HTMX language and `expandfile`

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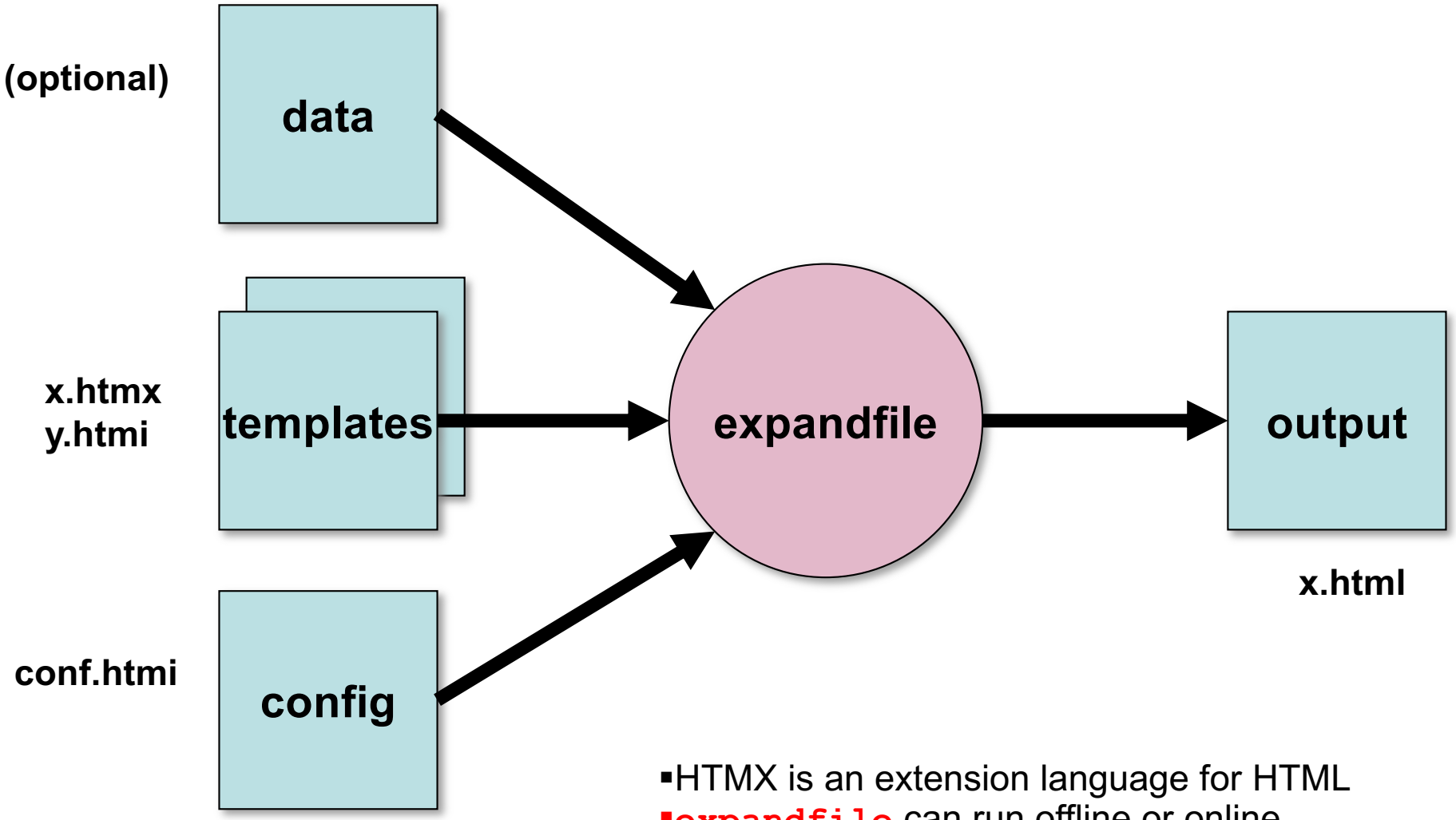
v28 – 10 Jun 2023

Overview



- HTMX is an extension language for HTML
- `expandfile` can run offline or online
- Can produce any format of output, not just HTML

