

Commonly Required Data Analysis Procedures using XL Audit Commander

XL Audit Commander

data analysis made easier ...

XL Audit Commander

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Overview

The purpose of this article is to describe an approach to streamline and improve the audit process regarding data analysis and data mining, especially where the volume of data is significant. The process described involves combining a series of small “building block” scripts in order to perform complex data analysis procedures. Each building block is based on a template which performs a specific process and can be tailored to individual audit requirements.

The auditor has a choice of the environment for running the building blocks. Processing can be done either with an Excel environment or else as a standalone process, using the Windows Scripting Host. Both procedures require the Windows operating system.

Background

Often the analytical procedures performed for data analysis in audits have similarities between audits. For example, many audits require data stratification, quantification of population values, random sampling, data extraction, checking for gaps in numeric sequences, etc.

Each of these procedures can become time consuming, and must often be re-performed from start to finish on various audits. The alternative, which is suggested here, is to construct a uniform, repeatable process, using standard templates.

Audit steps are performed using one or a series of scripts based upon templates. Each script is a “building block” for a specific analytical procedure.

Location / Cost of software and data

All of the data and software described in this article can be downloaded at no cost. The download includes documentation and in some cases video tutorials on the use of the software. The only cost incurred is if additional support is required, which is charged on a time and material basis. The software uses a standard install/uninstall process and can be downloaded at <http://ezrstats.com/online/inno/XLACSetup.exe>. File size is over 10 MB, so a broadband connection is strongly suggested. Test data and workbooks used in this article can also be downloaded from the website and include:

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- Workbook examples and sample scripts
<http://ezrstats.com/online/inno/macro.zip>.
- Data used for the fixed assets audit –
<http://ezrstats.com/Auditnet/FA/FADData.zip>.
- Data used for the procurement audit –
<http://ezrstats.com/Auditnet/PO/POData.zip>.
- Macro examples – <http://ezrstats.com/helpxlac/ndxmacro.php>.

The software requires the Windows operating system, Windows XP, 2000 or NT. If using Excel, Excel 2003 or later must be available. If using the Windows scripting host, Excel is not required, but SP2 or later is needed.

How it works in brief

Generally, the auditor starts with an existing template and modifies it to meet the needs of the current audit. Modification generally requires audit details such as name of the file, random number to use, where outputs are to be stored (file or worksheet), etc. These changes are typed into the script which is then run. If using Excel, a toolbar is clicked or else a menu option selected. If using the Windows Scripting Host, a variety of means are available, which include double-clicking the script file from within Explorer, running the program from within a text editor such as "Context" or typing in a command at the DOS command line.

Most commands analyze data in a file, but some of the Excel options include saving /loading data to a workbook, performing certain other functions such as sorting and cumulative percentages from within Excel. Unless the amounts of data involved are large, the processing should be reasonably fast, depending upon the processor speed used. The software does have some limitations which are described on the site. However, generally these limitations should not limit most audit testing.

Benefits of scripts

Scripts can increase audit efficiency and effectiveness due to:

1. Repeatable process
2. Audit documentation for procedures performed
3. Integration with Excel
4. Expanded audit coverage due to ease of performance of tests

1. Repeatable Process

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Once all the audit parameters and processing flows have been established for the audit of a process, it is feasible to repeat the audit testing at various intervals, with only minor changes to the scripts. Recurring audits are a good candidate for the use of scripts.

2. Audit Documentation

Output from the scripts can be incorporated into the audit work-papers to document the testing performed.

3. Integration with Excel

Where Excel is used, output from the scripts can easily be loaded onto Excel worksheets for further analysis. Also, Excel can be used to schedule long running tasks (e.g. working with large files) to be run unattended in the off hours, such as evenings and weekends.

4. Expanded audit coverage

Because many of the audit tests which can be performed by the scripts can be run fairly quickly and efficiently, it becomes possible to perform 100% testing and to perform a variety of audit tests which would ordinarily not be cost-effective to perform.

Script Types

Two types of scripts will be described here. The first is that contained within an Excel macro. The second type, somewhat similar, is run using Windows Scripting Host software, a free software download from Microsoft.

To illustrate, one example of each type of script will be shown. The purpose of both scripts is the same, to take as input, a file named clmdenbp.txt, and run an analysis on the amount contained in the column named paid amount. The report results are to be written to a file named clmdenbp.ben.

