texosquery: query OS information from \TeX

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Abstract

The \texttt{texosquery} bundle provides the \texttt{texosquery.jar} application (and variations \texttt{texosquery-jre8.jar} and \texttt{texosquery-jre5.jar}) This is a cross-platform Java application to query certain operating system (OS) and locale information. The application is specifically designed for use within \TeX’s shell escape mechanism, through the \TeXOSQuery command provided by the \texttt{texosquery} package (\texttt{texosquery.tex} and \texttt{texosquery.sty}).

The \TeXOSQuery command performs more than a simple piped input as it first changes category codes of various problematic characters and locally defines some short control sequences that are used in the application’s result. These commands aren’t defined outside of \TeXOSQuery, so a direct piped input may cause undefined control sequences. If you really want to use this direct method rather than using \TeXOSQuery, then you will need to run \texttt{texosquery} in backward compatibility mode 0 or 1 (using \texttt{--compatible 1}). The first two versions of \texttt{texosquery} didn’t use those short commands.

Important Note: You will need \TeX’s piped shell escape enabled and you will also need the Java Runtime Environment (JRE) installed. MiKTeX users will need to add \texttt{--enable-pipes} to \TeX’s command line options. (Alternatively, use \texttt{\TeXOSQueryFromFile} if you can’t use the piped shell escape.) The configuration file \texttt{texosquery.cfg} should be edited to reflect your system set-up before use.

There are three variations of the \texttt{texosquery} application provided:

- \texttt{texosquery.jar}: requires at least Java 7, has medium locale support, obeys openin\_any but has additional restrictions imposed for security reasons (no listings outside the current working directory path); Note that Java 7 has reached its end of life and is now deprecated.

- \texttt{texosquery-jre8.jar}: requires at least Java 8, has best locale support, obeys openin\_any but has additional restrictions imposed for security reasons (no listings outside the current working directory path);

- \texttt{texosquery-jre5.jar}: requires at least Java 5, has poor locale support (language scripts not recognised), doesn’t have the walk action, obeys openin\_any but doesn’t
have the extra restrictions of the Java 7 and 8 versions for the listing functions. Note that Java 5 and 6 are deprecated. Old deprecated versions are considered a security risk.

The default is texosquery.jar. Throughout this document texosquery is used to reference the application, regardless which of these three jar files you’ve chosen to use. See section 1.1 for further details.

The aim of the original version of texosquery was to provide a way of accessing the operating system’s locale information. Version 1.3 of the tracklang package provides \TrackLangQueryEnv which uses kpsewhich to query the appropriate locale environment variable (such as $LANG or LC_ALL). Unfortunately this doesn’t work under Windows as the locale information there is stored in the registry. The Lua os.setlocale(nil) function can simply return C or POSIX, which isn’t helpful from tracklang’s point of view. Although Java has its drawbacks, it’s one of the most ubiquitous platform-independent methods to obtain this information. Since it seemed overkill to write a Java application that simply returned the locale, I decided to add a few extra functions that might be of use, but accessing locale information was, and still is, the primary purpose of this application.

Although the POSIX environment variables, such as $LC_ALL, are easy to read with kpsewhich, these days the IETF BCP 47 language tag is the more appropriate way of identifying a locale, so version 1.2 has added the --bcp47 function to support this. The tracklang package has similarly added \TrackLanguageTag{⟨IETF tag⟩}.

The locale package occasionally referenced in this document is still under development at the time of writing. The --numeric, --locale-data, --date-time and --time-zones options are designed to interface with the locale package, so although texosquery and locale will be distributed separately, version 1.2 of texosquery is being developed alongside version 1.0 of the locale package. The aim of the locale package is to use both tracklang and texosquery to automatically set up the document language. For example, in the following \LaTeX document

\documentclass{article}
\usepackage{locale}
\begin{document}
Language: \CurrentLocaleLanguageNativeName.
Region: \CurrentLocaleRegionNativeName.
Today: \CurrentLocaleDate. (Compare with \today.)
Time: \CurrentLocaleTime.
Currency Symbol: \CurrentLocaleCurrency
Integer:
\texosqueryfmtnumber{\CurrentLocaleIntegerPattern}{123456}{0}{0}
Decimal:
\texosqueryfmtnumber{\CurrentLocaleDecimalPattern}{123456}{78}{0}
Percentage:
\texosqueryfmtnumber{\CurrentLocalePercentPattern}{0}{65}{0}
Currency:
\texosqueryfmtnumber{\CurrentLocaleCurrencyPattern}{1234567}{0}{0}
\end{document}

the locale package will automatically:
• load the textcomp package for currency symbols (package option symbols=fontawesome will use fontawesome instead);

• if \LaTeX or Lua\LaTeX:
  – load fontspec (unless option fontspec=false is used);
  – load polyglossia and use \setmainlanguage with options that can be determined from the language tag (use package option support=babel to use babel regardless of the \LaTeX format);

otherwise:
  – load inputenc (default file encoding obtained from texosquery's --codeset-lcs action);
  – load fontenc (font encoding obtained using tracklang to query the language script);
  – load babel with the appropriate language label (use support=none to prevent this);

• load datetime2 with the useregional=text option (use datetime2=false to prevent this).

The generic locale.tex code doesn't load the above packages, but can still obtain information about the locale:

\input locale

Language: \CurrentLocaleLanguageNativeName.  
Region: \CurrentLocaleRegionNativeName.  
Today: \CurrentLocaleDate. (Compare with \today.)  
Time: \CurrentLocaleTime.  
Currency Symbol: \CurrentLocaleCurrency  
Integer: \texosqueryfmtnumber{\CurrentLocaleIntegerPattern}{123456}{0}{0}  
Decimal: \texosqueryfmtnumber{\CurrentLocaleDecimalPattern}{123456}{78}{0}  
Percentage: \texosqueryfmtnumber{\CurrentLocalePercentPattern}{0}{65}{0}  
Currency: \texosqueryfmtnumber{\CurrentLocaleCurrencyPattern}{1234567}{0}{0}  
\bye

So that's the reasoning behind the new v1.2 actions. Hopefully the new locale package will be uploaded to CTAN shortly after the new version of texosquery.
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1 texosquery.jar: the Java application

The texosquery Java command line application looks up certain system information that may be of use in \TeX documents. This information can be obtained using native commands, but the Java application allows an OS-independent approach with results that can easily be captured by \TeX's shell-escape without having to strip formatting information. It also uses control sequence markup to indicate whether characters should be interpreted literally (such as in file names) or if they should obey their current category code (such as punctuation occurring in textual information) or if they should be interpreted in some other way (such as pattern markup). This markup is expanded by \TeXOSQuery when it performs the piped shell escape.

**Important Note:** texosquery provides read-only actions, and I don't intend adding any actions that modify system settings or files.

Since the application is designed to work with \TeX (through \TeXOSQuery defined in texosquery.tex) each action (indicated by a command line switch) will display the result on a single line. For multiple results, each line is grouped. A blank line (or empty group) will be displayed if the information isn't available or is prohibited. A forward slash (\slashes) is always used as a directory divider, regardless of the operating system, so the result can be used, for example, in \input or \includegraphics.

For example, I have a 64-bit Linux operating system installed on my computer, so I could use `uname` in a bash terminal:

```
uname -o -r
```

which (for me) produces:

```
4.1.13-100.fc21.x86_64 GNU/Linux
```

I could also run texosquery directly from the bash terminal:

```
texosquery -o -r
```

which produces the rather more cryptic:

```
{Linux}
{4\fdot 1\fdot 13\fhyn 100\fdot fc21\fdot x86\fusc 64}
```

However texosquery isn't intended for this direct use. It's intended for use with \TeXOSQuery provided by texosquery.tex. Here's a plain \TeX document:

```
\input texosquery
\TeXOSQuery{\result}{-o -r}
def\parseresult#1#2{OS Name: {\tt #1}. OS Version: {\tt #2}.}
\ifx\result\empty
  Query failed!
\else
  \expandafter\parseresult\result
\fi
\bye
```
The markup commands, such as \fusc, are now converted to literal characters with category code 12 ("other"), so the underscore isn’t a problem. This document is now also platform independent (as long as texosquery and a recent version of the JRE are installed). Unlike \unam, texosquery also obeys the order of the command line switches, which makes it easier to define the helper command (\parsedresult in the above) that processes the result.

1.1 Installation and Setup

Installation is best done through your \TeX{} package manager. However if for some reason you need to install this package manually the instructions are below. If you install through your package manager, Windows users will probably find that the .jar files have been converted to .exe (with the .bat files omitted) and Unix-like users may find that the bash scripts are missing the .sh extension (these are actually symbolic links to the distributed .sh files). See section 1.2 to test that the package has been successfully installed.

Even if you use your \TeX{} distribution’s package manager to install this package, you may still need to edit the texosquery.cfg file (see step 3 below). It’s best to copy this file to your \texttt{TEXMFHOME} or \texttt{TEXMFLOCAL} tree to avoid losing your changes when the package is updated.

You can find the correct value of \texttt{TEXMFHOME} using

\texttt{kps\\texttt{which \texttt{-var-value=}TEXMFHOME}}

Similarly for \texttt{TEXMFLOCAL}.

You can find where the package manager has put texosquery.cfg using

\texttt{kps\\texttt{which texosquery.cfg}}

This bundle contains the following files:

- \texttt{texosquery.dtx}
  
  The DTX file contains the source code for this document, and also the files:
  
  - \texttt{texosquery.tex} (generic \TeX{} code)
  - \texttt{texosquery.sty} (\LaTeX{} package wrapper)
  - \texttt{texosquery.cfg} (configuration file)

  The bash scripts (which will need the extensions removed):
  
  - \texttt{texosquery-jre8.sh}
  - \texttt{texosquery.sh}
  - \texttt{texosquery-jre5.sh}

  Windows batch files (which will need the extensions changed to .bat)
  
  - \texttt{texosquery-jre8.batch}
  - \texttt{texosquery.batch}
- texosquery-jre5.batch

- texosquery.ins The driver file used to extract all the above files contained in texosquery.dtx.

- The three different versions of the texosquery application: texosquery-jre8.jar, texosquery.jar and texosquery-jre5.jar. The source code for these is contained in the java sub-directory.

- texosquery.pdf This PDF document.

- README.md The README file in markdown format.

- CHANGES Lists major changes for each version.

To install manually (⟨TEXMF⟩ indicates the TEXMF directory):

1. Run

   \texttt{tex texosquery.ins}

   to extract the .tex, .sty, .cfg, .sh and .batch files.

   \textbf{Windows} Change the extension of the .batch files to .bat (\TeX on Windows prohibits the creation of .bat files). Move the .bat files to somewhere on your system’s path. (You may omit the .bat files you don’t need.) The .sh files may be deleted.

   \textbf{Unix-like} Make the .sh files executable:

   \texttt{chmod u+x texosquery*.sh}

   Move the .sh files to somewhere on your path without the .sh extension. (If the .sh extension is retained, you will have to edit the texosquery.cfg file to include it.) For example (if ~/bin is included in $PATH):

   \texttt{mv texosquery-jre8.sh ~/bin/texosquery-jre8}

   (You may omit the .sh files you don’t need.) The .batch files may be deleted.