HTMX Benefits

- **Simplify features of HTML.**
- **Avoid errors.**
- **Edit one file instead of many:**
  - **Standard headers, footers, values.**
  - **One file can depend on another's content.**
  - **One file can depend on another's attributes.**
- **Fill in values automatically.**
- **Can still use any HTML feature.**

- ***Pages are statically generated offline.***
- ***No security holes introduced.***

HTMX Example 1

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
    <title>%[titlestring]%</title>
%[*include,=mxstdfmt.htmi]%
%[*include,=linktags.htmi]%
%[*include,=h1style.htmi]%
</head>
  <body>
    <div class="outer">
%[*set,&headingtitle,="Phase One"]%
%[*set,&headingdate,="25 Jul 1995"]%
%[*include,=class2head.htmi]%
      <br>
. . .
```

- **Contents of `%[ ... ]%` are expanded. The rest is copied.**
- **Expansions beginning with `*` perform *built-in functions*:**
  - **Assign** `%[*set,&var,value]%`
  - **Include file** `%[*include,=filename]%`

HTMX Example 2

```
%[*set,&title,="My Fish Story"]%
%[*block,&content,^END]%
  <p>This is a story called %[title]%.
  It will get standard head and foot.
  </p>
END
%[*include,=story-template.htmi]%
```

Sets variable `title` to the string "My Fish Story"
Sets variable `content` to the block of 3 lines before END.
Reads and expands macro file `story-template.htmi`
which expands the values of variables `title` and `content`
and wraps the content with a standard heading and footer.
Design templates once and use them in many pages.

HTMX Builtins Can…

- Assign and modify variables.
- Include other HTMX files, which may contain variable references or macros.
- Execute programs and use their output.
- Perform conditional tests.
- Write data to files for later inclusion.
- Use values from configuration files and environment variables.
- Use information from database or file system.

HTMX example 3

```
1 %[*shell,&humordate,=filemodshort multics-humor.htmx]%
2 %[*shell,&humorK,=filesizek ../multics/multics-humor.html]%
  %[*set,&age,=fileagedays ../multics/multics-humor.html]%
3 %[*set,&humoru,=""]%
  %[*if,>,9,age,*set,&humoru,updatedflag]%

4 <dt><a href="multics-humor.html"><span class="topic">Humor</span></a>
    %[humoru]%</dt>
5 <dd>Jokes about Multics.
     <span class="adata">(%[humorK]%K, 1 picture, %[humordate]%)</span>
  </dd>
```

1. Set variable `humordate` to the date a file was modified. (External program `filemodshort` returns the date modified of a file as mm/dd/yy.)
2. Set `humorK` to the size of a file, by calling external program `filesizek,` and set `age` to the age of the file in days.
3. Set `humoru` to contents of `updatedflag` if file is less than 9 days old.
4. Insert a line beginning with `<dt>`.
5. Insert a <dd> block with the file's size and date last modified.

HTMX example 3a

```
1 %[*include,=htmxlib.htmi]%
  ....
2 %[*callv,myfileinfo,="multics-humor"]%

  <dt><a href="multics-humor.html">
3     <span class="topic">Humor</span></a> %[upflag]%</dt>
4 <dd>Jokes about Multics. %[fileattrib]%</dd>
```

Use a macro to do the same thing, hides the details.

1. **Include file `htmxlib.htmi` (once) which loads a library of macros.**
2. **Call macro `myfileinfo` to get file info and set some variables.**
3. **Insert a line with the file size and date modified.**

Result: automatic updating of the listing whenever the file changes.
Simple source code.

HTMX example 4

```
%[*include,htmxlib.htmi]%
%[*callv,getimgdiv,="sp2.gif",="p2.gif",="horse",="click for
larger view.",="pic",=""]%
```

Invoke a macro to generate an image tag, calling a program to get the image size. Output:

```
<div class="pic">
  <a href="p2.gif"><img src="sp2.gif" width="300" height="317"
   alt="horse" title="click for larger view."></a>
</div>
```

Result: don't need to put image size in your source.
If the image changes, the generated HTML will adjust when you recompile.

HTMX Expansion

- `%[var]%` (get the value named `var`)
- Inserts the contents of a variable.

- `%[block]%`
- Inserts the contents of a variable or block, expanding any `%[..]%` references inside.

Variables

- **Variables have names**
  - Letters, digits, spaces, ()-+_. are allowed.
  - All-numeric names cause a warning.
- **Variables have string values**
  - Any length.
  - HTMX built-ins may set variable values

    ```
    %[*set,&var,="string value"]%
    ```
  - Configuration file may pre-set variable values.
  - Shell environment variables are searched too.
  - Variables can be set to a string returned by an external program.

HTMX Syntax

- **Literal values begin with =**
  - `%[*set,&x,="abc"]%`
  - **Sets variable `x` to the value `"abc"`, outputs nothing.**
  - **Quotes are required if you have special characters in the value, like commas, or `%[`. Use the quotes for clarity.**
  - **Compare `%[*set,&x,="it is %[xyz]%"]%`**
    and `%[*set,&y,=it is %[xyz]%]%`
    when variable `xyz` contains `"Tuesday"`.
    The first one sets `x` to `"it is %[xyz]%"` because of quotes and the second one sets `y` to `"it is Tuesday"`
- **The ampersand**
  - **As in `%[*set,&x,=abc]%`**
  - **Indicates that a value is modified by the builtin.**
  - **If you leave it out, a warning is printed.**

HTMX Syntax

- **Nesting**
  - Expands inner variable references first.
  - `%[*set,&x,=abc%[r]%xyx]%`
  - Assuming variable `r` contains `"99"`, this will set `x` to `"abc99xyz"`
- **Quoting**
  - `%[*set,&x,="]%"]%`
  - Sets `x` to a right bracket and a percent.
    Quotes are interpreted only inside `%[ ]%`.
    Outside of `%[ ]%` quotes are just characters.
- **Escaping**
  - `%[*set,&x,="\""]%`
  - Sets `x` to a quote character. Similarly `\\`, `\%`, etc.
  - The `\` character removes the special meaning of the next char.
  - `\` is respected everywhere. To input a `\` in text, use `\\` instead.
- **Tracing**
  - `%[*set,&_xf_tracebind,="yes"]%`
  - Causes `*sqlloop`, `*csvloop`, `*xmlloop`, `*dirloop`, and `*ssvloop` to output a message when they bind a variable.

Builtin Values

(built into `expandfile`)

`%[year]%`	2004
`%[prevyear]%`	2003
`%[day]%`	07
`%[month]%`	Oct
`%[prevmonth]%`	Sep
`%[monthx]%`	10
`%[hour]%`	09
`%[min]%`	31
`%[date]%`	07 Oct 2004
`%[timestamp]%`	2004-10-07 09:31
`%[pct]%`	%
`%[lbkt]%`	[
`%[rbkt]%`	]
`%[quote]%`	"
`%[_xf_currentfilename]%`	xyz.htmx

37 HTMX built-in functions

Begin with `*`. Won't cause blank lines in the output if they are the only thing on a line.

- **`%[*include,=filename]%`**
  - **insert the contents of `filename`, expanding variables in it.**
  - **(use the `*fread2` builtin to read files without expanding values.)**
- **`%[*set,&varname,value]%`**
  - **set `varname` to `"value"`, for later expansion.**
  - **`value` can be**
    - `=string` **Literal string value, e.g. `="2 cats"`, `=Fred`**
    - `name` **Value of variable `name`, from a previous *set***
    - `envvar` **Value of shell environment variable `envvar`**
  - **can have multiple `value` args, all are concatenated.**
- **`%[** a remark]%`**
  - **Is a comment.**

HTMX Blocks

- `%[*block,&blockname,end-re]%`
  - Reads following lines until a line matching regular expression `end-re` and puts the lines in variable `blockname`.
  - For `end-re`, use something like `^EOB`.
  - Variables and builtins in the block are not expanded at definition time, but instead when the block is expanded later.
  - Specifying the same `blockname` more than once *appends* content to the block definition.
  - Must be alone on a line. Blocks do not nest.

- Use blocks to put HTMX into a variable that can be...
  - expanded later, as in example 2.
  - expanded many times, e.g. for database iterators.
  - called as a macro with `%[*callv,blockname,..]%`

Conditionals

- **%[*if,*rel*,varname,value,*statement*]%**
  - **Execute** statement **if** varname **has relation** rel **to** value
  - rel **may be** gt lt eq ne ge le =~ !~ eqlc nelc
  - statement **may be a variable name or builtin invocation, e.g.** *set, *if**, and may have arguments.**
  - **Comparisons are done as in Perl.**
  - **The** =~ **and** !~ **operators use regular expression match.**
  - **The** eqlc **and** nelc **operators ignore case.**

- **Examples:**
  - **%[*if,=,moddate,="",*set,&moddate,date]%**
  - **Sets** moddate **to the current date if it is blank.**
  - **%[*if,eq,d,="0",*if,ne,sm,="",*fwrite,=%[m]%,sm]%**
  - **If** d **is zero and** sm **is nonblank, write** sm **into file** m**.**
  - **%[*if,gt,x0,=999,*subst,&w0,="^.*(...)$",=",$1"]%**
  - **Drops all but the last 3 characters of** w0 **and prefixes them with a comma.**

