Minitab®

Minitab Automation

Minitab

Release 20.2

Contents

1 Getting Started

Introducing Automation in Minitab

The COM automation library contains a set of standard COM (Component Object Model) objects that expose much of Minitab's internal functionality. You can use this COM library with any COM-compliant language.

Note Automation in Minitab is limited based on the applicable License Agreement. The number of automation users is restricted to whichever of the following is the lowest value: three times the number of simultaneous users permitted to use Minitab or the total number of employees.

Strategies for Handling Errors in COM overview

HRESULT values

COM returns an HRESULT value for all methods in all component interfaces. An HRESULT indicates whether a COM method succeeded or failed. HRESULTs also report any errors in making function calls or interface method calls and identify the facilities associated with the errors, such as RPC, WIN32, or ITF for interface-specific errors. Lastly, system APIs provide a lookup from an HRESULT to a string that describes the error condition.

Using methods that return HRESULTs is fundamental to well-written components and is essential to the debugging process. Microsoft® Visual Basic automatically defines each method with an HRESULT as a return. In Microsoft Visual C++, you must explicitly return an HRESULT.

ErrorInfo objects

ErrorInfo objects are often called COM exceptions because they allow an object to pass (or throw) rich error information to its caller, even across apartment boundaries. The value of this generic error object is that it supplements an HRESULT, extending the type of error description, the source of the error, and the interface identifier of the method that originated the error. You can also include pointers to an entry in a Help file.

Automation provides three interfaces to manage the error object:

- Components must implement the ISupportErrorInfo interface to advertise their support for the ErrorInfo object.
- When an error occurs, the component uses the ICreateErrorInfo interface to initialize an error object.
- After the caller inspects the HRESULT and finds that the method call failed, it queries the object to see whether it supports the ErrorInfo object. If it does, the caller uses the IErrorInfo interface to retrieve the error information.

Visual Basic programmers have easy access to the ErrorInfo object, which is exposed through the Err object. You can raise errors with the Err Raise function and catch errors with the On Error statement. The Visual Basic run-time layer takes care of the mapping for you. If you are using the Visual C++ COM compiler support, you can use the _com_raise_error class to report an error, and the _com_error class to retrieve error information. COM will not propagate traditional C++ exceptions as extended IErrorInfo information.

HRESULT Definitions

The return value of COM functions and methods is an HRESULT. The following table lists the standard HRESULT definitions. To use the return values, you must include winerror.h in your project.

HRESULT	Definition
E_NOINTERFACE	The `QueryInterface` function did not recognize the requested interface. The interface is not supported.
E_NOTIMPL	The function contains no implementation.
E_FAIL	An unspecified failure has occurred.
E_OUTOFMEMORY	The function failed to allocate necessary memory.
E_POINTER	Invalid pointer.
E_INVALIDARG	One or more arguments are invalid.
E_UNEXPECTED	A catastrophic failure has occurred.
E_HANDLE	Invalid handle.
E_ABORT	Operation aborted.

Note The information in this section is from the MSDN Library - January 2001, platform SDK:COM (Component Services).

2 Data Types

Minitab Data Types

MtbAppStatusTypes

Defines the different Mtb Application status types.

0 = ASReady (Minitab is ready to accept commands)

1 = ASBusy (Minitab is busy executing a command)

2 = ASError (The last command executed caused an error)

3 = ASQuit (Quit has been called but the application object is not yet destroyed)

MtbDataTypes

Defines the different data types that are currently supported.

0 = Text

1 = Numeric

2 = DateTime

3 = DataUnassigned

MtbFormulaStatusTypes

Defines the state of the Formula for a Column or Constant object.

0 = FSNone

1 = FSUpToDate

2 = FSOutOfDate

3 = FSInvalid

MtbGraphFileTypes

Defines the different graph file types.

1 = GFJPEG

2 = GFPNGGrayscale

3 = GFPNGColor

3 = GFPNGHighColor

5 = GFTIFGrayscale

6 = GFTIFColor

7 = GFBMPGrayscale

8 = GFBMPColor

8 = GFBMPHighColor

10 = GFGIF

11 = GFEMF

MtbOutputFileTypes

Defines the different Output File types.

0 = OFPlainText

1 = OFHTML

2 = OFRTF

100 = OFDefault

MtbOutputTypes

Defines the different output types allowed in an Output object.

0 = OTGraph

1 = OTTable

3 = OTTitle

4 = OTMessage

6 = OTFormula

MtbValueOrderTypes

Defines the display ordering associated with a column.

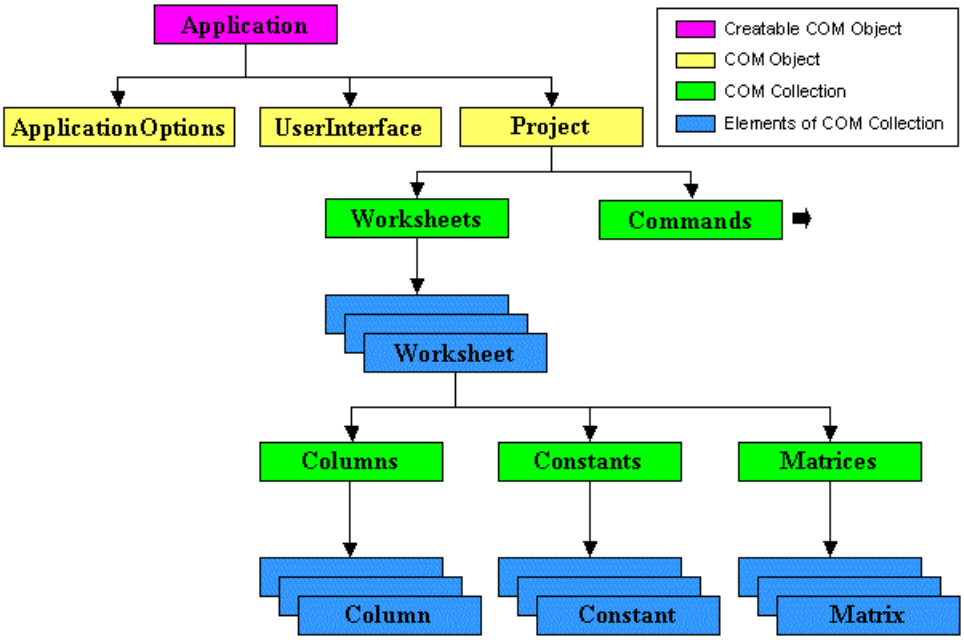
0 = Alphabetical

1 = WorksheetOrder

2 = UserDefined

3 Data Model

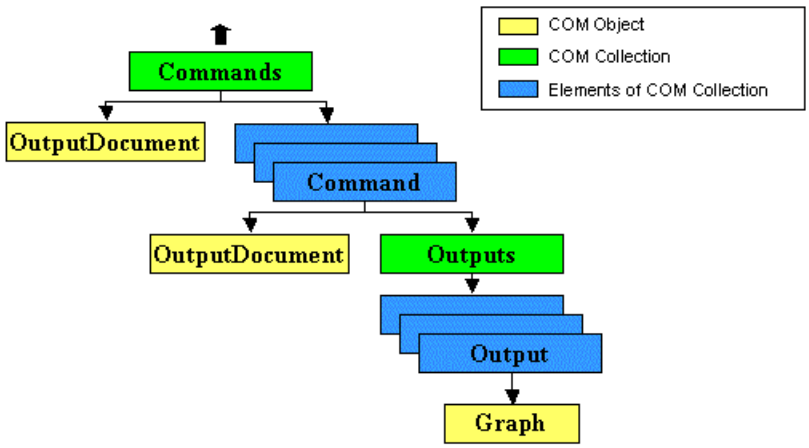
Minitab Automation objects



Object	Description
Application on page 22	The Application object serves as the root node in the Minitab automation server object hierarchy. The Application object is the only object in the hierarchy that can be created by the client. All the lower objects in the hierarchy are accessed through the Application object or through objects contained within the Application object. The Application object provides an interface to allow the client to set and get application-wide global properties.
ApplicationOptions on page 26	Use the `ApplicationOptions` object to read or set options that pertain to the Application object. Use the `Options` property of the `Application` object to access `ApplicationOptions`. For more information on the Application object, go to Application object on page 22.
UserInterface on page 29	The `UserInterface` object allows control of the Minitab host.
Project on page 31	The `Project` object contains all the information related to an individual project, including the `Worksheets` collection and the `Commands` collection.
Commands collection on page 83	The `Commands` collection contains the commands that have been issued to Minitab during the session. See Minitab Command Automation Objects on page 9 for the data model.
Worksheets collection on page 40	The Worksheets collection is a set of all the Worksheet objects within a Project object. It supports the standard collection properties and methods.

Object	Description
Worksheet on page 44	The Worksheet object contains all the information related to an individual worksheet, including the `Columns`, `Constants`, and `Matrices` collections, which provide access to all the columns, constants, and matrices in the worksheet.
Columns collection on page 50	The `Columns` collection is a set of all the `Column` objects within a Worksheet object. It supports the standard collection properties and methods.
Column on page 55	The `Column` object contains all the information related to an individual column. The data type on page 6 for each `Column` object can be `Text`, `Numeric`, `DateTime`, or `DataUnassigned`.
Constants collection on page 64	The `Constants` collection is a set of all the `Constant` objects within a `Worksheet` object. It supports the standard collection properties and methods.
Constant on page 68	The `Constant` object contains all the information related to an individual constant. The `Constant` object can contain numeric or text values.
Matrices collection on page 73	The `Matrices` collection is a set of all the `Matrix` objects within a `Worksheet` object. It supports the standard collection properties and methods.
Matrix on page 77	The `Matrix` object contains all the information related to an individual matrix. The `Matrix` object can contain *only* numeric data values.

Minitab Command Automation Objects



Object	Description
Commands collection on page 83	The `Commands` collection contains the commands that have been issued to Minitab during the session.
OutputDocument on page 97	An `OutputDocument` object contains all output generated by a single `Command` object or by all commands in the `Commands` collection.
Command on page 86	`Command` objects are created when you execute a Minitab command either programmatically or directly in Minitab.

Object	Description
Outputs collection on page 90	The `Outputs` collection for each `Command` object contains all the output generated by that command.
Output on page 92	Each `Output` object contains one component of the output from a Minitab Command object.
Graph on page 99	Each `Graph` object contains a single graph generated by a Minitab `Command` object.

4 My Menu

My Menu Overview

By creating specialized dynamic link libraries (DLLs) and placing them in the AddIns folder of your Minitab directory, you can add customized menus to Minitab that allow you to do the following:

- Run a Minitab macro from the menu.
- Display a customized dialog box for running a Minitab macro.
- Launch customized interfaces to corporate databases, or company-created macros.
- Create custom Minitab procedures using Minitab's new COM objects.
- Launch a separate executable from Minitab.

Your custom menus will appear at the right end of the menu bar. Minitab's new customizable menus and toolbars allow you to move any of the items from your custom menus to any menu or toolbar you would like.

My Menu Addin DLLs

To specify the layout, items, and actions for a custom menu, you need to create a DLL and place it in the AddIns folder of your Minitab directory.

Each Addin DLL must include the following 9 methods:

public string GetName on page 13()
This method returns the friendly name of your Addin. Both the name and the description of the Addin are stored in the registry.

public string GetDescription on page 13()
This method returns the description of your Addin.

public void GetMenuItems on page 13(ref string sMainMenu, ref Array saMenuItems, ref int iFlags)
This method returns the text for the main menu and each menu item. You can return "|" to create a menu separator in your menu items. You must instantiate the menu items array to fit your number of items.

public void OnConnect on page 13(int iHwnd, object pApp, ref int iFlags)
This method is called as Minitab is initializing your Addin. The "iHwnd" parameter is the handle to the main Minitab window. The "pApp" parameter is a reference to the "Minitab Automation object." You can hold onto either of these for use in your Addin. "iFlags" is used to tell Minitab if your Addin has dynamic menus (i.e., should be reloaded each time Minitab starts up). Set iFlags to 1 for dynamic menus and 0 for static.

public void OnDisconnect on page 13()
This method is called as Minitab is closing your Addin.

public string OnDispatchCommand on page 13(int iMenu)
This method is called whenever a user selects one of your menu items. The "iMenu" variable should be equivalent to the menu item index set in "GetMenuItems".

public void OnNotify on page 13(AddinNotifyType eAddinNotifyType)
This method is called when Minitab notifies your Addin that something has changed. Use the "eAddinNotifyType" to figure out what changed.

public bool QueryCustomCommand on page 13(string sCommand)
This method is called when Minitab asks your Addin if it supports a custom command. The argument "sCommand" is the name of the custom command. Return "true" if you support the command.

public void ExecuteCustomCommand on page 13(string sCommand, ref Array saArgs)
This method is called when Minitab asks your Addin to execute a custom command. The argument "sCommand" is the name of the command, and "saArgs" is an array of arguments.

Create a Custom Menu

To create a custom menu, refer to the following high-level steps.

1. Create a C# Class Library on page 12.
2. Add COM References on page 12.
3. Build and Test Your Solution on page 13.

Before you start

- Refer to the example DLL, along with all supporting files for the C# project used to create it, which are located in the MyMenu folder of your Minitab directory.
- Refer to portions of the code from the main module of this project, which are displayed in My Menu - C# Example on page 13.
- Be sure that the add-in implements the add-in interface.
- Add the Minitab Addin Interface to the project references.
- If you want to use the Minitab objects, add a reference to the Minitab Type Library.
- Add the following four attributes to your class:

```
[ComVisible(true)]
    [Guid("40B99FD8-21FB-4E92-AD9B-7DE6358B675B")]
    [ClassInterface(ClassInterfaceType.None)]
    [ProgId("MyMenu.AddIn")]
```

Note When creating multiple menu items, be sure to create a unique GUID for each item.

- Add this attribute to your class:

```
[DllExport("DllRegisterServer", CallingConvention.StdCall)]
        public static int DllRegisterServer()
```

Create a C# Class Library

1. Open Microsoft® Visual Studio.
2. Choose **File** > **New** > **Project**.
3. Create C# class library, then click **OK**.
4. From the **Solutions Explorer**, right-click the solution and choose **Configuration Manager**.
5. In the **Configuration Manager** dialog box, under **Active solution platform**, choose **<New...>**.
6. In the **New Solution Platform** dialog box, choose **x86** as the new platform, click **OK**, and then **Close**.

Add COM References

1. In Microsoft® Visual Studio, choose **Tools** > **NuGet Package Manager** > **Package Manager Console**.

2. At the **Package Manager** prompt, type *Install-Package UnmanagedExports*, then press **Enter**. (For the 64-bit version of Microsoft® Visual Studio, type *Install-Package UnmanagedExports-Version 1.2.3-Beta*.)
   Under **References**, you now have a reference to **RGiesecke.DllExport**.

3. Under the project, right-click **References** and choose **Add Reference**.

4. In the **Reference Manager**, click **COM**, select the following libraries, then click **OK**.
   - Minitab Addin Interface
   - Mtb Type Library

   Under **References**, you now have references to **MinitabAddinTLB** and **Mtb**.

Build and Test Your Solution

1. In Visual Studio, open the Class1.cs file in your solution and add the following directive:
   ```
   using RGiesecke.DllExport;
   ```
2. Choose **Build** > **Build Solution**.
3. Create a compiled resource file.
   a. Open a Visual Studio Developer Command prompt as an administrator.
   b. At the prompt, change the directory to the object (OBJ) folder where the MyMenu.DLL file is located.
   c. Type the following commands and press **Enter**:
   ```
   TlbExp.exe /win32 MyMenu.dll
   echo 1 typelib MyMenu.tlb > MyMenu.rc
   rc.exe MyMenu.rc
   ```
4. In Visual Studio, point to the resource file you created in the previous step.
   a. Right-click the project in your solution and choose **Properties**.
   b. On the **Application tab**, under **Resources**, click **Resource file**.
   c. Click the browse button ....
   d. Browse to the compiled resource (.res) file and click **OK**.
5. Choose **Build** > **Rebuild Solution**.
6. Test the solution.
   a. Copy the MyMenu.DLL file from the binary (BIN) folder to the English\Addins folder of your Minitab installation directory, for example, C:\Program Files (x86)\Minitab\Minitab 19.
   b. Run Minitab as an administrator.
   c. In Minitab, choose **View** > **Customize**.
   d. On the **Menu** tab, under **Application Frame Menus**, click **Reset**.

