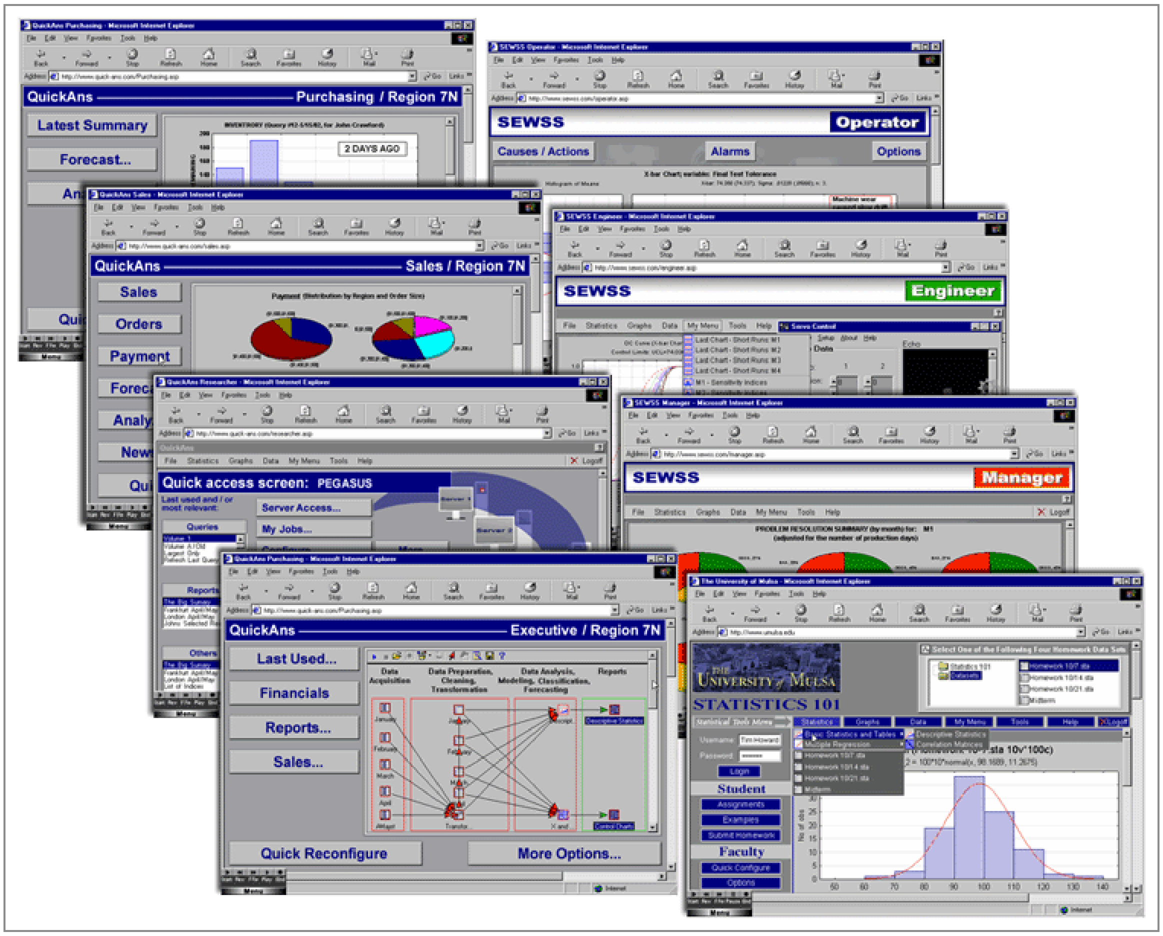
7. A variety of interactive facilities to perform special database, quality control, or data mining operations (including interactively building data mining models by dragging arrows in the model workspace; see below) are provided, and are accessible from the standard browser.



In addition to these built-in, straightforward user-interface facilities, Statistica Enterprise Server also includes a toolkit that enables users to customize the user interface and develop custom applications with specifically predefined functionality, packaged in a way that matches the requirements of their specific applications.

Compatibility with Industry Standards

The unsurpassed compatibility with industry standards is another in the long list of unique advantages of Statistica Enterprise Server.



Statistica Enterprise Server can be deployed on any of the popular Web server platforms (for example, a UNIX-based Apache or IIS), and therefore, it will conform to the existing local security protocols (fire walls) as required by the corporate client.

Statistica Enterprise Server uses advanced proprietary technology developed at Statistica to ensure its high performance and scalability. For example, multiple, multiprocessor Statistica Enterprise Server computers working in a distributed processing environment.

