



Jagacy Total Access

Total Access is a powerful on-demand data processing tool, standalone automated testing platform, and report generator, written in 100% Java -- it runs on any platform. It leverages the power of an enhanced awk scripting language that specializes in data conversion and management, cutting development time to a fraction of existing methods. Total Access can be used for Web screen scraping, REST (and automated testing), data mining, generating adhoc analytics reports, and manipulating/cleansing data from a variety of data sources (including databases, XML, HTML, JSON and Microsoft® Excel™ spreadsheets). In addition, it is Web enabled, providing online report generation and viewing.

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1. Introduction

Total Access is based on the awk programming language (please see https://ia802309.us.archive.org/25/items/pdfy-MgN0H1joloDVoIC7/The_AWK_Programming_Language.pdf). It enhances the language by providing a rich set of additional functions, and by allowing data other than text files to be processed. If the Input Type (IT) variable is set to “database”, “excel”, “xml”, “http”, “html”, “rest”, “json” or “csv”, Total Access reads databases, xls/xlsx, XML, Web, HTML, JSON or CSV files, respectively. Each row is passed to the script as a line, with each column/field separated by the value of the Input Field Separator (IFS) variable. Please refer to the examples in the Total Access installation directory for more information.

2. Web Screen Scraping Example

The following Total Access script scrapes the Jagacy Software home page and prints all product descriptions. The http connection information is stored in an XML properties file:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE properties SYSTEM "http://java.sun.com/dtd/properties.dtd">
<properties>
    <comment>Web scrape Jagacy Software home page</comment>
    <entry key="httpUrl">http://www.jagacy.com</entry>
</properties>
```

The Total Access script that performs the Web screen scraping is as follows:

```
# webScrapeJagacy.awk: Print all Jagacy Software product descriptions:
BEGIN {

    # These can also be specified on the command line.
    IT = "http:httpQuery=/html/body/div/div/div";
    FS = "[\t]";

}

# Check for invalid response code
isXmlNodeNode(_$NODE) {
    print getXmlNodeValue(_$NODE);
    next;
}
```

```
# else
{
    getXmlNodeArray(_$NODE, "./p", products);

    for (i in products) {
        product = getXmlNodeValue(getXmlNode(products[i],
            "text()"));
        gsub(/\r\n ]+/, " ", product);
        print i " ", escapeString(product);
        print "";
    }
}
```

This script can be executed as follows:

```
java -jar totalAccess.jar -f webScrapeJagacy.awk web_jagacy.xml
```

3. Rest Example

The following retrieves Bitcoin prices in real time:

```
BEGIN {

    # These can also be specified on the command line.
    IT = "rest";
    FS = "[\t]";

    # Put everything in DEFPROPS:
    DEFPROPS["restQuery"] = "/_json/bpi/*|/_json/time/updated";
    DEFPROPS["restIndent"] = 1;
    DEFPROPS["httpUrl"] =
        "http://api.coindesk.com/v1/bpi/currentprice.json";
    DEFPROPS["httpHeader.Accept"] = "application/json";

    print "Bitcoin prices:";
}

# Check for invalid response code
isXmlNodeNode(_$NODE) {
    print getXmlNodeValue(_$NODE);
    exit;
}

/^updated$/ {
    node = getXmlNode(_$NODE, "text()");
    print $0, "=", getXmlNodeValue(node);
}

/^USD$/ {
    node = getXmlNode(_$NODE, "./rate/text()");
    print $0, "=", getXmlNodeValue(node);
}
```

```

}

/^GBP$/ {
    node = getXmlNode(_$NODE, "./rate/text()");
    print $0, "=", getXmlNodeValue(node);
}

/^EUR$/ {
    node = getXmlNode(_$NODE, "./rate/text()");
    print $0, "=", getXmlNodeValue(node);
}

```

This script can be executed from Windows as follows:

```
java -jar totalAccess.jar -f restExample4.awk < NUL
```

or from Mac/Linux:

```
java -jar totalAccess.jar -f restExample4.awk < /dev/null
```

4. Data Mining Example

The following Total Access script creates a Pivot Table determining which people live in an area where given houses are for sale. The customer's information is stored in a database table while the houses for sale are stored in an excel spreadsheet. The database information is stored in an XML properties file (but could alternatively be specified in the script):

```

<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE properties SYSTEM "http://java.sun.com/dtd/properties.dtd">
<properties>
    <comment>customer_sql.xml: customer table query sql</comment>

    <entry key="driverClass">org.hsqldb.jdbc.JDBCDriver</entry>
    <entry key="databaseUrl">jdbc:hsqldb:file:testdb</entry>
    <entry key="databaseUserName">SA</entry>
    <entry key="databasePassword"></entry>

    <entry key="sqlQuery">
    <![CDATA[
        SELECT * FROM customer
        WHERE zip = :zip
    ]]>
    </entry>

</properties>

```

The Total Access script that performs the data mining is as follows:

```
# excelDbExample.awk:
```

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```

BEGIN {

    # These can be specified on the command line.
    IT = "excel:sheet=real_estate";
    FS = "[\t]";

    loadArray(querySql, "customer_sql.xml");

    # Use sorted array.
    createSortedArray(zips);
}

# Skip headers
(FNR == 1) {
    next;
}

# Check for empty line
($0 == "null") {
    next;
}

# else
{
    zips[$3]++;
}

END {

    # Tell compiler that this is an array.
    customer[0];

    # Use sorted array.
    createSortedArray(customer);

    # Find database entries with zip codes in the excel file.
    for (zip in zips) {
        querySql[":zip"] = integer(zip);
        statementHandle = queryDatabase(querySql, outArrays);
        for (i in outArrays) {
            copyArray(customer, outArrays[i]);
            print customer;
        }
    }

    if (statementHandle != "") {
        closeDatabaseStatement(statementHandle);
    }
}

```

This script can be executed from Windows as follows:

```

java -cp totalAccess.jar;hsqldb.jar com.jagacy.totalAccess.TotalAccess
-f excelDbExample.awk real_estate_full.xlsx

```

or from Mac/Linux:

```
java -cp totalAccess.jar:hsqldb.jar com.jagacy.totalAccess.TotalAccess
-f excelDbExample.awk real_estate_full.xlsx
```

5. Report Generation Web Servlet Example

Total Access can generate adhoc reports from within a Web application for viewing online:

```
package com.jagacy.totalAccess.servlet;

import java.io.OutputStream;
import java.io.IOException;

import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

import com.jagacy.totalAccess.TotalAccess;

/*****
 *
 * An example excel servlet.
 *
 * To use this in your web application:
 *
 * 1) Copy totalAccess.jar and this file into your web application.
 * 2) Copy csv2excel.awk and real_estate_basic.csv to the
 *    WEB-INF/totalAccess directory in your web application.
 * 3) Add the following to web.xml:
 *
 *     <servlet>
 *         <servlet-name>csv2excel</servlet-name>
 *         <servlet-class>
 *             com.jagacy.totalAccess.servlet.ExcelServlet
 *         </servlet-class>
 *     </servlet>
 *
 *     <servlet-mapping>
 *         <servlet-name>csv2excel</servlet-name>
 *         <url-pattern>/csv2excel</url-pattern>
 *     </servlet-mapping>
 *
 * 4) Start your web application.
 * 5) Type one of the following into your web browser:
 *     http://localhost:8080/<webapp>/csv2excel?ext=xls
 *     http://localhost:8080/<webapp>/csv2excel?ext=xlsx
 */

public class ExcelServlet extends HttpServlet {
    private static final long serialVersionUID = -2122149597586470902L;
    protected void doGet(HttpServletRequest request,
        HttpServletResponse response) throws ServletException,
        IOException {
        OutputStream output;

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```

```

boolean attachment;

output = null;
attachment = false;

String path = request.getServletContext().getRealPath(
    "/WEB-INF/totalAccess");

String ext = request.getParameter("ext");
if (!"xls".equals(ext) && !"xlsx".equals(ext)) {
    ext = "xls";
}

try {
    // Prepare:
    //int contentLength = input.available();

    String fileName = "real_estate_basic." + ext;

    String contentType = "application/vnd.ms-excel";
    if (fileName.endsWith(".xlsx")) {
        contentType = "application/vnd." +
            "openxmlformats-officedocument.spreadsheetml.sheet";
    }

    String disposition = attachment ? "attachment" : "inline";

    // Init servlet response.
    response.setHeader("cache-control", "no-cache, max-age=0");
    response.setHeader("pragma", "no-cache");
    response.setHeader("expires", "-1");
    response.setDateHeader("Last-Modified",
        System.currentTimeMillis());
    //response.setContentLength(contentLength);
    response.setContentType(contentType);
    response.setHeader("Content-disposition", disposition
        + "; filename=\"" + fileName + "\"");

    output = response.getOutputStream();

    // Invoke the Total Access engine:
    TotalAccess totalAccess = new TotalAccess();
    totalAccess.registerInputVariable("excelFileName",
        ":stream:" + ext);
    totalAccess.registerOutputStream(output);
    try {
        totalAccess.invoke(path + "/csv2excel.awk",
            path + "/real_estate_basic.csv");
    } catch (Throwable t) {
        throw new RuntimeException(t);
    }
} finally {
    if (output != null) {
        try {
            output.close();
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}

```

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```

    }
  }
}

```

6. Differences from awk

String literals	Supports \t, \n, \r, \b, \f, \", \', \\, \a, \v, \### (octal), \u#### (unicode), \x## (hexadecimal).
Number literals	Supports 0### (octal), 0x##, or 0x#### (hexadecimal).
Regular expressions	Of the form: http://docs.oracle.com/javase/7/docs/api/java/util/regex/Pattern.html
FS variable	If set to 1 space character (" "), matches on space (" "), \t, \n, \r, \f.
CONVFMT variable, printf(), sprintf()	Of the form: https://docs.oracle.com/javase/7/docs/api/java/util/Formatter.html#syntax
getline, getline < "file"	Subject to IT, IFS variable processing .
arrays	Supports sorted and list arrays, in addition to nested arrays.
variables	Also supports Nodes and integers, but does not support strnums.