My Menu - C# Example

```
using System;
using System.Collections;
```

```
using System.Diagnostics;
using System.Reflection;
using System.Runtime.InteropServices;
using System.Text;
using System.Windows.Forms;
using Microsoft®.Win32;
using MinitabAddinTLB;
using Mtb;
using Application = Mtb.Application;

namespace MyMenu
{
    [ComVisible(true)]
    [Guid("40B99FD8-21FB-4E92-AD9B-7DE6358B675B")]
    [ClassInterface(ClassInterfaceType.None)]
    [ProgId("MyMenu.AddIn")]
    public class AddIn : IMinitabAddin
    {
        internal static Application gMtbApp;

        [DllExport("DllRegisterServer", CallingConvention.StdCall)]
        public static int DllRegisterServer()
        {
            try
            {
                SetUpCLSID(Registry.ClassesRoot);
                SetUpCLSID(Registry.LocalMachine.OpenSubKey("SOFTWARE",
true).OpenSubKey("Classes", true));
            }
            catch (Exception)
            {
                // Probably didn't have permissions to modify the registry
            }

            return 0;
        }

        private static void SetUpCLSID(RegistryKey root)
        {
            Type type = typeof(AddIn);
            string guid = type.GUID.ToString("B");
            string runtimeVersion = Environment.Version.ToString();
            string codeBase = Assembly.GetExecutingAssembly().CodeBase;

            RegistryKey typeRoot = root.CreateSubKey(type.FullName);
            typeRoot.SetValue("", type.FullName);
            typeRoot.CreateSubKey("CLSID").SetValue("", guid);

            RegistryKey clsidGuid = root.OpenSubKey("CLSID", true).CreateSubKey(guid);
            clsidGuid.SetValue("", type.FullName);

            clsidGuid.CreateSubKey("Implemented
Categories").CreateSubKey("{62C8FE65-4EBB-45e7-B440-6E39B2CDBF29}");
            RegistryKey server = clsidGuid.CreateSubKey("InprocServer32");
            server.SetValue("", "mscoree.dll");
            server.SetValue("ThreadingModel", "Both");
            server.SetValue("Class", type.FullName);
            server.SetValue("Assembly", type.Assembly.FullName);
            server.SetValue("RuntimeVersion", runtimeVersion);
            server.SetValue("CodeBase", codeBase);
```

```
            RegistryKey serverVersion = server.CreateSubKey("1.0.0.0");
            serverVersion.SetValue("Class", type.FullName);
            serverVersion.SetValue("Assembly", type.Assembly.FullName);
            serverVersion.SetValue("RuntimeVersion", runtimeVersion);
            serverVersion.SetValue("CodeBase", codeBase);

            clsidGuid.CreateSubKey("ProdId").SetValue("", type.FullName);
        }

        public void OnConnect(IntPtr iHwnd, object pApp, ref int iFlags)
        {
            // This method is called as Minitab is initializing your add-in.
            // The "iHwnd" parameter is the handle to the main Minitab window.
            // The "pApp" parameter is a reference to the "Minitab Automation object."
            // You can hold onto either of these for use in your add-in.
            // "iFlags" is used to tell Minitab if your add-in has dynamic menus
            // (i.e. should be reloaded each time
            // Minitab starts up).  Set iFlags to 1 for dynamic menus and 0 for static.
            gMtbApp = pApp as Application;
            // Static menus:
            iFlags = 0;
            return;
        }

        public void OnDisconnect()
        {
            // This method is called as Minitab is closing your add-in.
            GC.Collect();
            GC.WaitForPendingFinalizers();
            GC.Collect();
            GC.WaitForPendingFinalizers();
            try
            {
                Marshal.ReleaseComObject(gMtbApp);
                gMtbApp = null;
            }
            catch
            {
            }
            return;
        }

        public string GetName()
        {
            // This method returns the friendly name of your add-in:
            // Both the name and the description of the add-in are stored in the registry.
            return "Example C# Minitab Add-In";
        }

        public string GetDescription()
        {
            // This method returns the description of your add-in:
            return "An example Minitab add-in written in C# using the "My Menu"
functionality.";
        }

        public void GetMenuItems(ref string sMainMenu, ref Array saMenuItems, ref int iFlags)

        {
            // This method returns the text for the main menu and each menu item.
            // You can return "|" to create a menu separator in your menu items.
```

```
            sMainMenu = "&My Menu";  // This string is the name of the menu.

            saMenuItems = new string[5];  // The strings in this array are the names of the

                                          // items on the aforementioned menu.

            saMenuItems.SetValue("Describe &column(s)…", 0);
            saMenuItems.SetValue("Rename active &worksheet…", 1);
            saMenuItems.SetValue("|", 2);
            saMenuItems.SetValue("&DOS window", 3);
            saMenuItems.SetValue("&Geometric Mean and Mean Absolute Difference…", 4);

            // Flags is not currently used:
            iFlags = 0;

            return;
        }

        public string OnDispatchCommand(int iMenu)
        {
            // This method is called whenever a user selects one of your menu items.
            // The iMenu variable should be equivalent to the menu item index set in
"GetMenuItems."
            string command = string.Empty;
            DialogResult dialogResult = new DialogResult();
            switch (iMenu)
            {
                case 0:
                    // Describe column(s):
                    FormDescribe formDescribe = new FormDescribe(ref gMtbApp);
                    // Fill up list box in dialog with numeric columns in worksheet:
                    formDescribe.checkedListBoxOfColumns.ClearSelected();
                    int lColumnCount = gMtbApp.ActiveProject.ActiveWorksheet.Columns.Count;

                    for (int i = 1; i <= lColumnCount; i += 1)
                    {
                        // Select only the numeric columns:
                        if (gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).DataType
 == MtbDataTypes.Numeric)
                        {

formDescribe.checkedListBoxOfColumns.Items.Add(gMtbApp.ActiveProject.ActiveWorksheet.
             Columns.Item(i).SynthesizedName);
                        }
                    }
                    // Show the dialog:
                    dialogResult = formDescribe.ShowDialog();
                    if (dialogResult == DialogResult.OK)
                    {
                        StringBuilder cmnd = new StringBuilder("Describe ");

                        bool bPrev = false;
                        for (int i = 0; i <
formDescribe.checkedListBoxOfColumns.CheckedItems.Count; i += 1)
                        {
                            if (bPrev)
                            {
                                cmnd.Append(" ");
                            }

cmnd.Append(formDescribe.checkedListBoxOfColumns.CheckedItems[i].ToString());
```

```
                        bPrev = true;
                    }
                    if (formDescribe.chkMean.Checked)
                    {
                        cmnd.Append("; Mean");
                    }
                    if (formDescribe.chkVariance.Checked)
                    {
                        cmnd.Append("; Variance");
                    }
                    if (formDescribe.chkSum.Checked)
                    {
                        cmnd.Append("; Sums");
                    }
                    if (formDescribe.chkNnonmissing.Checked)
                    {
                        cmnd.Append("; N");
                    }
                    if (formDescribe.chkHistogram.Checked)
                    {
                        cmnd.Append("; GHist");
                    }
                    if (formDescribe.chkBoxplot.Checked)
                    {
                        cmnd.Append("; GBoxplot");
                    }
                    cmnd.Append(".");
                    command = cmnd.ToString();
                }
                formDescribe.Close();
                break;
            case 1:
                // Rename active worksheet:
                FormRename formRename = new FormRename(ref gMtbApp);
                string sCurrent = gMtbApp.ActiveProject.ActiveWorksheet.Name;
                formRename.textBoxCurrent.Enabled = true;
                formRename.textBoxCurrent.Text = sCurrent;
                formRename.textBoxCurrent.Enabled = false;
                // Show the dialog:
                dialogResult = formRename.ShowDialog();
                if (dialogResult == DialogResult.OK)
                {
                    gMtbApp.ActiveProject.ActiveWorksheet.Name =
formRename.textBoxNew.Text;
                }
                formRename.Close();
                break;
            case 2:
                break;
            case 3:
                // Open a DOS Window:
                string[] fileNamePossibilities = { "cmd.exe", "command.com" };
                Process process;
                ProcessStartInfo processStartInfo;
                foreach (string fileNamePossibility in fileNamePossibilities)
                {
                    process = new Process();
                    processStartInfo = new ProcessStartInfo();
                    processStartInfo.UseShellExecute = true;
                    processStartInfo.FileName = fileNamePossibility;
                    process.StartInfo = processStartInfo;
```

```
                        try
                        {
                            process.Start();
                            break;
                        }
                        catch (Exception e)
                        {
                            MessageBox.Show(e.Message, "My Menu");
                            MessageBox.Show("Cannot locate DOS executable or otherwise start
 a command prompt…", "My Menu");
                            continue;
                        }
                    }
                    break;
                case 4:
                    // “Geometric Mean” and “Mean Absolute Difference” (stored in the
worksheet):
                    FormGeoMean formGeoMean = new FormGeoMean(ref gMtbApp);
                    // Fill up list box in dialog with numeric columns in worksheet:
                    lColumnCount = gMtbApp.ActiveProject.ActiveWorksheet.Columns.Count;
                    Hashtable hashtableOfNumericColumns = new Hashtable();
                    for (int i = 1; i <= lColumnCount; i += 1)
                    {
                        if (gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).DataType
 == MtbDataTypes.Numeric)
                        {
                            string sSynthesizedColumnName =
gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).SynthesizedName;
                            string sColumnName =
gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).Name;
                            // Add column name (if it exists):
                            if (sColumnName != sSynthesizedColumnName)
                            {
                                sSynthesizedColumnName += string.Concat("  ", sColumnName);

                            }
                            formGeoMean.comboBox.Items.Add(sSynthesizedColumnName);
                            hashtableOfNumericColumns.Add(sSynthesizedColumnName,
gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i));
                        }
                    }
                    // Show the dialog:
                    dialogResult = formGeoMean.ShowDialog();
                    if (dialogResult == DialogResult.OK)
                    {
                        // Get data from the column and pass it to the function to do
calculations:
                        object selectedItem = formGeoMean.comboBox.SelectedItem;
                        Column mtbDataColumn =
(Column)hashtableOfNumericColumns[selectedItem];
                        // “FindGeoMean” takes an array of doubles and returns the geometric
 mean.
                        // “bSuccess” indicates if the calculations were completed.
                        Array daData = (Array)mtbDataColumn.GetData();
                        bool bSuccess;
                        object dGeoMean = FindGeoMean(ref daData, out bSuccess);
                        if (bSuccess)
                        {
                            // Find the “Mean Absolute Difference”:
                            object dMAD = FindMAD(ref daData);
                            // Store both values in the first available column:
```

```
                            Column mtbStorageColumn =
gMtbApp.ActiveProject.ActiveWorksheet.Columns.Add();
                            mtbStorageColumn.SetData(ref dGeoMean, 1, 1);
                            mtbStorageColumn.SetData(ref dMAD, 2, 1);
                            mtbStorageColumn.Name = "MyResults";
                        }
                        else
                        {
                            // An error occurred:
                            gMtbApp.ActiveProject.ExecuteCommand("NOTE ** Error ** Cannot
compute statistics…");
                        }
                        formGeoMean.Close();
                    }
                    break;
                default:
                    break;
            }
            return command;
        }

        public void OnNotify(AddinNotifyType eAddinNotifyType)
        {
            // This method is called when Minitab notifies your add-in
            // that something has changed.
            // Use the "eAddinNotifyType" parameter to figure out what changed.
            // Minitab currently fires no events, so this method is not called.
            return;
        }

        public bool QueryCustomCommand(string sCommand)
        {
            // This method is called when Minitab asks your Addin if it supports a custom
command.
            // The argument "sCommand" is the name of the custom command.
            // Return "true" if you support the command.
            return sCommand.ToUpper() == "EXPLORER" || sCommand.ToUpper() == "CLEAR";
        }

        public void ExecuteCustomCommand(string sCommand, ref Array saArgs)
        {
            // This method is called when Minitab asks your add-in to execute a custom
command.
            // The argument "sCommand" is the name of the command, and "saArgs" is an array
 of arguments.
            if (sCommand.ToUpper() == "EXPLORER")
            {
                // Open Windows Explorer:
                Process process = new Process();
                ProcessStartInfo processStartInfo = new ProcessStartInfo();
                processStartInfo.UseShellExecute = true;
                processStartInfo.FileName = "explorer.exe";
                process.StartInfo = processStartInfo;
                try
                {
                    process.Start();
                }
                catch (Exception e)
                {
                    MessageBox.Show(e.Message, "My Menu");
                    MessageBox.Show("Apparently, Windows Explorer could not be started…",
```

```
"My Menu");
                }
            }
            else if (sCommand.ToUpper() == "CLEAR")
            {
                // Clear indicated columns:
                int lColumnCount = gMtbApp.ActiveProject.ActiveWorksheet.Columns.Count;
                int saArgsCardinality = saArgs.GetLength(saArgs.Rank - 1);
                IEnumerator myEnumerator = saArgs.GetEnumerator();
                while (myEnumerator.MoveNext())
                {
                    for (int i = 1; i <= lColumnCount; i++)
                    {
                        int myEnumeratorCurrent = 0;
                        int.TryParse(myEnumerator.Current.ToString(), out
myEnumeratorCurrent);
                        if (gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).Number
== myEnumeratorCurrent)
                        {
                            gMtbApp.ActiveProject.ActiveWorksheet.Columns.Item(i).Clear();
                        }
                    }
                }
            }
        }

        public double FindGeoMean(ref Array saData, out bool bSuccess)
        {
            // Find geometric mean:
            double dSum = 0.0;
            int iCount = 0;
            bSuccess = true;
            foreach (double dValue in saData)
            {
                if (dValue <= 0)
                {
                    bSuccess = false;
                    MessageBox.Show("All values must be strictly positive!", "My Menu");
                    break;
                }
                dSum += Math.Log(dValue);
                iCount += 1;
            }

            return Math.Exp(dSum / iCount);
        }

        public double FindMAD(ref Array daData)
        {
            // Find M(ean) A(bsolute) D(ifference):
            double dSum = 0.0;
            int iCount = 0;

            foreach (double dValue in daData)
            {
                dSum += dValue;
                iCount += 1;
            }

            double dMAD = 0.0;
            double dMean = dSum / iCount;
```

```
            foreach (double dValue in daData)
            {
                dMAD += Math.Abs(dValue - dMean);
            }

            dMAD /= iCount;

            return dMAD;
        }
    }
}
```

A Minitab Automation Object Reference

Application object

The Application object serves as the root node in the Minitab automation server object hierarchy. The Application object is the only object in the hierarchy that can be created by the client. All the lower objects in the hierarchy are accessed through the Application object or through objects contained within the Application object. The Application object provides an interface to allow the client to set and get application-wide global properties.

Properties

Property	Description
ActiveProject on page 23	Returns the currently active project.
AppPath on page 23	The path to the currently running Minitab executable.
Handle on page 23	The handle to the main Minitab window.
LastError on page 23	Holds the last error that occurred during execution of a command.
Options on page 24	Returns the `ApplicationOptions` object.
Status on page 24	Indicates the current status of the Minitab application.
UserInterface on page 24	Returns the `UserInterface` object of the application.

Methods

Method	Description
Help on page 25	Use to launch this Help file.
New on page 25	Use to create a new project and make it the active project.
Open on page 25	Use to open an existing project file and make it the active project.
Quit on page 26	Use to close and delete all objects in the `Application` object hierarchy, including the `Application` object.

Example

Create a Minitab Application object (`mtbApp`) and make it visible to the user. Then display a message box with the values of the `Status`, `LastError`, `AppPath`, and `Handle` properties, as well as the `DefaultFilePath` property of the `ApplicationOptions` object. Finally, change the comment for the active project via the `ActiveProject` property.

```
Mtb.Application mtbApp = new Mtb.Application();
mtbApp.UserInterface.Visible = true;

MessageBox.Show("Status = " + mtbApp.Status + "\r\n" +
    "LastError = " + mtbApp.LastError + "\r\n" +
    "Default File Path = " + mtbApp.Options.DefaultFilePath + "\r\n" +
    "Application Path = " + mtbApp.AppPath + "\r\n" +
    "Window Handle = " + mtbApp.Handle);

mtbApp.ActiveProject.Comment = "New Minitab Project.";
```

Application property - ActiveProject

Description
Returns the currently active project.

