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Introduction

Statgraphics *Stratus* is a statistical package that assists data analysts in performing a wide variety of statistical analyses within a web browser. There is no need to download any software, since the program resides on a remote server. After loading data into a datasheet, statistical calculations are performed resulting in tabular and graphical output, all within the browser. This is accomplished using a combination of HTML5, JavaScript, and ASP.Net. Data may reside anywhere, including on your local computer.

To use Statgraphics *Stratus*, go to [www.statpoint.net](http://www.statpoint.net).
Chapter 1: Getting Started

Statgraphics Stratus can analyze data residing in various types of files, including Excel workbooks, XML files, and delimited text files. The main page, which is displayed when you start the program, shows a summary of the variables in the active data file:

Initially, an empty data file named Untitled is created, containing 10 columns and 100 rows.

If you wish to try out the statistical procedures using sample datasets, just select any menu item from the main item. The program will automatically load a sample dataset with data appropriate for the selected procedure. If you wish to analyze your own data, you must first login using the link in the upper right corner of the page.

1.1 Creating a User Account

In order to analyze your own data, you must first create a user account. When you press the Login link, you will see the following input fields:
If you have already created a user account, enter your user name and password. Otherwise, click on Register and enter the following information:

**CREATE A NEW ACCOUNT**

Use the form below to create a new account.

Passwords are required to be a minimum of 6 characters in length.

**Account Information**

User Name: myusername
E-mail: me@anywhere.com
Password: 
Confirm Password: 

Create User

User names contain from 1 to 16 characters (with no blanks) and are used to identify data files belonging to an individual user. Both your user name and e-mail address
cannot already be in use. If you have forgotten your user name and/or password, use the links on the first login screen to retrieve them.

When you press the Create User button, your account will be created and you will be logged in. You will be returned to the main page and your username displayed at the top right. You can change your password at any time by selecting My Account under Edit on the main menu:

<table>
<thead>
<tr>
<th>Statgraphics Stratus</th>
<th>Welcome myusername! [ Log Out ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MY ACCOUNT</td>
<td></td>
</tr>
<tr>
<td>Username: myusername</td>
<td></td>
</tr>
<tr>
<td>E-mail: <a href="mailto:me@anywhere.com">me@anywhere.com</a></td>
<td></td>
</tr>
<tr>
<td>Status: Registered User</td>
<td></td>
</tr>
<tr>
<td>Date created: 1/27/2015</td>
<td></td>
</tr>
<tr>
<td>Subscription expiration date: (not a subscriber)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Allocated</th>
<th>Used</th>
<th>Data files</th>
<th>10</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scripts</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Actions: Change Password | Delete Account

The line labeled Status on the My Account page indicates what type of user you are:

1. **Guest** – Guests are users who have not created a username and password and are not logged in. Guests may only analyze the sample data sets. They cannot enter their own data, save files, or save output to the session log.

2. **Registered User** – Registered users are individuals who have created an account by registering a username and password, but have not purchased a monthly subscription. Registered users may enter up to 10 columns and 100 rows of their own data. They may save up to 10 data files and 10 scripts and may save output to the session log.

3. **Subscriber** – Subscribers are registered users who have also purchased a monthly subscription. They may enter up to 100 columns and 20,000 rows of their own data. They may also save more data files and scripts than nonsubscribers.
For information of becoming a subscriber to Statgraphics *Stratus*, please visit
[www.statgraphics.com](http://www.statgraphics.com).
Chapter 2: Entering and Manipulating Data

To enter data into Statgraphics Stratus, you must first login. You then have several choices:

1. Press the *Edit Data* button on the main page to load the data editor. This will display a datasheet of rows and columns into which you may type data.

2. Select *File – Open Sample Dataset* to load one of Statgraphics’ sample datasets.


4. Select *File – Open User Data File – From Server* to load a data file that you have previously saved on the Statgraphics server.

5. Select *File – Open User Data File – From Clipboard* to retrieve data that you have pasted on the system clipboard while in another application.