7. Variables

IT (Input Type) – Allows Total Access to read files other than text files. It can be specified in the script or on the command line (to change input types). Please see csv2db.bat (or csv2db.sh for Mac/Linux) for more information. Acceptable values are:

- **excel** – Reads an Excel file. The default sheet name is "Sheet1", booleans are not converted to 0 or 1, an empty row is returned as "null", and an empty column is returned as an empty string ("").
- **excel**: [sheet=<sheetName>,awkBoolean=<true|false>,emptyRow=<value>,emptyColumn=<value>]
- **csv** – Reads a CSV file. The default delimiter is comma (","), an empty row is returned as "null", and an empty column is returned as an empty string ("").

- **csv**:`[delimiter=<value>,emptyRow=<value>,emptyColumn=<value>]`
- **database** – Reads from the database specified in the given XML properties file (please see [Database XML Properties](#)).
- **database**:`[properties or :parameters]`
- **xml** – Reads an XML file. Uses a forward slash (“/”) as the default xmlQuery XPath (please see <http://en.wikipedia.org/wiki/XPath>). Does not include the xml header or indent a node’s XML when the node is converted into a string.

The variable **_\$NODE** contains each node read, and **\$0** is set to:

`<node name><IFS><attr1>=<value1><IFS><attr2>=<value2><IFS>...`

- **xml**:`[xmlQuery=<value>,xmlHeader=<true|false>,xmlIndent=<true|false>]`
- **http** – Reads HTML or XML from the Web using the HTTP connection parameters specified in the given XML properties file (please see [HTTP XML Properties](#)), and converts it to XML if necessary. If an invalid response code is received, a NUL node is returned with the response code as its value. Uses a forward slash (“/”) as the default httpQuery XPath (please see <http://en.wikipedia.org/wiki/XPath>). If XML is read, does not include the xml header or indent a node’s XML when the node is converted into a string.

The variable **_\$NODE** contains each node read, and **\$0** is set to:

`<node name><IFS><attr1>=<value1><IFS><attr2>=<value2><IFS>...`

- **http**:`[httpQuery=<value>,httpHeader=<true|false>,httpIndent=<true|false>]`
- **html** – Reads an HTML file and converts it to XML. Uses a forward slash (“/”) as the default htmlQuery XPath (please see <http://en.wikipedia.org/wiki/XPath>).

The variable **_\$NODE** contains each node read, and **\$0** is set to:

`<node name><IFS><attr1>=<value1><IFS><attr2>=<value2><IFS>...`

- **html**:`[htmlQuery=<value>]`
- **rest** – Reads XML or JSON from the Web using the HTTP connection parameters specified in the given XML properties file (please see [HTTP XML Properties](#)) and converts it to XML if necessary. If an invalid response code is received, a NUL node is returned with the response code as its value. Uses a forward slash (“/”) as the default restQuery XPath (please see <http://en.wikipedia.org/wiki/XPath>). The default is JSON (json=true).

The variable **_\$NODE** contains each node read, and **\$0** is set to:

`<node name><IFS><attr1>=<value1><IFS><attr2>=<value2><IFS>...`

- **rest**:`[restQuery=<value>,json=<true|false>]`
- **json** – Reads a JSON file and converts it to XML. Uses a forward slash (“/”) as the default jsonQuery XPath (please see <http://en.wikipedia.org/wiki/XPath>).

The variable **_\$NODE** contains each node read, and **\$0** is set to:

`<node name><IFS><attr1>=<value1><IFS><attr2>=<value2><IFS>...`

- **json**:`[jsonQuery=<value>]`
- **text** (the default).

IFS (Input Field Separator) – Used to separate columns/fields in database query results, HTTP/REST queries, Excel, XML, HTML and CSV input files. The default is tab (“\t”).

_\$NODE – The current node read from an XML/HTML/JSON file or HTTP/REST connection. The default is a NUL node.

DATEFMT – The format used for dates. Of the form: <https://docs.oracle.com/javase/7/docs/api/java/text/SimpleDateFormat.html>. The default is “yyyy-MM-dd HH:mm:ss.SSS”.

NS – An array of XML namespaces of the form:

```
NS["prefix"] = "URL";
```

DEFPROPS – An array of properties that are the defaults for all input type (IT) readers. For example:

```
DEFPROPS["restIndent"] = 1;
```

SYSPROPS – The Java system properties as an associative array.

8. Array Functions

- **copyArray**(target, source)

Copies the source array to the target array, without changing its type. Returns the target array.

- **createSortedArray**(array, [dimension], [subscript1, subscript2, ..., subscriptN, value, ...])
createListArray(array, [dimension], [subscript1, subscript2, ..., subscriptN, value, ...])

Creates a sorted or list array. If dimension is 0 (the default), consecutive integer values are used as subscripts (of the form 1,2,3,4...), indexed from 1. Otherwise, the subscript argument(s) are used. Returns the array.

- **cloneArray**(source)

Makes a copy of the given array (using the type of the source array) and returns it.

- **clearArray**(array)

Rather than the delete statement, this function just clears the array for reuse. Returns the array.

- **mergeArray**(target, source1, [source2, source3, ...])

Merges source1, source2, etc. into the target array. Returns the target array.

- len = **arrayLength**(array)

Returns the number of elements in the array.