Type
Project

Range
N/A

Access
Read-only

Application property - AppPath

Description
The path to the currently running Minitab executable.

Type
String

Range
Valid string

Access
Read-only

Application property - Handle

Description
The handle to the main Minitab window.

Type
Long

Range
Any valid long integer

Access
Read-only

Application property - LastError

Description
Holds the last error that occurred during execution of a command.

Type
String

Range
Valid string

Access
Read-only

After executing an asynchronous command, the `Status` property should be checked to see when the command completes. If the `Status` property indicates an error occurred then use the `LastError` property to retrieve the error message. For more information on the `Status` property, go to Application property - Status on page 24.

Application property - Options

Description
Returns the `ApplicationOptions` object.

Type
ApplicationOptions on page 26

Range
N/A

Access
Read-only

Application property - Status

Description
Indicates the current status of the Minitab application.

Type
MtbAppStatusTypes on page 6

Range
Any `MtbAppStatusTypes` constant

Access
Read-only

After executing an asynchronous command, the `Status` property should be checked to see when the command completes. If the `Status` property indicates an error occurred then use the `LastError` property to retrieve the error message. For more information on the LastError property, go to Application property - LastError on page 23.

Application property - UserInterface

Description
Returns the `UserInterface` object of the application.

Type
UserInterface on page 29

Range
N/A

Access
Read-only

Application method - Help

Use to launch this Help file.

Syntax

```
Help()
```

Returns

```
HRESULT
```

Example

Call the online Help file.

```
Mtb.Application mtbApp = new Mtb.Application();
mtbApp.Help();
```

Application method - New

Use to create a new project and make it the active project.

Syntax

```
New()
```

Returns

```
HRESULT
```

Example

Create a new project and make it the active project.

```
Mtb.Application mtbApp = new Mtb.Application();
mtbApp.New();
```

Application method - Open

Use to open an existing project file and make it the active project.

Syntax

```
Open(Filename as String)
```

Arguments

Filename

Required. The path and name of the project file to be opened. If a path is not specified, the DefaultFilePath is used. For more information on the DefaultFilePath, go to ApplicationOptions property - DefaultFilePath on page 28.

Returns

`HRESULT`

Example

Open an existing project file and make it the active project.

```
Mtb.Application mtbApp = new Mtb.Application();

mtbApp.Open("C:\\MyProject.mpj");
```

Application method - Quit

Use to close and delete all objects in the `Application` object hierarchy, including the `Application` object.

Syntax

```
Quit()
```

Returns

`HRESULT`

Example

Delete all the objects in the `Application` Object hierarchy, including the `mtbApp`.

```
Mtb.Application mtbApp = new Mtb.Application();

mtbApp.Quit();
```

ApplicationOptions object

Use the `ApplicationOptions` object to read or set options that pertain to the Application object. Use the `Options` property of the `Application` object to access `ApplicationOptions`. For more information on the Application object, go to Application object on page 22.

Properties

Property	Description
ClientMissingValueDateTime on page 27	Date/time to use to represent missing date/time values when receiving date/time values from a client or giving date/time values to a client.

Property	Description
ClientMissingValueNumeric on page 28	Number to use to represent missing numeric values when receiving numeric data from a client or giving numeric data to a client.
DefaultFilePath on page 28	Default file path used by the application for opening/saving files.
DefaultOutputFileType on page 29	Returns or sets the default type of output document file that will be produced.

Example

Create a Minitab Application object (`mtbApp`), then use the `ApplicationOptions` object to access and display the `DefaultFilePath` in a message box. For more information on the ApplicationOptions object, go to ApplicationOptions object on page 26.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.ApplicationOptions mtbAppOpt = mtbApp.Options;

MessageBox.Show("The current default file path is " + mtbAppOpt.DefaultFilePath);
```

ApplicationOptions property - ClientMissingValueDateTime

Description

Date/time to use to represent missing date/time values when receiving date/time values from a client or giving date/time values to a client.

Type

Date

Range

Valid COM DATE value

Default

12/31/9999

Access

Read/Write

This property does not affect Minitab's convention that uses "*" to represent missing values; therefore, in the Minitab worksheet missing values will always appear as "*".

Example

Set the `ClientMissingValueDateTime` to June1, 2018 for a Minitab Application object, then display it in a message box.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.ApplicationOptions mtbAppOpt = mtbApp.Options;

DateTime missingDate = new DateTime(2018, 6, 1);
mtbAppOpt.ClientMissingValueDateTime = missingDate;

MessageBox.Show("The ClientMissingValueDateTime is " +
mtbAppOpt.ClientMissingValueDateTime);
```

ApplicationOptions property - ClientMissingValueNumeric

Description

Number to use to represent missing numeric values when receiving numeric data from a client or giving numeric data to a client.

Type

Double

Range

Valid double precision value

Default

1.23456E30

Access

Read/Write

This property does not affect Minitab's convention that uses "*" to represent missing values; therefore, in the Minitab worksheet missing numeric values will always appear as "*".

Example

Set the `ClientMissingValueNumeric` to 0.001 for a Minitab Application object, then display it in a message box.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.ApplicationOptions mtbAppOpt = mtbApp.Options;

mtbAppOpt.ClientMissingValueNumeric = 0.001;
MessageBox.Show("The ClientMissingValueNumeric is " +
mtbAppOpt.ClientMissingValueNumeric);
```

ApplicationOptions property - DefaultFilePath

Description

Default file path used by the application for opening/saving files.

Type

String

Range

Any valid path

Access

Read/Write

The default `DefaultFilePath` is the directory where the task scheduler will schedule the task to execute.

Example

Create a Minitab Application object (`mtbApp`), then use the `ApplicationOptions` object to access and display the `DefaultFilePath` in a message box. For more information on the ApplicationOptions object, go to ApplicationOptions object on page 26.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.ApplicationOptions mtbAppOpt = mtbApp.Options;

MessageBox.Show("The current default file path is " + mtbAppOpt.DefaultFilePath);
```

ApplicationOptions property - DefaultOutputFileType

Description

Returns or sets the default type of output document file that will be produced.

Type

MtbOutputFileTypes on page 7

Range

Any `MtbOutputFileTypes` constant

Access

Read/Write

The default is HTML.

Example

Create a Minitab Application object (`mtbApp`) and then display the `DefaultOutputFileType` in a message box.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.ApplicationOptions mtbAppOpt = mtbApp.Options;

MessageBox.Show("The current default output file type is " +
mtbAppOpt.DefaultOutputFileType);
```

UserInterface object

The `UserInterface` object allows control of the Minitab host.

Properties

Property	Description
DisplayAlerts on page 30	Controls whether Minitab displays alerts and messages while a client script is running.
Interactive on page 30	Controls whether the user is able to issue commands or alter data directly in Minitab if it is visible.
UserControl on page 30	Controls whether Minitab quits when the last client object is released.
Visible on page 30	Controls whether Minitab server is visible.

Example

Create a Minitab Application object (`mtbApp`), make it visible to the user, and set the `Interactive`, `UserControl`, and `DisplayAlerts` properties of the `UserInterface` object to `True`.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.UserInterface mtbUI = mtbApp.UserInterface;

mtbUI.Visible = true;
mtbUI.Interactive = true;
mtbUI.UserControl = true;
mtbUI.DisplayAlerts = true;
```

UserInterface property - DisplayAlerts

Description
Controls whether Minitab displays alerts and messages while a client script is running.

Type
Boolean

Range
True/False

Access
Read/Write

It is good practice to set `DisplayAlerts` back to `True` when a script finishes. Minitab does not do this automatically.

UserInterface property - Interactive

Description
Controls whether the user is able to issue commands or alter data directly in Minitab if it is visible.

Type
Boolean

Range
True/False

Access
Read/Write

The default is True.

UserInterface property - UserControl

Description
Controls whether Minitab quits when the last client object is released.

Type
Boolean

Range
True/False

Access
Read/Write

The default is `False` if the application was started programmatically. Minitab must be visible for `UserControl` to be `True`.

UserInterface property - Visible

Description
Controls whether Minitab server is visible.

Type
Boolean

Range
True/False

Access
Read/Write

The default is `True` when Minitab is started by the user, `False` when started programmatically.

Project object

The `Project` object contains all the information related to an individual project, including the `Worksheets` collection and the `Commands` collection.

For more information on the Worksheets collection, go to Worksheets Collection object on page 40. For more information on the Commands collection, go to Commands Collection object on page 83.

Properties

Property	Description
ActiveWorksheet on page 32	Returns or sets the active worksheet for the project.
Commands on page 33	Returns the `Commands` collection for the project.
Comment on page 33	Comment for the project.
Creator on page 33	Creator of the project.
Date on page 34	Date of the project.
FullName on page 34	Full name of the `Project` object disk file, including the path name and/or drive name, set when a project is opened or saved.
Name on page 35	Name of the project and its disk file.
Path on page 35	Path of the `Project` object disk file, set when a project is opened or saved
Worksheets on page 36	Returns the `Worksheets` collection of the project.

Methods

Method	Description
CancelCommand on page 36	Use to cancel the execution of a user-issued or COM-issued command.
Delete on page 36	Use to delete the `Project` object and the underlying `Worksheets` and `Commands` collections.
ExecuteCommand on page 37	Use to run a Minitab session command and create a command object.
ExecuteCommandAsync on page 37	Use to run a Minitab session command asynchronously and create a command object.
Save on page 38	Use to save the project to `FullName`.
SaveAs on page 38	Use to save a copy of the project.

Example

Create a Minitab Application object, execute Minitab commands both synchronously and asynchronously, and then attempt to cancel the asynchronous command. Also use the `Comment`, `Creator`, and `Date` properties as well as the `Save` and `SaveAs` methods.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj = mtbApp.ActiveProject;
Mtb.MtbAppStatusTypes status;

mtbProj.ExecuteCommand("rand 30 c1");
mtbProj.ExecuteCommandAsync("rand 100000 c2-c100");

status = mtbApp.Status;
if (status == Mtb.MtbAppStatusTypes.ASBusy)
{
    mtbProj.CancelCommand();
}

mtbApp.UserInterface.Visible = true;
```

Save the project as a Release 19 project called MyProject. For Minitab 19 and higher, 19 is the earliest valid argument.

```
mtbProj.SaveAs("C:\\MyProject",true,19);
```

Add creator, date, and comment information.

```
mtbProj.Creator = "Me";
mtbProj.Date = DateTime.Now.ToShortDateString();
mtbProj.Comment = "This is my project.";
```

Display creator, date, and comment information.

```
MessageBox.Show("This project created by " + mtbProj.Creator +
    " on " + mtbProj.Date + "\r\nComment: " + mtbProj.Comment);
```

Save the project again.

```
mtbProj.Save();
```

Project property - ActiveWorksheet

Description

Returns or sets the active worksheet for the project.

Type

Worksheet on page 44

Range

N/A

Access

Read/Write

Example

Create a Minitab `Application` object, then rename the project's active worksheet and display a message with the new name. For more information on the Application object, go to Application object on page 22.

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
```

```
mtbSheet.Name = "My Worksheet";
MessageBox.Show("The active worksheet is called " +
mtbApp.ActiveProject.ActiveWorksheet.Name);
```

Project property - Commands

Description

Returns the `Commands` collection for the project. For more information on the Commands collection, go to Commands Collection object on page 83.

Type

Commands collection

Range

N/A

Access

Read-only

Example

Retrieve the Commands collection from the `Project` object and display a message with the number of commands in the collection.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj = mtbApp.ActiveProject;
Mtb.Commands mtbCommands = mtbProj.Commands;

MessageBox.Show("The number of commands that has been run is: " +
mtbCommands.Count.ToString());
```

Project property - Comment

Description

Comment for the project.

Type

String

Range

Valid string

Access

Read/Write

Default is blank.

Project property - Creator

Description

Creator of the project.

Type

String

Range
Valid string

Access
Read/Write

Default is blank.

Project property - Date

Description
Date of the project.

Type
String

Range
Valid string

Access
Read/Write

Default is blank

Project property - FullName

Description
Full name of the `Project` object disk file, including the path name and/or drive name, set when a project is opened or saved.

Type
String

Range
Valid file name, including the path name and/or drive name

Access
Read-only

Example

Display the `FullName` property (path and name) of the project in a message box.

```
Mtb.Application mtbApp;
Mtb.Project mtbProj;

mtbApp = new Mtb.Application();
mtbProj = mtbApp.ActiveProject;

mtbProj.Name = "My Project";
MessageBox.Show("The FullName is " + mtbProj.FullName);
```

Project property - Name

Description

Name of the project and its disk file. It also is the name of the file if the project is saved to disk. Setting the `Name` property automatically updates the file name portion of the `FullName` property.

Type

String

Range

Any valid file name

Access

Read/Write

Do not include the path when setting the `Name` property.

Example

Retrieve the active project, name it "My Project," and print the name in a message box.

```
Mtb.Application mtbApp;
Mtb.Project mtbProj;

mtbApp = new Mtb.Application();
mtbProj = mtbApp.ActiveProject;

mtbProj.Name = "My Project";
MessageBox.Show("The project is " + mtbProj.Name);
```

Project property - Path

Description

Path of the `Project` object disk file, set when a project is opened or saved

Type

String

Range

Valid path name. It may include the drive name.

Access

Read-only

Example

Display the `Path` property of the project in a message box.

```
Mtb.Application mtbApp;
Mtb.Project mtbProj;

mtbApp = new Mtb.Application();
mtbProj = mtbApp.ActiveProject;

MessageBox.Show("The path is " + mtbProj.Path);
```

Project property - Worksheets

Description

Returns the `Worksheets` collection of the project. For more information on the Worksheets collection, go to Worksheets Collection object on page 40.

Type

Worksheets collection

Range

N/A

Access

Read-only

Example

Retrieve the `Worksheets` collection from the `Project` object and display a message with the number of worksheets in the collection.

```
Mtb.Application mtbApp;
Mtb.Project mtbProj;
Mtb.Worksheets mtbSheets;

mtbApp = new Mtb.Application();
mtbProj = mtbApp.ActiveProject;
mtbSheets = mtbProj.Worksheets;

MessageBox.Show("There are this many worksheets in the project: " + mtbSheets.Count);
```

Project method - CancelCommand

Use to cancel the execution of a user-issued or COM-issued command.

Syntax

```
CancelCommand()
```

Returns

```
Boolean
```

Remarks

Returns `True` if the command was cancelled, `False` if no command was executing.

Project method - Delete

Use to delete the `Project` object and the underlying `Worksheets` and `Commands` collections. `Delete` also sets the active project for the application to NULL.

For more information on the Worksheets collection, go to Worksheets Collection object on page 40. For more information on the Commands collection, go to Commands Collection object on page 83.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Example

Delete the `Project` object and the underlying `Worksheets` and `Commands` collections.