More HTMX built-ins

- `%[*expand,varname]%`
  - Expand constructs in `varname`, output the result.
- `%[*expandv,&var,varname]%`
  - Expand constructs in `varname`, put result in `var`, output nothing.
- `%[*concat,&varname,value]%`
  - Concatenate `value` onto the value in `varname`, output nothing.
- `%[*ncopies,&varname,value,n]%`
  - Put n copies of `value` into `varname,` output nothing.
- `%[*subst,&varname,left,right]%`
  - Apply Perl substitution `s/left/right/ig` to the contents of `varname,` replacing its contents, output nothing.
    - `left` can be a regular expression.
    - `left` can contain parenthesized strings, used in `right` as $1 $2 etc.
    - Backslashes in the expression need to be doubled.
    - Slashes in `left` or `right` need to be prefixed by \\

HTMX Arithmetic

- **%[*increment,&varname,value]%**
  - **Increment** varname**'s contents by contents of** value**, output nothing.**
- **%[*decrement,&varname,value]%**
  - **Decrement** varname**'s contents by contents of** value**, output nothing.**
- **%[*product,&varname,value1,value2]%**
  - **Multiply** value1 **by** value2 **and store in** varname**, output nothing.**
- **%[*quotient,&varname,value1,value2]%**
  - **Divide** value1 **by** value2 **and store integer in** varname**, output nothing.**
- **%[*quotientrounded,&varname,value1,value2]%**
  - **Divide** value1 **by** value2**, round, store integer in** varname**, output nothing.**
- **%[*scale,&varname,value1,value2,value3]%**
  - **Store** int(.5+(value1*value3)/value2) **in** varname**, output nothing.**

External files

- **`%[*fwrite,=file,varname]%`**
  - **Write contents of `varname` to `file`, output nothing.**
- **`%[*fappend,=file,varname]%`**
  - **Append contents of `varname` to `file`, output nothing.**
- **`%[*fread,&varname,=file]%`**
  - **Read contents of `file` into `varname`, output nothing.**
  - **If input is not found, sets `varname` to empty string.**
  - **Does not expand values or blocks.**

External Values

- **`%[*shell,&x,abc]%`**
  - **Executes the shell command in variable `abc`, sets `x` to result, output nothing. If multiple lines are returned, change newline to the value of `_xf_ssvsep` (default is space).**
  - **Example: `%[*shell,&xdate,=filemodiso %[inputfile]%]%` might set `xdate` to "`2016-07-04`"**

- **`%[*urlfetch,&varname,=url]%`**
  - **Read contents of `url` into `varname`, output nothing.**
  - **(Think carefully about security if you do something like this.)**

External Shell Scripts

- **Useful external shell commands**
  - **supplied with expandfile, written in Perl**
  - **Import values into expandfile**
  - **write your own as needed, in any language**

  - `filemodshort, filemodyear, filemodiso`
  - `filedaysold, filesizek`
  - `gifsize`
  - `firstletter, uppercase, lowercase`
  - `fmtnum`
  - `nargs`

Miscellaneous

- `%[*format,&varname,fmtstring,val1,val2,...]%`
  - Replace `$1 $2` etc. in `fmtstring` with corresponding values.
  - Result in `varname`, output nothing.

- `%[*htmlescape,varname]%`
  - Output a HTML-escaped version of `varname`.
  - `<fred>` => `<fred>`

- `%[*warn,message]%`
  - Write a line to STDERR.

- `%[*dump]%`
- Output the entire symbol table for debugging.

- `%[*exit]%`
  - Stop expanding.

Special Files

- `config.htmi`
  - Defines values you use in many files.
  - Sequence of `%[*set,&var,=value]%` commands.
  - Specify on command line.

- Included files and macros
  - Examples: `htmxlib.htmi`, `pagewrapper.htmi`
  - Standard formatting used in many pages
  - Write your own, copy others
  - Library `htmxlib.htmi` is supplied with expandfile.

HTMX error messages

- `expandfile: x.htmx missing end of *block BLOCKNAME -- REXP`
- `expandfile: x.htmx need NUMBER ]%`
- `expandfile: x.htmx unclosed quoted string beginning 'XXXX'`
- `expandfile: x.htmx missing CSV file 'FILE' ERR`
- `expandfile: x.htmx missing XML file 'FILE' ERR`
- `expandfile: x.htmx missing *include 'FILE' ERR`
- `expandfile: x.htmx missing *includeraw 'FILE' ERR`
- `expandfile: x.htmx cannot *fappend 'FILE' ERR`
- `expandfile: x.htmx cannot *fwrite 'FILE' ERR`
- `expandfile: x.htmx extra arguments X,Y,Z... to *BUILTIN`
- `expandfile: x.htmx invalid varname *set,&VARNAME`
- `expandfile: x.htmx unknown builtin *NAME,ARGS`
- `expandfile: x.htmx cannot open DBI:mysql:DB:HOST USER for query QUERY`
- `expandfile: x.htmx cannot prepare query QUERY ERRMSG`
- `expandfile: x.htmx cannot execute query QUERY ERRMSG`
- `expandfile: x.htmx cannot execute COMMANDLINE ERR`

- `expandfile: warning: x.htmx *set,&VARNAME varname is all digits, is = missing?`
- `expandfile: warning: x.htmx missing = before argument VARNAME`
- `expandfile: warning: x.htmx>w.htmi>imgtag 'imgtag_result' should begin with &`
- `expandfile: warning: expandfile: warning: unknown *if ::`

Using HTMX Templates

I usually start with comments