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Excel macro script

Below is an example of a script which can be run as an Excel macro. This script analyzes the paidamt column in the data file clmdensp.txt, using the test F1 (first digit) and writes the results to a report file named clmdenbp.ben.

```
Sub RunBen()  
  Const BASEDIR = "c:\temp\test\  
  Dim oEZ As New cEZ  
  
  oEZ.Benford _  
  InFile:=BASEDIR & "clmdensp.txt", _  
  Report:=BASEDIR & "clmdensp.ben", _  
  Column:="paidamt", _  
  BenType:="F1"  
  
  Set oEZ = Nothing  
  
End Sub
```

Windows Scripting Host script

This script (using Windows scripting host) performs the same function as the previous macro which was written for Excel. Note that there are only a few differences in the syntax.

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```
dim oEZ
set oEZ = createObject("XL_Audit_Commander.cNFile")
oEZ.Benford _
InFile:=BASEDIR & "clmdensp.txt", _
Report:=BASEDIR & "clmdensp.ben", _
Column:="paidamt", _
BenType:="F1"

Set oEZ = Nothing
```

Examples to View and Run

A zipped file is available at <http://ezrstats.com/online/inno/macro.zip> which contains an Excel workbook with numerous examples which can be used as a starting point. This workbook includes four modules, which groups the macros into types – fraud detection modules, analytical modules, examples for a fixed assets audit and a collection of miscellaneous functions. There are also a number of Windows Hosting scripts (files with an extension of “.vbs”) which can run. Test data is available with the installation of the XL Audit Commander which is available at <http://ezrstats.com/online/inno/XLACSetup.exe>.

Examples of macros which can be copied and pasted are available at <http://ezrstats.com/helpxlac/ndxmacro.php>.

Overview of the Fixed Assets audit example

As an example to work through, fictional data used as part of an audit of fixed assets is provided. The audit procedure consists of 11 steps, each of which has a specific audit objective. Macros are available at <http://ezrstats.com/Macros/fandx.php>.

Overview of the Procurement audit example

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As an example to work through, fictional data used as part of an audit of procurement is provided. The audit procedure consists of xx steps, each of which has a specific audit objective. Macros are available at <http://ezrstats.com/Macros/pondx.php>.

File Format

Output from the system is a file in “tab separated value” format, whose first row consists of column names separated by tab characters. Each record is terminated with carriage return line feed character. Each column value is separated by a tab character.

Templates

In order to “jump start” an audit, a collection of templates is provided. Each of these templates can then be customized to meet the specific needs of a particular audit. Generally, customization will consist primarily of adding or deleting procedures to be run, changing files names and sort sequences, etc.

Case Studies

In order to provide an example of the types of processes which can be performed, two case studies are presented. The first is an audit of a fixed asset system which is contained in a Microsoft Access database.

For this case study, a series of audit objectives will be listed, along with the procedures needed to accomplish those objectives. Examples of scripts will be presented in both Excel format as well as Windows Scripting Host format. Output and results from the scripts are the same.

Fixed Assets – Audit Steps

Step 1 – Extract data from the MS-Access database

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Step 2 – Obtain population totals and counts separated into negative, positive and zero amounts.

Step 3 – Obtain a list of the ten highest cost asset items

Step 4 – Obtain a histogram of the asset costs

Step 5 – Obtain sub-totals of asset costs by store location.

Macros are available at <http://ezrstats.com/Macros/fandx.php>.

Procurement

17 steps altogether. Details are available at <http://ezrstats.com/Macros/pondx.php>.

Sampling

Perform an interval sample (random).

Step 1 - Obtain a count of the population

Step 2 – Determine the required sample size based upon the required confidence level, precision level, population size and expected error rate.

Step 3 – Compute the required interval

Step 4 – Specify a random number (or let the system select a random number)

Step 5 – Select an interval sample

Step 6 – Assess the attributes

Step 7 – Compute the sample error rate and the precision achieved

All of the steps above (except step6) can be accomplished using two scripting steps. The examples are included in the workbook named Macros.xls which is included in the installation file for the XL Audit Commander.

Command Syntax

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Overview

Commands are entered as a series of statements, each separated by a trailing comma and underscore at the end of the line, except for the last line, which has none. Each audit command will have a number of parameters or values which specify the type of processing to be performed, location of files, etc. Each parameter value has a default value which is used if no value is provided. Sequence of parameters is not important. Case is recognized only for parameter values.

An example command structure is shown below:

```
Command_To_Perform _  
    Specification1 := Specification 1 value, _  
    Specification2 := Specification 2 value, _  
    .... Etc, _  
    Specification := Specification n value
```

In the example above, the command “Command to perform” is to be run with n parameter values.

The most common types of parameters are as follows:

Parameter name	Example value	Description
Infile	“c:\temp\input file.txt”	Input file to be processed
Report	“c:\temp\Output file.txt”	Report file to be created
SortKeys	“vendor + a paidamt -n”	The keys for a sort or process step to use
ColName	Vendor	A column to be analyzed

A complete list of all parameters is shown on page 13.

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Running Scripts – Excel

To run scripts within Excel, first go to the Visual Basic Editor and insert a module (or use an existing module, if desired). Then copy or paste the macro text into the module, edit or specify the processing parameters and then click the toolbar run command (right arrow) or select the menu item “Run”.

There is a macro workbook with examples which can be used as a starting point for macro development.

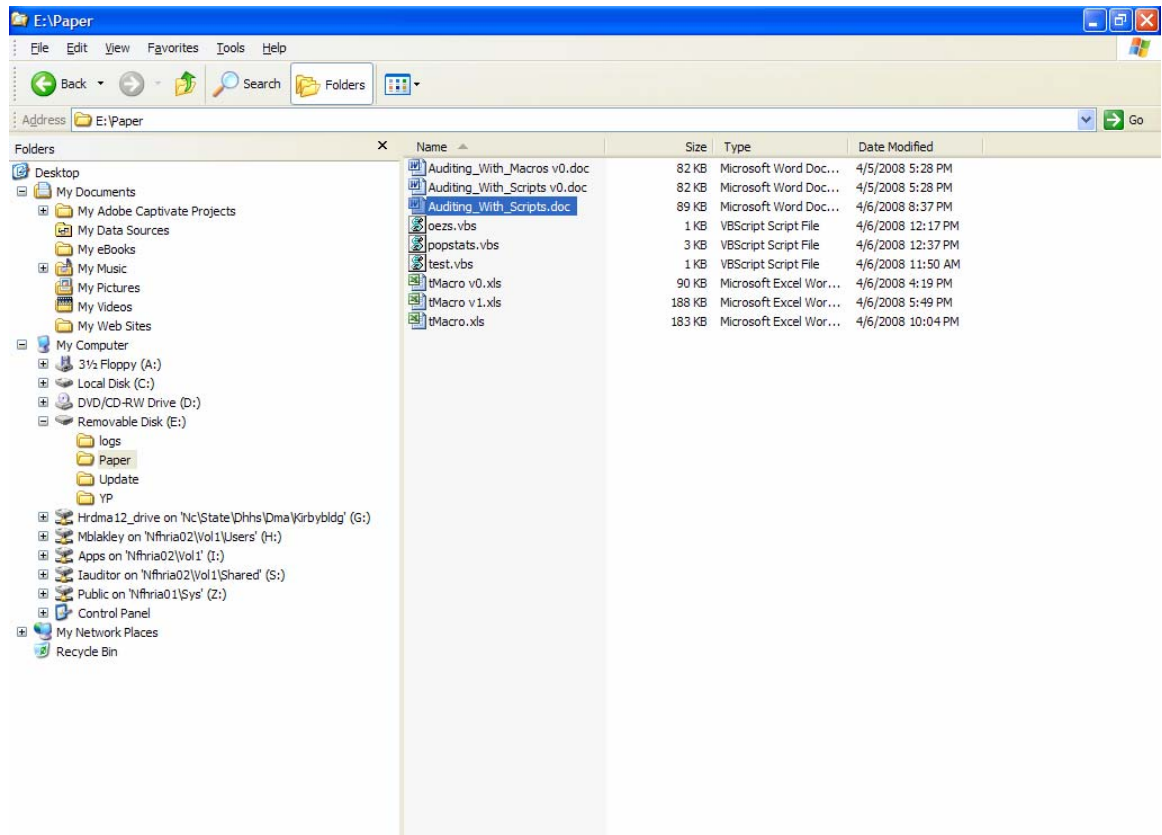
As an alternative to opening the visual basic editor, clicking the menu or toolbar items, etc. it is possible to set up a “button” on a work sheet to run the macro directly. An example of this method can be found on the sheet “Examples” in the workbook provided.