2. Move texosquery.tex to ⟨TEXMF⟩/tex/generic/texosquery/

3. Edit texosquery.cfg so that \TeXOSInvokerName is defined to the application of your choice. For example, if you have Java 8 installed:

   \texttt{\def\TeXOSInvokerName{texosquery-jre8}}

   Or if you only have Java 5 or 6 installed:

   \texttt{\def\TeXOSInvokerName{texosquery-jre5}}
You can find out your Java version by running the following in your command prompt or terminal:

```
java -version
```

If the version number starts with 1.8 then you have Java 8 installed, if it starts with 1.7 then you have Java 7, etc.

4. Move `texosquery.cfg` to `(TEXMF)/tex/generic/texosquery/

5. Move `texosquery.sty` to `(TEXMF)/tex/latex/texosquery/

6. Move the `.jar` files to `(TEXMF)/scripts/texosquery/

### 1.2 Installation Test

To test the installation:

1. In the command prompt or terminal do:

   ```
texosquery -b
```

   (Replace `texosquery` with the command that matches the value of \TeXOSInvokerName in the `texosquery.cfg` file described in section 1.1.) The above command should display the system’s default locale. For me, this simply displays the line:

   `en-GB`

   If you get an Unknown option `-b' error, then your OS is picking up an old version of `texosquery`. Check the version number with the `-v` switch.

   ```
texosquery -v
```

   If you get a “command not found” or “bad command or file name” error, then recheck the installation steps in section 1.1 and make sure that the executable file has been placed on your system’s path.

   If this test is successful, try the next step.

2. Create the following plain TeX document called `test.tex`:

   ```
   \input texosquery
   \TeXOSQuery{\result}{-b}\result
   \bye
   ```

   and compile using:

   `pdftex --shell-escape test`
Alternatively, create the following \LaTeX document called test.tex:

\documentclass{article}
\usepackage{texosquery}
\begin{document}
\TeXOSQuery{\result}{-b}\result
\end{document}

and compile using:

pdflatex --shell-escape test

In both cases, the resulting PDF file test.pdf should show the default locale. If not check the transcript test.log which should include something like (\texttt{|texosquery -b|}) or (\texttt{|texosquery-jre8 -b|}) etc. If it simply has the line:

\TeXOSQuery: texosquery -b

(or similar) then the dry run mode was on, which means the shell escape wasn’t used. Check that the \texttt{--shell-escape} switch was used when calling \texttt{pdftex} or \texttt{pdflatex}.

\TeX Live 2017 has added \texttt{texosquery-jre8} to the restricted list, but you need to modify the configuration file to take advantage of this. Make sure that the line

\TeXOSQueryAllowRestricted

hasn’t been commented out in the \texttt{texosquery.cfg} file and try the above example documents in restricted mode.

### 1.3 Accessing file information

If an input file name is required (for example, with the \texttt{--pdfdate} argument described below) then the file may be in the current working directory, relative to the current directory (with forward slash / as the directory divider), an absolute path (again with forward slash) or on \TeX X’s path (in which case, \texttt{kpsewhich} is used to locate it). As from version 1.2, \texttt{texosquery} honours the \texttt{openin\_any} attribute set in the \texttt{texmf.cnf} configuration file. This value is fetched using

\texttt{kpsewhich -var-value=openin\_any}

(You can find the configuration files using \texttt{kpsewhich -a texmf.cnf}) For example, suppose the file \texttt{/tmp/.test} exists. If the \texttt{openin\_any} attribute is set to “a” (any file), then (assuming the operating system allows read-access to that file) the \texttt{texosquery} file-reading operations will be permitted. For example

\texttt{texosquery --pdfdate /tmp/.test}
will return the file modification date in PDF date-time format. However, if openin_any is
set to “r” (restricted), the read access will be denied because the file is considered hidden
so an empty result is returned. Similarly, if openin_any is set to “p” (paranoid), the
read access will be denied again because the file is hidden but also because the file has an
absolute path that isn’t under $TEXMFOUTPUT (assuming that environment variable hasn’t
been set to /tmp).

1.4 MiKTeX
MiKTeX doesn’t support the openin_any variable so, if this is unset, texosquery will
fallback on “a”.
Note that MiKTeX disables piped input by default for security reasons. Since
\TeXOSQuery relies on piped input, you’ll need to enable it with --enable-pipes when
you run \TeX.

1.5 Restricted Mode
TeXLive2017now has texosquery-jre8 on the list of trusted applications that may be
run in restricted mode. In order to make use of this, you need to set up your configuration
file to use both texosquery-jre8 and to automatically switch off the dry run mode if
the restricted shell escape is detected. However, note that the restricted mode has limita-
tions on the characters allowed in the shell escape for security reasons. This means that
arguments (such as file names) can’t be quoted in restricted mode and therefore arguments
that contain spaces can’t be delimited and will cause problems. Either avoid spaces in file
names or use the unrestricted mode.

1.6 Return Values
The return values may include literal text where special characters need to have their cat-
egory code changed to 12 (for example, file names) but the return values may also include
\TeX code that needs to be processed by \TeX, either during the shell escape or deferred
for later (such as date-time or numeric patterns). This means that the result from the shell
escape can’t be automatically detokenized.
Therefore, as from version 1.2, the return values include short control sequences that
are locally defined by \TeXOSQuery and so are only valid within that command’s scope.
For example, \fcln expands to a colon (:) with category code 12 whereas \tcln expands
to a colon according to its current meaning. Note that this has changed from earlier
versions which simply returned the actual characters, which may or may not have had the
category code set to 12 at the start of \TeXOSQuery. To reproduce the original behaviour,
use the compatibility mode (--compatible) with the level set to 0 or 1. For the full list
of shortcut commands, see the definition of \@texosquery@enableshortcs.
If the operating system uses a backslash \ as a directory divider, returned path names
will always replace this with a forward slash / (which is then converted to \fslash, as
described above). This is designed to make the result as compatible as possible with
\TeX file commands (such as \input) which require a forward slash. However, for some
systems, further modification may need to be done. For example, with \TeX{} on Cygwin, the Windows path name `c:\cygwin64\usr\local\texlive` may correspond to the \TeX{} path name `/usr/local/texlive`. This path is returned by `texosquery` as `c:/cygwin64/usr/local/texlive / (fcln and \fsln replaced for clarity). You can use `--strip-path-prefix` to strip the leading `c:/cygwin64` for convenience (see section 1.8).

The output produced by the `texosquery` application will be returned using the system's default file encoding. (For example, UTF-8.) You will need to ensure that your \TeX{} document uses the same encoding if you want to typeset any of the results that may contain non-ASCII characters. You can determine the default encoding with `texosquery -C`, which is formatted to match the options used by the `inputenc` package. (For example, `utf8` for UTF-8.)

To test the file encoding rerun the plain \TeX{} or \LaTeX{} test file in section 1.2 with `-N` instead of `-b`. Most currency symbols are outside the ASCII set, so this should return a non-ASCII character. If you happen to have $ as your currency, then try `en-GB` or `en-IE` which have £ and €, respectively. \LaTeX{} users may need to load `inputenc` and `fontenc`. \Xe\LaTeX{} and Lua\LaTeX{} users may need to load `fontspec`.

As from version 1.6, you can now override the default encoding using the `--encoding` option. This can be set on a document basis, for example:

```
\usepackage[utf8]{inputenc}
\TeXOSQuery{\result}{--encoding UTF-8 -N}
```

or for all documents by editing the `texosquery.cfg` file to include the option in the invoker command.

### 1.7 Locales

The options that have a locale identifier as an argument need the identifier formatted as a regular IETF BCP 47 language tag that uses hyphens as separators. POSIX style locales (with underscores replaced by hyphens, for example `fr-BE.utf8@euro`) are only used as a return value in the `--locale` and `--locale-lcs` options.

**Not all locales are supported by Java.** For example, Irish is supported but Scottish and Welsh aren’t supported by the JRE. The Unicode Consortium’s Common Locale Data Repository (CLDR) can be accessed with Java 8, but the CLDR isn’t enabled by default. It can be turned on using the system property `java.locale.providers`, which may provide additional support. For example, although Welsh isn’t supported by the JRE, it is supported with the CLDR, so both Java 8 and the CLDR locale provider are required for that language. The proposed Java 9 should have the CLDR enabled by default.

The bash script `texosquery-jre8` automatically sets `java.locale.providers` to CLDR, JRE. Alternatively, the `JAVA_TOOL_OPTIONS` environment variable can be set to

```
-Djava.locale.providers=CLDR,JRE
```

which will enable it for all installed Java applications. If you need to set multiple options, these can be combined in the value of `JAVA_TOOL_OPTIONS`. For example

```
-Djava.locale.providers=CLDR,JRE -Dfile.encoding=UTF-8
```
You may find that the results are different depending on the data provider. For example with `java.locale.providers` set to JRE, CLDR then

texosquery -D en-GB

displays the long date in the form “06 November 2016” and the medium date in the form “06-Nov-2016”, but with the ordering reversed to CLDR, JRE (so that the CLDR is queried first) then the long date is now in the form “6 November 2016” and the medium date is in the form “6 Nov 2016”.

Note that texosquery can only access locale information provided by Java. For example, Java currently doesn’t provide any methods to access telephone codes.

1.8 Command line invocation

The syntax for the command line invocation of texosquery is:

texosquery [⟨options⟩] ⟨action⟩ ...

The syntax for `texosquery-jre8` is exactly the same except for the application name:

texosquery-jre8 [⟨options⟩] ⟨action⟩ ...

Similarly for `texosquery-jre5`. (Bash users may need the `.sh` extension if it wasn’t removed from the script name during the installation setup, but it’s best to remove it.)

Available actions are described below. At least one action is required.

Available options (must come before actions):

- `-h` or `--help` or `-help` Displays help message and exits.
- `-v` or `--version` or `-version` Displays version information and exits.
- `--nodebug` No debugging information. Only command line syntax errors are written to STDERR. (Default.)
- `--debug [⟨n⟩]` or `-debug [⟨n⟩]` Set the debugging level, where ⟨n⟩ is a non-negative integer. If ⟨n⟩ is omitted, 3 is assumed. If ⟨n⟩ is 0, then debugging information is suppressed (equivalent to `--nodebug`). If ⟨n⟩ ≥ 1, error messages are written to STDERR. If ⟨n⟩ ≥ 2, any exceptions encountered will additionally write the stack trace to STDERR. If ⟨n⟩ ≥ 3 non-error informational messages are included.
- `--compatible [⟨n⟩]` or `--compat [⟨n⟩]` Set the compatibility mode. The argument should be either a non-negative integer (0 for version 1.0, 1 for version 1.1, 2 for version 1.2 onwards) or the keyword `latest` to indicate the latest version (default). Note that the compatibility mode only affects the available actions and the display style of the result, and does not change security features. For example, the check for the `openin_any` setting was only introduced to version 1.2, but this is still checked even if the compatibility mode is set to 0 or 1.
- `--encoding ⟨charset⟩` or `-enc ⟨charset⟩` (New to version 1.6.) This option may be used to override the default file encoding. For example, if your native file encoding is CP1250, but your document uses UTF-8 then you’ll need to use `--encoding UTF-8`. 

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--default-encoding or -defenc (New to version 1.6.) This option is the default, but may be used to cancel the effect of --encoding. (For example, if you have added --encoding to the invoker command in the texosquery.cfg file, but you want to cancel it in a particular document.)