```
Mtb.Application mtbApp;
Mtb.Project mtbProj;

mtbApp = new Mtb.Application();
mtbProj = mtbApp.ActiveProject;

mtbProj.Delete();
```

Project method - ExecuteCommand

Use to run a Minitab session command and create a command object.

Syntax

```
ExecuteCommand(Command as String, WorksheetObj as Worksheet)
```

Arguments

Command

Required. One or more session commands to execute in Minitab. Multiple commands and subcommands may be included in the same command. Subcommands must be separated from commands and from each other by semicolons. Each command must end with a period, with the exception of LET. LET commands must be separated from other commands by a new line rather than a period.

WorksheetObj

Optional. The worksheet to use when executing the command. The specified worksheet becomes the `ActiveWorksheet`. If none specified, then the current `ActiveWorksheet` is used.

Remarks

The command is executed synchronously, meaning this interface will not return until the command has completed executing, giving direct feedback as to the completion status of the command, success or failure.

Project method - ExecuteCommandAsync

Use to run a Minitab session command asynchronously and create a command object.

Syntax

```
ExecuteCommandAsync(Command as String, WorksheetObj as Worksheet)
```

Arguments

Command

Required. One or more session commands to execute in Minitab. Multiple commands and subcommands may be included in the same command. Subcommands must be separated from commands and from each other by semicolons. Each command must end with a period, with the exception of LET. LET commands must be separated from other commands by a new line rather than a period.

WorksheetObj

Optional. The worksheet to use when executing the command. The specified worksheet becomes the `ActiveWorksheet`. If none specified, then the current `ActiveWorksheet` is used.

Returns

`HRESULT`

Remarks

The command is submitted for execution asynchronously, meaning this interface will return before the command is executed. Use the `Application` object's `Status` property to see if the command completed successfully. If an error occurred, use the application's `LastError` property to retrieve the error message.

For more information on the `Application` object, go to Application object on page 22. For more information on the `Status` property, go to Application property - Status on page 24. For more information on the `LastError` property, go to Application property - LastError on page 23.

Project method - Save

Use to save the project to `FullName`.

For more information on FullName, go to Project property - FullName on page 34.

Syntax

```
Save()
```

Returns

`HRESULT`

Project method - SaveAs

Use to save a copy of the project.

Syntax

```
SaveAs(Filename as String, Replace as Boolean, Version as Long)
```

Arguments

Filename

Optional. Path and file name to use when saving the project. If a path is not specified, then the `DefaultFilePath` is used. If a file name is not specified then the `Name` property is used.

Replace

Optional. If `True`, an existing file with the same name will be overwritten. The default is `True`.

Version

Optional. The Minitab version number to save the project as. If not specified, the current version number is used.

For more information on the `DefaultFilePath`, go to ApplicationOptions property - DefaultFilePath on page 28.
For more information on the `Name` property, go to Project property - Name on page 35.

Returns

`HRESULT`

B Worksheet Object Reference

Worksheets Collection object

The Worksheets collection is a set of all the Worksheet objects within a Project object. It supports the standard collection properties and methods.

Properties

Property	Description
Count on page 40	Number of `Worksheet` objects within the `Worksheets` collection.

Methods

Method	Description
Add on page 41	Use to add *`Count`* `Worksheet` objects to the `Worksheets` collection.
Delete on page 41	Use to remove all `Worksheet` objects from the `Worksheets` collection.
Item on page 42	Use to return a `Worksheet` object within the `Worksheets` collection.
Open on page 42	Use to open an existing Minitab worksheet disk file, read it into a `Worksheet` object, and add the `Worksheet` object to the end of the `Worksheets` collection.
Remove on page 43	Use to delete a `Worksheet` object and remove it from the `Worksheets` collection.

Example

Retrieve the Worksheets collection from the Project, add two worksheets to it and name the first one "First Year," open an existing Minitab worksheet ("Market"), then remove the second worksheet from the Worksheets collection:

```
Mtb.Worksheets mtbSheets;
mtbSheets = mtbProj.Worksheets;

mtbSheets.Add(2).Name = "First Year";
mtbSheets.Open("Market");
mtbSheets.Remove(2);
```

Note This example assumes that the `MtbProject` object was previously initialized to a valid `Project` object as demonstrated in the Project object example.

Worksheets Collection property - Count

Description

Number of `Worksheet` objects within the `Worksheets` collection.

Type

Long

Range

0 - number of `Worksheet` objects within the `Worksheets` collection

Access
Read-only

Example

Retrieve the Worksheets collection from a previously initialized Project object, then display the number of Worksheet objects in the Worksheets collection in a message box.

```
mtbSheets = mtbProj.Worksheets;

MessageBox.Show(mtbSheets.Count.ToString());
```

Worksheets Collection method - Add

Use to add *Count* `Worksheet` objects to the `Worksheets` collection.

Syntax

```
Add(Quantity Long String)
```

Arguments

Quantity
Optional. Number of worksheets to add. The default is 1.

Returns

```
Worksheet
```

Remarks

The first worksheet added is returned.

Examples

Retrieve the Worksheets collection, add two worksheets to it, naming the first one "Growth."

```
mtbSheets = mtbProj.Worksheets;
mtbSheets.Add(2).Name = "Growth";
```

Add one worksheet to the Worksheets collection.

```
mtbSheets.Add();
```

Worksheets Collection method - Delete

Use to remove all `Worksheet` objects from the `Worksheets` collection.

For more information on the `Worksheet` object, go to Worksheet object on page 44.

Syntax

```
Delete()
```

Returns

`HRESULT`

Remarks

To remove a single worksheet, use `Remove` or the `Worksheet` object method, `Delete`.

For more information on the Remove method for the `Worksheets` collection, go to Worksheets Collection method - Remove on page 43. For more information on the `Delete` method for a worksheet object, go to Worksheet method - Delete on page 49.

Example

Delete the Worksheets collection, including all its worksheets:

```
mtbSheets.Delete();
```

Worksheets Collection method - Item

Use to return a `Worksheet` object within the `Worksheets` collection.

Syntax

```
Item(Index as Variant)
```

Arguments

Index

Required. The index of the worksheet as an integer (`Long`) from 1 - the number of worksheets in the collection, or the `name` (`String`) of the worksheet. For more information on the name property of the worksheet, go to Worksheet property - Name on page 48.

Returns

`Worksheet`

Examples

Retrieve the second worksheet in the Worksheets collection, name the worksheet "First Year," then print the name in a message box.

```
mtbSheet = mtbSheets.Item(2);
mtbSheet.Name = "First Year";
MessageBox.Show("The second worksheet is " + mtbSheet.Name);
```

Retrieve the worksheet called "Second Year" and print the name in a message box.

```
mtbSheet = mtbSheets.Item("Second Year");
MessageBox.Show("The current worksheet is: " + mtbSheet.Name);
```

Worksheets Collection method - Open

Use to open an existing Minitab worksheet disk file, read it into a `Worksheet` object, and add the `Worksheet` object to the end of the `Worksheets` collection.

Syntax

```
Open(Filename as String)
```

Arguments

Filename

Optional. The path and name of the worksheet file to be opened. If a path is not specified, the `DefaultFilePath` is used. For more information on the DefaultFilePath, go to ApplicationOptions property - DefaultFilePath on page 28.

Returns

`HRESULT`

Remarks

When you open a worksheet file, the `Name`, `Path`, and `FullName` properties of the `Worksheet` object are automatically updated. If you don't specify an extension, .MWX is automatically added.

Example

Open the Minitab worksheet "Market.mtw", retrieve the first worksheet, then print the name in a message box.

```
mtbSheets.Open("C:\\sheets\\Market.mtw");
mtbSheet = mtbSheets.Item(1);
MessageBox.Show("Worksheet name: " + mtbSheet.Name);
```

Worksheets Collection method - Remove

Use to delete a `Worksheet` object and remove it from the `Worksheets` collection.

Syntax

```
Remove(Index as Variant)
```

Arguments

Index

Required. The index of the worksheet as an integer (`Long`) from 1 - the number of worksheets in the collection, or the `name` on page 48 (`String`) of the worksheet.

Returns

`HRESULT`

Remarks

The same results can be achieved using the `Delete` method of the `Worksheet` object. To remove all worksheets, use the `Delete` method of the `Worksheets` collection object.

For more information on the `Delete` method for a `Worksheet` object, go to Worksheet method - Delete on page 49. For more information on the `Worksheet` object, go to Worksheet object on page 44. For more information on the `Delete` method of the `Worksheets` collection object, go to Worksheets Collection method - Delete on page 41. For more information on the `Worksheets` collection object, go to Worksheets Collection object on page 40.

Example

Remove the first worksheet and the worksheet named "First Year" from the `Worksheets` collection.

```
mtbSheets.Remove(1);
mtbSheets.Remove("First Year");
```

Worksheet object

The Worksheet object contains all the information related to an individual worksheet, including the `Columns`, `Constants`, and `Matrices` collections, which provide access to all the columns, constants, and matrices in the worksheet.

Properties

Property	Description
Columns on page 45	Returns the `Columns` collection of the worksheet.
Comment on page 45	Comment for the `Worksheet` object, saved as part of the Minitab worksheet description.
Constants on page 46	Returns the `Constants` collection of the worksheet.
Creator on page 46	Creator of the `Worksheet` object, saved as part of the Minitab worksheet description.
Date on page 46	Date of the `Worksheet` object description, saved as part of the Minitab worksheet description.
FullName on page 47	Full name of the `Worksheet` object disk file, including the path name and/or drive name, set when a `Worksheet` object is opened or saved.
Matrices on page 47	Returns the `Matrices` collection of the worksheet.
Name on page 48	Name of the `Worksheet` object and its disk file.
Path on page 48	Path of the `Worksheet` object disk file, set when a `Worksheet` object is opened or saved.

Methods

Method	Description
Delete on page 49	Use to delete a `Worksheet` object and remove it from the `Worksheets` collection.
Save on page 49	Use to save a `Worksheet` object to disk with the file name specified in the `FullName` property.
SaveAs on page 50	Use to save a `Worksheet` object to disk with the file name specified in the `Filename` argument.

Example

Retrieve the `Worksheet` object named "First Year", set the creator, date, and comment for the worksheet, then save the worksheet as "Year1."

```
Mtb.Worksheet mtbSheet;
mtbSheet = mtbSheets.Item("First Year");
mtbSheet.Creator = "M. Smith";
mtbSheet.Date = "6/4/2002";
mtbSheet.Comment = "1999 is the first year";
mtbSheet.SaveAs("Year1");
```

Worksheet property - Columns

Description

Returns the `Columns` collection of the worksheet.

Type

Columns on page 50

Range

N/A

Access

Read-only

Example

Retrieve the `Columns` collection.

```
mtbColumns = mtbSheet.Columns;
```

Note This example assumes that the `mtbSheet` object was previously initialized to a valid `Worksheet` object as demonstrated in the `Worksheet` object example. For the example, go to Worksheet object on page 44.

Worksheet property - Comment

Description

Comment for the `Worksheet` object, saved as part of the Minitab worksheet description.

Type

String

Range

Valid string

Access

Read/Write

Example

Retrieve the first worksheet in the `Worksheets` collection and add a comment to the worksheet.

```
mtbSheet = mtbSheets.Item(1);
mtbSheet.Comment = "This worksheet has the old data. It needs to be updated by the end
 of the year.";
```

Worksheet property - Constants

Description
Returns the `Constants` collection of the worksheet.

Type
Constants on page 64

Range
N/A

Access
Read-only

Example

Set `mtbConstants` to the `Constants` collection of worksheet `mtbSheet`.

```
mtbConstants = mtbSheet.Constants;
```

Note This example assumes that the `mtbSheet` object was previously initialized to a valid `Worksheet` object as demonstrated in the `Worksheet` object example. For the example, go to Worksheet object on page 44.

Worksheet property - Creator

Description
Creator of the `Worksheet` object, saved as part of the Minitab worksheet description.

Type
String

Range
Valid string

Access
Read/Write

Example

Retrieve the first worksheet in the `Worksheets` collection, specify the creator of the worksheet (M. Smith), then print the creator in a message box.

```
mtbSheet = mtbSheets.Item(1);
mtbSheet.Creator = "M. Smith";
MessageBox.Show("The creator is " + mtbSheet.Creator);
```

Worksheet property - Date

Description
Date of the `Worksheet` object description, saved as part of the Minitab worksheet description.

Type
String

Range
Valid string

Access
Read/Write

Example

Retrieve the first worksheet in the `Worksheets` collection, specify the date of the worksheet, then print the date in a message box.

```
mtbSheet = mtbSheets.Item(1);
mtbSheet.Date = "6/4/2018";
MessageBox.Show("The date is " + mtbSheet.Date);
```

Worksheet property - FullName

Description
Full name of the `Worksheet` object disk file, including the path name and/or drive name, set when a `Worksheet` object is opened or saved.

Type
String

Range
Valid file name, including path name and/or drive name

Access
Read/Write

Example

Display the `FullName` property (path and name) of the worksheet in a message box.

```
MessageBox.Show("The FullName is " + mtbSheet.FullName);
```

Worksheet property - Matrices

Description
Returns the `Matrices` collection of the worksheet.

Type
Matrices on page 73

Range
N/A

Access
Read-only

Example

Set `mtbMatrices` to the `Matrices` collection of worksheet `mtbSheet`.

```
mtbMatrices = mtbSheet.Matrices;
```

Note This example assumes that the `mtbSheet` object was previously initialized to a valid `Worksheet` object as demonstrated in the `Worksheet` object example. For the example, go to Worksheet object on page 44.

Worksheet property - Name

Description

Name of the `Worksheet` object and its disk file. It is also the name of the file if the `Worksheet` object is saved to disk. Setting `Name` automatically updates the file name portion of the `FullName` property.

Type

String

Range

Any valid file name

Access

Read/Write

Do not include the path when setting `Name`.

Example

Retrieve the second worksheet in the `Worksheets` collection, name the worksheet "Second Year," then print the name in a message box.

```
mtbSheet = mtbSheets.Item(2);
mtbSheet.Name = "Second Year";
MessageBox.Show("The second worksheet is " + mtbSheet.Name);
```

Worksheet property - Path

Description

Path of the `Worksheet` object disk file, set when a `Worksheet` object is opened or saved.

Type

String

Range

Valid path name. It may include the drive name.

Access

Read-only

Example

Display the `Path` property of the worksheet in a message box.

```
MessageBox.Show("The Path is " + mtbSheet.Path);
```

Worksheet method - Delete

Use to delete a `Worksheet` object and remove it from the `Worksheets` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the `Remove` method of the `Worksheets` collection object. To remove all worksheets, use the `Delete` method of the `Worksheets` collection object.

For more information on the `Remove` method for a `Worksheets` collection object, go to Worksheets Collection method - Remove on page 43. For more information on the `Delete` method of the `Worksheets` collection object, go to Worksheets Collection method - Delete on page 41. For more information on the `Worksheets` collection object, go to Worksheets Collection object on page 40.

Example

Delete the `Worksheet` object from the `Worksheets` collection.

```
mtbSheet.Delete();
```

Worksheet method - Save

Use to save a `Worksheet` object to disk with the file name specified in the `FullName` property.

Syntax

```
Save(Filename as String)
```

Returns

```
HRESULT
```

Remarks

When you save a worksheet, the `Name`, `Path`, and `FullName` properties of the `Worksheet` object are automatically updated. If you don't specify an extension, .MWX is automatically added to the worksheet name. If the `FullName` property is null, then the worksheet is saved to Minitab.MWX at the default file path.

Example

Save the current worksheet.

```
mtbSheet.Save();
```

Worksheet method - SaveAs

Use to save a `Worksheet` object to disk with the file name specified in the `Filename` argument.

Syntax

`SaveAs(`*`Filename`* `as String,` *`Replace`* `as Boolean,` *`Version`* `as Long)`

Arguments

`Filename`
Optional. Path and file name to use when saving the file. If a path is not specified, then the `DefaultFilePath` is used. For more information on the DefaultFilePath, go to ApplicationOptions property - DefaultFilePath on page 28.

`Replace`
Optional. If `True`, an existing file with the same name will be overwritten. The default is `False`.

`Version`
Optional. The Minitab version number to save the worksheet as. Valid parameters are 19 or later.

Returns

`HRESULT`

Remarks

When you save a worksheet, the `Name`, `Path`, and `FullName` properties of the `Worksheet` object are automatically updated. With the release of Minitab 19 and tabbed output, if you don't specify an extension, .MWX is automatically added to the worksheet name. Earlier versions of Minitab use .MTW. You cannot save worksheets as .MTW files in versions of Minitab that do not support tabbed output.

Examples

Save the current worksheet as "April Totals" at the file path C:\MTBsheets.

```
mtbSheet.SaveAs("C:\\MTBsheets\\April Totals");
```

Save the current worksheet as "April Totals" at the default file path, overwriting the existing "April Totals".