- **subArray**(target, subscript, source)

Copies all source array elements that have the initial subscript to the

target array, without changing its type. Returns the target array.

- **arrayArg**(array) – Useful for passing nested arrays to user defined functions.
- **loadArray**(target, propertiesFile)

Loads the array from the specified properties file (if the file ends with .properties) or XML properties file (if the file ends with .xml). Returns the array.

9. Data Type Functions

- type = **typeof**(var)

Returns “AssocArray”, “Double”, “Integer”, “Node” or “String”.

- str = **string**(var)

Returns the string value of var.

- dbl = **double**(var)

Returns the double value of var, or 0 if it cannot be converted to a double.

- int = **integer**(var)

Returns the integer value of var, or 0 if it cannot be converted to an integer. Any fraction is truncated.

- numeric = **isNumeric**(numericStr)

Returns 1 if string is numeric; 0 otherwise.

10. Date Functions

- dateStr = **date**([format])

Returns the current date/time as a string. If format isn't specified, the value of the DATEFMT variable is used.

- `dateStr = convertDate(fromDate, fromFormat, [toFormat])`

Converts the `fromDate` with the format `fromFormat` to `toFormat`. If `toFormat` isn't specified, the value of the `DATEFMT` variable is used.

11. File Functions

- `exists = fileExists(fileName)`

Returns 1 if the file exists, 0 otherwise.

- `deleted = deleteFile(fileName)`

Deletes the file with the name `fileName`. Returns 1 if the file was deleted, 0 otherwise.

- `renamed = renameFile(fromName, toName)`

Renames `fromName` to `toName`. Returns 1 if the file was renamed, 0 otherwise.

- `created = mkdir(dirName)`

Makes the directory `dirName`. Returns 1 if the directory was created, 0 otherwise.

12. String Functions

- `unescapedStr = unescapeString(escapedStr)`

Returns a string with all special characters (preceded by “\”) unescaped.

- `escapedStr = escapeString(unescapedStr)`

Returns a string with all special characters escaped (with “\”).

- `trimmedStr = trim(untrimmedStr)`

Returns a string with all beginning and ending whitespace removed.

13. Excel Functions

In addition to reading xls/xlsx files using the IT variable, Total Access provides the following functions. Please see the csv2excel.awk, db2excel.awk, excelDbExample.awk, excelDbExample2.awk, excelDbExample3.awk, excelExample.awk and ExcelServlet.java examples in the Total Access installation directory for more information:

- **handle = openExcel(fileName, [sheetName])**

Opens a new or existing Excel spreadsheet, using the sheet sheetName. If the spreadsheet is new, the extension of fileName (.xls or .xlsx) determines what type of spreadsheet will be created. If fileName is “:stream:.xls” or “:stream:.xlsx”, the registered OutputStream (via the TotalAccess.registerOutputStream() method) is used (please see [Java API](#)). If sheetName is not specified, it defaults to “Sheet1”. Returns a handle for all subsequent operations.

- **createExcelFont(handle, fontId, fontStyles)**

Fonts are a limited resource, and should be reused. This function creates an Excel font with the name fontId, and applies the fontStyles to it (please see [Excel Font Styles](#)). The handle is the value returned by openExcel().

- **createExcelCellStyle(handle, styleId, cellStyles)**

Cell styles are also a limited resource (3000), and should be reused. This function creates an Excel cell style and applies the cellStyles to it (please see [Excel Cell Styles](#)). The handle is the value returned by openExcel().

- **printExcelValue(handle, row, column, value, [settings])**

Stores the value in the cell specified by row and column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by openExcel().

- **printExcelRTF(handle, row, column, rtfStr, [settings])**

Stores the Rich Text Format (RTF) string in the cell specified by row and column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by openExcel().

- **printExcelDate(handle, row, column, dateStr, [settings], [dateFmt])**

Converts dateStr using dateFmt (or the value of the DATEFMT variable if dateFmt is not specified), and stores it in the cell specified by row and

column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by `openExcel()`.

- **printExcelFormula**(handle, row, column, formula, [settings])

Stores the formula in the cell specified by row and column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by `openExcel()`.

- **printExcelLink**(handle, row, column, value, link, [settings])

Stores the hyperlink in the cell specified by row and column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by `openExcel()`.

- **printExcelBoolean**(handle, row, column, value, [settings])

Stores the boolean in the cell specified by row and column, applying the cell settings (please see [Excel Cell Settings](#)). Row and column are indexed from 1. The handle is the value returned by `openExcel()`.

- `rowCount = getExcelRowCount(handle)`

Returns the number of rows in the sheet. The handle is the value returned by `openExcel()`.

- `columnCount = getExcelColumnCount(handle, row)`

Returns the number of columns in a row. Row is indexed from 1. The handle is the value returned by `openExcel()`.

- `value = getExcelValue(handle, row, column, [toAwkBoolean], [emptyRowValue], [emptyColumnValue])`

Returns the value of the cell at the row and column specified. If `toAwkBoolean` is 1, booleans are returned as 0 or 1. If `emptyRowValue` is set, this value will be returned for empty rows (otherwise "null" is returned). If `emptyColumnValue` is set, this value will be returned for empty cells (otherwise empty string ("") is returned). Row and column are indexed from 1. The handle is the value returned by `openExcel()`.