The following options (introduced in v1.5) allow returned paths or URIs to be altered (for example, if a mount point needs to be removed). Note that these options only affect returned paths, not path names provided in the command line. The substitution is performed after any backslash directory dividers \ are changed to forward slashes / (if applicable) but before non-alphanumerics are changed to control sequences (such as \fcln or \fslh). If there’s no match, the path is returned without alteration.

--strip-path-prefix ⟨prefix⟩ or -sp ⟨prefix⟩ Strip ⟨prefix⟩ from the start of returned path names (but not URIs, see below). For example:

```
texosquery --strip-path-prefix c:/cygwin64 -p article.cls
```

This will strip the c:/cygwin64 mount point. Note that ⟨prefix⟩ isn’t an expression. For a regular expression, use --replace-path. (This option can’t be used with --replace-path.)

--nostrip-path-prefix Cancels the effect of --strip-path-prefix.

--replace-path ⟨regex⟩ ⟨replacement⟩ or -rp ⟨regex⟩ ⟨replacement⟩ This replaces the first occurrence of the regular expression ⟨regex⟩ in any returned path (but not URI) and replaces it with ⟨replacement⟩.

--noreplace-path Cancels the effect of the --replace-path.

--strip-uri-prefix ⟨prefix⟩ or -su ⟨prefix⟩ Replace initial file:/⟨prefix⟩ with just file:/ from returned URIs. Note that ⟨prefix⟩ isn’t an expression. For a regular expression, use --replace-uri. (This option can’t be used with --replace-uri.)

--nostrip-uri-prefix Cancels the effect of --strip-uri-prefix.

--replace-uri ⟨regex⟩ ⟨replacement⟩ or -ru ⟨regex⟩ ⟨replacement⟩ This replaces the first occurrence of the regular expression ⟨regex⟩ in any returned URI and replaces it with ⟨replacement⟩. For example:

```
texosquery -ru file:/C: file://cgwin64/c -u filename
```

--noreplace-uri Cancels the effect of the --replace-uri.

If multiple actions are given, they will be processed in the order specified in the command line invocation. Each result will be displayed on a separate line. As from v1.1, if there are multiple actions, each result will be grouped. This makes it easier to process the results in \TeX. For example:

```
texosquery -l
```

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This just produces (for me):

```
en\fhyn GB\fdot utf8
```

(which expands to \en-\GB.utf8 when used with \TeXOSQuery) whereas

```
texosquery -l -o
```

produces:

```
{en\fhyn GB\fdot utf8}
{Linux}
```

To reproduce the v1.0 display use \texttt{--compatible 0}. (This will also explicitly use the punctuation characters rather than replacing them with the control sequence markup, such as \fhyn or \fdot.)

Note that unavailable information will produce an empty group. For example (assuming nofile doesn’t exist or doesn’t have read access):

```
texosquery -l -d nofile
```

produces:

```
{en\fhyn GB\fdot utf8}
{
}
```

whereas

```
texosquery -d nofile
```

just displays an empty line.

If you’re puzzled as to why an empty line has been returned, try rerunning the command with \texttt{--debug} for further information. Available actions are listed below.

**Action** \texttt{-b} \texttt{or} \texttt{--bcp47}

(New to version 1.2.) This action displays the BCP 47 language tag. For example, my locale is \en-\GB (English in the United Kingdom), so

```
texosquery -b
```

Simply returns:

```
en\fhyn GB
```

(which expands to \en-\GB with \TeXOSQuery) whereas a user whose default locale is set to Swiss German with the new orthography would get:

```
de\fhyn CH\fhyn 1996
```

(which expands to \de-\CH-1996 with \TeXOSQuery).
Action -L or --locale

This action displays the locale information in the POSIX form

\langle lang\rangle-(region).\langle codeset\rangle@\langle modifier\rangle

where \langle lang\rangle is the ISO code for the language (e.g. en), \langle region\rangle is the ISO code for the region (e.g. GB), \langle codeset\rangle is the default code set (e.g. UTF-8) and \langle modifier\rangle is the modifier. Elements may be omitted if unavailable. For example, en-GB.UTF-8 has the \langle modifier\rangle omitted, and en has all but the language omitted. As above, the punctuation characters will actually be returned using the control sequences \fhyn (hyphen), \fdot (dot) and \fatc (at).

If the --encoding option is used, the codeset will reflect that value.

Action -l or --locale-lcs

This action is similar to --locale, but the codeset is converted to lower case and any hyphens are stripped. For example, if --locale returns en-GB.UTF-8, then --locale-lcs would return en-GB.utf8. As above, the punctuation characters will actually be returned using the control sequences \fhyn (hyphen), \fdot (dot) and \fatc (at). Again, if the --encoding option is used, the codeset will reflect that value.

Action -cs or --codeset

(New to version 1.6.) This action returns just the codeset. For example, my default file encoding is UTF-8, so
texosquery --codeset
returns
UTF-8

whereas
texosquery --encoding ISO-8859-1 --codeset
returns
ISO-8859-1

(In both the above examples, the hyphen character is actually returned as the control sequence \fhyn.)

Action -C or --codeset-lcs

(New to version 1.2.) This action returns just the codeset converted to lower case with hyphens stripped. For example, my default file encoding is UTF-8, so
texosquery -C
returns 
utf8

whereas
texosquery --encoding ISO-8859-1 -C
returns
iso88591

**Action** `-o` or `--osname`
This action displays the operating system name. For example, for me this produces:

Linux

**Action** `-r` or `--osversion`
This action displays the operating system version. For example, for me this produces:

4\13\hyn 100\fc21\x86\fusc 64

(which expands to 4.1.13-100.fc21.x86_64 when used with \TeXOSQuery).

**Action** `-a` or `--osarch`
This action displays the operating system architecture. For example, for me this produces:

amd64

**Action** `-M` or `--date-time`

(New to version 1.2.) This action displays all the current date time data in a format suitable for use in \textosqueryfmtdatetime. (See section 3.1.4.)

**Action** `-Z [⟨locale⟩]` or `--time-zones [⟨locale⟩]`

(New to version 1.2.) This action displays all of the time zone mappings for the given locale (or the default if ⟨locale⟩ is omitted) in the format

{{{⟨id1⟩}{⟨short name⟩}{⟨long name⟩}{⟨dst short name⟩}{⟨dst long name⟩}}}...{{{⟨idn⟩}{⟨short name⟩}{⟨long name⟩}{⟨dst short name⟩}{⟨dst long name⟩}}}

The ⟨id⟩ is the unique label used by Java to identify the time zone (such as Europe/London) as used in the time zone information returned by `−M (−date-time)`.  

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Action  -n or --pdfnow

This action displays the current date and time in PDF format. For example

```
\pdfd \fcln 20160704131006\fpls 01\fapo 00\fapo
```

This uses the shorthand tags \pdfd, \fcln, \fpls and \fapo that are locally redefined by \TeXOSQuery to produce a D, a colon (:), a plus sign (+) and an apostrophe (’) with the category code set to 12 to make it consistent with \pdfcreationdate. This also allows for situations where the punctuation characters have been made active (for example, through babel).

Some, but not all, \TeX formats provide \pdfcreationdate, which is more efficient than using the shell escape, but this can be used as a fallback method for those that don’t (for example, X\TeX).

Note that versions 1.0 and 1.1 didn’t use \pdfd etc but simply used the actual characters. For example:

```
D:20160704131006+01’00’
```

If you want to reproduce this format, use --compatible with the level set to 0 or 1.

Action  -d ⟨file⟩ or --pdfdate ⟨file⟩

This action displays the last modified timestamp of the given file in PDF format or a blank line if the file doesn’t exist or the file permissions prohibit this action. Again some, but not all, \TeX formats provide \pdffilemoddate{⟨file⟩}, which is more efficient than using the shell escape.

As with --pdfnow this now uses \pdfd etc which are converted by \TeXOSQuery to characters with the category code set to 12.

This action obeys the openin_any setting, so if access to ⟨file⟩ is forbidden by this setting, the result will be empty.

Action  -s ⟨file⟩ or --filesize ⟨file⟩

This action displays the size in bytes of the given file or an empty string if the file doesn’t exist or the file permissions prohibit this action. Some, but not all, \TeX formats provide \pdffilesizel{⟨file⟩}, which is more efficient than using the shell escape.

This action obeys the openin_any setting, so if access to ⟨file⟩ is forbidden by this setting, the result will be empty.

Action  -c or --cwd

This action displays the current working directory. This obeys the openin_any setting, so this action will return an empty string if this file information is forbidden by that setting.

Action  -m or --userhome

This action displays the user’s home directory. This obeys the openin_any setting, so this action will return an empty string if this file information is forbidden by that setting.
**Action -t or --tmpdir**

This action displays the temporary directory. This obeys the openin_any setting, so this action will return an empty string if this file information is forbidden by that setting.

**Action -i (sep) (dir) [sort] or --list (sep) (dir) [sort]**

This action lists all files in the given directory with the output on a single line using (sep) as the separator between entries. Note that the list doesn’t include the full path, just the file names.

**Important Note:** As from v1.2, new restrictions have been placed on the value of (dir) for security reasons. For all three applications, texosquery-jre8, texosquery and texosquery-jre5, the openin_any setting is checked. If read access to (dir) is forbidden by the openin_any setting, then this action returns an empty string. Additionally, regardless of openin_any, the more restrictive applications, texosquery-jre8 and texosquery, prohibit a value of (dir) that’s outside the current working directory path (e.g. ..) or that has no parent directory (e.g. /). Both texosquery-jre8 and texosquery check the canonical path of (dir), so if (dir) is a symbolic link, the target path is checked.

This is a security feature to prevent any malicious code that might try to recursively list the contents of the entire filing system, which would hog resources, or that might try to discover files outside the current working directory. An exception is made for texosquery-jre5 since that application is already considered insecure (due to Java 5 and 6 being long deprecated), so if you really need (dir) as, say .. (the parent directory) or / (the root directory), you can use texosquery-jre5 (by redefining \TeXOSInvokerName before using \TeXOSQuery) although this isn’t recommended. It will still obey the openin_any setting, so the listing still won’t work with texosquery-jre5 if the openin_any setting is set to p (paranoid).

As from version 1.2, there is now an optional argument (sort), which indicates how the returned list should be sorted. If omitted default is assumed. Available values of (sort):

- **default** Use the default order. This is typically in alphabetical order, but depends on the operating system or JRE.
- **date-ascending** Order by file modified date from oldest to newest. This option has synonyms date and date-asc.
- **date-descending** Order by file modified date from newest to oldest. You may use the shorter date-des value instead.
- **size-ascending** Order by file size from smallest to largest. This option has synonyms size and size-asc.
size-descending Order by file size from largest to smallest. You may use the shorter size-des value instead.

name-ascending Order by file name (case-sensitive) alphabetically. This option has synonyms name and name-asc.

name-descending Order by file name (case-sensitive) in reverse alphabetic order. You may use the shorter name-des value instead.

iname-ascending Order by file name (case-insensitive) alphabetically. This option has synonyms iname and iname-asc.

iname-descending Order by file name (case-insensitive) in reverse alphabetic order. You may use the shorter iname-des value instead.

ext-ascending Order by file extension (case-sensitive) alphabetically. If files have the same extension, they are ordered by name. This option has synonyms ext and ext-asc.

ext-descending Order by file extension (case-sensitive) in reverse alphabetic order. If files have the same extension, they are ordered by name (reverse alphabetic order). You may use the shorter ext-des value instead.