### 2.1 Entering Data into the Data Editor

When you press the *Edit Data* button on the main page, a spreadsheet style editor will be displayed, similar to that used in applications such as Microsoft Excel. The spreadsheet data editor has the appearance shown below:
It contains a data book with two sheets: one sheet for *Input* data that you wish to analyze, and a second sheet into which calculated *Results* will be placed. You can switch between the two sheets using the toolbar along the bottom of the page. To enter data, simply type it into the cells of the table. You should also assign meaningful names to the columns of the table. Column names are used to select data while in the statistical procedures and are displayed on tables and graphs. You can also use the row beneath the column names to indicate additional information about each column, such as the unit of measurement. A typical completed data sheet is shown below:
The menu across the top of the Data Editor page allows you to perform several important operations. To save data you have entered, select File - Save File As, which will display the following page:
You may save data in any of the indicated formats. If you plan to use the data only with STATGRAPHICS, we recommend that you save it as a STATGRAPHICS .sgd file. SGD files are XML files designed to contain information in a format that can be easily manipulated by the statistical procedures. A typical example is shown below:

```
<?xml version="1.0"?>
<statgraphics_data>
  <FORMAT>
    <DateOrder>MDY</DateOrder>
    <DateSeparator>/</DateSeparator>
    <DecimalSymbol>.</DecimalSymbol>
  </FORMAT>
  <COLUMNS>
    <C1 name="Make" type="C"/>
    <C2 name="Model" type="C"/>
    <C3 name="Type" type="C"/>
    <C4 name="Min Price" type="N" comment="price for basic version in $1,000"/>
    <C5 name="Mid Price" type="N" comment="average of min and max prices"/>
  </COLUMNS>
  <ROW>
    <C1>Acura</C1>
    <C2>Integra</C2>
    <C3>Small</C3>
    <C4>12.9</C4>
    <C5>15.9</C5>
  </ROW>
  <ROW>
    <C1>Acura</C1>
    <C2>Legend</C2>
    <C3>Midsize</C3>
    <C4>29.2</C4>
    <C5>33.9</C5>
  </ROW>
</statgraphics_data>
```

It contains information about how the data is formatted, column names and comments, and the raw data. You can also edit SGD files in any text editor, provided you maintain the same basic format.

Other operations that you can perform in the spreadsheet data editor include:

1. **Pasting columns of data from other applications** – First copy data from the other applications to the system clipboard. In the Statgraphics data sheet,
highlight the location at which you wish to paste the data. Then click on the Copy button in the lower toolbar.

2. **Paging within large datasets** – To reduce the amount of information that must be sent between your browser and the server, large datasets are displayed in blocks. The default block size is controlled by the setting on the *Edit – Preferences* page. You can page between blocks using the arrows on the lower toolbar.

3. **Printing data** – Click on the printer icon on the lower toolbar to send a copy of the data to your printer.

4. **Cancel entries** – As you make changes to your data, they are changed within the browser but not sent to the server until:
   a. You perform an operation such as selecting something from the menu that causes a new page to be posted.
   b. You click on *Update* on the lower toolbar.
To undo all input since the last post to the server, click on *Cancel* on the lower toolbar. NOTE: changes posted to the server are not permanent until you select *File - Save* from the top menu.

5. **Delete rows, columns or cells** – Highlight the data to be deleted and select *Delete* from the top menu.

6. **Insert rows, columns or cells** – Highlight the data after which space is to be added and select *Insert* from the top menu.

7. **Sort data** – Highlight a single column and select *Rows – Sort* to sort data according to the values in the highlighted column.

After you enter and save the data, press *Cancel* to return to the main page. The name of the saved file and a summary of its contents will be displayed:
The summary shows:

1. **Nonmissing values** – the number of rows in the column for which an entry has been made. Empty cells will be treated as missing values by the statistical procedures.

2. **Numeric values** – the number of rows in the column that have valid numeric entries. When performing a statistical operation that requires numeric values, only these cells will be used in the analysis.

3. **Minimum and maximum** – the smallest and largest values in the column. For columns with no numeric values, this is based on an alphanumeric comparison.
2.2 Opening a Sample Dataset

Statgraphics Software has provided a collection of sample datasets that may be loaded by selecting File – Open Sample Dataset. Choose the file to be loaded and press Open Dataset.

OPEN SAMPLE DATASET

Select one of the following sample data sets:

- Automobile data
- Baseball statistics
- Blood pressures
- Circuit boards
- Cloth samples
- Defect checksheet
- Demographic data
- Election poll
- Glass bottles
- Golden Gate Bridge traffic
- Mendel’s pea plants
- Monthly sales volumes
- Opinion survey
- Orange juice cans
- Pulse rates
- Process data
- Resistivity of silicon wafers
- Shelf life study
- Shock absorber failures
- Stress test
- Temperatures & heart rates
- Wafers
- Widgets

Open Dataset
2.3 Opening a User File

Users may also open data files from their client machine by selecting File – Open User Data File – From Client. This will display the page shown below:

**OPEN USER DATASET FROM CLIENT**

**Step 1:** Select the file to open: C:\Data\Process data.xls

**Step 2:** Select the file attributes (except for SGD files):

- **Header:**
  - Column names
  - Column names and comments
  - None

- **Delimiter (text files only):**
  - Tab
  - Comma ()
  - Space
  - Semicolon ()

- **Decimal symbol:**
  - Period (.)
  - Comma ()

- **Date separator:**
  - Slash (/)
  - Period (.)
  - Dash (-)

- **Date format:**
  - M D Y
  - D M Y
  - Y M D

**Step 3:** Press the Open File button to read the file:

- Open File
- Open in read only mode
- Cancel

Press the **Browse** button to search your computer for the file that you wish to load. The program will automatically determine the file type from the file extension. Indicate options for the file by editing the following fields:

- **Header:** indicate whether the first row of the file contains names for each of the columns and whether the second row contains comments for each of the columns.