```
mtbSheet.SaveAs("April Totals",true);
```

Columns Collection object

The `Columns` collection is a set of all the `Column` objects within a Worksheet object. It supports the standard collection properties and methods.

The `Columns` collection for a worksheet is empty by default.

Properties

Property	Description
Count on page 51	Number of `Column` objects within the `Columns` collection.

Methods

Method	Description
Add on page 52	Use to add *`Quantity`* `Column` objects to the `Columns` collection in the position before *`Before`* or after *`After`*.
Delete on page 53	Use to remove all `Column` objects from the `Columns` collection.
Item on page 53	Use to return a `Column` object within the `Columns` collection.
Remove on page 54	Use to delete a `Column` object and remove it from the `Columns` collection.

Example

Retrieve the `Columns` collection (`mtbColumns`), add two columns to the end of the collection and name the first one "Sales," then remove the second column from the `Columns` collection.

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;
Mtb.Columns mtbColumns;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
mtbColumns = mtbSheet.Columns;

mtbApp.UserInterface.Visible = true;
mtbApp.UserInterface.UserControl = true;

mtbColumns.Add(null,null,2).Name = "Sales";
mtbColumns.Remove(2);
```

Columns Collection property - Count

Description

Number of `Column` objects within the `Columns` collection.

Type

Long

Range

0 - number of `Column` objects within the `Columns` collection

Access

Read-only

Example

Retrieve the `Columns` collection, then display in a message box the number of `Column` objects in the `Columns` collection.

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;
```

```
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
mtbColumns = mtbSheet.Columns;

MessageBox.Show(mtbColumns.Count.ToString());
```

Columns Collection method - Add

Use to add *Quantity* Column objects to the Columns collection in the position before *Before* or after *After*.

Syntax

```
Add(Before as Variant, After as Variant, Quantity as Long)
```

Arguments

Before
Optional. Column object to add new columns before.

After
Optional. Column object to add new columns after.

Quantity
Optional. Number of columns to add. The default is 1.

Returns

Column on page 55

Remarks

You can specify either *Before* or *After*, but not both. Use an integer (Long) from 1 - the number of columns in the collection, or the name(String) of a column. If neither *Before* nor *After* is specified, then the columns are added after the last column in the collection. For more information on the Name property, go to Column property - Name on page 59.

The first column added is returned.

Examples

Create a Minitab Application object, add four columns to the active worksheet, and name the first column "Year."

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
mtbColumns = mtbSheet.Columns;

mtbColumns.Add(null, null, 4).Name = "Year";
```

Add one column to it after the last column.

```
mtbColumns.Add();
```

Add two columns to the `Columns` collection before column three, and name the first column "First Time."

```
mtbColumns.Add(3, null, 2).Name = "First Time";
```

Add two columns to the `Columns` collection after column three.

```
mtbColumns.Add(null, 3, 2);
```

Add four columns to the `Columns` collection before the "Year" column and name the first column "Next Year."

```
mtbColumns.Add("Year", null, 4).Name = "Next Year";
```

Add two columns to the `Columns` collection after the "Year" column.

```
mtbColumns.Add(null, "Year", 2);
```

Columns Collection method - Delete

Use to remove all `Column` objects from the `Columns` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

To remove a single column, use `Remove` on page 54 or the `Column` object method, `Delete` on page 60.

Example

Delete the `Columns` collection (`MtbColumns`), including all its columns.

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;
Mtb.Columns mtbColumns;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
mtbColumns = mtbSheet.Columns;

mtbColumns.Delete();
```

Columns Collection method - Item

Use to return a `Column` object within the `Columns` collection.

Syntax

```
Item(Index as Variant)
```

Arguments

Index

Required. The index of the column as an integer (`Long`) from 1 - the number of columns in the collection, or the `name` on page 48 (`String`) of the column.

Returns

`Column` on page 55

Examples

Create a Minitab `Application` object, add four columns to the active worksheet, and name the first column "Mileage."

```
Mtb.Application mtbApp;
Mtb.Worksheet mtbSheet;
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbApp = new Mtb.Application();
mtbSheet = mtbApp.ActiveProject.ActiveWorksheet;
mtbColumns = mtbSheet.Columns;

mtbColumns.Add(null, null, 4).Name = "Mileage";
```

Retrieve the second column in the `Columns` collection, name the column "Range," then print the name in a message box.

```
mtbColumn = mtbColumns.Item(2);
mtbColumn.Name = "Range";
MessageBox.Show("The second column is " + mtbColumn.Name);
```

Retrieve the column called "Mileage" then print the name in a message box.

```
mtbColumn = mtbColumns.Item("Mileage");
MessageBox.Show("The current column is " + mtbColumn.Name);
```

Columns Collection method - Remove

Use to delete a `Column` object and remove it from the `Columns` collection.

Syntax

```
Remove(Index as Variant)
```

Arguments

Index

Required. The index of the column as an integer (`Long`) from 1 - the number of columns in the collection, or the name(`String`) of the column. For more information on the `Name` property, go to Column property - Name on page 59.

Returns

`HRESULT`

Remarks

The same results can be achieved using the `Delete` method of the `Column` object. To remove all columns, use the `Delete` method of the `Columns` collection object.

For more information on the `Delete` method of the `Column` object, go to Column method - Delete on page 60. For more information on the `Column` object, go to Column object on page 55. For more information on the `Delete` method of the `Columns` collection object, go to Columns Collection method - Delete on page 53. For more information on the `Columns` collection object, go to Columns Collection object on page 50.

Examples

Remove the second column and the column named "First Year" from the `Columns` collection:

```
mtbColumns.Remove(2);
mtbColumns.Remove("First Year");
```

Column object

The `Column` object contains all the information related to an individual column. The data type on page 6 for each `Column` object can be `Text`, `Numeric`, `DateTime`, or `DataUnassigned`.

Properties

Property	Description
Comment on page 56	Description of the Column object.
DataType on page 57	Type of data in the `Column` object.
Formula on page 57	Formula for the `Column` object.
FormulaStatus on page 58	Status of the `Formula` property for the `Column` object.
MissingCount on page 58	Number of missing data rows in the `Column` object
Name on page 59	Name of the `Column` object.
Number on page 59	Number of the `Column` object within the `Columns` collection.
RowCount on page 59	Number of rows in the `Column` object
ValueOrderType on page 60	Order in which values from text columns will be displayed in output.

Methods

Method	Description
Clear on page 60	Use to clear the data in the `Column` object without deleting the `Column` object from the `Columns` collection.
Delete on page 60	Use to delete a `Column` object and remove it from the `Columns` collection.
GetData on page 61	Use to get *`NumRows`* of data from a `Column` object, starting at *`StartRow`*.
SetData on page 62	Use to set *`NumRows`* of *`Data`* in the `Column` object, beginning at *`StartRow`*.
SetValueOrder on page 63	Use to set the order in which text values are displayed in output. Column must be of type `Text` or `DataUnassigned`.

Examples

Create a Minitab `Application` object and add a `Column` object to the `Columns` collection of the active worksheet. Define and populate the array "`arrSales`" with the column information, retrieve the `Column` object (`mtbColumn`), name it "Sales," and place the information in `arrSales` into the "Sales" column. Finally, set the `Comment` property of the new column.

```
Mtb.Application mtbApp;
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;
double[] arraySales = new double[] { 94, 99, 92, 106, 116, 113, 108 };

mtbApp = new Mtb.Application();
mtbColumns = mtbApp.ActiveProject.ActiveWorksheet.Columns;
mtbColumn = mtbColumns.Add(null, null, 1);

mtbColumn.Name = "Sales";
mtbColumn.SetData(arraySales);

mtbColumn.Comment = "Sales data for 1999";
```

Create a Minitab `Application` object and add two `Column` objects to the `Columns` collection of the active worksheet. Retrieve the second column, add the value "1993" to the third row, set the `Name` property to "Second Year," set the `ValueOrderType` property to 0, and set the `Comment` property (column description) to "New column for second year data." Finally, display message boxes with the values of the column's `Name`, `Number`, `RowCount`, `MissingCount`, `DataType`, `ValueOrderType`, and `Comment` properties.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbColumns = mtbApp.ActiveProject.ActiveWorksheet.Columns;
mtbColumns.Add(null, null, 2);
mtbColumn = mtbColumns.Item(2);
object newval = "1993";
mtbColumn.SetData(ref newval, 3, 1);

//Set property values
mtbColumn.Name = "Second Year";
mtbColumn.SetValueOrder(0);
mtbColumn.Comment = "New column for second year data.";

//Display messages with column property values
MessageBox.Show("The second column is " + mtbColumn.Name);
MessageBox.Show("This is column number: " + mtbColumn.Number.ToString());
MessageBox.Show("This column has this many rows: " + mtbColumn.RowCount.ToString());
MessageBox.Show("This column has this many missing rows: " +
mtbColumn.MissingCount.ToString());
MessageBox.Show("The data type of the column is " + mtbColumn.DataType.ToString());
MessageBox.Show("The ValueOrderType is " + mtbColumn.ValueOrderType.ToString());
MessageBox.Show("The column description is " + mtbColumn.Comment);
```

Column property - Comment

Description

Description of the Column object.

Type

String

Range

Valid string

Access
Read/Write

Column property - DataType

Description
Type of data in the `Column` object.

Type
MtbDataTypes on page 6

Range
Any `MtbDataTypes` constant

Access
Read-only

Column property - Formula

Description
Formula for the `Column` object.

Type
String

Range
Valid string

Access
Read-only

Example

Create 30 rows of random data in column C1, then create a formula that sets the value of C2 equal to the square of C1. Display a message box showing the value of the `Formula` and `FormulaStatus` properties for C2. Finally, change to manual formula calculation using the `CFMANUALLY` session command, change a value in C1, and display the same message. Notice that `FormulaStatus` changes from 1 to 2.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Worksheet mtbSheet;
Mtb.Column mtbCol1, mtbCol2;

mtbApp.UserInterface.Visible = true;
mtbApp.ActiveProject.ExecuteCommand("rand 30 c1");
mtbApp.ActiveProject.ExecuteCommand("formula c2=c1**2");
mtbSheet = mtbApp.ActiveProject.Worksheets.Item(1);

mtbCol1 = mtbSheet.Columns.Item(1);
mtbCol2 = mtbSheet.Columns.Item(2);

MessageBox.Show("Column 2 formula: " + mtbCol2.Formula + "\r\nColumn 2 formula status:
 " + mtbCol2.FormulaStatus.GetHashCode());

mtbApp.ActiveProject.ExecuteCommand("cfmanually");
object newval = 20;
```

```
mtbCol1.SetData(ref newval,3,1);

MessageBox.Show("Column 2 formula: " + mtbCol2.Formula + "\r\nColumn 2 formula status:
 " + mtbCol2.FormulaStatus.GetHashCode());
```

Column property - FormulaStatus

Description

Status of the `Formula` property for the `Column` object.

Type

MtbFormulaStatusTypes on page 6

Range

Any `MtbFormulaStatusTypes` constant

Access

Read-only

Example

Create 30 rows of random data in column C1, then create a formula that sets the value of C2 equal to the square of C1. Display a message box showing the value of the `Formula` and `FormulaStatus` properties for C2. Finally, change to manual formula calculation using the `CFMANUALLY` session command, change a value in C1, and display the same message. Notice that `FormulaStatus` changes from 1 to 2.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Worksheet mtbSheet;
Mtb.Column mtbCol1, mtbCol2;

mtbApp.UserInterface.Visible = true;
mtbApp.ActiveProject.ExecuteCommand("rand 30 c1");
mtbApp.ActiveProject.ExecuteCommand("formula c2=c1**2");
mtbSheet = mtbApp.ActiveProject.Worksheets.Item(1);

mtbCol1 = mtbSheet.Columns.Item(1);
mtbCol2 = mtbSheet.Columns.Item(2);

MessageBox.Show("Column 2 formula: " + mtbCol2.Formula + "\r\nColumn 2 formula status:
 " + mtbCol2.FormulaStatus.GetHashCode());

mtbApp.ActiveProject.ExecuteCommand("cfmanually");
object newval = 20;
mtbCol1.SetData(ref newval,3,1);

MessageBox.Show("Column 2 formula: " + mtbCol2.Formula + "\r\nColumn 2 formula status:
 " + mtbCol2.FormulaStatus.GetHashCode());
```

Column property - MissingCount

Description

Number of missing data rows in the `Column` object

Type

Long

Range
N/A

Access
Read-only

Column property - Name

Description
Name of the `Column` object.

Type
String

Range
Valid string

Access
Read/Write

Column property - Number

Description
Number of the `Column` object within the `Columns` collection.

Type
Long

Range
1 - number of `Column` objects within the `Columns` collection (current Minitab limit is 4000)

Access
Read-only

Column property - RowCount

Description
Number of rows in the `Column` object

Type
Long

Range
N/A

Access
Read-only

Column property - ValueOrderType

Description
Order in which values from text columns will be displayed in output.

Type
MtbValueOrderTypes on page 7

Range
Any `MtbValueOrderTypes` constant

Access
Read-only

Column method - Clear

Use to clear the data in the `Column` object without deleting the `Column` object from the `Columns` collection.

Syntax

```
Clear()
```

Returns

```
HRESULT
```

Examples

Create a Minitab `Application` object and add two columns to the active worksheet. Retrieve the second column in the `Columns` collection, name the column "Second Year," and add the value "1993" to the third row.

```
Mtb.Application mtbApp;
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbApp = new Mtb.Application();
mtbApp.UserInterface.Visible = true;
mtbApp.UserInterface.UserControl = true;
mtbColumns = mtbApp.ActiveProject.ActiveWorksheet.Columns;
mtbColumns.Add(null,null,2);

mtbColumn = mtbColumns.Item(2);
mtbColumn.Name = "Second Year";
object newval = "1993";
mtbColumn.SetData(ref newval,3,1);
```

Clear the data from the `Column` object without deleting the column itself.

```
mtbColumn.Clear();
```

Column method - Delete

Use to delete a `Column` object and remove it from the `Columns` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the `Remove` method of the `Columns` collection object. To delete all columns, use the `Delete` method of the `Columns` collection object.

For more information on the `Remove` method of the `Columns` collection object, go to Columns Collection method - Remove on page 54. For more information on the `Delete` method of the `Columns` collection object, go to Columns Collection method - Delete on page 53. For more information on the `Columns` collection object, go to Columns Collection object on page 50.

Example

Create a Minitab `Application` object and add two columns to the active worksheet. Retrieve the second column in the `Columns` collection, name the column "Second Year," and add the value "1993" to the third row. Finally, delete the `Column` object from the `Columns` collection.

```
Mtb.Application mtbApp;
Mtb.Columns mtbColumns;
Mtb.Column mtbColumn;

mtbApp = new Mtb.Application();
mtbApp.UserInterface.Visible = true;
mtbApp.UserInterface.UserControl = true;
mtbColumns = mtbApp.ActiveProject.ActiveWorksheet.Columns;
mtbColumns.Add(null,null,2);

mtbColumn = mtbColumns.Item(2);
mtbColumn.Name = "Second Year";
object newval = "1993";
mtbColumn.SetData(ref newval,3,1);

mtbColumn.Delete();
```

Column method - GetData

Use to get *`NumRows`* of data from a `Column` object, starting at *`StartRow`*.

Syntax

```
GetData(StartRow as Long, NumRows as Long)
```

Arguments

`StartRow`
Optional. First row to get. The default is 1.

`NumRows`
Optional. Number of rows to get. The default is 1.

Returns

`Variant`

Remarks

If neither *StartRow* nor *NumRows* is specified, then `GetData` gets all rows.

Examples

Use the `GetData` method to populate an array with all the values from the current column, then use a loop to print the values in message boxes.

```
double [] cvQ1sales;
cvQ1sales = mtbColumn.GetData();

for (int i = 0; i < (cvQ1sales.Length); i++)
{
    MessageBox.Show(cvQ1sales[i].ToString());
```

Get one value (the first value) from the column and print it in a message box.

```
MessageBox.Show("The value is " + mtbColumn.GetData(1, 1).ToString());
```

Get one value (the second value) from the column and print it in a message box.

```
MessageBox.Show("The value is " + mtbColumn.GetData(2, 1).ToString());
```

Column method - SetData

Use to set *NumRows* of *Data* in the `Column` object, beginning at *StartRow*.

Syntax

```
SetData(Data as Variant, StartRow as Long, NumRows as Long)
```

Arguments

Data
Data to write to the column. Can be numeric, text, or date/time.

StartRow
Optional. First row to set. The default is 1.

NumRows
Optional. Number of rows to set. The default is 1.

Returns

`HRESULT`

Remarks

If neither *StartRow* nor *NumRows* is specified, `SetData` sets the entire column and deletes all previous entries. Otherwise, entries outside the specified range of rows are not affected.