- `sheetName = getExcelSheetName(handle)`

Returns the sheet name being processed. The handle is the value returned by `openExcel()`.

- line = **getExcelLine**(handle, [toAwkBoolean], [emptyRowValue], [emptyColumnValue], [outFields])

Returns the next row in an Excel sheet as a line. Cells in the line are separated by the value of the IFS variable. Cells are also stored in the outFields list array (if specified), with each entry indexed with a consecutive integer (starting at 1). If toAwkBoolean is 1, booleans are returned as 0 or 1. If emptyRowValue is set, this value will be returned for empty rows (otherwise "null" is returned). If emptyColumnValue is set, this value will be returned for empty cells (otherwise empty string ("") is returned). A NUL string ("\0") is returned when no more rows exist. The handle is the value returned by openExcel().

- **closeExcel**(handle, [closeSettings])

Closes the Excel sheet, applying the closeSettings (please see [Excel Close Settings](#)). The handle is the value returned by openExcel().

14. Excel Font Styles

Font Style	Possible Values
fontColor	See Excel Colors
bold	0 or 1
italic	0 or 1
strikeout	0 or 1
underline	none single double singleAccounting doubleAccounting
fontName	A valid font name.
fontPointSize	A valid point size.

15. Excel Cell Styles

Cell Style	Possible Values
useFont	A font id created with createExcelFont()
halign	center left right justify

	general
valign	center bottom top justify distributed
wrapText	0 or 1
dataFormat	<p>Either a number:</p> <p>0, "General"</p> <p>1, "0"</p> <p>2, "0.00"</p> <p>3, "#,##0"</p> <p>4, "#,##0.00"</p> <p>5, "\$#,##0_); (\$#,##0) "</p> <p>6, "\$#,##0_); [Red] (\$#,##0) "</p> <p>7, "\$#,##0.00); (\$#,##0.00) "</p> <p>8, "\$#,##0.00_); [Red] (\$#,##0.00) "</p> <p>9, "0%"</p> <p>0xa, "0.00%"</p> <p>0xb, "0.00E+00"</p> <p>0xc, "# ?/?"</p> <p>0xd, "# ??/??"</p> <p>0xe, "m/d/yy"</p> <p>0xf, "d-mmm-yy"</p> <p>0x10, "d-mmm"</p> <p>0x11, "mmm-yy"</p> <p>0x12, "h:mm AM/PM"</p> <p>0x13, "h:mm:ss AM/PM"</p> <p>0x14, "h:mm"</p> <p>0x15, "h:mm:ss"</p> <p>0x16, "m/d/yy h:mm"</p> <p>// 0x17 - 0x24 reserved for international and undocumented</p> <p>0x25, "#,##0_); (#,##0) "</p> <p>0x26, "#,##0_); [Red] (#,##0) "</p> <p>0x27, "#,##0.00_); (#,##0.00) "</p> <p>0x28, "#,##0.00_); [Red] (#,##0.00) "</p> <p>0x29, "_(* #,##0_);_(* (#,##0);_(* \"-\"_);_(@_)"</p> <p>0x2a, "_(\$* #,##0_);_(\$* (#,##0);_(\$* \"-\"_);_(@_)"</p> <p>0x2b, "_(* #,##0.00_);_(* (#,##0.00);_(* \"-\"??_);_(@_)"</p> <p>0x2c, "_(\$* #,##0.00_);_(\$* (#,##0.00);_(\$* \"-\"??_);_(@_)"</p> <p>0x2d, "mm:ss"</p> <p>0x2e, "[h]:mm:ss"</p> <p>0x2f, "mm:ss.0"</p> <p>0x30, "##0.0E+0"</p> <p>0x31, "@" - This is text format.</p> <p>0x31 "text" - Alias for "@"</p> <p>Or a custom string format (please see https://support.microsoft.com/en-us/help/264372/how-to-control-and-</p>

	understand-settings-in-the-format-cells-dialog-box)
_fillForegroundColor	(Note: Set foreground color before background color) See Excel Colors
fillBackgroundColor	(Note: Set foreground color before background color) See Excel Colors
fillPattern	altBars, bigSpots, bricks, diamonds, fineDots, leastDots, lessDots, noFill, solidForeground, sparseDots, thickBackwardDialog, thickForwardDialog, thinHorzBands, thinVertBands
borderBottom, borderLeft, borderRight, borderTop	dashDot, dashDotDot, dashed, dotted, double, hair, medium, mediumDashDot, mediumDashed, none, slantedDashDot, thick, thin
borderBottomColor, borderLeftColor, borderRightColor, borderTopColor	See Excel Colors
shrinkToFit	0 or 1
quotePrefix	0 or 1
locked	0 or 1
hidden	0 or 1
rotation	A valid rotation value.
indentation	A valid indentation value.

16. Excel Cell Settings

<u>Cell Settings</u>	<u>Possible Values</u>
useCellStyle	A style id created with createExcelCellStyle()
activeCell	1

17. Excel Close Settings

<u>Close Settings</u>	<u>Possible Values</u>
selectedSheet	1
activeSheet	1
hiddenSheet	1

autoSizeColumn, <columnNumber>	1. Note that columnNumber is indexed from 1.
columnWidth, <columnNumber>	width. Note that columnNumber is indexed from 1. width is 1/256 of a character.