```
%[** created by Tom 02/28/15 **]%
```

Set initial values of some variables

```
%[*set,&title,="Daily report"]%
```

Define content blocks, which may refer to variables

```
%[*block,&content,^END]%
...
<h1>%[title]%</h1>
...
END
```

At the end, include a HTMX wrapper file that expands variables including blocks (that may expand variables).

```
%[*include,=pagewrapper.htmi]%
```

HTMX idioms

- **Some useful code:**

- **Change a variable containing HTML so that `</li>` tags at the beginning of the line are joined to the previous line.**
  - **`%[*subst,&menu,="\\n<\\/li>",="<\\/li>"]%`**
  - **Escape slashes in `subst` args, since it uses / as delimiter.**
  - **The newline is input to the `subst` as backslash-n.**
  - **Input the backslash as double backslash.**

- **Use a value from a Makefile in a macro call**
  - **Say you want to define a relative path prefix `REL`**
  - **In your Makefile, use**
    `REL=../`
  - **In the template, use**
    `%[*callv,img2,=%[REL]%"icon.gif"]%`
  - **Don't put `%[REL]%` inside the quotes, or it won't be expanded.**

SQL Loops

- **Extracting data from an SQL database:**
  - `%[*sqlloop,&rs,tpt,="SELECT * FROM table1"]%`
- **This statement**
  - **Performs the database query and expands `tpt` for each row after binding values to variable names in the symbol table like `table1.varname`.**
  - **Values are bound to names like `table1.owner`.**
  - **Computed values such as `COUNT` are bound to names like `.count`.**
  - **Database parameters come from the symbol table variables**
    - `_xf_hostname`, `_xf_database`, `_xf_username`, `_xf_password`
    - **These values are often set in `config.htmi`**
  - **Binds `_xf_nrows` to the number of rows read.**
  - **Binds `_xf_colnames` to a space separated list of the column names**
  - **Concatenates all expansion output into result variable `rs`, outputs nothing.**
- **A warning is printed if no rows are selected, and execution continues.**

Using *sqlloop

- Some useful functions to use in templates:
  - `%[*onchange,var,statement]%`
  - `%[*onnochange,var,statement]%`
- Queries can contain ORDER BY, GROUP BY, LIMIT, SUBSTRIN_INDEX, inner and outer joins, self joins, etc.
- Handy macro to dump what was bound, for debugging:
  - `%[*callv,sqldump,string]%`

CSV loops

- **A similar loop operates on each row in a CSV (comma separated values) file. See RFC-4180. (The file may be gzipped.)**
  - **`%[*csvloop,&resultvar,rowtpt,=filename]%`**
  - **First line (row) of the file provides the column names.**
  - **For each of the rest of the rows, parses items, binds to column names, expands `rowtpt` for the row, appends result to `resultvar`, outputs nothing.**
  - **Items in the CSV file are comma separated and may be quoted**
    - **example:** this,"is,an,example",12345
    - **three items:**
      - this
      - is,an,example
      - 12345
  - **Binds `_xf_nrows` to number of lines read, after loop finishes.**
  - **Binds `_xf_colnames` to space separated list of col names.**

CSV Loop Example