Examples

Retrieve the first column in the `Columns` collection, then populate that column with the contents of the array `arrIndex`.

```
mtbColumn = mtbColumns.Item(1);
mtbColumn.SetData(arrIndex);
```

Place the value 10 in row 20 of the current Minitab column, then print the value for row 20 in the Immediate window.

```
object newval = 10;
mtbColumn.SetData(ref newval, 20, 1);
MessageBox.Show(mtbColumn.GetData(20, 1).ToString());
```

Change the data type of the column from numeric to text, place "Green" in the first row of the column, and print it in a message box.

```
mtbProj.ExecuteCommand("text c1 c1");
object newval2 = "Green";
mtbColumn.SetData(ref newval2, 1, 1);
MessageBox.Show("The value is " + mtbColumn.GetData(1, 1).ToString());
```

Column method - SetValueOrder

Use to set the order in which text values are displayed in output. Column must be of type `Text` or `DataUnassigned`.

For more information on types of columns, go to MtbDataTypes on page 6.

Syntax

```
SetValueOrder(ValueOrderType as MtbValueOrderTypes, UserDefinedOrder as Variant)
```

Arguments

ValueOrderType

Required. Value order type for column. May be any MtbValueOrderTypes constant. For constants of MtbValueOrderTypes, go to MtbValueOrderTypes on page 7.

UserDefinedOrder

Optional. Variant array specifying user defined value order. Required for MtbValueOrderTypes = 2, ignored otherwise.

Returns

`HRESULT`

Example

Create a new Minitab `Application` object, create and add text data to column 1, then set a user-defined value order for the column.

```
Mtb.Application mtbApp = new Mtb.Application();

string[] arData = new string[6];
object[] arOrder = new object[3];

arData[0] = "a";
arData[1] = "a";
arData[2] = "b";
arData[3] = "b";
arData[4] = "c";
arData[5] = "c";
```

```
arOrder[0] = "c";
arOrder[1] = "a";
arOrder[2] = "b";

Mtb.Project mtbProj = mtbApp.ActiveProject;
mtbProj.ActiveWorksheet.Columns.Add(null, null, 3);
mtbProj.ActiveWorksheet.Columns.Item(1).SetData(arData);
mtbProj.ActiveWorksheet.Columns.Item(1).SetValueOrder(Mtb.MtbValueOrderTypes.UserDefined,
 arOrder);
```

Constants Collection object

The `Constants` collection is a set of all the `Constant` objects within a `Worksheet` object. It supports the standard collection properties and methods.

The `Constants` collection for a worksheet is empty by default.

Properties

Property	Description
Count on page 64	Number of `Constant` objects within the `Constants` collection.

Methods

Method	Description
Add on page 65	Use to add *`Count`* `Constant` objects to the `Constants` collection in the position before *`Before`* or after *`After`*.
Delete on page 66	Use to remove all `Constant` objects from the `Constants` collection.
Item on page 66	Use to return a `Constant` object within the `Constants` collection.
Remove on page 67	Use to delete a `Constant` object and remove it from the `Constants` collection.

Example

Retrieve the `Constants` collection and add a constant, then name it "SalesFactor."

```
Mtb.Constants mtbConstants;
mtbConstants = mtbSheet.Constants;
mtbConstants.Add().Name = "SalesFactor";
```

Constants Collection property - Count

Description

Number of `Constant` objects within the `Constants` collection.

Type

Long

Range

0 - number of `Constant` objects in the `Constants` collection

Access
Read-only

Example

Retrieve the `Constants` collection, add four `Constant` objects to it, then display the number of `Constant` objects in the `Constants` collection in a message box.

```
mtbConstants = mtbSheet.Constants;
mtbConstants.Add(null, null, 4);
MessageBox.Show("Number of constants in collection: " + mtbConstants.Count.ToString());
```

Constants Collection method - Add

Use to add *`Count`* `Constant` objects to the `Constants` collection in the position before *`Before`* or after *`After`*.

Syntax

```
Add(Before as Variant, After as Variant, Quantity as Long)
```

Arguments

`Before`
Optional. `Constant` object to add new constants before.

`After`
Optional. `Constant` object to add new constants after.

`Quantity`
Optional. Number of constants to add. The default is 1.

Returns

`Constant` on page 68

Remarks

You can specify either *`Before`* or *`After`*, but not both. Use an integer (`Long`) from 1 - the number of constants in the collection, or the name(`String`) of a constant. If neither *`Before`* nor *`After`* is specified, then the constants are added after the last constant in the collection. For more information on the `Name` property, go to Column property - Name on page 59.

The first constant added is returned.

Examples

Retrieve the `Constants` collection and add one constant to it after the last constant.

```
mtbConstants = mtbSheet.Constants;
mtbConstants.Add();
```

Add two constants to the `Constants` collection before the third constant, then name the first constant "Factor1."

```
mtbConstants.Add(3,null,2).Name = "Factor1";
```

Add two constants to the Constants collection after the third constant.

```
mtbConstants.Add(null,3,2);
```

Add four constants to the Constants collection before the "Factor1" constant, then name the first constant "NewFactor1."

```
mtbConstants.Add("Factor1", null, 4).Name = "NewFactor1";
```

Add two constants to the Constants collection after the "Factor1" constant.

```
mtbConstants.Add(null,"Factor1",2);
```

Constants Collection method - Delete

Use to remove all Constant objects from the Constants collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

To remove a single constant, use Remove or the Delete method of the Constant object.

For more information on the Remove method, go to Constants Collection method - Remove on page 67. For more information on the Delete method, go to Constant method - Delete on page 71. For more information on the Constant object, go to Constant object on page 68.

Example

Delete the Constants collection, including all its constants.

```
mtbConstants.Delete();
```

Constants Collection method - Item

Use to return a Constant object within the Constants collection.

Syntax

```
Item(Index as Variant)
```

Arguments

Index

Required. The index of the constant as an integer (Long) from 1 - the number of constants in the collection, or the name on page 71 (String) of the constant.

Returns

Constant on page 68

Examples

Retrieve the second constant in the Constants collection, name the constant "Conversion Factor", and print the name in a message box.

```
mtbConstant = mtbConstants.Item(2);
mtbConstant.Name = "Conversion Factor";
MessageBox.Show("The second constant is " + mtbConstant.Name);
```

Retrieve the constant called "Metric" and print the name in a message box.

```
mtbConstant = mtbConstants.Item("Metric");
MessageBox.Show("The current constant is " + mtbConstant.Name);
```

Constants Collection method - Remove

Use to delete a Constant object and remove it from the Constants collection.

Syntax

```
Remove(Index as Variant)
```

Arguments

Index

Required. The index of the constant as an integer (Long) from 1 - the number of constants in the collection, or the name(String) of the constant.

For more information on name, go to Constant property - Name on page 71.

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the Delete method of the Constant object. To remove all constants, use the Delete method of the Constants collection object.

For more information on the Delete method for the Constant object, go to page 71. For more information on the Constant object, go to page 68. For more information on the Delete Method of the Constants collection object, go to page 66. For more information on the Constants collection object, go to page 64.

Example

Remove the first constant and the constant named "Factor1" from the Constants collection.

```
mtbConstants.Remove(1);
mtbConstants.Remove("Factor1");
```

Constant object

The `Constant` object contains all the information related to an individual constant. The `Constant` object can contain numeric or text values.

Properties

Property	Description
Comment on page 68	Description of the `Constant` object.
DataType on page 69	Type of the data in the `Constant` object.
Formula on page 69	Formula for the `Constant` object.
FormulaStatus on page 70	Status of the `Formula` property for the `Constant` object.
Name on page 71	Name of the `Constant` object
Number on page 71	Number of the `Constant` object.

Methods

Method	Description
Delete on page 71	Use to delete a `Constant` object and remove it from the `Constants` collection.
GetData on page 72	Use to return the value stored in the constant.
SetData on page 72	Use to set the value of the `Constant` object using the value in *`Data`*.

Example

Define the `Constant` object (`mtbConstant`) and retrieve the first constant in the `Constants` collection, set the value of the constant to 22.2, then print the constant in a message box.

```
Mtb.Constant mtbConstant;
mtbConstant = mtbSheet.Constants.Item(1);
mtbConstant.SetData(22.2);
MessageBox.Show(mtbConstant.GetData().ToString());
```

Constant property - Comment

Description

Description of the `Constant` object.

Type

String

Range

Valid string

Access

Read/Write

Example

Add a comment to the constant and print the comment in a message box.

```
mtbConstant.Comment = "This constant converts English to metric.";
MessageBox.Show(mtbConstant.Comment);
```

Constant property - DataType

Description
Type of the data in the `Constant` object.

Type
MtbDataTypes on page 6

Range
Any `MtbDataTypes` constant except `DateTime`

Access
Read-only

Example

Display the data type of the constant in a message box.

```
MessageBox.Show("The data type of the constant is " + mtbConstant.DataType);
```

Constant property - Formula

Description
Formula for the `Constant` object.

Type
String

Range
Valid string

Access
Read-only

Example

Create two constants, K1 and K2. Set the value of K1 to 3 and create a formula that makes the value of K2 equal to K1 squared. Display a message box showing the values of both constants as well as the `Formula` and `FormulaStatus` properties of K2. Finally, change to manual formula calculation using the `CFMANUALLY` session command, change the value of K1, then display the same message. Notice that `FormulaStatus` changes from 1 to 2.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj = mtbApp.ActiveProject;
Mtb.Worksheet mtbSheet = mtbProj.ActiveWorksheet;

Mtb.Constants mtbConstants = mtbSheet.Constants;

Mtb.Constant mtbConst1, mtbConst2;
mtbConst1 = mtbConstants.Add();
```

```
mtbConst2 = mtbConstants.Add();

mtbConst1.SetData(3);

mtbProj.ExecuteCommand("FORMULA K2 = K1**2");

MessageBox.Show("K1 = " + mtbConst1.GetData() + "\r\n" +
    "K2 formula = " + mtbConst2.Formula + "\r\n" +
    "K2 = " + mtbConst2.GetData() + "\r\n" +
    "K2 formula status = " + mtbConst2.FormulaStatus.GetHashCode());

mtbProj.ExecuteCommand("CFMANUALLY");

mtbConst1.SetData(5);

MessageBox.Show("K1 = " + mtbConst1.GetData() + "\r\n" +
    "K2 formula = " + mtbConst2.Formula + "\r\n" +
    "K2 = " + mtbConst2.GetData() + "\r\n" +
    "K2 formula status = " + mtbConst2.FormulaStatus.GetHashCode());
```

Constant property - FormulaStatus

Description

Status of the `Formula` property for the `Constant` object.

Type

MtbFormulaStatusTypes on page 6

Range

Any `MtbFormulaStatusTypes` constant

Access

Read-only

Example

Create two constants, K1 and K2. Set the value of K1 to 3 and create a formula that makes the value of K2 equal to K1 squared. Display a message box showing the values of both constants as well as the `Formula` and `FormulaStatus` properties of K2. Finally, change to manual formula calculation using the `CFMANUALLY` session command, change the value of K1, then display the same message. Notice that `FormulaStatus` changes from 1 to 2.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj = mtbApp.ActiveProject;
Mtb.Worksheet mtbSheet = mtbProj.ActiveWorksheet;

Mtb.Constants mtbConstants = mtbSheet.Constants;

Mtb.Constant mtbConst1, mtbConst2;
mtbConst1 = mtbConstants.Add();
mtbConst2 = mtbConstants.Add();

mtbConst1.SetData(3);

mtbProj.ExecuteCommand("FORMULA K2 = K1**2");

MessageBox.Show("K1 = " + mtbConst1.GetData() + "\r\n" +
    "K2 formula = " + mtbConst2.Formula + "\r\n" +
    "K2 = " + mtbConst2.GetData() + "\r\n" +
    "K2 formula status = " + mtbConst2.FormulaStatus.GetHashCode());

mtbProj.ExecuteCommand("CFMANUALLY");
```

```
mtbConst1.SetData(5);

MessageBox.Show("K1 = " + mtbConst1.GetData() + "\r\n" +
    "K2 formula = " + mtbConst2.Formula + "\r\n" +
    "K2 = " + mtbConst2.GetData() + "\r\n" +
    "K2 formula status = " + mtbConst2.FormulaStatus.GetHashCode());
```

Constant property - Name

Description

Name of the `Constant` object

Type

String

Range

Valid string

Access

Read/Write

Example

Retrieve the second constant in the `Constants` collection, name the constant "Factor2," and print the name in a message box.

```
mtbConstant = mtbConstants.Item(2);
mtbConstant.Name = "Factor2";
MessageBox.Show("The second constant is " + mtbConstant.Name);
```

Constant property - Number

Description

Number of the `Constant` object.

Type

Long

Range

1 - number of `Constant` objects in the `Constants` collection (current Minitab limit is 1000)

Access

Read-only

Example

Display in a message box the number of the `Constant` object within the `Constants` collection.

```
MessageBox.Show(mtbConstant.Number.ToString());
```

Constant method - Delete

Use to delete a `Constant` object and remove it from the `Constants` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the `Remove` method of the `Constants` collection object. To delete all constants, use the `Delete` method of the `Constants` collection object.

For more information on the `Remove` method, go to page 64. For more information on the `Delete` method, go to page 66. For more information on the `Constants` collection object, go to page 64.

Example

Delete the `Constant` object from the `Constants` collection.

```
mtbConstant.Delete();
```

Constant method - GetData

Use to return the value stored in the constant.

Syntax

```
GetData()
```

Returns

```
Variant
```

Example

Print the value of the constant in a message box.

```
MessageBox.Show("The constant value is " + mtbConstant.GetData().ToString());
```

Constant method - SetData

Use to set the value of the `Constant` object using the value in *`Data`*.

Syntax

```
SetData(Data as Variant)
```

Arguments

`Data`

Required. Value to be stored in constant. Can be numeric or text.

Returns

HRESULT

Examples

Retrieve the first constant in the Constants collection, then set it equal to "Purple."

```
mtbConstant = mtbConstants.Item(1);
mtbConstant.SetData("Purple");
```

Set the value of the current constant to 4.275, then print the value in the Immediate window.

```
mtbConstant.SetData(4.275);
string writeValue = mtbConstant.GetData().ToString();
Console.WriteLine(writeValue);
```

Matrices Collection object

The Matrices collection is a set of all the Matrix objects within a Worksheet object. It supports the standard collection properties and methods.

The Matrices collection for a worksheet is empty by default.

Properties

Property	Description
Count on page 73	Number of Matrix objects within the Matrices collection.

Methods

Method	Description
Add on page 74	Use to add *Count* Matrix objects to the Matrices collection in the position before Before or after After.
Delete on page 75	Use to remove all Matrix objects from the Matrices collection.
Item on page 75	Use to return a Matrix object within the Matrices collection.
Remove on page 76	Use to delete a Matrix object and remove it from the Matrices collection.

Example

Retrieve the Matrices collection (mtbMatrices) and add a matrix, naming it "Weather Factors."

```
Mtb.Matrices mtbMatrices;
mtbMatrices = mtbSheet.Matrices;
mtbMatrices.Add().Name = "Weather Factors";
```

Matrices Collection property - Count

Description

Number of Matrix objects within the Matrices collection.

Type
Long

Range
0 - number of `Matrix` objects in the `Matrices` collection

Access
Read-only

Example

Retrieve the `Matrices` collection, add four `Matrix` objects to it, then display in a message box the number of `Matrix` objects in the `Matrices` collection.

```
mtbMatrices = mtbSheet.Matrices;
mtbMatrices.Add(null,null,4);
MessageBox.Show("Number of matrices in collection: " + mtbMatrices.Count.ToString());
```

Matrices Collection method - Add

Use to add *`Count`* `Matrix` objects to the `Matrices` collection in the position before `Before` or after `After`.

Syntax

```
Add(Before as Variant, After as Variant, Quantity as Long)
```

Arguments

`Before`
Optional. `Matrix` object to add new matrices before.

`After`
Optional. `Matrix` object to add new matrices after.

`Quantity`
Optional. Number of matrices to add. The default is 1.

Returns

`Matrix` on page 77

Remarks

You can specify either `Before` or `After`, but not both. Use an integer (`Long`) from 1 - the number of matrices in the collection, or the name on page 79 (`String`) of a matrix. If neither `Before` nor `After` is specified, then the matrices are added after the last matrix in the collection.