18. Excel Colors

One of the following:

aqua, automatic, black, black1, blue, blueGrey, blue1, brightGreen, brightGreen1, brown, coral, cornflowerBlue, darkBlue, darkGreen, darkRed, darkTeal, darkYellow, gold, green, grey25%, grey40%, grey50%, grey80%, indigo, lavender, lemonChiffon, lightBlue, lightCornflowerBlue, lightGreen, lightOrange, lightTurquoise, lightTurquoise1, lightYellow, lime, maroon, oliveGreen, orange, orchid, paleBlue, pink, pink1, plum, red, red1, rose, royalBlue, seaGreen, skyBlue, tan, turquoise, turquoise1, violet, white, white1, yellow, yellow1.

19. Database XML Properties

Please see the db2excel.awk example in the installation directory for more information:

<u>Property</u>	<u>Possible Values</u>
driverClass	A JDBC driver class.
databaseUrl	A JDBC url.
databaseUserName	Database user.
databasePassword	User's password.
autoCommit	true or false. Default is true.
databaseHeaders	true or false (Used by IT variable processing). Default is false.
emptyColumn	Any string. Default is "".
sql	The sql to execute by updateDatabase().
sqlQuery	The query to execute by queryDatabase(), openDatabaseQuery() or IT variable processing.
:parameter	The value to substitute in the sql.

20. Database Functions

In addition to querying database tables using the IT variable, Total Access provides the following functions. Please see the `csv2db.awk`, `excelDbExample.awk`, `excelDbExample2.awk` and `excelDbExample3.awk` examples in the installation directory for more information:

- `statementHandle = queryDatabase(queryProperties, outputArrays, [outputLines])`

Executes a SELECT query and returns the results in the list arrays `outputArrays` and optionally `outputLines`. `outputArrays` is an array of arrays and `outputLines` is an array of lines, with each entry indexed by row number (starting at 1). Columns in each line of the `outputLines` array are separated by the value of the IFS variable. Returns a handle used by `closeDatabaseStatement()`.

- `statementHandle = updateDatabase(inputProperties, [result])`

Executes non-query sql using the configuration specified in the input properties array, and returns any result in `result[1]`. Returns a handle used by `closeDatabaseStatement()`.

- `statementHandle = openDatabaseQuery(queryProperties)`

Opens a SELECT query using the configuration specified in the query properties array. Returns a handle used by `getDatabaseRow()` and `closeDatabaseStatement()`.

- `line = getDatabaseRow(statementHandle, [emptyColumnValue], [outColumns])`

Returns the next row from a SELECT query as a line. Columns in the line are separated by the value of the IFS variable. Columns are also stored in the sorted `outColumns` array (if specified). If `emptyColumnValue` is set, this value will be returned for NULL columns (otherwise empty string ("")) is returned). A NUL string ("\0") is returned when no more rows exist. The `statementHandle` is the value returned by `openDatabaseQuery()`.

- `closeDatabaseStatement(statementHandle)`

Closes a database statement used by `queryDatabase()`, `updateDatabase()` or `openDatabaseQuery()`, freeing resources.

21. XML Functions

In addition to reading XML files using the IT variable, Total Access provides the following functions. Please see the `htmlExample.awk`, `xmlExample.awk`, `webScrapeJagacy.awk` and `webScrapePost.awk` examples in the Total Access installation directory for more information:

- `attrArray = getXmlNodeAttrs(node, attrArray)`

Returns a sorted array of the node's attributes.

- `nameStr = getXmlNodeName(node)`

Returns the node's name or a NUL string (`"\0"`) if it is a NUL node.

- `valueStr = getXmlNodeValue(node)`

Returns the node's value (or empty string (`""`) if the node doesn't have a value).

- `isNul = isXmlNulNode(node)`

Returns 1 if the node is a NUL node; 0 otherwise.

- `childNode = getXmlNode(node, xpathQuery, [xmlHeader], [xmlIndent])`

Returns a child node based on the XPath query. A NUL node is returned if a node isn't associated with the query. If `xmlHeader` is 1, the XML header is returned when the node is converted into an XML string. If `xmlIndent` is 1, the XML returned when the node is converted into a string is indented.

- `getXmlNodeArray(node, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])`

Returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1). If `xmlHeader` is 1, the XML header is returned when each node is converted into an XML string. If `xmlIndent` is 1, the XML returned when each node is converted into a string is indented.

- `node = createXmlNode(xmlStr, xpathQuery, [xmlHeader], [xmlIndent])`

Parses an XML string and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query. If `xmlHeader` is 1, the XML header is returned when the node is converted into an XML string. If `xmlIndent` is 1, the XML returned when the node is

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converted into a string is indented.

- **createXmlNodeArray**(xmlStr, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])

Parses an XML string and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1). If xmlHeader is 1, the XML header is returned when each node is converted into an XML string. If xmlIndent is 1, the XML returned when each node is converted into a string is indented.

- **node = loadXmlNode**(fileName, xpathQuery, [xmlHeader], [xmlIndent])

Reads an XML file and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query. If xmlHeader is 1, the XML header is returned when the node is converted into an XML string. If xmlIndent is 1, the XML returned when the node is converted into a string is indented.