- **Delimiter:** for text files, indicate the character that is used as a delimiter to separate values for each column in a row.

- **Decimal symbol:** indicate the character used as the decimal symbol in numeric values.

- **Date separator:** indicate the character used to separate the month, day and year in dates.

- **Date format:** indicate the order in which the month, day and year occur in dates.

When you press **Open File**, the program will:
1. Upload a copy of the file to the STATGRAPHICS stratus server.

2. Make the selected data file the active file for access by the statistical procedures.

You will then be returned to the main page.

NOTES:

1. If you wish to restrict the program (and yourself) from making changes to the input file, select Open in readonly mode. You will still be able to display the data in the data editor, but you will not be able to make changes to it.

2. If you open an Excel file, only the data in the first sheet of the Excel workbook will be copied to the server and loaded. If you make changes to the file and resave it on the server, please remember that it contains only that one sheet.

2.4 Formatting Data

When you read data from external files (non-STATGRAPHICS files), the data is assumed to follow the formatting conventions indicated on the dialog box shown above. When you type data into the Data Editor, you should use the format appropriate for your current locale. You can specify a different format for the statistical output if desired by changing the setting under Edit – Set Preferences on the main menu.

2.5 Managing Data Files

The File menu contains a selection titled Manage Data Files that allows you to perform common operations on user data files that have been saved on the server. It displays the page shown below:
The buttons perform the following operations:

- **Rename** – To rename a file, select the file you wish to rename from the drop down list. Then enter a new name for the file. NOTE: since this option does not change the contents of the file, the file extension should usually not be changed.

- **Copy** – To create a copy of a file, select the file you wish to copy from the drop down list. Then enter a name for the new file. NOTE: since this option does not change the contents of the file, the file extension of the new file should usually be the same as the original file.

- **Delete** – To delete a file, select the file you wish to copy from the drop down list. Check the *Okay to delete file* box and press *Delete*.

- **Download** – This option is designed to allow you to download a file from the server to your client computer. Select the file you wish to copy from the drop down list. When you press download, a link will be added to the page specifying the URL necessary to access that file. You can then use your browser’s capabilities to download the file to your computer.

- **Upload** - This option is designed to allow you to upload a file from your client computer to the server. Use the *Browse* button to locate the file you wish to upload and then press *Upload*. 
Chapter 3: Selecting System Preferences

The Edit menu contains a selection titled Set Preferences that allows you to change the default settings used by STATGRAPHICS stratus. It consists of multiple pages, each similar to the page shown below:

<table>
<thead>
<tr>
<th>Set Preferences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant digits</strong></td>
</tr>
<tr>
<td><strong>Default confidence level</strong></td>
</tr>
<tr>
<td><strong>Rows to display in tables</strong></td>
</tr>
<tr>
<td><strong>Table width in characters</strong></td>
</tr>
<tr>
<td><strong>StatAdvisor</strong></td>
</tr>
<tr>
<td><strong>Data editor page size</strong></td>
</tr>
<tr>
<td><strong>Main Tab</strong></td>
</tr>
<tr>
<td><strong>Analysis Output</strong></td>
</tr>
</tbody>
</table>

3.1 General Settings

The General Settings page allows you to specify the following settings:

- **Significant digits** – the number of significant digits shown when displaying numeric values.

- **Default confidence level** – the confidence level used by default when creating interval estimates and hypothesis tests, and that used by the StatAdvisor when interpreting statistical results.

- **Rows to display in tables** – the maximum number of rows displayed when a table is created. This prevents tables from becoming excessively large when analyzing large datasets.

- **Table width in characters** – the maximum number of characters displayed across the page when outputting a table. Tables exceeding this width will be displayed in multiple segments.
• **StatAdvisor** – controls whether StatAdvisor information is displayed after tables and graphs. The StatAdvisor interprets the statistical output.

• **Data editor page size** – the number of rows displayed at one time within the spreadsheet data editor.

• **Main tab** – whether the default format for the home page is a summary of the variables in the data file or a listing of the actual data.

• **Analysis output** – whether each statistical analysis is displayed in the same main tab of the web browser as the home page or displayed using a new tab.
### 3.2 Internationalization

<table>
<thead>
<tr>
<th>SET PREFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Settings</td>
</tr>
<tr>
<td>Output language</td>
</tr>
<tr>
<td>Decimal symbol</td>
</tr>
<tr>
<td>Date separator</td>
</tr>
<tr>
<td>Date format</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

- **Output language** – the language used in output tables and graphs. Currently, input pages are only available in English.

- **Decimal separator** – the decimal separator to be used in displaying output. All numeric values on input pages and in user data files are assumed to follow the conventions of the current locale setting for your computer.

- **Date separator** - the date separator to be used in displaying output. All date and date-time values on input pages and in user data files are assumed to follow the conventions of the current locale setting for your computer.