```
%[*set,&rowno,=0]%
%[*csvloop,&outvar,iter,=examp.csv]%
%[*block,&iter,^END]%
%[*increment,&rowno,=1]%
row %[rowno]%:   %[col1]%   %[col2]%    %[col3]%   %[col4]%   %[col5]%
END

What I read from file "examp.csv"
%[*includeraw,=examp.csv]%

The column names are: %[_xf_colnames]%

We read in %[_xf_nrows]% rows not counting the header

Formatted output:
%[outvar]%
```

set variable

CSV loop

block def

text that is copied

builtin

variable expansion

expansion of variable set by CSV loop

XML loops

- **A similar loop operates on each item in an XML file.**
  (The file may be gzipped.)
  - `%[*xmlloop,&resultvar,tpt,=filename]%`
  - **XML file has**
    - **outermost `<list> ... </list>`**
    - **containing a sequence of `<item> ... </item>`**
  - **Each item contains multiple fields**
    - `<item>`
    - `  <name>John Smith</name>`
    - `  <addr>1234 Any Street</addr>`
    - `</item>`
  - **For each item, binds fields to names like `item.name`, expands `tpt`, appends result to `resultvar`, outputs nothing.**
  - **Binds `_xf_nxml` to number of items read, after loop finishes.**
  - **Binds `_xf_xmlfields` to space separated list of field names.**
  - **Instead of `<cite>` use `!!cite!!whatever!!/cite!!`**
  - **Instead of `&aacute;` use `&amp;aacute;`**

XML loops cont.

- **An alternate form of the loop allows an XPath**
  - **`%[*xmlloop,&resultvar,tpt,=filename,xpath]%`**
  - **for cases where the XML structure is more complex.**
  - **if xpath is not specified, the default is `"/*/*"`**
  - **for each item found by the XPath arg,**
    - **bind the values of sub-items `"./*"`**
    - **bind the values of attributes of items `"./@*"`**
  - **example JAMF file, access items with "*/computers/computer"**