- **loadXmlNodeArray**(fileName, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])

Reads an XML file and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1). If xmlHeader is 1, the XML header is returned when each node is converted into an XML string. If xmlIndent is 1, the XML returned when each node is converted into a string is indented.

- **escapedStr = escapeXml**(str)

Returns an escaped XML String.

- **unescapedStr = unescapeXml**(str)

Returns an unescaped XML string.

22. HTTP XML Properties

Please see the webScrapeJagacy.awk and webScrapePost.awk examples in the installation directory for more information:

Property	Possible Values
httpRequestMethod	GET (the default), HEAD, POST, PUT, DELETE, CONNECT, OPTIONS, TRACE, PATCH.

httpUrl	A valid http or https URL (default is http://localhost:80).
httpConnectTimeout	A timeout in milliseconds (default is 10000).
httpReadTimeout	A timeout in milliseconds (default is 10000).
httpUseCaches	true or false. Default is false.
word2000	Used for HTML. true or false. Default is false.
json	Used for REST. true or false. Default is true.
httpHeader. <i>Header</i> [#]	(Please see https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers). If more than one value exists for a header, attach a unique # to each property.
httpHeader.Cookie. <i>name</i>	Any string.
httpBody. <i>parameter</i>	Any string. Used for passing POST parameters.

23. HTML/HTTP Functions

In addition to processing HTML and HTTP requests using the IT variable, Total Access provides the following functions. Please see the `htmlExample.awk` example in the installation directory for more information:

- `node = createHtmlNode(htmlStr, xpathQuery)`

Parses a HTML string and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query.

- `createHtmlNodeArray(htmlStr, xpathQuery, nodeArray)`

Parses a HTML string and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1).

- `node = loadHtmlNode(fileName, xpathQuery)`

Reads a HTML file and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query.

- `loadHtmlNodeArray(fileName, xpathQuery, nodeArray)`

Reads a HTML file and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1).

- `node = loadHttpNode(httpProperties, xpathQuery, [xmlHeader], [xmlIndent])`

Reads HTML or XML from a Web site using the configuration specified in the http properties array, and returns a node based on the XPath query. If an invalid response code is received, a NUL node is returned with the response code as its value. A NUL node is also returned if a node isn't associated with the query, with an empty string ("") as its value. If xmlHeader is 1, the XML header is returned when the node is converted into an XML string. If xmlIndent is 1, the XML returned when the node is converted into a string is indented.

- `loadHttpNodeArray(httpProperties, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])`

Reads HTML or XML from a Web site using the configuration specified in the http properties array, and returns a list node array based on the XPath query. If an invalid response code is received, a NUL node is returned with the response code as its value. Each node in the array is indexed with a consecutive integer (starting at 1). If xmlHeader is 1, the XML header is returned when each node is converted into an XML string. If xmlIndent is 1, the XML returned when each node is converted into a string is indented.

- `escapedStr = escapeHtml(str)`

Returns an escaped HTML string.

- `unescapedStr = unescapeHtml(str)`

Returns an unescaped HTML string.

- `encodedStr = encodeUrl(str)`

Returns an encoded string.

- `decodedStr = decodeUrl(str)`

Returns a decoded string.

24. REST/JSON Functions

In addition to processing REST and JSON requests using the IT variable, Total Access provides the following functions. Please see the `restExample.awk`, `restExample2.awk`, `restExample3.awk`, `restExample4.awk` and `jsonExample.awk` examples in the installation directory for more information:

- `node = createJsonNode(jsonStr, xpathQuery, [xmlHeader], [xmlIndent])`

Parses a JSON string, converts it to XML, and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query. If `xmlHeader` is 1, the XML header is returned when the node is converted into an XML string. If `xmlIndent` is 1, the XML returned when the node is converted into a string is indented.

- `createJsonNodeArray(jsonStr, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])`

Parses a JSON string, converts it to XML, and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1). If `xmlHeader` is 1, the XML header is returned when each node is converted into an XML string. If `xmlIndent` is 1, the XML returned when each node is converted into a string is indented.

- `node = loadJsonNode(fileName, xpathQuery, [xmlHeader], [xmlIndent])`

Reads a JSON file, converts it to XML, and returns a node based on the XPath query. A NUL node is returned if a node isn't associated with the query. If `xmlHeader` is 1, the XML header is returned when the node is converted into an XML string. If `xmlIndent` is 1, the XML returned when the node is converted into a string is indented.

- `loadJsonNodeArray(fileName, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])`

Reads a JSON file, converts it to XML, and returns a list node array based on the XPath query. Each node in the array is indexed with a consecutive integer (starting at 1). If `xmlHeader` is 1, the XML header is returned when each node is converted into an XML string. If `xmlIndent` is 1, the XML returned when each node is converted into a string is indented.

- `node = loadRestNode(httpProperties, xpathQuery, [xmlHeader], [xmlIndent])`

Reads XML or JSON from a Web site using the configuration specified in the `http properties` array, converts it to XML if necessary, and returns a node based on the XPath query. If an invalid response code is received, a

NUL node is returned with the response code as its value. A NUL node is also returned if a node isn't associated with the query, with an empty string ("") as its value. If xmlHeader is 1, the XML header is returned when the node is converted into an XML string. If xmlIndent is 1, the XML returned when the node is converted into a string is indented.