This action obeys the openin_any setting for all the listed files as well as for the directory ⟨dir⟩, so if access to a file in the directory is forbidden, the file will be omitted from the list. (This action is equivalent to the following with ⟨regex⟩ set to .* to match all files.)

If you want to excluded hidden dot files (where they aren’t automatically excluded by openin_any), use the --filterlist action described below with ⟨regex⟩ set to [^\].*. (Remember that you’ll need to use \string when using the shell escape, as noted below.)

**Important Note:** Unlike most of the return values the ⟨sep⟩ part here isn’t escaped, so take care if ⟨sep⟩ contains any commands. For example, if you want to use \ as the separator, you’ll need to use \string\noexpand\string\ in the ⟨sep⟩ part within \TeXOSQuery.

For example:
\TeXOSQueryFileList{\result}{\string\noexpand\string\}{.}
calls (through the shell escape):
texosquery -i '\noexpand\' .'.
(the two \string commands have detokenized their arguments) so texosquery uses \noexpand\ as the separator in the returned list, but this list is expanded as it’s read in. However \noexpand prevents the \ from being expanded, so the separator becomes just \ which may be (re)defined before the resulting list is processed.

Note that \TeXOSQueryFileList automatically adds the single quotes around the arguments. If \TeXOSQuery is used explicitly, these quotes would need to be added as appropriate.
**Action** -id \(\langle\text{sep}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --list-dir \(\langle\text{sep}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

This action is like --list but only includes sub-directories of \(\langle\text{dir}\rangle\). The caveats and security notes for --list also apply here.

**Action** -r \(\langle\text{sep}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --list-regular \(\langle\text{sep}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

This action is like --list but only includes regular files. The caveats and security notes for --list also apply here.

**Action** -f \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --filterlist \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

This action is like --list but only lists those files whose name matches the regular expression given in \(\langle\text{regex}\rangle\). Note that since this uses Java’s String.matches method this tests for a complete match on the file name (not including directory path). For example, if \(\langle\text{regex}\rangle\) is foo.*, it will only match files whose name starts with foo (for example, foobar will match but barfoo won’t). Use .*foo.* to match all files that contain foo in the name (so foobar and barfoo will both match).

**Important Note:** You can’t have an empty regular expression. You can use the regular expression . * to match all files (which is what --list does).

As from version 1.2, this action now has an optional argument \(\langle\text{sort}\rangle\), which indicates how to sort the returned list. The available values for \(\langle\text{sort}\rangle\) are the same as for --list, described above.

The caveats and security notes for --list also apply here.

**Action** -fd \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --filterlist-dir \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

This action is like --filterlist but only includes sub-directories of \(\langle\text{dir}\rangle\).

The caveats and security notes for --list also apply here.

**Action** -fr \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --filterlist-regular \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

This action is like --filterlist but only includes regular files.

The caveats and security notes for --list also apply here.

**Action** -w \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\) or --walk \(\langle\text{sep}\rangle\) \(\langle\text{regex}\rangle\) \(\langle\text{dir}\rangle\) \([\langle\text{sort}\rangle]\)

(New to version 1.2. Not available with texosquery-jre5.)

This action starts from the directory \(\langle\text{dir}\rangle\) which must be on the current working directory’s path and returns a list separated by \(\langle\text{sep}\rangle\) of all the regular files whose basename matches the regular expression \(\langle\text{regex}\rangle\) (as for the filtered file listings described above), recursively descending sub-directories. Any files or sub-directories that are hidden, unreadable or symbolic links are skipped. The list is sorted according to \(\langle\text{sort}\rangle\), which is as for the file listing actions described above. Note that \(\langle\text{dir}\rangle\) is first converted to its canonical
path, so if ⟨dir⟩ is a symbolic link, the security check will test if the target path is on the current working directory path.

As with the above file listings, the separator ⟨sep⟩ isn’t escaped so take care if ⟨sep⟩ contains any commands. The resulting list will consist of paths relative to ⟨dir⟩.

**Important Note:** This action requires at least Java 7 so it’s not available with texosquery-jre5.jar.

**Action** -u ⟨file⟩ or --uri ⟨file⟩

This action displays the URI of the given file or an empty string if the file doesn’t exist or if the file permissions or the openin_any setting prohibit read access.

**Action** -p ⟨file⟩ or --path ⟨file⟩

This action displays the canonical path of the given file or an empty string if the file doesn’t exist or if the file permissions or the openin_any setting prohibit this action.

**Action** -e ⟨file⟩ or --dirname ⟨file⟩

(New to v1.1.) This action displays the canonical path of the given file’s parent (that is, the directory containing ⟨file⟩) or an empty string if the file doesn’t exist or if the file permissions or the openin_any setting prohibits this action. Note that this is different to the Unix-like dirname command, which will return a relative path if ⟨file⟩ isn’t an absolute path.

**Action** -N [[language tag]] or --numeric [[language tag]]

(New to v1.2.) This action displays:

\{⟨locale tag⟩}\{⟨group sep⟩\}⟨⟨decimal sep⟩\}⟨⟨exp sep⟩\}⟨⟨use group⟩\}⟨⟨currency code⟩\}⟨⟨regional currency code⟩\}⟨⟨currency sym⟩\}⟨⟨\TeX currency⟩\}⟨⟨currency sep⟩\}

for the ⟨language tag⟩ given in the optional argument. If omitted, the default locale is assumed. The returned values are:

- ⟨tag⟩ the language tag.
- ⟨group sep⟩ the numeric group separator.
- ⟨decimal sep⟩ the decimal separator.
- ⟨exp sep⟩ the exponent separator.
- ⟨use group⟩ 1 if the locale uses number grouping otherwise 0.
- ⟨currency code⟩ the ISO 4217 currency code.
- ⟨regional currency code⟩ either the ISO 4217 currency code or an unofficial code. The only unofficial codes returned are: GGP (Guernsey pound), JEP (Jersey pound), IMP (Isle of Man pound), KID (Kiribati dollar) and TVD (Tuvaluan dollar).
• ⟨currency sym⟩ the currency symbol. (This may sometimes be the same as ⟨currency code⟩.) Non-ASCII characters will be marked up with \twrp (see below).

• ⟨ŁeX currency⟩ the currency symbol using ŁeX code provided by texosquery. This is obtained by substituting known Unicode currency symbols occurring in ⟨currency sym⟩ with \texosquerycurrency{⟨xxx⟩}, which expands to the control sequence given by the name texosquerycurrency{⟨xxx⟩}. These commands are defined in texosquery.tex. Since there are no generic ŁeX commands available for all these symbols (except $), these commands will need to be redefined as appropriate but are provided in the event that there’s no UTF-8 support. There is a limited check for some known currency commands, such as \texteuro or \euro, but if an appropriate currency command can’t be found, the \texosquerycurrency{⟨xxx⟩} commands will be defined to simply the currency label (usually the same as the ⟨xxx⟩ part).

• ⟨currency sep⟩ the currency decimal separator.

The language tag should conform to IETF BCP 47. See http://docs.oracle.com/javase/8/docs/api/java/util/Locale.html for further details. If you are using texosquery-jre5, only the language, region and variant elements will be recognised since the language tag support was introduced in Java 7.

For example:

texosquery -N en-GB

produces

{en-GB}{,}{.}{E}{1}{GBP}{GBP}{\twrp{£}}{\texosquerycurrency{pound}}{.}

The \twrp command is used by texosquery to markup a non-ASCII character. This command is one of the shorthands only defined within \TeXOSQuery. In this case it’s a shortcut for the command \texosquerynonascii\twrp. By default this just does its argument, but it may be redefined to perform some other action such as converting from one encoding to another.

In most cases the ⟨regional currency code⟩ will be the same as ⟨currency code⟩. A few non-ambiguous unofficial codes are known by texosquery and may be used if the country code is recognised. For example,

texosquery -N en-IM

produces

{en-IM}{,}{.}{E}{1}{GBP}{IMP}{\twrp{£}}{M\twrp{£}}{IMP}{\texosquerycurrency{pound}}{.}

If Java doesn’t support the given locale, the currency code will appear as XXX with the symbol ¶ (generic currency sign).

Important Note: This option and the following (--locale-data) are best used with XeŁeX or LuaŁeX to deal with the non-ASCII characters. Make sure the file encoding used by Java matches the ŁeX file.

(See section 1.7 for the difference in locale providers.)
**Action** -D [\langle language tag\rangle] or --locale-data [\langle language tag\rangle]

(New to v1.2.) This action provides more extensive information than --numeric. The result has nested groups to assist parsing. Again the \langle language tag\rangle may be omitted. For example,

texosquery --locale-data

For the default locale or
texosquery --locale-data en-GB

for the locale identified by en-GB. As with all the other actions, the result is written to STDOUT on a single line. Its overall length and the use of the shortcut commands used by texosquery to markup certain elements mean that it’s not particularly human-readable, but it's designed to be easy for \TeX{} to interpret. The information is returned in the following format:

\{\langle locale block\rangle\}\{\langle current date block\rangle\}\{\langle date pattern block\rangle\}\{\langle current time block\rangle\}\{\langle time pattern block\rangle\}\{\langle current date time block\rangle\}\{\langle date time pattern block\rangle\}\{\langle days of the week block\rangle\}\{\langle abbreviated dates of the week block\rangle\}\{\langle standalone days of the week block\rangle\}\{\langle abbreviated standalone days of the week block\rangle\}\{\langle month names block\rangle\}\{\langle abbreviated month names block\rangle\}\{\langle current month names block\rangle\}\{\langle abbreviated current month names block\rangle\}\{\langle standalone month names block\rangle\}\{\langle abbreviated standalone month names block\rangle\}\{\langle numeric block\rangle\}\{\langle numeric patterns block\rangle\}

There may seem to be some repetition here with the month and week day names, but with texosquery-jre8, the second set are the standalone version (for example, for a column header). In some languages, these may be different from the names used in the date format. Since this is new to Java 8, it’s not supported in texosquery.jar or texosquery-jre5.jar and they simply reproduce the non-standalone names.

The information supplied with this option is quite complex, but it’s used by the locale package to set up all the required information for each locale used in the document. Any non-ASCII characters are marked up with \twrp, which is locally defined by \TeXOSQuery{} to expand to \texosquerynonasciiwrap. This may be redefined to deal with the characters if necessary. For example, if the character needs to be converted from one encoding to another.

The blocks are:

\langle locale block\rangle

The locale information in the form:

\{\langle tag\rangle\}\{\langle language name\rangle\}\{\langle locale language name\rangle\}\{\langle region name\rangle\}\{\langle locale region name\rangle\}\{\langle variant name\rangle\}\{\langle locale variant name\rangle\}

The \langle tag\rangle is the language tag (the same format as -bcp47).
The \langle language name\rangle is the language name in the operating system’s default locale.
The \langle locale language name\rangle is the language name in the locale’s language.
For example, my locale is *en-GB*, so if I use

```latex
texosquery -D en-GB
```

then both *(language name)* and *(locale language name)* will be *English*, but if I use:

```latex
texosquery -D fr-GB
```

then *(language name)* will be *French* and the *(locale language name)* will be *fran\twrp{ç}ais* (note the non-ASCII character has been marked up). The locale tag *fr-GB* indicates that I’m writing in French but I’m in the United Kingdom (so the currency should be GBP).