- **Date format** - the format for months, days and years to be used in displaying output. A double letter such as mm requests that numbers below 10 be written with a leading zero. All date and date-time values on input pages and in user data files are assumed to follow the conventions of the current locale setting for your computer.
3.3 Fonts

This page controls the fonts used when outputting tables and graphs. Press the Foreground button to display the available colors that may be selected in the dropdown lists:
<table>
<thead>
<tr>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AntiqueWhite</td>
<td>Bisque</td>
<td>Aqua</td>
<td>BlanchedAlmond</td>
<td>Blue</td>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beige</td>
<td>Brown</td>
<td>Black</td>
<td>CadetBlue</td>
<td>Chartreuse</td>
<td>DarkGray</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BlueViolet</td>
<td>Coral</td>
<td>BurlyWood</td>
<td>Cornsilk</td>
<td>Crimson</td>
<td>DarkGray</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chocolate</td>
<td>DarkBlue</td>
<td>CornflowerBlue</td>
<td>DarkGoldenrod</td>
<td>DarkOrange</td>
<td>DarkGray</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyan</td>
<td>DarkKhaki</td>
<td>DarkCyan</td>
<td>DarkOliveGreen</td>
<td>DarkSlateBlue</td>
<td>DeepSkyBlue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DarkGreen</td>
<td>DarkRed</td>
<td>DarkMagenta</td>
<td>DarkSeaGreen</td>
<td>DeepPink</td>
<td>DeepSkyBlue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DarkOrchid</td>
<td>DarkTurquoise</td>
<td>Firebrick</td>
<td>FloralWhite</td>
<td>ForestGreen</td>
<td>Goldenrod</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DarkSlateGray</td>
<td>DodgerBlue</td>
<td>GhostWhite</td>
<td>Gold</td>
<td>HotPink</td>
<td>Goldenrod</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DimGray</td>
<td>Gainsboro</td>
<td>GreenYellow</td>
<td>Honeydew</td>
<td>Lavender</td>
<td>HotPink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuchsia</td>
<td>Green</td>
<td>Ivory</td>
<td>Khaki</td>
<td>LightCoral</td>
<td>HotPink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gray</td>
<td>Indigo</td>
<td>LemonChiffon</td>
<td>LightBlue</td>
<td>LightCoral</td>
<td>LightPink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IndianRed</td>
<td>LawnGreen</td>
<td>LightGray</td>
<td>LightGreen</td>
<td>LightPink</td>
<td>LightPink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LavenderBlush</td>
<td>LightGoldenrodYellow</td>
<td>LightSkyBlue</td>
<td>LightSteelBlue</td>
<td>Magenta</td>
<td>Linen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LightCyan</td>
<td>Lime</td>
<td>LimeGreen</td>
<td>MediumAquamarine</td>
<td>MediumGreen</td>
<td>MediumOrchid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LightSalmon</td>
<td>MediumBlue</td>
<td>MediumSeaGreen</td>
<td>MediumSlateBlue</td>
<td>MediumTurquoise</td>
<td>Medium VioletRed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LightYellow</td>
<td>MediumSpringGreen</td>
<td>MidnightBlue</td>
<td>MintCream</td>
<td>Moccasin</td>
<td>NavajoWhite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maroon</td>
<td>MediumTeal</td>
<td>MintCream</td>
<td>OldLace</td>
<td>Olive</td>
<td>NavajoWhite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MediumSeaGreen</td>
<td>MediumTeal</td>
<td>OliveDrab</td>
<td>Orange</td>
<td>OliveDrab</td>
<td>OliveDrab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MidnightBlue</td>
<td>OldLace</td>
<td>PaleGoldenrod</td>
<td>PaleTurquoise</td>
<td>Pink</td>
<td>PaleTurquoise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olive</td>
<td>PapayaWhip</td>
<td>PeachPuff</td>
<td>Pink</td>
<td>Pink</td>
<td>PaleoViolet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>PowderBlue</td>
<td>Purple</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OrangeRed</td>
<td>Purple</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PaleVioletRed</td>
<td>Red</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plum</td>
<td>Salmon</td>
<td>Red</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PowderBlue</td>
<td>Silver</td>
<td>SandyBrown</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple</td>
<td>SkyBlue</td>
<td>SeaGreen</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>SteelBlue</td>
<td>SlateBlue</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmon</td>
<td>Turquoise</td>
<td>SlateBlue</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td>Tomato</td>
<td>Tan</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SpringGreen</td>
<td>Yellow</td>
<td>Violet</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teal</td>
<td>WhiteSmoke</td>
<td>YellowGreen</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4 Graphics

- **Graph width and height** – the size of graphs in pixels.

- **Function resolution** – the number of X values at which functions will be evaluated when drawn on a graph. Higher resolution results in smoother curves.

- **Contour plot resolution** – the number of X and Y values at which a function will be evaluated when contour plots are created. Higher resolution results in smoother divisions between the contour levels.

- **Graph background color** – the color displayed within the axes of a graph.

- **Graph border color** – the color displayed outside the axes of a graph.

- **3D effects** – whether 3D effects are used around the frame of a graph and when displaying filled areas such as bars and pie slices.