- **loadRestNodeArray**(httpProperties, xpathQuery, nodeArray, [xmlHeader], [xmlIndent])

Reads XML or JSON from a Web site using the configuration specified in the http properties array, converts it to XML if necessary, and returns a list node array based on the XPath query. If an invalid response code is received, a NUL node is returned with the response code as its value. Each node in the array is indexed with a consecutive integer (starting at 1). If xmlHeader is 1, the XML header is returned when each node is converted into an XML string. If xmlIndent is 1, the XML returned when each node is converted into a string is indented.

- jsonStr = **xmlToJsonString**(node, [indent])

Converts a node to a JSON string, with optional indentation.

25. CSV Functions

In addition to reading CSV files using the IT variable, Total Access provides the following functions. Please see the csv2db.awk, csv2excel.awk, fixedWidth2csv.awk and ExcelServlet.java examples in the Total Access installation directory for more information:

- handle = **openCsv**(fileName, [delimiter])

Opens an existing CSV file. If delimiter is not specified, it defaults to comma (","), Returns a handle for all subsequent operations.

- line = **getCsvLine**(handle, [emptyRowValue], [emptyColumnValue], [outFields], [toNumber])

Returns the next line in a CSV file. Fields in the line are separated by the value of the IFS variable. Fields are also stored in the outFields list array (if specified), with each entry indexed with a consecutive integer (starting at 1). If toNumber is 1, Total Access attempts to convert the field into a number before storing it in the outFields array. If emptyRowValue is set, this value will be returned for empty rows (otherwise "null" is returned). If emptyColumnValue is set, this value will be returned for empty fields

(otherwise empty string ("") is returned). A NUL string ("\0") is returned when no more rows exist. The handle is the value returned by openCsv().

- **closeCsv**(handle)

Closes a CSV file. The handle is the value returned by openCsv().

- line = **parseCsvLine**(inputLine, [delimiter], [emptyRowValue], [emptyColumnValue], [outFields], [toNumber])

Parses the CSV inputLine and returns a line. Fields in the line are separated by the value of the IFS variable. Fields are also stored in the outFields list array (if specified), with each entry indexed with a consecutive integer (starting at 1). If delimiter is specified, it is used as the delimiter for the CSV input; otherwise comma (",") is used. If emptyRowValue is set, this value will be returned for empty rows (otherwise "null" is returned). If emptyColumnValue is set, this value will be returned for empty fields (otherwise empty string ("") is returned). If toNumber is 1, Total Access attempts to convert the field into a number before storing it in the outFields array.

- str = **unescapeCsv**(str)

Returns an unescaped CSV string.

- str = **escapeCsv**(str)

Returns an escaped CSV string.

26. Fixed Width Functions

Please see the fixedWidth2csv.awk and fixedWidth2excel.bat (or fixedWidth2excel.sh for Mac/Linux) examples in the Total Access installation directory:

- line = **parseFixedLine**(inputLine, widths, [outFields], [toNumber])

Parses the fixed width input and returns a line. Fields in the line are separated by the value of the IFS variable. Fields are also stored in the outFields list array (if specified), with each entry indexed with a consecutive integer (starting at 1). The widths array specifies the width of each field (and white space). If toNumber is 1, Total Access attempts to convert the field into a number before storing it in the outFields array.

27. Velocity Functions

Please see the xml2html.awk and XmlServlet.java examples in the Total Access installation directory:

- `str = mergeVelocityTemplate(templateName, contextArray, [outName], [initProps])`

Uses Velocity templates to create HTML or other text formats (please see <http://velocity.apache.org/engine/1.7/user-guide.html> for more information). If outName is not specified, the generated text is returned as a string. If outName is “:stream:”, the registered OutputStream (via the `TotalAccess.registerOutputStream()` method) is used (please see [Java API](#)). Useful constructs for the Velocity template are:

```
$array.map.keySet()
$array.map[$key]

$node.name
$node.escapeXmlName()
$node.escapeHtmlName()
$node.value
$node.escapeXmlValue()
$node.escapeHtmlValue()
$node.xml
$node.getAttrs($array)
$node.getXmlNode(...)
$node.getXmlNodeArray(...)
$node.isXmlNode or $node.xmlNode
```

28. Java API

The following methods are available for use in the TotalAccess class:

- `public void registerInputVariable(String name, String value)`

Registers an input variable to be used with the Total Access engine.

- `public void registerOutputStream(OutputStream out)`

Registers an OutputStream for use with the Excel or Velocity API.

- public void **registerMap**(String varName, Map<Object, Object> value)

Registers a map to be used as an associative array. The argument varName is the Total Access variable name to use, and value is the map to use. Keys in the map are always Strings, while values can be Strings, Integers, Doubles, AssocArrays or AwkNodes.

- public void **invoke**(String script, String ...varFiles)

Invokes the Total Access engine. The script argument is the script to execute, and varFiles are variables (of the form name=value) and files to be processed. Throws an error or exception on error.