The *(region name)* is the region’s name in the operating system’s default language. The *(locale region name)* is the region’s name in the locale’s language.

So for me with *-D en-GB* I get *United\tspc Kingdom* for both *(region name)* and *(locale region name)*. This illustrates another of the shorthand commands that texosquery uses that’s only locally defined within \TeXOSQuery. In this case, \tspc just expands to a space. This is used to avoid accidentally discarding any intentional spaces that might follow a command name or any intentional consecutive spaces.

If, however, I use *-D fr-GB* I still get *United\tspc Kingdom* in *(region name)*, but *(locale region name)* is now *Royaume-Uni*.

The *(variant name)* is the language’s variant. For example, with *de-CH-1996* (Swiss German using the new orthography), the variant is 1996. There’s no variant in *en-GB* so this value is empty for me.

The *(locale variant name)* is the variant in the locale’s language. In the case of *de-CH-1996* this is still 1996.

*(current date block)*

This returns the current date in four different formats and also an integer that indicates the first day of the week in the given locale:

```latex
{⟨full date⟩}{⟨long date⟩}{⟨medium date⟩}{⟨short date⟩}{⟨first day⟩}
```

The actual date formats depend on the locale. For example, with *en-GB* the *(full date)* is (assuming today is 2016-11-08):

```latex
Tuesday,\tspc 8\tspc November\tspc 2016
```

(Tuesday, 8 November 2016). The *(long date)* is

```latex
08\tspc November\tspc 2016
```

25
(08 November 2016). The ⟨medium date⟩ is
08\thyn Nov\thyn 2016

(08-Nov-2016). The ⟨short date⟩ is
08\tslh 11\tslh 16

(08/11/2016). Note that there’s a difference between using the CLDR locale data and the JRE data. If I’m using the Java 7 compatible texosquery.jar which only uses JRE locale data, then I get the above results, but if I use the bash script texosquery-jre8 which sets java.locale.providers to CLDR, JRE then I get a slightly different result. The ⟨long date⟩ is
8\tspc November\tspc 2016

(8 November 2016) and the ⟨medium date⟩ is
8\tspc Nov\tspc 2016

(8 Nov 2016). The ⟨medium date⟩ may be numeric or may be an abbreviated form of ⟨long date⟩, depending on the language and the locale provider. Some languages aren’t supported by JRE but are supported by CLDR. (Some aren’t supported by either, but there’s a chance that those languages will eventually be added to the CLDR.) For example, if I use -D cy-GB with the JRE as the locale provider I just get the en-GB dates, but if I use the CLDR provider I get Welsh dates.

Note that the proposed Java 9 should automatically use the CLDR as the locale provider, which is being increasingly adopted by applications as a common data repository.

The first day of the week index is zero-based starting with Monday. This is done in order to be compatible with pgfcalendar. For example, with -D en-GB ⟨first day⟩ is 0 (Monday), but with pt-BR ⟨first day⟩ is 6 (Sunday). The locale package provides a way of converting the index to Monday=1 or Sunday=1 indexing.

⟨date pattern block⟩
The pattern used to format the full date, long date, medium date and short date. This is in the form:
{ ⟨full pattern⟩ }{ ⟨long pattern⟩ }{ ⟨medium pattern⟩ }{ ⟨short pattern⟩ }
Each pattern uses shorthand mark-up that’s only locally defined within \TeX OSQuery. These short commands are expanded to longer commands provided by texosquery.tex to avoid name clashing with other packages. When used directly in the document text, these expand to reproduce the pattern.

For example, with -D en-GB I get the following pattern for the short date:
\patdtf{2}{d}\tslh \patdtf{2}{M}\tslh \patdtf{2}{y}
When parsed by \TeXOSQuery{}, this is internally converted to
\texosquerydtf{2}{d}/\texosquerydtf{2}{M}/\texosquerydtf{2}{y}
But default this simply expands to dd/MM/yy but may be used in the first argument
of \textosqueryfmtdatetime{}. See sections 3.1.3 and 3.1.4 for further details.

\<current time block\>
The current time provided in various formats suitable to the given locale:
\{\<full time\>\}\{\<long time\>\}\{\<medium time\>\}\{\<short time\>\}
As with the current date, the actual format depends on the locale and the locale
provider. For example, with en-GB I get:
\{15:59:41\spc o\csq clock\spc GMT\}\{15:59:41\spc GMT\}\{15:59:41\}\{15:59\}
with the JRE. If I switch to CLDR (in the bash script texosquery-jre8) I get:
\{16:00:51\spc Greenwich\spc Mean\spc Time\}\{16:00:51\spc GMT\}\{16:00:51\}\{16:00\}

\<time pattern block\>
The pattern used to format the full time, long time, medium time and short time.
\{\<full time pattern\>\}\{\<long time pattern\>\}\{\<medium time pattern\>\}\{\<short time pattern\>\}
Again, when used with \TeXOSQuery{}, the short commands, such as \patdtf{}, are
internally converted. They're not defined outside that scope.

\<current date time block\>
The current date and time provided in various formats suitable to the given locale:
\{\<full date time\>\}\{\<long date time\>\}\{\<medium date time\>\}\{\<short date time\>\}
This may simply be the date and time from above separated by a space.

\<date time pattern block\>
The pattern used to format the full date time, long date time, medium date time and
short date time. This may simply be the date and time patterns from above separated
by a space.
\{\<full date time pattern\>\}\{\<long date time pattern\>\}\{\<medium date time pattern\>\}\{\<short date time pattern\>\}

\<days of the week block\>
The week day names (starting with Monday for consistency with pgfcalendar) in
the locale’s language. Non-ASCII characters are marked up with \twrp. 
\{(Monday)\}\{(Tuesday)\}\{(Wednesday)\}\{(Thursday)\}\{(Friday)\}\{(Saturday)\}\{(Sunday)\}

\{abbreviated days of the week block\}
As above, but abbreviated.

\{month names block\}
The month names.

\{abbreviated month names block\}
The abbreviated month names.

\{standalone days of the week block\}
The week day names when used in a standalone context (for example, a column header). This may be the same as the earlier \{days of the week block\} (and will be the same for texosquery.jar and texosquery-jre5.jar). The standalone support was introduced to Java 8.

\{abbreviated standalone days of the week block\}
As above, but abbreviated.

\{standalone month names block\}
The month names when used in a standalone context (for example, a column header). This may be the same as the earlier \{month names block\} (and will be the same for texosquery.jar and texosquery-jre5.jar). The standalone support was introduced to Java 8.

\{abbreviated standalone month names block\}
As above but abbreviated.

\{numeric block\}
The numeric data similar to \--numeric but it’s missing the \{tag\} (which is provided in the earlier \{locale block\}) and there are two extra items:

\{(group sep)\}\{(decimal sep)\}\{(exp sep)\}\{(use group)\}\{(currency code)\}\{(regional currency code)\}\{(currency sym)\}\{(currency tex)\}\{(currency sep)\}\{(percent sym)\}\{(per mill sym)\}

See above for the elements that are also provided in \--numeric. The additional elements are \{percent sym\} and \{per mill sym\}, which are the percent and per-mill symbols, respectively. The percent symbol % has its category code changed to 12 by Te\TeXOSQuery. As with other non-ASCII characters, the per-mill symbol will be marked up with \texttt{\textwarp}.

\{numeric patterns block\}
The patterns used to format decimals, integers, currency and percentages.
{(decimal pattern)}{(integer pattern)}{(currency pattern)}{(percentages pattern)}

As with the date and time patterns, when used with \TeXOSQuery, the short commands, such as \patdgt, are internally converted. They’re not defined outside that scope.

If a pattern is used directly in the text, it will expand to the original pattern padded to ten digits. (Eleven digit integers are outside \TeX’s maximum number range.)

Any of these numeric patterns may be used in the first argument of the low-level user command \texosqueryfmtnumber described in section 3.1.5. This command uses the following macros:

\texosquerypatfmtcurrencysign

The currency sign (defaults to \$). For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨currency sym⟩} or {⟨currency tex⟩} elements.

\texosquerypatfmtgroupsep

The group separator (defaults to ,). For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨group sep⟩} element.

\texosquerypatfmtdecsep

The decimal separator (defaults to .). For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨dec sep⟩} element.

\texosquerypatfmtcurdecsep

The monetary decimal separator (defaults to .). For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨currency sep⟩} element.

\texosquerypatfmtexp

The exponent sign (defaults to E). For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨exp sep⟩} element.

\texosquerypatfmtpercentsign

The percent symbol. For example, when parsing the previous ⟨numeric block⟩, this command can be redefined to the {⟨percent sym⟩} element.
The per-mill symbol. For example, when parsing the previous \texttt{numeric block}, this command can be redefined to the \texttt{\{\texttt{per-mill sym}\}} element.

The international currency sign. This is defined as \texttt{\£} by default, unless the command \texttt{\textcurrency} has been defined, in which case that's used instead. If the UTF-8 character \texttt{¤} is available and \texttt{\textcurrency} hasn't been defined before \texttt{texosquery} was input, then you will need to redefine this command as appropriate.

The minus sign.

The plus sign.

## texosquery.tex: generic \TeX{} code

You can run \texttt{texosquery} directly from \TeX{}'s shell escape. For example:

\texttt{\input\"texosquery \--locale\"}

However, \texttt{texosquery} uses markup commands in some of the results which need to be defined first. The file \texttt{texosquery.tex} provides generic \TeX{} code to do this for you and stores the result in a control sequence.

Plain \TeX{} users can input this file through the usual \texttt{\input} method:

\texttt{\input texosquery}

\LaTeX{} users may also simply input this file:

\texttt{\input{texosquery}}

but may prefer the standard package approach:

\texttt{\usepackage{texosquery}}

**Important Note:** The commands described below are all fragile.

The basic command to run \texttt{texosquery} and capture its output in a control sequence is:

\texttt{\TeXOSQuery\{\texttt{cs}\}\{\texttt{args}\}}
where \langle cs \rangle is the control sequence in which to store the result and \langle args \rangle are the command line arguments to pass to texosquery. This first locally changes the category code of some problematic characters and defines the short markup commands that texosquery uses to identify characters that need to be interpreted literally (for example, in file names). These commands will automatically be expanded by \TeXOSQuery when the result is input. For example

texosquery -n

produces
\pdfd \fcln 20161129221559\fps 00\fapo 00\fapo

but when used with
\TeXOSQuery{\result}{texosquery -n}

the \result command will be set to
D:20161129221559+00'00'

where the characters D : + and ' all have category code 12 (other).

If you're not able to use \TeX’s piped shell escape but you can run texosquery outside of \TeX, then another approach is to first run texosquery with the output redirected to a temporary file and then build your document, but instead of using \TeXOSQuery, use:
\TeXOSQueryFromFile{\langle cs \rangle}{\langle file name \rangle}

where \langle file name \rangle is the name of the temporary file. For example, first run

texosquery -b -n > tmpresult.tex

and then in the document:
\TeXOSQueryFromFile{\result}{tmpresult}

Avoid spaces and other awkward characters in the file name.