Press the **Background** button to display the available colors that may be selected in the dropdown lists:
<table>
<thead>
<tr>
<th>Color</th>
<th>Color</th>
<th>Color</th>
<th>Color</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>AliceBlue</td>
<td>AntiqueWhite</td>
<td>Aqua</td>
<td>Aquamarine</td>
<td>Azure</td>
</tr>
<tr>
<td>Beige</td>
<td>Bisque</td>
<td>Black</td>
<td>BlanchedAlmond</td>
<td>Blue</td>
</tr>
<tr>
<td>BlueViolet</td>
<td>Brown</td>
<td>BurlyWood</td>
<td>CadetBlue</td>
<td>Chartreuse</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Coral</td>
<td>CornflowerBlue</td>
<td>Cornsilk</td>
<td>Crimson</td>
</tr>
<tr>
<td>Cyan</td>
<td>DarkBlue</td>
<td>DarkCyan</td>
<td>DarkGoldenrod</td>
<td>DarkGray</td>
</tr>
<tr>
<td>DarkGreen</td>
<td>DarkKhaki</td>
<td>DarkMagenta</td>
<td>DarkOliveGreen</td>
<td>DarkOrange</td>
</tr>
<tr>
<td>DarkOrchid</td>
<td>DarkRed</td>
<td>DarkSalmon</td>
<td>DarkSeaGreen</td>
<td>DarkSlateBlue</td>
</tr>
<tr>
<td>DarkSlateGray</td>
<td>DarkTurquoise</td>
<td>DarkViolet</td>
<td>DeepPink</td>
<td>DeepSkyBlue</td>
</tr>
<tr>
<td>DimGray</td>
<td>DodgerBlue</td>
<td>Firebrick</td>
<td>FloralWhite</td>
<td>ForrestGreen</td>
</tr>
<tr>
<td>Fuchsia</td>
<td>Gainsboro</td>
<td>GhostWhite</td>
<td>Gold</td>
<td>Goldenrod</td>
</tr>
<tr>
<td>Gray</td>
<td>Green</td>
<td>GreenYellow</td>
<td>Honeydew</td>
<td>HotPink</td>
</tr>
<tr>
<td>IndianRed</td>
<td>Indigo</td>
<td>Ivory</td>
<td>Khaki</td>
<td>Lavender</td>
</tr>
<tr>
<td>LavenderBlush</td>
<td>LawnGreen</td>
<td>LemonChiffon</td>
<td>LightBlue</td>
<td>LightCoral</td>
</tr>
<tr>
<td>LightCyan</td>
<td>LightGoldenrodYellow</td>
<td>LightGray</td>
<td>LightGreen</td>
<td>LightPink</td>
</tr>
<tr>
<td>LightSalmon</td>
<td>LightSeaGreen</td>
<td>LightSkyBlue</td>
<td>LightSlateGray</td>
<td>LightSteelBlue</td>
</tr>
<tr>
<td>LightYellow</td>
<td>Lime</td>
<td>LimeGreen</td>
<td>Linen</td>
<td>Magenta</td>
</tr>
<tr>
<td>Maroon</td>
<td>MediumAquamarine</td>
<td>MediumBlue</td>
<td>MediumOrchid</td>
<td>MediumPurple</td>
</tr>
<tr>
<td>MediumSeaGreen</td>
<td>MediumSlateBlue</td>
<td>MediumSpringGreen</td>
<td>MediumTurquoise</td>
<td>MediumVioletRed</td>
</tr>
<tr>
<td>MidnightBlue</td>
<td>MintCream</td>
<td>MistyRose</td>
<td>Moccasin</td>
<td>NavajoWhite</td>
</tr>
<tr>
<td>Navy</td>
<td>OldLace</td>
<td>Olive</td>
<td>OliveDrab</td>
<td>Orange</td>
</tr>
<tr>
<td>OrangeRed</td>
<td>Orchid</td>
<td>PaleGoldenrod</td>
<td>PaleGreen</td>
<td>PaleTurquoise</td>
</tr>
<tr>
<td>PaleVioletRed</td>
<td>PapayaWhip</td>
<td>PeachPuff</td>
<td>Peru</td>
<td>Pink</td>
</tr>
<tr>
<td>Plum</td>
<td>PowderBlue</td>
<td>Purple</td>
<td>Red</td>
<td>RosyBrown</td>
</tr>
<tr>
<td>RoyalBlue</td>
<td>SaddleBrown</td>
<td>Salmon</td>
<td>SandyBrown</td>
<td>SeaGreen</td>
</tr>
<tr>
<td>SeaShell</td>
<td>Sienna</td>
<td>Silver</td>
<td>SkyBlue</td>
<td>SlateBlue</td>
</tr>
<tr>
<td>SlateGray</td>
<td>Snow</td>
<td>SpringGreen</td>
<td>SteelBlue</td>
<td>Tan</td>
</tr>
<tr>
<td>Teal</td>
<td>Thistle</td>
<td>Tomato</td>
<td>Turquoise</td>
<td>Violet</td>
</tr>
<tr>
<td>Wheat</td>
<td>White</td>
<td>WhiteSmoke</td>
<td>Yellow</td>
<td>YellowGreen</td>
</tr>
</tbody>
</table>
Graphs may contain up to 20 different types of filled areas. You may change the color and/or type of fill used in each area.
Graphs may contain up to 20 different line types. You may change the color and/or type of each line.
3.7 Points