Running Scripts – Windows Scripting Host

Windows Explorer

Scripts can be run from Windows Explorer, either by double clicking the filename or else running a specific program from the menu displayed when the filename is right mouse clicked::

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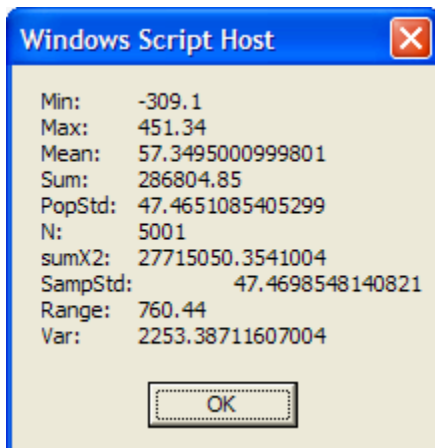


Right mouse click the script to be run, in this example popstats.vbs. The display from running the script is shown as follows:

A selection prompt from Windows Explorer, asks which program to run. Select the program

Microsoft® Windows Based Script Host

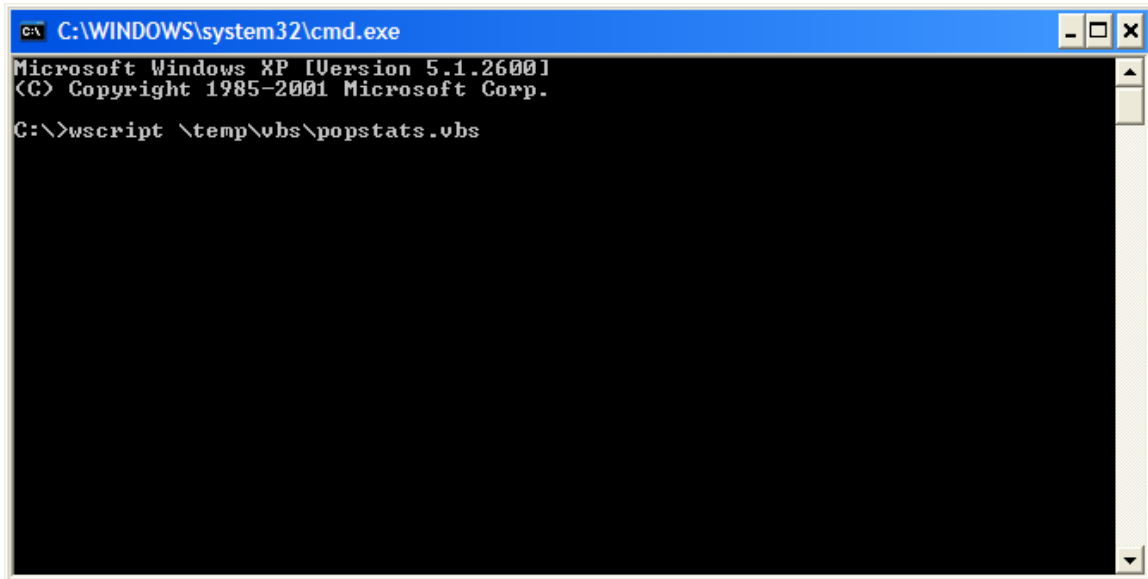
The result from processing is shown as follows:



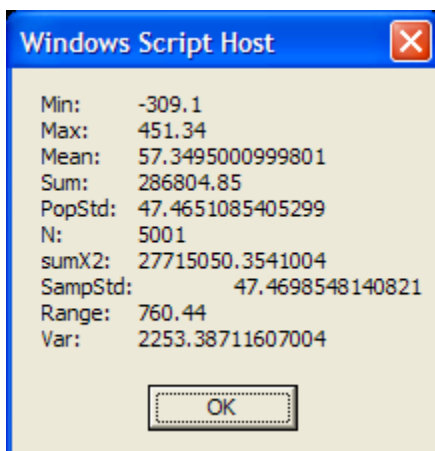
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Command Line

First, open a DOS command line, e.g. Start | Run | cmd.exe, then type in the command “wscript \temp\vbs\popstats.vbs”



The script runs and the output is displayed:



Excel Macro

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The purpose of the macro below is to obtain basic population statistics for the column paidamt in the file named clmdenbp.txt and write the report to the report file clmdenbp.pop (written in text format).