In the case of \TeXOSQuery, if the command failed, \langle cs \rangle will be set to empty. This will also occur with \TeXOSQueryFromFile if the file doesn’t exist. It’s best to always test for success after use. For example:
\TeXOSQuery{\result}{-b}
\ifa\result\empty
  Failed!
\else
  Result: \result.
\fi

In the case of \TeXOSQuery, failure can occur because the dry run mode was on, or it can occur if the query was denied (for example, forbidden file access), or if there’s a syntax error in the system call. In the case of \TeXOSQueryFromFile, the control sequence will be empty if the file doesn’t exist or if the file was empty.
As from version 1.2, `texosquery` checks the `openin_any` setting, which may forbid read access. Java’s security manager or the filing system may also forbid read access.

To determine the cause of the error, first inspect the log file to check if the shell escape was used. In the above example, if the shell escape was permitted, then the log file should include

```
(!texosquery -b)
```

Copy and paste the system call (`texosquery -b` in the above case) into your command prompt or terminal and insert the `--debug` switch at the start of the argument list. For example:

```
texosquery --debug -b
```

This should help determine whether it’s a syntax error or a query forbidden by the operating system.

If multiple queries are required, it’s more efficient to perform them all in one go. For example:

```
\TeXOSQuery{\result}{-l -n -o}
```

\def\parseresult#1#2#3{\%
  Locale: #1. Now: #2. OS: #3.\%
}

```
\ifx\result\empty
  Query failed.
\else
  \expandafter\parseresult\result
\fi
```

(Make sure you have at least v1.1 for this to work correctly.)

**Important Note:** Take care of characters that have a special meaning to your shell. For example, bash interprets `#` as a comment. For example, if you have a file called `image#1.png`, then you can’t simply do

```
\TeXOSQuery{\result}{-p image#1.png}
```

since bash will pass this as

```
texosquery -p image
```

(The `#1.png` part is treated as a comment.) Nor can you do

```
\TeXOSQuery{\result}{-p image\#1.png}
```

as `\TeX` will replace the `\#` with `#` when passing the command invocation to the shell. The only way to deal with this situation is to do

```
\TeXOSQuery{\result}{-p image\string\#1.png}
```
to protect the # character from both \TeX{} and the shell.

Dry run mode is determined by the conditional

\ifTeXOSQueryDryRun

If true, the shell escape won’t be used and the requested command invocation will be printed in the transcript file prefixed with

\TeXOSQuery:

(the control sequence \langle cs \rangle will be set to empty).

**Important Note:** Remember that a query can still fail even if the dry run mode is off.

Note that if you switch off the dry run mode when the shell escape setting forbids the execution of \texttt{texosquery}, then you’ll get the rather annoying error:

runpopen command not allowed: texosquery

! I can't find file `"|texosquery -b"'.
\TeXOSQueryInvoker ...\TeXOSInvokerName \space #1"

\TeXOSQuery ...noexpand #1{\TeXOSQueryInvoker {#2}
}}\x \f

1.5 \TeXOSQuery{\result}{-b} "^M

(Press Enter to retry, or Control-D to exit)

By default, the dry run mode is only switched off if the unrestricted shell escape mode is on (detected through \texttt{\shellescape} or \texttt{\pdfshellescape}).

If \texttt{texosquery} is added to the restricted list, you can add

\TeXOSQueryAllowRestricted

to the \texttt{texosquery.cfg} file. (This command can’t be used outside of that file.)

If you get the above error, then:

- make sure you don’t have \texttt{\TeXOSQueryAllowRestricted} in your \texttt{texosquery.cfg} file;

- make sure you run \TeX{} with the shell escape enabled;

- check the definition of \texttt{\TeXOSInvokerName};

- try using the application directly from the command prompt or terminal. For example, in the above message, the bit between "| and "' (that is, \texttt{texosquery-jre8 -b}) shows the attempted system call. Copy and paste it directly into your operating system’s **command prompt or terminal** and to check the application has been installed correctly.
The \TeXOSQuery command uses \TeXOSInvokerName to reference the application name. This defaults to texosquery but needs to be redefined to reflect the particular system call that's required. For example, texosquery (Java 7) or texosquery-jre8 (Java 8). This redefinition can be done in the configuration file texosquery.cfg for a system-wide setting. See section 1.1 for further details.

**Important Note:** Some of the shortcut commands listed below require extra arguments after the relevant switch. These are automatically enclosed in single-quotes to protect any spaces, but only with the *unrestricted* shell escape. If the argument actually contains any single-quote characters, make sure you use \string\' to prevent interference. The quote character is forbidden in the shell escape in restricted mode (see section 1.5), so the arguments won't be delimited in this case and the quote character should be avoided.

Since a file name reference may need to be obtained from \jobname, which sometimes includes double-quotes, the first double-quote pair found is stripped in file name arguments. Any other double-quotes will need to be protected in the same manner as single-quotes (but this shouldn't be an issue if you use a safe file naming scheme) and again be aware of the limitations imposed by the restricted shell escape.

All paths should use a forward slash for the directory divider.

### 2.1 Locale

The locale (-l or --locale-lcs) information can be obtained using:

\TeXOSQueryLocale{⟨cs⟩}

Note that this uses the lower case codeset form, which has a better chance of matching the encoding names used by the inputenc package. If you want the unprocessed codeset name, you can do:

\TeXOSQuery{⟨cs⟩}{-L}

If you just want the codeset in the same form as --locale-lcs you can do:

\TeXOSQuery{⟨cs⟩}{-C}

Similarly for the unprocessed codeset (--encoding).

The IETF BCP 47 language tag (-b or --bcp47) can be obtained using:

\TeXOSQueryLangTag{⟨cs⟩}

The numeric separators and currency symbols (-N or --numeric) can be obtained using

\TeXOSQueryNumeric{⟨cs⟩}{⟨locale⟩}

The ⟨locale⟩ should be a valid language tag or may be empty for the system’s default locale. Similarly for the command below.

All the locale data (-D or --locale-data) can be obtained using

\TeXOSQueryLocaleData{⟨cs⟩}{⟨locale⟩}
2.2 Operating System Information
The OS name (-o or --osname) can be obtained using:
\TeXOSQueryName{⟨cs⟩}

The OS version (-r or --osversion) can be obtained using:
\TeXOSQueryVersion{⟨cs⟩}

The OS architecture (-a or --osarch) can be obtained using:
\TeXOSQueryArch{⟨cs⟩}

2.3 Dates and Times
The current date and time information (-M or --date-time) can be obtained using:
\TeXOSQueryDateTime{⟨cs⟩}

Example usage:
\texosquerydefpattern{\pattern}{\%2d/\%2M/\%4y \%2H:\%2m:\%2s}
\TeXOSQueryDateTime{\datetimedata}
\ifx\datetimedata\empty Query Failed! \else \expandafter\texosqueryfmtdatetime\expandafter\pattern\datetimedata \fi

Note that commands such as \texosqueryfmtpatMMM will need to be defined to produce textual elements. See sections 3.1.3 and 3.1.4 for further details.

The time zone mappings (-Z or --time-zones) can be obtained using:
\TeXOSQueryTimeZones{⟨cs⟩}{⟨locale⟩}

Leave ⟨locale⟩ empty if the default locale is required.

The current date-time stamp in PDF format (-n or --pdfnow) can be obtained using:
\TeXOSQueryNow{⟨cs⟩}

This is provided for the benefit of users who don’t have \pdfformatdate defined by their \TeX format (for example, Xe\TeX).

The modification date-time stamp in PDF format for a file (-d or --pdfdate) can be obtained using:
\TeXOSQueryFileDate{⟨cs⟩}{⟨filename⟩}

where ⟨filename⟩ is the name of the file. This is provided for the benefit of users who don’t have \pdfformatdate defined by their \TeX format.
2.4 File Operations

The current working directory (-c or --cwd) can be obtained using:
\TeXOSQueryCwd{(cs)}

The home directory (-m or --userhome) can be obtained using:
\TeXOSQueryHome{(cs)}

The temporary directory (-t or --tmpdir) can be obtained using:
\TeXOSQueryTmpDir{(cs)}

The size in bytes of a file (-s or --filesize) can be obtained using:
\TeXOSQueryFileSize{(cs)}{(filename)}

where \textit{filename} is the name of the file. This is provided for the benefit of users who don’t have \pdffilesize defined by their \LaTeX format.

The URI of a file (-u or --uri) can be obtained using:
\TeXOSQueryFileURI{(cs)}{(filename)}

where \textit{filename} is the name of the file. (Any percent symbols \% contained in the URI will have their category code set to 12.)

The canonical path of a file (-p or --path) can be obtained using:
\TeXOSQueryFilePath{(cs)}{(filename)}

where \textit{filename} is the name of the file.

The canonical path of a file’s parent (-e or --dirname) can be obtained using:
\TeXOSQueryDirName{(cs)}{(filename)}

where \textit{filename} is the name of the file.

The list of files in a given directory (-i or --list) can be obtained using:
\TeXOSQueryFileList{(cs)}{(sep)}{(dir)}

where \textit{sep} is the separator and \textit{dir} is the directory name. For example:
\TeXOSQueryFileList\result{{.}{{.}}}

will store a comma-separated list of all the files contained in the current directory in the control sequence \texttt{\result}.

To omit directories (-ir or --list-regular):
\TeXOSQueryRegularFileList{(cs)}{(sep)}{(dir)}

To omit regular files (-id or --list-dir):
\TeXOSQuerySubDirList{(cs)}{(sep)}{(dir)}
A filtered list of files in a given directory (\texttt{-f} or \texttt{--filterlist}) can be obtained using:

\TeXOSQueryFilterFileList{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

where \langle regex \rangle is a regular expression. Take care of any backslashes in the regular expression! For example, to list only those files that have an extension:

\TeXOSQueryFilterFileList{\langle result \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

Note the use of \texttt{\string\}, to ensure that \texttt{\_} isn’t interpreted as a command. Another example, list only .png and .jpg files in the directory called images:

\TeXOSQueryFilterFileList{\langle result \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

\textbf{Important Note:} Unlike most of the return values the \langle sep \rangle part here isn’t escaped, so take care if \langle sep \rangle contains any commands. For example, if you want to use \texttt{\_\_} as the separator, you’ll need to use \texttt{\string\noexpand\string\_\_} in the \langle sep \rangle part.

\TeXOSQueryFilterFileList{\langle result \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

If you want the list sorted, you can use the following which set the optional \langle sort \rangle argument.