The first matrix added is returned.

For more information on name, go to Matrix property - Name on page 79.

Examples

Retrieve the Matrices collection and add one matrix to it after the last matrix.

```
mtbMatrices = mtbSheet.Matrices;
mtbMatrices.Add();
```

Add two matrices to the Matrices collection before the third matrix, and name the first added matrix "Gradient1."

```
mtbMatrices.Add(3,null,2).Name = "Gradient1";
```

Add two matrices to the Matrices collection after the third matrix.

```
mtbMatrices.Add(null,3,2);
```

Add four matrices to the Matrices collection before the "Gradient1" matrix, and name the first added matrix "NewGradient1."

```
mtbMatrices.Add("Gradient1", null, 4).Name = "NewGradient1";
```

Add two matrices to the Matrices collection after the "Gradient1" matrix.

```
mtbMatrices.Add(null,"Gradient1",2);
```

Matrices Collection method - Delete

Use to remove all Matrix objects from the Matrices collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

To remove a single matrix, use Remove or the Delete method of the Matrix object.

For more information on the Remove method, go to Matrices Collection method - Remove on page 76. For more information on the Delete method, go to Matrix method - Delete on page 80. For more information on the Matrix object, go to Matrix object on page 77.

Example

Delete the Matrices collection, including all its Matrix objects.

```
mtbMatrices.Delete();
```

Matrices Collection method - Item

Use to return a Matrix object within the Matrices collection.

Syntax

```
Item(Index as Variant)
```

Arguments

Index

Required. The index of the matrix as an integer (`Long`) from 1 - the number of matrices in the collection, or the name(`String`) of the matrix.

For more information on name, go to Matrix property - Name on page 79.

Returns

`Matrix` on page 77

Examples

Retrieve the second matrix in the `Matrices` collection, name the matrix "gradient," then print the name in a message box.

```
mtbMatrix = mtbMatrices.Item(2);
mtbMatrix.Name = "gradient";
MessageBox.Show("The second matrix is " + mtbMatrix.Name);
```

Retrieve the matrix called "Gradient" and print the name in a message box.

```
mtbMatrix = mtbMatrices.Item("Gradient");
MessageBox.Show("The current matrix is " + mtbMatrix.Name);
```

Matrices Collection method - Remove

Use to delete a `Matrix` object and remove it from the `Matrices` collection.

Syntax

`Remove(`*`Index`* `as Variant)`

Arguments

Index

Required. The index of the matrix as an integer (`Long`) from 1 - the number of matrices in the collection, or the name (`String`) of the matrix.

For more information on name, go to Matrix property - Name on page 79.

Returns

`HRESULT`

Remarks

The same results can be achieved using the `Delete` method of the `Matrix` object. To remove all matrices, use the `Delete` method of the `Matrices` collection object.

For more information on the `Delete` method of the `Matrix` object, go to Matrix method - Delete on page 80. For more information on the `Matrix` object, go to Matrix object on page 77. For more information on the `Delete` method of the `Matrices` collection object, go to Matrices Collection method - Delete on page 75. For more information on the `Matrices` collection object, go to Matrices Collection object on page 73.

Example

Remove the first matrix and the matrix named "Gradient1" from the `Matrices` collection.

```
mtbMatrices.Remove(1);
mtbMatrices.Remove("Gradient1");
```

Matrix object

The `Matrix` object contains all the information related to an individual matrix. The `Matrix` object can contain *only* numeric data values.

Properties

Property	Description
ColumnCount on page 78	Number of columns in the `Matrix` object
Comment on page 78	Description of the `Matrix` object
MissingCount on page 78	Number of missing values in the `Matrix` object
Name on page 79	Name of the `Matrix` object
Number on page 79	Number of the `Matrix` object in the `Matrices` collection.
RowCount on page 80	Number of rows in the `Matrix` object

Methods

Method	Description
Delete on page 80	Use to delete a `Matrix` object and remove it from the `Matrices` collection.
GetData on page 81	Use to return the matrix value or values in the specified row and column.
SetData on page 81	Use to set values for a `Matrix` object using the elements specified in *`Data`*.

Example

Define and populate the array "`arrTemps`" with data values , retrieve the first matrix, name the matrix "Temperatures" and place the information in `arrTemps` into the "Temperatures" matrix with 4 rows and 3 columns, then add a comment:

```
object [] arrTemps = new object [12];

arrTemps[0] = 72;
arrTemps[1] = 95;
arrTemps[2] = 69;
arrTemps[3] = 87;
arrTemps[4] = 86;
arrTemps[5] = 75;
arrTemps[6] = 58;
arrTemps[7] = 92;
arrTemps[8] = 89;
arrTemps[9] = 66;
arrTemps[10] = 70;
arrTemps[11] = 91;

Mtb.Matrix mtbMatrix;
mtbMatrix = mtbMatrices.Item(1);
mtbMatrix.Name = "Temperatures";
```

```
mtbMatrix.SetData(ref arrTemps, 4, 3);
mtbMatrix.Comment = "Temperatures for experiment 1";
```

Matrix property - ColumnCount

Description
Number of columns in the `Matrix` object

Type
Long

Range
1 - N

Access
Read-only

Example

Display in a message box the number of columns in the `Matrix` object.

```
MessageBox.Show("This matrix has this many columns: " +
mtbMatrix.ColumnCount.ToString());
```

Matrix property - Comment

Description
Description of the `Matrix` object

Type
String

Range
Valid string

Access
Read/Write

Example

Add a comment to the matrix.

```
mtbMatrix.Comment = "Temperature gradient values.";
```

Matrix property - MissingCount

Description
Number of missing values in the `Matrix` object

Type
Long

Range
N/A

Access
Read-only

Example

Display in a message box the number of missing values in the `Matrix` object.

```
MessageBox.Show("This matrix has this many missing values: " +
mtbMatrix.MissingCount.ToString());
```

Matrix property - Name

Description
Name of the `Matrix` object

Type
String

Range
Valid string

Access
Read/Write

Example

Retrieve the second matrix in the `Matrices` collection, name the matrix "Gradient 2," then print the name in a message box:

```
mtbMatrix = mtbMatrices.Item(2);
mtbMatrix.Name = "Gradient 2";
MessageBox.Show("The second matrix is " + mtbMatrix.Name);
```

Matrix property - Number

Description
Number of the `Matrix` object in the `Matrices` collection.

Type
Long

Range
1 - number of the Matrix objects in the Matrices collection (current Minitab limit is 1000)

Access
Read-only

Example

Display in a message box the number of the `Matrix` object within the `Matrices` collection.

```
MessageBox.Show("This is matrix number: " + mtbMatrix.Number.ToString());
```

Matrix property - RowCount

Description
Number of rows in the `Matrix` object

Type
Long

Range
1 - N

Access
Read-only

Example

Display in a message box the number of rows in the `Matrix` object.

```
MessageBox.Show("This matrix has this many rows: " + mtbMatrix.RowCount.ToString());
```

Matrix method - Delete

Use to delete a `Matrix` object and remove it from the `Matrices` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the `Remove` method of the `Matrices` collection object. To delete all matrices, use the `Delete` method of the `Matrices` Collection object.

For more information on the `Remove` method on the `Matrices` collection object, go to Matrices Collection method - Remove on page 76. For more information on the `Delete` method, go to Matrices Collection method - Delete on page 75. For more information on the `Matrices` collection object, go to Matrices Collection object on page 73.

Example

Delete the `Matrix` object from the `Matrix` collection.

```
mtbMatrix.Delete();
```

Matrix method - GetData

Use to return the matrix value or values in the specified row and column.

Syntax

```
GetData(Row as Long, Col as Long)
```

Arguments

Row
Optional. Row of the value to get.

Col
Optional. Column of the value to get.

Returns

```
Variant
```

Remarks

If you specify *Row* you must specify *Col*, and vice versa. If neither *Row* nor *Col* is specified, then `GetData` gets the entire matrix.

Multiple data values are returned in a vector in column major order, that is, all rows of column 1 are placed in the vector first, followed by column 2 rows, column 3 rows, etc.

Example

Get the value in the second row, second column of the matrix and print it in a message box.

```
MessageBox.Show("The value is " + mtbMatrix.GetData(2, 2));
```

Matrix method - SetData

Use to set values for a `Matrix` object using the elements specified in *Data*.

Syntax

```
SetData(Data as Variant, Rows as Long, Cols as Long)
```

Arguments

Data
Required. Numeric value or values to set in the matrix.

Rows
Required. Either the row of the matrix where a single value is to be set, or the number of rows to be set, starting at row 1.

Cols

Required. Either the column of the matrix where a single value is to be set, or the number of columns to be set, starting at column 1.

Returns

HRESULT

Remarks

If *Data* holds an individual numeric value, then *Rows* and *Cols* refer to an individual cell in the matrix that will be set. If *Data* holds multiple numeric values, then all previous data in the matrix is deleted and the matrix is set starting at position 1,1.

Data is read into the Matrix object column by column. Therefore, to set multiple data values in the matrix, *Data* must be a vector in column major order; that is, place all rows of column 1 in the vector first, followed by column 2 rows, column 3 rows, etc.

Examples

Retrieve the first matrix in the Matrices collection and populate four rows and three columns in the matrix with the array "arrIndex."

```
Mtb.Matrix mtbMatrix = mtbMatrices.Item(1);

int [] arrIndex1 = new int [12];

arrIndex1[0] = 72;
arrIndex1[1] = 95;
arrIndex1[2] = 69;
arrIndex1[3] = 87;
arrIndex1[4] = 86;
arrIndex1[5] = 75;
arrIndex1[6] = 58;
arrIndex1[7] = 92;
arrIndex1[8] = 89;
arrIndex1[9] = 66;
arrIndex1[10] = 70;
arrIndex1[11] = 91;

object arrIndex = arrIndex1;

int rows = 4;
int cols = 3;

mtbMatrix.SetData(ref arrIndex, rows, cols);
```

Place the value 10 in row 2, column 2 of the current matrix.

```
object newval = 10;
mtbMatrix.SetData(ref newval, 2, 2);
```

C Command Object Reference

Commands Collection object

The `Commands` collection contains the commands that have been issued to Minitab during the session.

Properties

Property	Description
Count on page 84	Number of `Command` objects.
OutputDocument on page 84	Returns an `OutputDocument` object containing all output generated from all commands in the `Commands` collection.

Methods

Method	Description
Delete on page 84	Use to remove all `Command` objects from the `Commands` collection.
Item on page 85	Use to return a `Command` object within the `Commands` collection.
Remove on page 85	Use to delete a `Command` object and remove it from the `Commands` collection.

Example

Create a Minitab `Application` object and execute three Minitab commands. Then delete the first command, and loop through the remaining two, displaying a message box with the values of the following properties for each, as well as the name of the worksheet:

- `CommandLanguage`
- `Name`
- `Tag`
- `CreatedBy`
- `CreateDate`

Save the output document for each command and delete all commands at the end.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
Mtb.Command mtbCom;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1-C2");
mtbProj.ExecuteCommand("REGRESS C1 1 C2");


//For the next command, use the ZTAG subcommand to set the Tag property.
mtbProj.ExecuteCommand("CORR C1 C2; ZTAG \"My Correlation\".");

mtbProj.Commands.Item(1).Delete();
```

```
for (int i = 1; i <= mtbProj.Commands.Count; i++)
{
    mtbCom = mtbProj.Commands.Item(i);

    MessageBox.Show("CommandLanguage = " + mtbCom.CommandLanguage + "\r\nCommand Name
 = " +
        mtbCom.Name + "\r\nTag = " + mtbCom.Tag + "\r\nCreated by " + mtbCom.CreatedBy
 +
        "\r\nCreated on " + mtbCom.CreateDate + "\r\nWorksheet = " +
mtbCom.Worksheet.Name);

    mtbCom.OutputDocument.SaveAs("C:\\Output for Command " + i, true,
Mtb.MtbOutputFileTypes.OFRTF);

}

mtbProj.Commands.Delete();
```

Commands Collection property - Count

Description

Number of `Command` objects.

Type

Long

Range

Any valid long integer

Access

Read-only

Commands Collection property - OutputDocument

Description

Returns an `OutputDocument` object containing all output generated from all commands in the `Commands` collection.

Type

OutputDocument on page 97

Range

N/A

Access

Read-only

Commands Collection method - Delete

Use to remove all `Command` objects from the `Commands` collection.

Syntax

```
Delete()
```

Returns

HRESULT

Remarks

To remove a single command, use Remove or the Delete method of the Command object.

For more information on the Remove method, go to Commands Collection method - Remove on page 85. For more information on the Delete method, go to Command method - Delete on page 89. For more information on the Command object, go to Command object on page 86.

Commands Collection method - Item

Use to return a Command object within the Commands collection.

Syntax

Item(*Index* as Variant)

Arguments

Index
Required. The index of the command as an integer (Long) from 1 - the number of commands in the collection.

Returns

Command on page 86

Commands Collection method - Remove

Use to delete a Command object and remove it from the Commands collection.

Syntax

Remove(*Index* as Variant)

Arguments

Index
Required. The index of the command as an integer (Long) from 1 - the number of commands in the collection.

Returns

HRESULT

Remarks

The same results can be achieved using the Delete method of the Command object. To remove all commands, use the Delete method of the Commands collection object.

For more information on the `Delete` method of the Command object, go to Command method - Delete on page 89. For more information on the `Command` object, go to Command object on page 86. For more information on the `Delete` method of the commands collection object, go to Commands Collection method - Delete on page 84. For mor information on the `Commands` collection object, go to Commands Collection object on page 83.

Example

Delete the first command from the `Commands` collection for a Minitab application set as `mtbApp`.

```
mtbApp.ActiveProject.Commands.Remove(1);
```

Command object

`Command` objects are created when you execute a Minitab command either programmatically or directly in Minitab.

Properties

Property	Description
CommandLanguage on page 87	Command language utilized to create the command object.
CreateDate on page 87	The date and time the command was generated.
Name on page 88	The name of the Minitab command that generated the output.
OutputDocument on page 88	Returns an `OutputDocument` object containing all output generated by the command.
Outputs on page 88	Returns the `Outputs` collection generated by the command.
Tag on page 89	A string used to identify or describe the `Command` object.
Worksheet on page 89	The worksheet that was utilized as the input for the command.

Methods

Method	Description
Delete on page 89	Use to delete a `Command` object and remove it from the `Commands` collection.

Example

Create a Minitab `Application` object and execute three Minitab commands. Then delete the first command, and loop through the remaining two, displaying a message box with the values of the following properties for each, as well as the name of the worksheet:

- `CommandLanguage`
- `Name`
- `Tag`
- `CreatedBy`
- `CreateDate`

Save the output document for each command and delete all commands at the end.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
```

```
Mtb.Command mtbCom;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1-C2");
mtbProj.ExecuteCommand("REGRESS C1 1 C2");


//For the next command, use the ZTAG subcommand to set the Tag property.
mtbProj.ExecuteCommand("CORR C1 C2; ZTAG \"My Correlation\".");

mtbProj.Commands.Item(1).Delete();

for (int i = 1; i <= mtbProj.Commands.Count; i++)
{
    mtbCom = mtbProj.Commands.Item(i);

    MessageBox.Show("CommandLanguage = " + mtbCom.CommandLanguage + "\r\nCommand Name
 = " +
        mtbCom.Name + "\r\nTag = " + mtbCom.Tag + "\r\nCreated by " + mtbCom.CreatedBy
 +
        "\r\nCreated on " + mtbCom.CreateDate + "\r\nWorksheet = " +
mtbCom.Worksheet.Name);

    mtbCom.OutputDocument.SaveAs("C:\\Output for Command " + i, true,
Mtb.MtbOutputFileTypes.OFRTF);

}

mtbProj.Commands.Delete();
```

Command property - CommandLanguage

Description
Command language utilized to create the command object.

Type
String

Range
Valid string

Access
Read-only

If the command is a custom command, the value of the `CommandLanguage` property is "COMCUSTOM."

Command property - CreateDate

Description
The date and time the command was generated.

Type
String

Range
Valid string

Access
Read-only

Command property - Name

Description
The name of the Minitab command that generated the output.