```
Sub RunPopStats()  
  Dim oEZ As New cEZ  
  
  oEZ.PopStats _  
  Infile:=BASEDIR & "clmdenbp.txt", _  
  Report:=BASEDIR & "clmdenbp.pop", _  
  Column:="paidamt"  
  
  LoadSheet _  
  ToSheet:="$Debug", _  
  Infile:=BASEDIR & "clmdenbp.pop"  
  
  Set oEZ = Nothing  
  
End Sub
```

Syntax

Each of the commands is run using one or more parameters. Some of the parameters are required, others are optional. The table below summarizes the commands and their parameters. Parameters colored light green are required, and parameters colored light yellow are optional. Miscellaneous parameters are shown in the rightmost column and are always required for the commands shown. Examples of all of the macros can be found in the workbook macros.xls which is part of the installation file (which also includes the data files used in the examples).

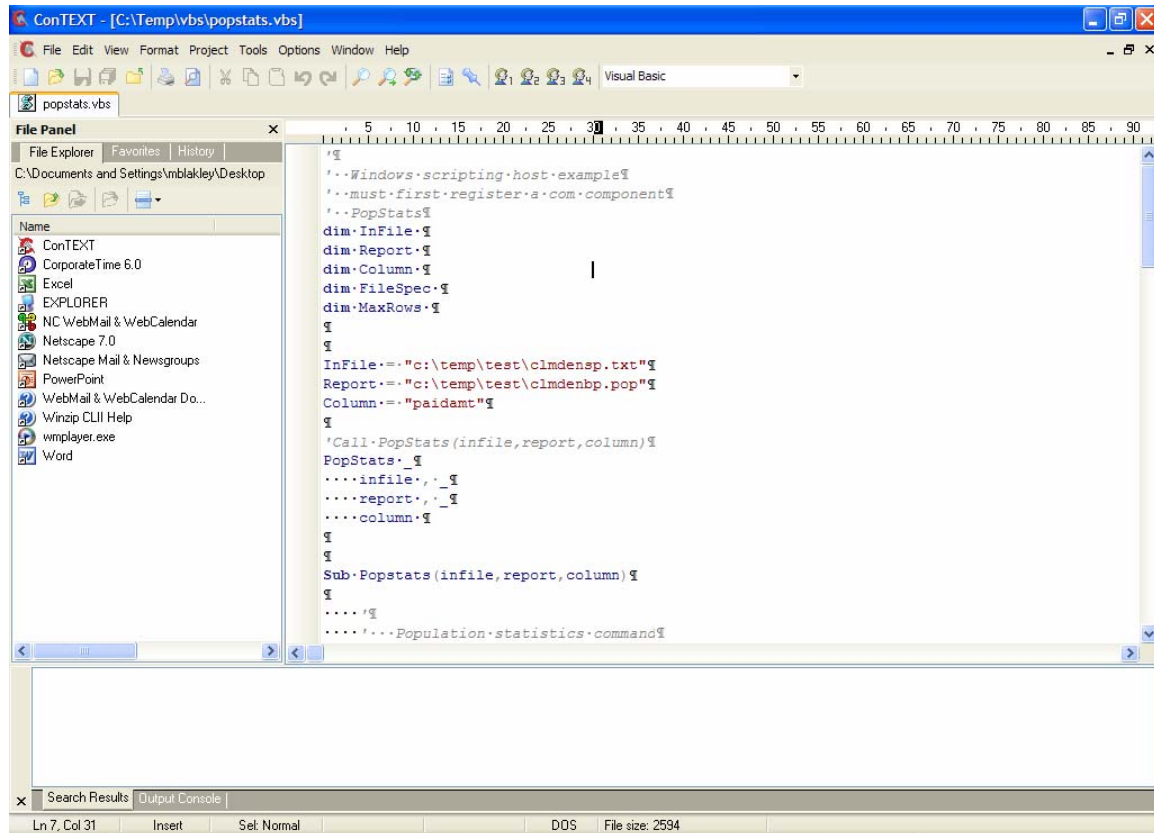
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Procedure	Infile	Report	Column	SortKeys	Extract		MaxRecs	FileSpec	StatType	MinGroup	Other
Age	X	X						0		0	DateColumn, TranColumn, AgeWidth, AgeDate
CMA	X	X	X		X			0			R, J, RN
Extract	X				X			0			Cond
Gaps	X	X	X					0			
Holiday	X	X	X				0	0			
Isamp	X	X			X			0			
ODBC					X						Conn, SQL
PopStats	X	X	X				0	0			
Prec											RequiredConfidence, PopulationSize, SampleSize, ActualErrors
RN	X	X	X								
RunBenford	X	X	X				0	0			BenType
RunByBenford	X	X	X	X							BenType
RunByHol	X	X	X	X			0		0	0	
RunByRN	X	X	X	X			0	0		0	
RunByStrata	X	X	X	X			0		0	0	Strata
RunByTrend	X	X	X	X			0		0	0	
RunByUni	X	X	X	X			0		0	0	
RunByWD	X	X	X	X			0		0	0	
RunDups	X	X		X			0		0	0	
RunSubTotals	X	X	X	X			0				
RunXT	X	X	X				0	0			Column2, AmountColumn
Sort	X			X	X						
SS											RequiredConfidence, PopulationSizeExpect edErrorRate, RequiredPrecision
SSD	X	X		X			0				
Stratify	X	X	X				0	0			
Uni	X	X	X				0	0			

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Context Editor

Commands can also be run from a text editor, such as the Context editor. Open script file in Context Editor. Use tools | Shell Execute



Note: Context editor is a freeware text editor which can be downloaded from <http://www.contexteditor.org/>.

Installation

To install the software, download the "setup" file and double click it. Detailed installation instructions are provided at http://ezrstats.com/online/inno/XL_Audit_Commander_Installation_Guide.pdf. Note that unless the add-in functionality of the software is specifically needed, it is not necessary to install the add-in. The add-in is used if there may be a desire to run some of the audit procedures from a menu or a command bar.

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The Excel macros and the Windows Scripting Host scripts can be run without the need to install the add-in.

To Run Scripts Using the Windows-Based Script Host (Wscript.exe)

1. At a command prompt type wscript.exe, and then press ENTER.
2. Set the script host properties you want, and then click **OK**.
3. In Windows Explorer or My Computer, double-click the script file you want to run.

NOTE: If you double-click a script file whose extension has not yet been associated with Wscript.exe, an **Open With** dialog box appears, prompting you for the program that should be used to open the file. After you choose **Windows Based Script Host (wscript.exe)**, if you select the **Always use this program to open these files** check box, Wscript.exe is registered as the default program for all files having the same extension as the one you double-clicked.