Order by last modified date starting with the oldest (\texttt{date-ascending}):

\TeXOSQueryFileListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the regular files only list:

\TeXOSQueryRegularFileListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the sub-directories only list:

\TeXOSQuerySubDirListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or for the filtered list:

\TeXOSQueryFilterFileListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

or for the filtered regular files only list:

\TeXOSQueryFilterRegularFileListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

or for the filtered sub-directories only list:

\TeXOSQueryFilterSubDirListDateAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

Order by last modified date starting with the newest (\texttt{date-descending}):

\TeXOSQueryFileListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the regular files only list:

\TeXOSQueryRegularFileListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}
or the sub-directories only list:
\TeXOSQuerySubDirListDateDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListDateDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListDateDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListDateDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

Order by file size starting with the smallest (size-ascending):
\TeXOSQueryFileListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListSizeAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

Order by file size starting with the largest (size-descending):
\TeXOSQueryFileListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListSizeDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}
\TeXOSQueryFilterFileListSizeDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListSizeDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListSizeDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

Order by file name in alphabetical order (name-ascending):
\TeXOSQueryFileListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the regular files only list:
\TeXOSQueryRegularFileListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the sub-directories only list:
\TeXOSQuerySubDirListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or for the filtered list:
\TeXOSQueryFilterFileListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListNameAsc{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}

Order by file name in reverse alphabetical order (name-descending):
\TeXOSQueryFileListNameDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the regular files only list:
\TeXOSQueryRegularFileListNameDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the sub-directories only list:
\TeXOSQuerySubDirListNameDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or for the filtered list:
\TeXOSQueryFilterFileListNameDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListNameDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}

or the filtered sub-directories only list:
Order by file name in case-insensitive alphabetical order (iname-ascending):
\TeXOSQueryFileListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

Order by file name in reverse case-insensitive alphabetical order (iname-descending):
\TeXOSQueryFileListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListNameIgnoreCaseDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

Order by file extension in alphabetical order (ext-ascending):
\TeXOSQueryFileListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListExtAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

Order by file extension in reverse alphabetical order (ext-descending):
\TeXOSQueryFileListExtDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the regular files only list:
\TeXOSQueryRegularFileListExtDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or the sub-directories only list:
\TeXOSQuerySubDirListExtDes{⟨cs⟩}{⟨sep⟩}{⟨dir⟩}

or for the filtered list:
\TeXOSQueryFilterFileListExtDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered regular files only list:
\TeXOSQueryFilterRegularFileListExtDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

or the filtered sub-directories only list:
\TeXOSQueryFilterSubDirListExtDes{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

A recursive filtered list of regular files starting from a given directory on the current working path (-w or --alk) can be obtained using:
\TeXOSQueryWalk{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}

where ⟨regex⟩ is as for the filtered listings described above.

To sort according to last modified date:
\TeXOSQueryWalkDateAsc{⟨cs⟩}{⟨sep⟩}{⟨regex⟩}{⟨dir⟩}
or in reverse order:
\TeXOSQueryWalkDateDes\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}

To sort according to file size:
\TeXOSQueryWalkSizeAsc\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}
 or in reverse order:
\TeXOSQueryWalkSizeDes\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}

To sort according to path name (case-sensitive):
\TeXOSQueryWalkNameAsc\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}
 or in reverse order:
\TeXOSQueryWalkNameDes\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}

To sort according to path name (case-insensitive):
\TeXOSQueryWalkNameIgnoreCaseAsc\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}
 or in reverse order:
\TeXOSQueryWalkNameIgnoreCaseDes\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}

To sort according to file extension:
\TeXOSQueryWalkExtAsc\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}
 or in reverse order:
\TeXOSQueryWalkExtDes\{\langle cs\rangle\}\{\langle sep\rangle\}\{\langle regex\rangle\}\{\langle dir\rangle\}

3 The Code

3.1 Generic \TeX Code

Change category code of @ if necessary.
\begin{verbatim}
1 \ifnum\catcode`@=11\relax
2 \def@texosquery@restore@at{}%
3 \else
4 \expandafter\edef\csname @texosquery@restore@at\endcsname{\noexpand\catcode`@=\number\catcode`@\relax}
5 \expandafter\endinput
6 \fi
\end{verbatim}

Check if already loaded.
\begin{verbatim}
9 \ifx\TeXOSQuery\undefined \else
10 \@texosquery@restore@at
11 \expandafter\endinput
12 \fi
\end{verbatim}
\@texosquery@warn\hfill

Generate warning message. Use tracklang’s warning if available (so that the warnings can be disabled for both packages at the same time).

\@texosquery@info

\@texosquery@err
\@texosquery@ifundef is defined in the same way as tracklang's \@tracklang@ifundef. (Can't assume tracklang has been loaded.)
\begin{verbatim}
\long\def\@texosquery@ifundef#1#2#3{\%\n  \ifcsname#1\endcsname\n    \expandafter\ifx\csname #1\endcsname\relax\n      #2\%\n    \else\n      #3\%\n    \fi\n  \else\n    \expandafter\ifx\csname #1\endcsname\relax\n      #2\%\n    \else\n      #3\%\n    \fi\n  \fi\n}\%\n\end{verbatim}
\TeXOSInvokerName The name of the texosquery application.
\def\TeXOSInvokerName{texosquery}
\texosquery@input If we're using \LaTeX, we'll need to use \@@input rather than \input.
\begin{verbatim}
\if\@@input\undefined\let\texosquery@input\input\else\let\texosquery@input\@@input\fi\end{verbatim}
\TeXOSQueryInvoker Invoke the application in the piped shell escape with the given arguments.
\def\TeXOSQueryInvoker#1{\texosquery@input|"\TeXOSInvokerName\space#1"}
\ifTeXOSQueryDryRun Provide a dry-run mode.
\newif\ifTeXOSQueryDryRun \TeXOSQueryDryRuntrue

\TeXOSQueryAllowRestricted The default behaviour only switches off the dry-run mode if the shell escape is unrestricted. The configuration file may override this with \TeXOSQueryAllowRestricted, which will allow the dry run mode to be switched off if restricted mode is detected.
\begin{verbatim}
\def\TeXOSQueryAllowRestricted{\%\n  \def\@texosquery@allowrestricted##1##2{##1}%;\%\n}\%\n\end{verbatim}
\TeXOSQueryDenyRestricted \ Switch it off.
88 \def\TeXOSQueryDenyRestricted{\%  
89 \def@texosquery@allowrestricted##1##2{##2}\%  
90 }  

@\@texosquery@allowrestricted \ Initialise to prevent shell escape in restricted mode.  
91 \def@texosquery@allowrestricted#1#2{#2}\%  

\TeXOSInvokerRestrictedMessage \ Message used if \TeX is run in restricted mode but the invoker name hasn't been allowed. This may be redefined in the configuration file to customise the message if the invoker name isn't allowed. Set to empty or \relax if the message should be omitted.  
92 \def\TeXOSInvokerRestrictedMessage{\%  
93 \string\TeXOSQuery\space doesn't work in dry run mode.  
94 \MessageBreak  
95 If \string\TeXOSInvokerName\space has been added to the \MessageBreak \restricted list, make sure that  
96 \MessageBreak \string\TeXOSQueryAllowRestricted\space  
97 \MessageBreak has been uncommented in the configuration file  
98 \MessageBreak (\texosquery.cfg) otherwise you need to use the  
99 \MessageBreak unrestricted shell escape}  

Only need to write this information to the transcript if \TeXOSQuery is actually used and the dry run mode is on in restricted mode.  

@\@texosquery@dorestrictedmessage  
101 \let@texosquery@dorestrictedmessage\relax  
Load the configuration file if it exists.  
102 \openin0=texosquery.cfg \ifeof0\relax \else  
103 \closein0\relax  
104 \begingroup  
105 \@\@texosquery@info{reading configuration file}\%  
106 \endgroup  
107 \input texosquery.cfg  
108 \fi  
Disable cfg-only commands:  
109 \def\TeXOSQueryAllowRestricted{\%  
110 \@\@texosquery@warn{\string\TeXOSQueryAllowRestricted\space  
111 ignored (only allowed in texosquery.cfg)}\%  
112 }  
113 \def\TeXOSQueryDenyRestricted{\%  
114 \@\@texosquery@warn{\string\TeXOSQueryDenyRestricted\space  
115 ignored (only allowed in texosquery.cfg)}\%  
116 }  
\texosquery@shellescape \ We need to know the shell escape mode. This is provided by PDF\TeX's \pdfshellescape primitive or Xe\TeX's \shellescape primitive. It's a little more complicated in Lua\TeX. Initialise to 0:  
117 \chardef\texosquery@shellescape=0  

45
Test for the PDF\TeX{} and Xe\TeX{} primitives.
\begin{verbatim}
118 \ifx\shellescape\undefined
119  \ifx\pdfshellescape\undefined
Neither primitive defined. Has pdftexcmds been loaded? If so, we can use \texttt{\pdffile{\shellescape}}.
120  \fi \pdfshellescape\undefined \pdfshellescape hasn't been defined. Is Lua\TeX{} in use?
121  \fi \directlua\undefined Not Lua\TeX{}. Most likely an old \TeX{} format. Have to assume the shell escape is unavailable.
122 \else Use Lua to find the shell escape. This uses the same method as pdftexcmds. (Not loading that package, as this is the only thing required from it.)
123  \edef\texosquery@shellescape{\directlua0{
124    if os.execute then
125      if status
126        and status.luatem_version
127        and status.luatem_version >= 68 then
128          tex.write(os.execute())
129        else
130          local result = os.execute()
131          if result == 0 then
132            tex.write("0")
133          else
134            if result == nil then
135              tex.write("0")
136            else
137              tex.write("1")
138            end
139          end
140        end
141      else
142        tex.write("0")
143      end
144    }\}
145 \fi \else \let\texosquery@shellescape=\pdfshellescape \fi
149 \else PDF\TeX{}'s \texttt{\pdfshellescape} has been defined, so that can be used, but first check it hasn't been set to \texttt{\relax}.
150 \ifx\pdfshellescape\relax Something's meddled with \texttt{\pdfshellescape}, so try \texttt{\pdf@shellescape}.
151 \fi \pdf@shellescape\undefined
\end{verbatim}
\pdf@shellescape hasn’t been defined. Is Lua\TeX\ in use?
152  \ifx\directlua\undefined
Not Lua\TeX. Most likely an old \TeX\ format. Have to assume the shell escape is unavailable.
153  \else
Use Lua to find the shell escape.
154  \edef\texosquery@shellescape{\directlua0{
155  \if os.execute then
156     \if status
157         and status.luatex_version
158         and status.luatex_version >= 68 then
159         \tex.write(os.execute())
160     else
161         local result = os.execute()
162         if result == 0 then
163             \tex.write("0")
164         else
165             \if result == nil then
166                 \tex.write("0")
167             else
168                 \tex.write("1")
169             end
170         end
171     \else
172         \te...
Something’s meddled with \pdfshellescape, so try \pdf@shellescape.

Try Lua.

Not Lua\TeX. Most likely an old \TeX format. Have to assume the shell escape is unavailable.

Use Lua to find the shell escape.

If shell escape is unrestricted, automatically switch off dry-run mode, unless the cfg file has allowed it.
Enable the restricted warning message, but it only needs to be written once, so disable it after use.

```latex
\def\@texosquery@dorestrictedmessage{\ifx\TeXOSInvokerRestrictedMessage\empty \else \ifx\TeXOSInvokerRestrictedMessage\relax \else \@texosquery@warn{\TeXOSInvokerRestrictedMessage}\fi \fi \let\@texosquery@dorestrictedmessage\relax}
```

Provide some utility commands. (Can't use \@gobble etc, as we may not be using \LaTeX.)

```latex
\def\@texosquery@gobble#1{}
\def\@texosquery@firstofone#1{#1}
```

The results obtained from texosquery may be file names for use in commands like \input or \includegraphics or they may be text that needs typesetting (such as month
names) or they may be date-time patterns or numeric patterns or they may be PDF date-
time strings, which may need to have the category code of the initial “D” set to 12 for
parsing commands that include this character in the argument syntax.