Graphs may contain up to 20 different point types. You may change the size, color and/or type of each point set.
Chapter 4 – Running Statistical Procedures

The main menu provides access to a large collection of statistical procedures. After opening the file containing the data you wish to analyze, use the menu to select the desired procedure. For example, suppose you wished to analyze the data contained in the sample dataset titled “Shelf Life Study”. This dataset contains 44 samples of a product. For each sample, the number of weeks since it was produced is recorded, as is the concentration of chlorine. Select File – Open Sample Dataset to open the desired file. Then select Relate – Simple Regression from the main menu, as shown below:

4.1 Data Input

Whenever you select a statistical procedure from the main menu, a page will be displayed on which to specify the columns containing the data that you wish to analyze. The initial page for the Simple Regression procedure is shown below:
You can specify the name of a variable in either of two ways:

1. Press the arrow to dropdown the list of variables and select the desired column.

2. Press the **Edit** button to the right of the column to display an edit field to the right of the button, as shown below:

You can type any valid STATGRAPHICS expression into the edit field, such as the expression above which will calculate the natural logarithms of *chlorine*. Then press the arrow button to put the edit field contents into the dropdown list.

STATGRAPHICS expressions are described in detail in the document STATGRAPHICS Operators.pdf.

Each **Data Input** page also contains a **Select** field, which can be used to select a subset of the rows in the file. Typical entries include:

<table>
<thead>
<tr>
<th>Entry</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST (k)</td>
<td>Selects the first <em>k</em> rows.</td>
<td>FIRST(25)</td>
</tr>
<tr>
<td>LAST (k)</td>
<td>Selects the last <em>k</em> rows.</td>
<td>LAST(25)</td>
</tr>
<tr>
<td>ROWS (start,end)</td>
<td>Selects rows between <em>start</em> and <em>end</em>, inclusive.</td>
<td>ROWS(21,30)</td>
</tr>
<tr>
<td>Operation</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>RANDOM (k)</td>
<td>Selects a random set of k rows.</td>
<td>RANDOM(25)</td>
</tr>
<tr>
<td>EXCLUDE(k)</td>
<td>Selects all rows except row k.</td>
<td>EXCLUDE(25)</td>
</tr>
<tr>
<td>column = value</td>
<td>Selects only rows for which column equals value.</td>
<td>weeks = 30</td>
</tr>
<tr>
<td>column &lt;&gt; value</td>
<td>Selects only rows for which column does not equal value.</td>
<td>weeks &lt;&gt; 30</td>
</tr>
<tr>
<td>column &gt; value</td>
<td>Selects only rows for which column is greater than value.</td>
<td>weeks &gt; 30</td>
</tr>
<tr>
<td>column &lt; value</td>
<td>Selects only rows for which column is less than value.</td>
<td>weeks &lt; 30</td>
</tr>
<tr>
<td>column &gt;= value</td>
<td>Selects only rows for which column is greater than or equal to value.</td>
<td>weeks &gt;= 30</td>
</tr>
<tr>
<td>column &lt;= value</td>
<td>Selects only rows for which column is less than or equal to value.</td>
<td>weeks &lt;= 30</td>
</tr>
<tr>
<td>condition1 &amp; condition2</td>
<td>Selects only rows that meet both conditions.</td>
<td>weeks &gt;= 20 &amp; weeks &lt;= 40</td>
</tr>
<tr>
<td>condition1</td>
<td>condition2</td>
<td>Selects only rows that meet at least one of the conditions.</td>
</tr>
</tbody>
</table>

If you push the *Help* button next to the *Select* field, it will display a list showing typical structures:

- All rows
- First ___ rows
- Last ___ rows
- Rows between ___ and ___
- Random ___ rows
- All rows except ___
- Rows for which ___ equals ___
- Rows for which ___ does not equal ___
- Rows for which ___ > ___
- Rows for which ___ < ___
- Rows for which ___ >= ___
- Rows for which ___ <= ___

If you select a radio button and then press *Help* again, an entry will be placed in the *Select* field as shown below:

(Select) ROWS(???,???)
Replace any ???’s with your desired entries.

### 4.2 Analysis Options

After specifying the columns containing the data to be analyzed, click on the *Analysis Options* button to display a second page containing overall options for the selected statistical procedure:

![Simple Regression](image)

You can stick with the default settings or make any desired changes.