Type
String

Range
Valid string

Access
Read-only

Command property - OutputDocument

Description
Returns an `OutputDocument` object containing all output generated by the command.

Type
OutputDocument on page 97

Range
N/A

Access
Read-only

Command property - Outputs

Description
Returns the `Outputs` collection generated by the command.

Type
Outputs on page 90 collection

Range
N/A

Access
Read-only

Command property - Tag

Description
A string used to identify or describe the `Command` object. Null by default.

Type
String

Range
Valid string

Access
Read/Write

The `Tag` property for most commands can also be set from the Minitab itself using the `ZTAG` subcommand. For example, entering the following in the Command Line pane creates a `Command` object with the tag "My Z-Test." The argument for `ZTAG` may be a string or text constant.

```
OneZ 20 3;
Sigma 1;
Test 2;
ZTAG "My Z-Test".
```

Command property - Worksheet

Description
The worksheet that was utilized as the input for the command.

Type
Worksheet on page 44

Range
Any worksheet in the `Worksheets` collection

Access
Read-only for Minitab commands; Read/Write for custom commands

Command method - Delete

Use to delete a `Command` object and remove it from the `Commands` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

The same results can be achieved using the `Remove` method of the `Commands` collection.

For more information on the `Remove` method, go to Commands Collection method - Remove on page 85. For more information on the `Commands` collection, go to Commands Collection object on page 83.

Outputs Collection object

The `Outputs` collection for each `Command` object contains all the output generated by that command.

For more information on command objects, go to Command object on page 86.

Properties

Property	Description
Count on page 91	The number of `Output` objects within the `Outputs` collection. For more information, go to Output object on page 92.

Methods

Method	Description
Delete on page 91	Use to remove all `Output` objects from the `Outputs` collection.
Item on page 91	Use to return an `Output` object within the `Outputs` collection.
Remove on page 92	Use to delete an `Output` object and remove it from the `Outputs` collection.

Example

Generate random data, then create a scatterplot and a regression analysis. Save the scatterplot to a file. Delete `Output` objects using the `Remove` method of the `Outputs` collection and the `Delete` method of an `Output` object. Finally, delete all outputs for a command at once using the `Delete` method of the `Outputs` collection.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1-C2");
mtbProj.ExecuteCommand("PLOT C1*C2");
mtbProj.ExecuteCommand("REGRESS C1 1 C2");

//Save the plot to a file
mtbProj.Commands.Item(2).Outputs.Item(1).Graph.SaveAs("C:\\MyGraph",true,
Mtb.MtbGraphFileTypes.GFPNGColor);

Mtb.Command mtbCom = mtbProj.Commands.Item(3);

//Save the output document as an HTML file
mtbCom.OutputDocument.SaveAs("C:\\MyOutput", true, Mtb.MtbOutputFileTypes.OFHTML);

//Delete the first 2 Output objects and save the output document again
mtbCom.Outputs.Remove(1);
mtbCom.Outputs.Item(1).Delete();
mtbCom.OutputDocument.SaveAs("C:\\MyOutput2", true,
Mtb.MtbOutputFileTypes.OFHTML);

//Delete all remaining Outputs
mtbCom.Outputs.Delete();
```

Outputs Collection property - Count

Description

The number of `Output` objects within the `Outputs` collection. For more information, go to Output object on page 92.

Type

Long

Range

0 to the number of `Output` objects within the `Outputs` collection

Access

Read-only

Outputs Collection method - Delete

Use to remove all `Output` objects from the `Outputs` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Remarks

To remove a single Output object, use `Remove` or the `Delete` method of the `Output` object.

For more information on the `Remove` method, go to Outputs Collection method - Remove on page 92. For more informtion on the `Delete` method, go to Output method - Delete on page 96. For more information on the `Output` object, go to Output object on page 92.

Outputs Collection method - Item

Use to return an `Output` object within the `Outputs` collection.

Syntax

```
Item(Index as Variant)
```

Arguments

Index

Required. The index of the Output object as an integer (`Long`) from 1 - the number of `Output` objects in the collection.

Returns

Output on page 92

Outputs Collection method - Remove

Use to delete an Output object and remove it from the Outputs collection.

Syntax

```
Remove(Index as Variant)
```

Arguments

Index
Required. The index of the output as an integer (Long) from 1 - the number of outputs in the collection.

Returns

HRESULT

Remarks

The same results can be achieved using the Delete method of the Output object. To remove all Output objects, use the Delete method of the Outputs collection.

For more information on the Delete method of the Output object, go to Output method - Delete on page 96. For more information on the Output object, go to Output object on page 92. For more information on the Delete method of the Outputs collection, go to Constants Collection method - Delete on page 66. For more information on the Outputs collection, go to Outputs Collection object on page 90.

Output object

Each Output object contains one component of the output from a Minitab Command object.

The OutputType and Tag properties are universal and apply to all Output objects. Each of the remaining properties are valid only for one specific output type. For example, using the Formula property on an Output object of type OTFormula, returns a Formula object. Using the Formula property on any other MtbOutputTypes returns an error.

For more information on a Minitab command object, go to Command object on page 86. For more information on OTFormula, go to MtbOutputTypes on page 7. For more information on MtbOutputTypes, go to MtbOutputTypes on page 7.

Properties

Property	Description
Graph on page 94	If the Output object is a graph, this property returns the corresponding Graph object.
HTMLText on page 95	The contents of the Output object as HTML-formatted text.

Property	Description
OutputType on page 95	The `Output` object type.
RTFText on page 95	The contents of the `Output` object as RTF-formatted text.
Tag on page 95	A string used to identify or describe the `Output` object.
Text on page 96	The contents of the `Output` object as un-formatted text.

Methods

Method	Description
Delete on page 96	Use to delete an `Output` object and remove it from the `Outputs` collection.

Examples

Create a Minitab `Application` object and execute several Minitab commands. Then loop through all `Output` objects in the `Outputs` collection for each `Command`, using the `OutputType` property to identify each output type. Display a message for each `Output` object stating the `Index` number of the `Command`, as well as the `Index` number, `OutputType`, and the `Text` of the `Output` object. Finally, save all output for all commands as an HTM file, using the `OutputDocument` object of the `Commands` collection.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
Mtb.Command mtbCmnd;
Mtb.Output mtbOutObj;
string msgStr;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

//Execute some Minitab commands
mtbProj.ExecuteCommand("RAND 30 C1-C3");
mtbProj.ExecuteCommand("PLOT C1*C2");
mtbProj.ExecuteCommand("REGRESS C1 1 C2");
mtbProj.ExecuteCommand("CORR C1 C2 C3 C4");
/*This CORR command will generate a correlation analysis and also an error
message because there is no data in C4.*/

//Add a worksheet and create a DOE design

mtbProj.Worksheets.Add();
mtbProj.ExecuteCommand("FFDESIGN 4 8; CTPT c3; RANDOMIZE; SORDER C1 C2; BRIEF 4;" +
    "ALIAS 4; XMATRIX C5 C6 C7 C8.");

//Loop through outputs from commands, identify type of each, and display message
for (int i = 1; i <= mtbProj.Commands.Count; i++)
{
    mtbCmnd = mtbProj.Commands.Item(i);

    for (int j = 1; j <= mtbCmnd.Outputs.Count; j++)
    {

        mtbOutObj = mtbCmnd.Outputs.Item(j);

        msgStr = "Command #" + i + ", " + "Output #" + j + " is OutputType ";

        int caseSwitch = mtbOutObj.OutputType.GetHashCode();
        switch (caseSwitch)
        {
            case 0:  //Graph
                MessageBox.Show(msgStr + "Graph.");
                break;
```

```
            case 1:  //Table
                MessageBox.Show(msgStr + "Table with the following text:\r\n" +
mtbOutObj.Table.Text);
                break;
            case 3:  //Title
                MessageBox.Show(msgStr + "Title with the following text:\r\n" +
mtbOutObj.Title.Text);
                break;
            case 4:  //Message
                MessageBox.Show(msgStr + "Message with the following text:\r\n" +
mtbOutObj.Message.Text);
                break;
            case 6:  //Formula
                MessageBox.Show(msgStr + "Formula with the following text:\r\n" +
mtbOutObj.Formula.Text);
                break;
                    }
                }


            }

//Save OutputDocument as an HTM file named mtb_out.htm
mtbProj.Commands.OutputDocument.SaveAs("C:\\mtb_out", true);
```

Create a new instance of Minitab, generate two columns of random data, and run a correlation analysis. Display the `Text`, `RTFText`, and `HTMLText` for each output of the analysis in a message box.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
Mtb.Outputs mtbOuts;
Mtb.Output mtbOut;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1-C2");
mtbProj.ExecuteCommand("CORRELATION C1 C2");
mtbOuts = mtbProj.Commands.Item(2).Outputs;

for (int i = 1; i <= mtbOuts.Count; i++)
{
    mtbOut = mtbOuts.Item(i);
    MessageBox.Show("Text for Output " + i + ":\r\n\r\n" + mtbOut.Text);
    MessageBox.Show("RTFText for Output " + i + ":\r\n\r\n" + mtbOut.RTFText);
    MessageBox.Show("HTMLText for Output " + i + ":\r\n\r\n" + mtbOut.HTMLText);
}
```

Output property - Graph

Description

If the `Output` object is a graph, this property returns the corresponding `Graph` object. Otherwise, an error is generated.

Type

Graph on page 99

Range

N/A

Access

Read-only

Output property - HTMLText

Description
The contents of the `Output` object as HTML-formatted text.

Type
String

Range
Valid string

Access
Read-only

Output property - OutputType

Description
The `Output` object type.

Type
MtbOutputTypes on page 7

Range
Any `MtbOutputTypes` constant

Access
Read-only

Output property - RTFText

Description
The contents of the `Output` object as RTF-formatted text.

Type
String

Range
Valid string

Access
Read-only

Output property - Tag

Description
A string used to identify or describe the `Output` object. Null by default.

Type
String

Range
Valid string

Access
Read/Write

Example

Set the `Tag` text for the first `Output` object in `mtbCommand` to "This is Output number 1," then display the tag in a message box.

```
mtbCommand.Outputs.Item(1).Tag = "This is Output number 1";
MessageBox.Show(mtbCommand.Outputs.Item(1).Tag);
```

Output property - Text

Description
The contents of the `Output` object as un-formatted text.

Type
String

Range
Valid string

Access
Read-only

Output method - Delete

Use to delete an `Output` object and remove it from the `Outputs` collection.

Syntax

```
Delete()
```

Returns

```
HRESULT
```

Example

Delete the first `Output` object from the command set as `mtbCommand`.

```
mtbCommand.Outputs(1).Delete
```

Remarks

The same results can be achieved using the `Remove` method of the `Outputs` collection.

For more information on the `Remove` method, go to Outputs Collection method - Remove on page 92. For more information on the `Outputs` collection, go to Outputs Collection object on page 90.

OutputDocument object

An `OutputDocument` object contains all output generated by a single `Command` object or by all commands in the `Commands` collection.

For more information on the command object, go to Command object on page 86. For more information on the commands collection, go to Commands Collection object on page 83.

Properties

Property	Description
HTMLText on page 97	Content of `OutputDocument` in HTML format.
RTFText on page 98	Content of `OutputDocument` in RTF format.
Text on page 98	Content of `OutputDocument` as plain text.

Methods

Method	Description
CopyToClipboard on page 98	Use to copy the `OutputDocument` object to the Windows clipboard.
SaveAs on page 99	Use to save a copy of the `OutputDocument` object.

Example

Create a Minitab `Application` object and execute some Minitab commands. Save the `OutputDocument` for the `Commands` collection and copy it to the Windows clipboard. Save the content of the `OutputDocument` in string variables as text, HTML formatted text, and RTF formatted text.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
Mtb.OutputDocument mtbOutDoc;
string sText, sHTML, sRTF;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1");
mtbProj.ExecuteCommand("DESCRIBE C1");

mtbOutDoc = mtbProj.Commands.OutputDocument;

mtbOutDoc.SaveAs("C:\\MyOutputDocument", true,
Mtb.MtbOutputFileTypes.OFRTF);
mtbOutDoc.CopyToClipboard();
sText = mtbOutDoc.Text;
sHTML = mtbOutDoc.HTMLText;
sRTF = mtbOutDoc.RTFText;
```

OutputDocument property - HTMLText

Description

Content of `OutputDocument` in HTML format.

Type
String

Range
Valid string

Access
Read-only

OutputDocument property - RTFText

Description
Content of `OutputDocument` in RTF format.

Type
String

Range
Valid string

Access
Read-only

OutputDocument property - Text

Description
Content of `OutputDocument` as plain text.

Type
String

Range
Valid string

Access
Read-only

OutputDocument method - CopyToClipboard

Use to copy the `OutputDocument` object to the Windows clipboard.

Syntax

```
CopyToClipboard()
```

Returns

```
HRESULT
```

OutputDocument method - SaveAs

Use to save a copy of the `OutputDocument` object.

Syntax

```
SaveAs(Filename as String, Replace as Boolean, OutputFileType as MtbOutputFileTypes)
```

Arguments

Filename

Required. Path and file name to use when saving the file. If a path is not specified, then the `DefaultFilePath` is used. For more information on the `DefaultFilePath`, go to ApplicationOptions property - DefaultFilePath on page 28.

Replace

Optional. If `True`, an existing file with the same name will be overwritten. The default is `False`.

OutputFileType

Optional. The format to use when saving the file. May be any `MtbOutputFileTypes` constant. For more information on `MtbOutputFileTypes`, go to MtbOutputFileTypes on page 7

Returns

`HRESULT`

Remarks

If you don't specify an extension matching the file type, the appropriate one (.HTM or .RTF) is automatically added to the file name.

Graph object

Each `Graph` object contains a single graph generated by a Minitab `Command` object.

For more information on the Minitab command object, go to Command object on page 86.

Methods

Method	Description
CopyToClipboard on page 100	Use to copy the `Graph` object to the Windows clipboard.
SaveAs on page 100	Use to save a copy of the `Graph` object.

Example

Create a new Minitab `Application` object, execute a command that generates a `Graph` object as `Output` object number 1, retrieve the graph, and then save it as a color PNG image file. Finally, copy the graph to the system clipboard.

```
Mtb.Application mtbApp = new Mtb.Application();
Mtb.Project mtbProj;
```

```
Mtb.Graph mtbGraph;

mtbApp.UserInterface.Visible = true;
mtbProj = mtbApp.ActiveProject;

mtbProj.ExecuteCommand("RAND 30 C1");
mtbProj.ExecuteCommand("HISTOGRAM C1");

mtbGraph = mtbProj.Commands.Item(2).Outputs.Item(1).Graph;

mtbGraph.SaveAs("C:\\MyGraph", true, Mtb.MtbGraphFileTypes.GFPNGColor);
mtbGraph.CopyToClipboard();
```

Graph method - CopyToClipboard

Use to copy the `Graph` object to the Windows clipboard.

Syntax

```
CopyToClipboard()
```

Returns

```
HRESULT
```

Remarks

You can copy a Minitab `Graph` object, Bitmap, MetaFile, or Enhanced metafile. For Minitab `Graph` objects, either a paste or a paste link operation is allowed with the copied object. For all other file formats, only paste is allowed.

Graph method - SaveAs

Use to save a copy of the `Graph` object.

Syntax

```
SaveAs(Filename as String, Replace as Boolean, GraphFileType as MtbGraphFileTypes,
Width as Long, Height as Long)
```

Arguments

Filename

Optional. Path and file name to use when saving the graph. If a path is not specified, then the `DefaultFilePath` is used. The default file name is Minitab. For more information on the `DefaultFilePath`, go to ApplicationOptions property - DefaultFilePath on page 28.

Replace

Optional. If `True`, an existing file with the same name will be overwritten. The default is `True`.

GraphFileType

Optional. The format to use when saving the file. May be any `MtbGraphFileTypes` constant. The default is .PNG. For more information on the `MtbGraphFileTypes`, go to MtbGraphFileTypes on page 6.

Width

Optional. Use to set the width of the graph in pixels.

Height

Optional. Use to set the height of the graph in pixels.

Returns

HRESULT

Remarks

If you don't specify an extension matching the file type, the appropriate one (.JPG, .PNG, .TIF, .BMP, .GIF, or .EMF) is automatically added to the file name.