```
<?xml version="1.0" encoding="UTF-8"?>
<computer_group>
<name>All Managed Clients</name>
<computers>
<size>119</size>
<computer>
<name>QA2 MacBook</name>
<serial_number>54321</serial_number>
</computer>
<computer>
<name>Rocky</name>
<serial_number>12345</serial_number>
</computer>
...
```

File System Loops

- **A similar loop iterates over a directory.**
- **`%[*dirloop,&outvar,iter,dirpath,starrex]%`**
- **Lists directory `dirpath` and expands block `iter` for each file matching regular expression `starrex`; output is appended to variable `outvar`, outputs nothing.**
- **e.g. `%[*dirloop,&out,it2,="/home/jack/xx",="*.html"]%`**
- **Binds variables to the values of** status() **info on each file**:
  - `file_name, file_type, file_dev, file_ino, file_mode, file_nlink, file_uid, file_gid, file_rdev, file_size, file_atime, file_mtime, file_ctime, file_blksize, file_blocks, file_sec, file_min, file_hour, file_mday, file_mon, file_year, file_wday, file_yday, file_isdst, file_datemod, file_modshort, file_sizek, file_age`
- **Variable `file_type` is set to `'f'` for file, `'d'` for dir, `'l'` for link**

SSV Loops over variables

- **A similar loop iterates over a list of items in a string value.**
  ("ssv" stands for "space separated values")
- **`%[*ssvloop,&outvar,iterblock,ssv]%`**
  - **Breaks `ssv` into tokens and expands `iterblock` for each, binding `_xf_ssvitem` to the token (skips null tokens).**
  - **Binds `_xf_nssv` to the number of tokens processed.**
  - **Token separator is the value of `_ssvsep`, default is space.**
  - **Result is stored in `outvar`.**
  - **Outputs nothing. Does not modify `ssv`.**

- **`%[*popssv,&var,&ssv]%`**
  - **Takes first value from `ssv`, puts it in `var`, rewrites `ssv` to remove value, outputs nothing.**

External Programs

- **Invoke any shell program or script and capture its output.**
- **Example**:
  - `%[*shell,&result,=filemodshort myfile.htmx]%`
- **Called from Perl, output has NL changed to space**
- **Useful programs (can be written in any language):**
  - `filemodshort file => 03/27/07`
  - `filesizek file => 33`
  - `nargs a bb c dd e f g => 7`
  - `gifsize pic.jpg => "pic.jpg" width="75" height="75"`
  - `lowercase ABcdE => abcde`
  - `nrandomlines x.htmx n` (`n` **lines from** `x.htmx` **separated by |**)
  - `firstletter applecart => a`
  - `filedaysold filename => 12`
  - `fmtnum 123456 num => 123,456`
  - `grep, sed, date, cut, awk =>` **(Unix command output)**
- **Write your own as needed**

Bind values from a CSV file

- Read a file in CSV format and bind variables in the memory.
  - `%[*bindcsv,=file]%`
  - The `file` can specify a local disk file or a URL.
  - First line of the file provides the column names.
  - Second line of the file provides the column values.
  - Will not bind variables beginning with `_` or `.` for security.
- For example, each server listed in an SSV could prepare a two-line `.csv` file, and a simple loop over the SSV could create an HTML table with a row for each server showing status.
- Binds `_xf_colnames` to the column names set.
- A warning is printed if the file is not found.

Macro Example

Call: `%[*callv,imgtag,="abc.jpg",="AAA",="Bbb"]%`

Generates: `<img src="abc.jpg" width="75" height="75" border="0" alt="AAA" title="Bbb">`

Use: generates IMG tag and fills in size in pixels, ALT and TITLE