### 4.3 Tables and Graphs

The third page lists all of the tables and graphs that can be generated by the selected statistical procedure, together with any options:
**Simple Regression**

This procedure fits a linear or nonlinear model relating a dependent variable Y to an independent variable X. For each graph, there is a button labeled *Titles and Scaling* that allows you to override the default selections. These buttons display the page shown below:

Press *All* to select all of the available output, or check only the tables and graphs that you want.

For each graph, there is a button labeled *Titles and Scaling* that allows you to override the default selections. These buttons display the page shown below:
To override the title or scaling for an axis, enter the desired information. Otherwise, default settings will be applied. Some of the special options available on this page are:

- **Log scale** – Check this box to draw an axis using a logarithmic scale. Note that graphs on which logarithmic scaling does not make sense will ignore this setting.
- **Powers of 10** – Check this box to draw an axis using an alternative logarithmic scale where the tickmarks are all powers of 10. Note that graphs on which logarithmic scaling does not make sense will ignore this setting.

- **No power** – Check this box to suppress scaling axes using a notation such as \( (X \times 1000) \) for very large or very small numbers.

- **Skip repeats** – Check this box to indicate that consecutive axis labels that are identical should not be drawn. This applies only to non-numeric axes.

- **X and Y offset** – This indicates the desired position of the legend block (if any) with respect to the axes. For offset purposes, the axes are considered to extend from \((0, 0)\) at the bottom left corner to \((1, 1)\) at the upper right corner. A value such as 1.1 for the X offset indicates that the legend block should be offset by 10% to the right of the axes. If a legend block is partially offscreen, use this setting and the page margins to adjust its position.

Additional fields are displayed in the lower half of the page:

Grid direction:
- None
- Horizontal
- Vertical
- Bidirectional

Margins:
- Top: 22.0%
- Bottom: 22.0%
- Left: 22.0%
- Right: 22.0%

3D Viewpoint:
- Horizontal angle: 20
- Vertical angle: 20

Jittering:
- X axis: 0%
- Y axis: 0%
- Z axis: %

The fields include:

- **Grid** – the direction of an optional grid that may be added to the plot.
• **Margins** – This indicates the offset of each axis from the edge of the graphics drawing area.

• **3D viewpoint** – These angles specify the location of the viewer with respect to the origin of a 3D graph. Increasing the angles moves the viewer farther to the right and farther above the graph.

• **Jittering** – the percentage by which point symbols are jittered with respect to each axis. Jittering adds a random offset to each point to reduce overplotting when there are identical data values.

Press *Return* to redraw the plot with the new features or *Cancel* to abandon any new entries.

### 4.4 Results to Save

The *Results to Save* button indicates which results, if any, should be saved for later access:

<table>
<thead>
<tr>
<th>Result to Save</th>
<th>Column name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted values</td>
<td>PREDICTED</td>
</tr>
<tr>
<td>Lower limits for predictions</td>
<td>LOWERPLIMS</td>
</tr>
<tr>
<td>Upper limits for predictions</td>
<td>UPPERPLIMS</td>
</tr>
<tr>
<td>Lower limits for forecast means</td>
<td>LOWERCLIMS</td>
</tr>
<tr>
<td>Upper limits for forecast means</td>
<td>UPPERCLIMS</td>
</tr>
<tr>
<td>Residuals</td>
<td>RESIDUALS</td>
</tr>
<tr>
<td>Studentized residuals</td>
<td>SRESIDUALS</td>
</tr>
<tr>
<td>Leverages</td>
<td>LEVERSAGES</td>
</tr>
<tr>
<td>Predictions from resistant model</td>
<td>ALTPREDICTED</td>
</tr>
<tr>
<td>Residuals from resistant model</td>
<td>ALTRESIDUALS</td>
</tr>
<tr>
<td>Model statistics</td>
<td>MODELSTATS</td>
</tr>
<tr>
<td>Model statistics identifiers</td>
<td>STATLABELS</td>
</tr>
</tbody>
</table>
When results are saved, they are placed in an XML file and a link to that file is added to the bottom of the output page. In addition, the results are loaded into the second page of the *Data Editor*. 
4.5 Output

Once all desired options have been selected, press the *Output* button to begin the statistical calculations. An XML script is automatically created and sent to the server. The server reads the indicated data, performs the calculations, and sends back an HTML page to the web browser for display. The HTML page contains tabular output and imbedded images, as in the example below:

**Simple Regression**

This procedure fits a linear or nonlinear model relating a dependent variable $Y$ to an independent variable $X$. [Documentation]

```
| Data Input | Analysis Options | Tables and Graphs | Results to Save | Output |
```

**Statgraphics stratus**
Generated: 4/1/2015 7:10:55 PM

**Data file: nonlin.sgd**

**Simple Regression - chlorine vs. weeks**
Dependent variable: chlorine (% available)
Independent variable: weeks (since production)
Linear model: $Y = a + b*X$