You can also set properties for an individual script by right-clicking a script file in My Computer or Windows Explorer, clicking **Properties**, and then clicking the **Script** tab.



Installing Windows Script Host

Generally, the Windows Script Host should already be installed on most computers. To easily find out, simply double click any of the example script files provided (they can be identified based upon their file extension of “.vbs”) If it is necessary to install the Windows Script Host, please see the following Microsoft Web site:

<http://msdn2.microsoft.com/en-us/library/ms950396.aspx>

Cautions and Limitations

Only certain types of data input formats can be processed using this system. If your data does not meet these criteria, then in order to use the system described

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here, the data must first be converted into a useable format. The input data must meet all of the following criteria:

1. Must be in ASCII code (e.g. EBCDIC not supported)
2. Must be unblocked, i.e. contained in data lines terminated by a carriage return and line feed character
3. Input data columnar data elements can not contain embedded tab characters (ASCII 09)
4. Proprietary data formats for numeric data are not supported, e.g. “packed” data, “zoned decimal”, binary and proprietary floating point amounts.
5. Arrays containing a variable number of elements are not supported
6. Each data element must occur in the same position (offset) in each record and must have a fixed length consistent from record to record

Certain data elements can not be converted or otherwise handled:

1. Dates prior to AD 100
2. Dates after AD 9999
3. Amounts less than negative 920 trillion or greater than positive 920 trillion

Other limitations

1. Record counts in excess of two billion will result in data conversion errors as to counts.
2. Cumulative sub-total amounts for numeric columns in excess of 920 trillion or less than negative 920 trillion will also result in conversion errors
3. Transactions with fractional pennies, i.e. amounts less than .01 will result in rounding errors in reported totals
4. Conversions in excess of 500 million rows can be performed, but the results can not be statistically analyzed with this system, i.e. totals, minimum, maximum, mode, mean, standard deviation, etc.

Conversion speeds

Benchmarks on a 1.53 GHz processor with .5 GB of memory using Windows XP indicate that conversion speeds encountered may be “sluggish”. For example, statistical computations process only about 3,000 transactions per second. A file with 80,000,000 records may require 5 – 6 hours to process.

Sorting speeds

Times required to sort data files depend upon a number of factors such as processor speed, number of processors as well as number and type of sort

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parameters. For example sorting dates is slower than sorting numbers which in turn is slower than sorting text. Commonly, speeds of 5 -15 rows per second are achievable on a desk top. The theoretical limit for file size is about two billion records. The number of sort columns which may be specified is 400. However, note that for large files, the length of time required to sort the file could be such that it is better to perform the sorts during an evening or weekend.