```
%[** macro for generating an image tag **]%
%[*block,&imgtag,^END]%
%[** parameters: ]%
%[**   param1 - file path, same rel path must work in source and obj]%
%[**   param2 - alt tag]%
%[**   param3 - title tag]%
%[** output: none]%
%[** sets: imgtag_result (resulting image tag)]%
%[** ------------------------------------------------------- **]%
%[*shell,&y,=gifsize %[param1]%]%
%[*if,eq,y,="",*concat,&y,param1]%
%[*set,&imgtag_result,="<img src="]%
%[*concat,&imgtag_result,y]%
%[*concat,&imgtag_result,=" alt=\""]%
%[*concat,&imgtag_result,param2]%
%[*concat,&imgtag_result,="\" title=\""]%
%[*concat,&imgtag_result,param3]%
%[*concat,&imgtag_result,="\">"]%
END
```

define block "imgtag"

external shell call to "gifsize"
(a program in my library)

Multics Formatting

- **Enabled if the `_xf_expand_multics` variable is set to `"all"` or `"nosql"`.**
- **Optional formatting constructs for**
  - **pathname: `{=text=}`**
    - expands to `<span class="pathname">text</span>`
  - **command: `{:text:}`**
    - **expands** to `<span class="cmd">text</span>`
  - **code**: **`{+text+}`**
    - **expands to** `<span class="code">text</span>`

Multics Links

- **Optional link constructs (with `"all"`) for**
  - **External link reference `{!tag anchor text!}`**
    - **See `loadext.sql` for external tags**
  - **Internal link reference `{@file anchor text@}`**
    - **See `loadpages.sql` for internal files**
  - **Link to Glossary `{{tag anchor text}}`**
    - **See `g1.sql` for glossary tags**
  - **Link to `multicians.html` `{[nametag Name]}`**
    - **See `loadm.sql` for Multicians tags**
- **Each construct expands to a hyperlink with an HTML `title` attribute from the database. (Database parameters from the symbol table.)**

Example from Multics Website

- **Example story file:** `manning.htmx`
  - **Sets some variables, e.g.** `title`
  - **Defines two blocks,** `body` **and** `extratail`
  - **Inserts** `pagewrapper.htmi`
- **Source features**
  - **Paragraphs have** `<p>` **and** `</p>` **(see *HTML Tidy*)**
  - **Uses** `Corbat&oacute;` **and** `&` **in text**
- **Multics features activated by** `_xf_expand_multics` **switch**
  - **Author para has** `{[Manning Eric Manning]}` **and has semantic tag** `class="author"`
  - **Special link** `{@-manning.html Next Story@}`

expandfile

- **what: Perl program in your `~/bin`**
- **how to invoke at command level:**

  `expandfile conf.htmi x.htmt > x.html`
- **what it does: expands a template**
- **who calls it: `Makefile`, shell scripts**
- **how it works**
  - *get args, read config file `conf.htmi`*
  - *read template file `x.htmt`*
  - *scan for blocks, register them, remove from template*
  - *`&expandstring()` the rest*
  - *write the result on `stdout`, piped into `x.html`*

Other uses for `expandfile`

- **`expandfile` doesn't know or care about the format of its input and output: *it does not know about HTML*.**
- **Can use it to create any kind of text file. Examples:**
  - **input to `GraphViz` and `rrdtool`**
  - **`procmail` control file**
  - **`mysql` input**
  - **XML data: Google site map, RSS feed**
  - **shell scripts**
- **Super Webtrax (SWT)**
  - **Web site traffic analysis report**
  - **Loads web server log into SQL, expands templates that query the database and writes HTML reports**

`&expandstring()`

- **what: Perl function provided in `expandfile.pm`**
- **how to invoke it:**

```
$result = &expandstring($tpt, \%symtb);
```

- **what it does: returns expansion of template**
- **who calls it:**
  - *expandfile, special expanders, various CGIs*
- **how it works:**
  - *Parses and interprets HTMX language*
  - *Uses and sets symbol table*
  - *Returns string as output*
- **can run auxiliary function for block expansion first:**

```
$xtpt = &expandblocks($tpt, \%symtb);
```

Using `&expandstring()`

- **Perl skeleton**

```
use expandfile.pm;
my %symtb;
# set up $symtb{xxx} with contents, computed somehow
# read in a template into $tptstr
$result = &expandstring($tptstr, \%symtb);
print "$result\n";
```

- **The Perl program has no output formatting built into it.**
- **The template does all formatting; could use HTML, CSV, or some other language. (Same data could be formatted in more than one language.)**
- **The coupling between the Perl program and the template is the list of hash keys / variable names in `%symtb`.**

Uses for `&expandstring()`

- **Online CGI programs in Perl call `&expandstring()` to**
  - **Generate dynamic web pages**
    - *mail form*
    - *registration*
    - *statistics*
    - *RSS feed formatting*
    - *management*
    - *result and error pages*
  - **Format mail messages**
    - *mail sending*
- **Offline Perl programs call `&expandstring()` to expand templates.**

HTMX / PHP similarities

- Both extend HTML
- Both have variables and functions
- Variable values are strings in each
- Both have user-defined functions and libraries
- Both can include files
- Both have MySQL integration

HTMX / PHP differences

HTMX

- Static compilation
- Parse once
- Errors found at compile
- 37 builtin functions
- Web server agnostic

- Blocks
- Wrapper templates
- Loops on SQL, CSV, XML, File System, and SSV

PHP

- Runtime interpreter
- Parse on every view
- Errors found at runtime
- >5000 builtin functions
- Web server integrated
- Arg sanitization risk
- Integrated with FORM
- 123 == "123foo"
  but "123foo" != 123
- SQL integration

Design Choices for HTMX

- Static pages
- Uses existing facilities
  - Can be used to extend HTML
  - Doesn't know HTML syntax
  - Uses the file system
  - Uses UNIX tools
  - extend language via shell commands

Availability

- **Documentation**
  - https://multicians.org/thvv/htmx/expandfile.html
- **Open Source**
  - https://github.com/thvv/expandfile