**Coefficients**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Least Squares Estimate</th>
<th>Standard Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.48551</td>
<td>0.00589066</td>
<td>82.4204</td>
<td>0.0000</td>
</tr>
<tr>
<td>Slope</td>
<td>-0.00271679</td>
<td>0.000243115</td>
<td>11.1749</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**Analysis of Variance**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F-Ratio</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.0295587</td>
<td>1</td>
<td>0.0295587</td>
<td>124.88</td>
<td>0.0000</td>
</tr>
<tr>
<td>Residual</td>
<td>0.00994133</td>
<td>42</td>
<td>0.000236698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (Corr)</td>
<td>0.0395</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation Coefficient = -0.855055
R-squared = 74.8321 percent
R-squared (adjusted for d.f.) = 74.2328 percent
Standard Error of Est. = 0.015385
Mean absolute error = 0.012834
Durbin-Watson statistic = 0.992081 (P = 0.0001)
Lag 1 residual autocorrelation = 0.451981
Once in the browser, you can scroll through the output. You can also use the browser to print the output, copy it to your system’s clipboard, or save the graphics images on your computer.

### 4.6 Preferences

At any time while in a statistical procedure, you can press the Preferences from the top menu to change system preferences. This accesses each of the pages described earlier in Chapter 3, which include settings such as the output language. If the Output button has already been pressed, it will be executed again using the new settings.

### 4.7 Add to Session Logfile

If you wish to save the current output to the session logfile, select Add to Session Logfile from the top menu. All the tables and graphs currently displayed in the Output page will be added to the session log and a message similar to that shown below will appear:
When finished with the current analysis, you may return to the *Home* page and select *File – Manage Session Logfiles* to display the contents of the session log.

### 4.8 Save Script

If you wish to view or save the XML script used to create the current statistical output, select *Save Script* from the top menu. This will display the following page:

![Save Script Window](image.png)

Scripts contain instructions about the statistical analysis to be performed, the input data, and the desired output. They are normally saved with the extension `.sgs`. Once a script has been saved, it can be executed again at a later time by selecting *File - Execute Script* from the main menu. The next chapter describes scripts in more detail.
Chapter 5 – Working with Scripts

The instructions sent to the server when the Output button is pressed within a statistical procedure are contained in an XML script. The script tells the .NET Web Services where to locate the data to be analyzed, which procedure to execute, and what options are desired. As outlined in Chapter 4, these scripts may be saved for later reexecution.

A typical script contains several sections. The top section indicates the identity of the script and specifies the values of any global settings:

```xml
<?xml version="1.0" ?>
<statgraphics>
  <globals>
    <BorderColor Value="SpringGreen"/>
    <InputDateFormat Value="M/D/YYYY"/>
    <OutputDateFormat Value="M/D/YYYY"/>
    <ThreeDFrameEffects Value="Yes"/>
    <FillColor1 Value="SteelBlue"/>
    <PointType Value="Plus"/>
  </globals>
</statgraphics>
```

Each global setting is followed by its desired value.

The second section of the script indicates the name of the data source and information about how the data is formatted:

```xml
<data Alias="nonlin.xml" Source="temp/nonlin.sgd">
  <DecimalSeparator Value="."/>
  <DateFormat Value="M/D/YYYY"/>
  <MissingValue Value=""/>
</data>
```

The Alias is the name of the original data file. Source specifies the relative location where the data is stored on the server. Data not contained in STATGRAPHICS .SGD files on the server are copied to a STATGRAPHICS data file when first loaded.

The last part of the script specifies information about the procedure to be run:

```xml
<proc name="SREG">
  <input>
    <Y Value="chlorine"/>
    <X Value="weeks"/>
  </input>
  <options>
    <Model Value="SquaredYReciprocalX"/>
  </options>
</proc>
```
The *Input* section specifies the columns containing the data to be analyzed. The *Options* section sets the values of any analysis options. The *Output* section identifies the tables and graphs to be created. The *Results* section indicates which numerical results should be saved for later use.

Currently, there are two procedures on the STATGRAPHICS *stratus* menu that deal with scripts:

1. *Execute script* – This option executes a saved script. When the script is executed, it will look for the original data file specified in the *Alias* tag. If the data has changed, the results will be different.

2. *Manage Scripts* – This option allows scripts to be copied, renamed, deleted, or downloaded to your client machine.

Beginning with Version XVI of STATGRAPHICS Centurion, these scripts may also be executable by the desktop Windows program.
Chapter 6 – Statlets

The main menu contains a special section labeled Statlets that provides access to special procedures that allow you to interact dynamically with your data. For example, select File - Open Sample Dataset from the main menu and open the sample dataset for the Shelf life study. Then select Statlets - Regression Analysis - Curve Fitting from the menu. This will display the page shown below:

![Curve-Fitting Statlet](image)

Select the Y and X variables and then press Update Plot. This will add the graph shown below to the page:
If your web browser supports HTML5 canvases, you may click on or touch any point on the graph to display its row number and coordinates:
After clicking on a point, you may then press the *Exclude/include selected point* button to remove it from the fit:
Excluded points are displayed in red.

Consult the documentation for each Statlet to learn what dynamic operations are currently supported by that procedure,
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