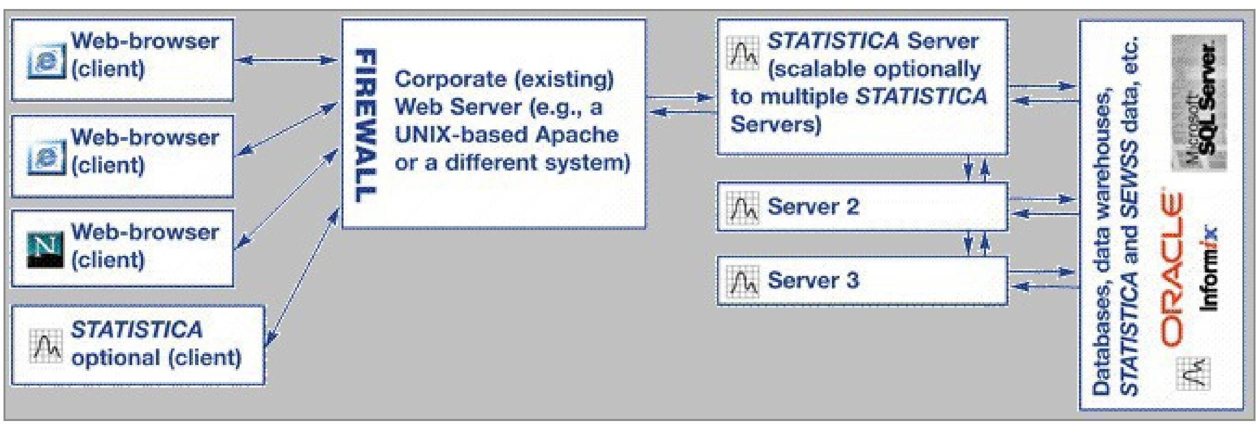
This technology is built on Statistica's years of experience providing high performance, scalable enterprise systems to major corporations in the United States and around the world. However, Statistica Enterprise Server is still based on the industry standard communication protocols (for example, XML) to ensure:

- its platform independence
- smooth transition to future technologies
- ease of customization by the client

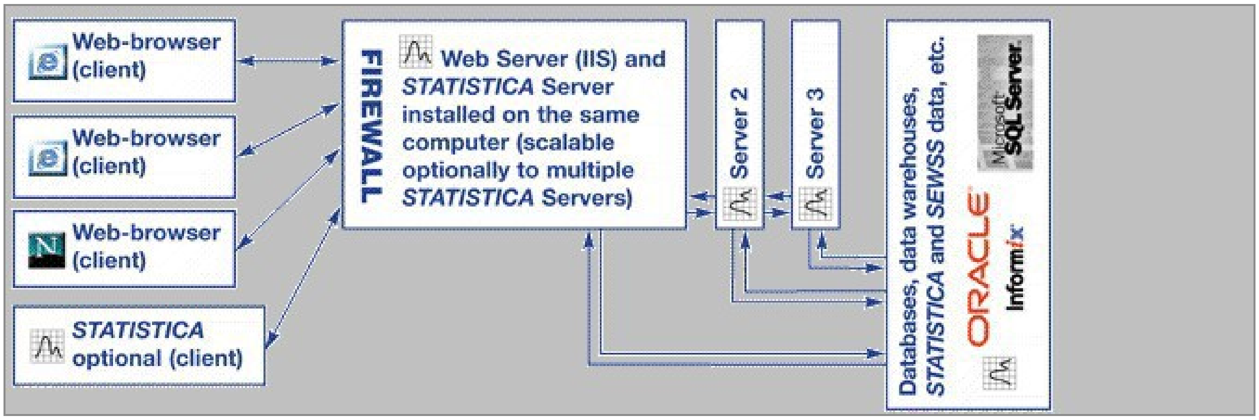
Note: The ease of customization is additionally boosted by the fact that only the industry standard syntax conventions (such as VB script, C++, HTML, and XML) are used to customize, configure, and define all the specific analytic operations and all output in Statistica Enterprise Server.

Architecture of the System - A Technical Note

The general design uses two computers in a typical configuration, the Web server (for example, a UNIX-based Apache system) and at least one Statistica Enterprise Server (optionally scalable to multiple Statistica Enterprise Servers)



In many cases, Statistica Enterprise Server could be installed on the same machine if desired (when IIS is used as the Web host).



The design allows for a flexible, generic Web server implementation by using a standard scripting language on the Web server. The purpose of the Web server is to package requests from the user (received from a browser), send these to the Statistica Enterprise Server, and then process responses from the Statistica Enterprise Server for display to the users (on their browsers).

Communication between the Web server and the Statistica Enterprise Server is accomplished through technology based on the industry standard XML conventions. The system is fully customizable, and for customers who want to develop their own modifications or extensions of this (ready-to-deploy) system, it provides development tool kit facilities allowing modification of all aspects of both the scripts that are being executed by Statistica (on the Statistica Enterprise Server side) and the appearance of the user interface exposed to the end users on the (browser-based) thin client side. Only the most standard, commonly known tools (such as VB or XML/HTML) are used to customize or expand the system.

The actual Web page definitions and Statistica scripts to be executed are stored in a designated Repository Facility on the Statistica Enterprise Server, and they are managed in a queue-like fashion. The system also includes a highly optimized Distributed Processing Manager that handles the incoming processing load and distributes it optimally over multiple threads of Statistica and multiple Statistica Enterprise Server computers.

The Statistica Enterprise Server software system also includes the Statistica Visual Basic Web Extensions. These extensions to the SVB language enable the script writer to either let the system display the resulting graphs and spreadsheets on the automatically generated (output) Web pages, or customize the appearance of the generated output pages by adding HTML directives as appropriate.

Security and authentication is a key design feature in the Statistica Enterprise Server application system. At the beginning of the session, users sign on to the system with their user name and password. System administrators are able to control access to data sources and scripts based either on user or group permissions.

The highest level of the access privilege allows advanced users or administrators to execute virtually arbitrary scripts. For example, in order to perform system administration or maintenance operations. This level requires a designated or highest access privilege because, due to the general nature and power of the Statistica Visual Basic language, it gives access to the authorized users to all resources on the network.

Note: This system can be integrated with the traditional (such as non-Web-based) Statistica concurrent network or a Statistica enterprise system authentication scheme.

Additional Advantages

Competitive Advantages

The competitive advantages of Statistica Enterprise Server applications start with the complete list of unique features of Statistica itself. Further, unlike the competing products, we offer a complete application or solution with a Web-based user interface and not merely a development kit (although the development kit facilities are also available to extend or customize the system). Also, we do not require that a specific Web server software be installed first, which may or may not comply with the client’s security standards and other policies.

Finally, our system is controlled by industry standard VB scripts, C++, HTML, and XML that can be easily modified by users or system administrators. In addition, our distributed processing and multithreading technology delivers performance and system responsiveness that is not matched by any competing products.

Knowledge Portal

A designated Knowledge Portal application is optionally available with which users can effectively and securely distribute organized sets of output documents over the Web. It offers support for workgroups of users (each with different access privileges, and thus access to different parts of the database of output documents), intuitive tree-view organization of available materials, and options to broadcast documents updated on the Web server in real time.

Statistica Enterprise Server Demo Movie

How does Statistica Enterprise Server work? Visit Statistica web site, http://statistica.io/, to view an informative presentation of the unique features of Statistica described here. The movie also includes a step-by-step example application.

TIBCO Documentation and Support Services

For information about this product, you can read the documentation, contact TIBCO Support, and join TIBCO Community.

How to Access TIBCO Documentation

Documentation for TIBCO products is available on the TIBCO Product Documentation website, mainly in HTML and PDF formats.

The TIBCO Product Documentation website is updated frequently and is more current than any other documentation included with the product.

Product-Specific Documentation

The following documentation for this product is available on TIBCO Statistica® Product Documentation page and TIBCO Statistica®- All Servers Product Documentation page:

- *TIBCO Statistica® Release Notes*
- *TIBCO Statistica® Installation*
- *TIBCO Statistica® Quick Reference*
- *TIBCO Statistica® Product Traceability*
- *TIBCO Statistica® Configuration for Windows Server 2019*
- *TIBCO Statistica® Data Entry Administration*
- *TIBCO Statistica® Server Administrator's Guide*
- *TIBCO Statistica® Options Configuration*
- *TIBCO Statistica® R Integration: Features and Options*
- *TIBCO Statistica® Security Guide*
- *TIBCO Statistica® User Guide*
- *TIBCO Statistica® Enterprise Manager Guide*
- *TIBCO Statistica® Statistica Object Model Guide*

- *TIBCO Statistica® Logistic Regression Formula Guide*
- *TIBCO Statistica® Stability Analysis Formula Guide*
- *TIBCO Statistica® Stepwise Model Builder Formula Guide*
- *TIBCO Statistica® Weight of Evidence Formula Guide*

The following documentation for this product is available on TIBCO® Data Science for TIBCO Spotfire® Analyst Product Documentation page:

- *TIBCO® Data Science for TIBCO Spotfire® Analyst Release Notes*
- *TIBCO® Data Science for TIBCO Spotfire® Analyst User Guide*

The following documentation for this product is available on TIBCO® Data Science Service for TIBCO Spotfire® Product Documentation page:

- *TIBCO® Data Science Service for TIBCO Spotfire® Release Notes*
- *TIBCO® Data Science Service for TIBCO Spotfire® User Guide*

How to Contact TIBCO Support

Get an overview of TIBCO Support. You can contact TIBCO Support in the following ways:

- For accessing the Support Knowledge Base and getting personalized content about products you are interested in, visit the TIBCO Support website.
- For creating a Support case, you must have a valid maintenance or support contract with TIBCO. You also need a user name and password to log in to TIBCO Support website. If you do not have a user name, you can request one by clicking **Register** on the website.

How to Join TIBCO Community

TIBCO Community is the official channel for TIBCO customers, partners, and employee subject matter experts to share and access their collective experience. TIBCO Community offers access to Q&A forums, product wikis, and best practices. It also offers access to extensions, adapters, solution accelerators, and tools that extend and enable customers to gain full value from TIBCO products. In addition, users can submit and vote on feature requests from within the TIBCO Ideas Portal. For a free registration, go to TIBCO Community.

Legal and Third-Party Notices

This software may be available on multiple operating systems. However, not all operating system platforms for a specific software version are released at the same time. See the readme file for the availability of this software version on a specific operating system platform.