This means that we need to take special characters into account, but the way they are
dealt with vary according to context. For example, # needs to have the category code set
to 12 if it’s part of a file name. If an image file is called, say, test_imagefile#.png
then the following doesn’t work:

\includegraphics{test\_imagefile\#}

It needs to be

\includegraphics{test\string\imagefile\string\#}
or

\includegraphics{\detokenize{test\_imagefile\#}}

The first two versions of texosquery try to deal with this by simply changing the category
code of _ to 12 and getting texosquery to replace all instances of # with \\#. This hash
substitution doesn’t work with the above image example so version 1.2 introduced a new
command that texosquery could use instead of \# that expands to \string#. This now
solves the problem for file names that are obtained through texosquery, but texosquery
doesn’t solely return file names. It also returns text that needs typesetting and it also returns
numeric patterns, which in their raw form include # as a digit identifier.

This means that we can’t simply detokenize the result from texosquery. Instead
texosquery replaces problematic characters with control sequences according to context.
For example, \texosqueryhash is used in a file name context, \texosquerytexthash
is used in a textual context and \texosquerypatdigitnozero in a numeric pattern con-
text.

These long control sequence names clutter the results when testing the application
directly in a terminal, so the Java code uses short forms that are locally defined by
\TeXOSQuery to expand to the longer forms.

\texosquerynonasciiwrap

Allow a way to deal with non-ASCII characters returned by texosquery. \TeXOSQuery
locally defines \twrp to this command. By default this just does its argument but may be
redefined. For example, if the document uses a different file encoding to Java, then this
command might need to be redefined to perform the appropriate conversion.

258 \def\texosquerynonasciiwrap#1{#1}

260 \def\texosquerynonasciidetokwrap#1{\detokenize{#1}}

262 \def\texosquerynonasciidetokwrap#1{\detokenize{#1}}

263 \fi

50
Now define commands used in \TeXOSQuery for various escaped characters. The literal versions are for file names. The textual versions are for use within the document text. For completeness, all the ASCII punctuation characters have both a literal and textual version. This helps to protect against babel shorthands etc.

\texttt{\textbackslash} \texttt{Literal backslash.}
\verbatim{\edef\texosquerybackslash{\expandafter\@texosquery@gobble\string\textbackslash}}
\texttt{\textbackslash} \texttt{Textual backslash.}
\verbatim{\ifx\textbackslash\undefined \def\texosquerytextbackslash{\texosquerybackslash} \else \def\texosquerytextbackslash{\noexpand\textbackslash} \fi}
\texttt{\{\textbackslash} \texttt{Literal left brace.}
\verbatim{\edef\texosqueryleftbrace{\expandafter\@texosquery@gobble\string\{}}}
\texttt{\textbackslash{}\textbackslash} \texttt{Textual left brace.}
\verbatim{\def\texosquerytextleftbrace{\{}}
\texttt{\}\textbackslash} \texttt{Literal right brace.}
\verbatim{\edef\texosqueryrightbrace{\expandafter\@texosquery@gobble\string\}}
\texttt{\}\textbackslash} \texttt{Textual right brace.}
\verbatim{\def\texosquerytextrightbrace{\}}
\texttt{\textbackslash} \texttt{Literal hash.}
\verbatim{\edef\texosqueryhash{\expandafter\@texosquery@gobble\string\#}}
\texttt{\textbackslash} \texttt{Textual hash.}
\verbatim{\def\texosquerytexthash{\#}}
\texttt{\textbackslash} \texttt{Literal underscore.}
\verbatim{\edef\texosqueryunderscore{\expandafter\@texosquery@gobble\string\_}}
\texttt{\textbackslash} \texttt{Textual underscore.}
\verbatim{\def\texosquerytextunderscore{\_}}
\texttt{\textbackslash} \texttt{Literal grave.}
\verbatim{\edef\texosquerybacktick{\string'}}
\texttt{\textbackslash} \texttt{Textual open quote.}
\verbatim{\def\texosquerytextbacktick{'}}
\texttt{\textbackslash} \texttt{Literal apostrophe.}
\verbatim{\edef\texosqueryclosequote{\string'}}
\textosquerytextclosequote  Textual apostrophe / single closing quote.
\textosquerydoublequote  Literal double-quote.
\textosquerytextdoublequote  Textual double-quote.
\textosquerycolon  Literal colon.
\textosquerytextcolon  Textual colon.
\textosquerysemicolon  Literal semi-colon.
\textosquerytextsemicolon  Textual semi-colon.
\textosqueryequals  Literal equals.
\textosquerytextequals  Textual equals.
\textosqueryslash  Literal slash.
\textosquerytexthyphen  Textual hyphen.
\textosqueryhyphen  Literal hyphen.
\textosquerytexthyphen  Textual hyphen.
\textosqueryplus  Literal plus.
\textosquerytextplus  Textual plus.
\textosqueryperiod  Literal period.
\textosquerytextperiod  Textual period.
297  \def\textosquerytextperiod{.}

\textosquerycomma  Literal comma.
298  \edef\textosquerycomma{\string,}

\textosquerytextcomma  Textual comma.
299  \def\textosquerytextcomma{,}

\textosqueryopenparen  Literal open bracket.
300  \edef\textosqueryopenparen{\string(}

\textosquerytextopenparen  Textual open bracket.
301  \def\textosquerytextopenparen{(}

\textosquerycloseparen  Literal close bracket.
302  \edef\textosquerycloseparen{\string)}

\textosquerytextcloseparen  Textual close bracket.
303  \def\textosquerytextcloseparen{)}

\textosqueryopensq  Literal open square bracket.
304  \edef\textosqueryopensq{\string[}

\textosquerytextopensq  Textual open square bracket.
305  \def\textosquerytextopensq{[}

\textosqueryclosesq  Literal close square bracket.
306  \edef\textosqueryclosesq{\string]}

\textosquerytextclosesq  Textual close square bracket.
307  \def\textosquerytextclosesq{]}

\textosqueryasterisk  Literal asterisk.
308  \edef\textosqueryasterisk{\string*}

\textosquerytextasterisk  Textual asterisk.
309  \def\textosquerytextasterisk{*}

\textosqueryatchar  Literal at character.
310  \edef\textosqueryatchar{\string @}

\textosquerytextatchar  Textual at character.
311  \def\textosquerytextatchar{0}

\textosquerybar  Literal bar.
312  \edef\textosquerybar{\string |}
\textosquerytextbar \quad Textual bar.
313 \textbar
314 \userdef\textosquerytextbar{}
315 \else
316 \userdef\textosquerytextbar{\ifmmode|\else\textbar\fi}
317 \fi
\textosquerylessthan \quad Literal less than.
318 \userdef\textosquerylessthan{\string<}
\textosquerytextlessthan \quad Textual less than.
319 \if\textlessthan\undefined
320 \userdef\textosquerytextlessthan{<}
321 \else
322 \userdef\textosquerytextlessthan{\ifmmode<\else\textless\fi}
323 \fi
\textosquerygreaterthan \quad Literal greater than.
324 \userdef\textosquerygreaterthan{\string>}
\textosquerytextgreaterthan \quad Textual greater than.
325 \if\textgreater\undefined
326 \userdef\textosquerytextgreaterthan{<}
327 \else
328 \userdef\textosquerytextgreaterthan{\ifmmode<\else\textgreater\fi}
329 \fi
\textosquerytilde \quad Literal tilde.
330 \userdef\textosquerytilde{\string~}
\textosquerytexttilde \quad Textual tilde.
331 \if\textasciitilde\undefined
332 \userdef\textosquerytexttilde{\string~}
333 \else
334 \userdef\textosquerytexttilde{\textasciitilde}
335 \fi
\textosquerycircum \quad Literal circumflex.
336 \userdef\textosquerycircum{\string^}
\textosquerytextcircum \quad Textual circumflex.
337 \if\textasciicircum\undefined
338 \userdef\textosquerytextcircum{\string^}
339 \else
340 \userdef\textosquerytextcircum{\textasciicircum}
341 \fi
\textosqueryampersand \quad Literal ampersand.
342 \userdef\textosqueryampersand{\string&}
\textosquerytextampersand Textual ampersand.
343 \def\textosquerytextampersand{\&}

\textosquerydollar Literal dollar. (This could just be defined as \string\$, but that plays havoc with the syntax highlighting!)
344 \edef\textosquerydollar{\expandafter\@texosquery@gobble\string\$}

\textosquerytextdollar Textual dollar.
345 \def\textosquerytextdollar{\$}

\textosquerypercent Literal percent.
346 \edef\textosquerypercent{\expandafter\@texosquery@gobble\string\%}

\textosquerytextpercent Textual percent.
347 \def\textosquerytextpercent{\%}

\textosqueryexclam Literal exclamation.
348 \edef\textosqueryexclam{\string!}

\textosquerytextexclam Textual exclamation.
349 \def\textosquerytextexclam{!}

\textosqueryquestion Literal question mark.
350 \edef\textosqueryquestion{\string?}

\textosquerytextquestion Textual question mark.
351 \def\textosquerytextquestion{?}

\textosqueryliteralspace Literal space.
352 \edef\textosqueryliteralspace{\expandafter\string\space}

\textosquerytextspace Textual space. (Don’t allow it to expand while it’s being fetched from \textosquery just in case it disappears.)
353 \def\textosquerytextspace{\noexpand\space}

\@texosquery@D The D identifier in PDF date-time formats need to have category code 12. This is only used by methods that return results in the form:
\begin{verbatim}
D: ⟨YYYY⟩⟨MM⟩{⟨DD⟩}⟨HH⟩⟨mm⟩⟨ss⟩⟨TZh⟩ ⟨TZm⟩
\end{verbatim}
354 \edef\@texosquery@D{\string D}

\@texosquery@enableshortcs Enable shortcut commands.
355 \def\@texosquery@enableshortcs{%
These are for the date-time and numeric patterns.

\def\patdtf{\noexpand\texosquerydtf}\%
\def\patpmnumfmt{\noexpand\texosquerypatplusminus}\%
\def\patnumfmt{\noexpand\texosquerypatnum}\%
\def\patsinumfmt{\noexpand\texosquerypatsinum}\%
\def\patdecfmt{\noexpand\texosquerypatdec}\%
\def\patpcur{\noexpand\texosquerypatprefixcurrency}\%
\def\patcur{\noexpand\texosquerypatprefixicurrency}\%
\def\patscur{\noexpand\texosquerypatsuffixcurrency}\%
\def\patsicur{\noexpand\texosquerypatsuffixicurrency}\%
\def\patstr{\noexpand\texosquerypatstr}\%
\def\patapo{\noexpand\texosquerypatquote}\%
\def\patdgt{\noexpand\texosquerypatdigit}\%
\def\patdgtznf{\noexpand\texosquerypatdigitnozero}\%
\def\patmsg{\noexpand\texosquerypatminus}\%
\def\patngp{\noexpand\texosquerypatgroupsep}\%
\def\patpct{\noexpand\texosquerypatprefixpercent}\%
\def\patpml{\noexpand\texosquerypatprefixpermill}\%
\def\patspct{\noexpand\texosquerypatsuffixpercent}\%
\def\patspml{\noexpand\texosquerypatsuffixpermill}\%

Hook to adjust the processing of non-ASCII characters.

\def\twrp{\texosquerynonasciwrap}\%
\def\fwrp{\texosquerynonasciidetokwrap}\%

Locally redefine some more commands that may occur in \texttt{texosquery}'s return value (via the \texttt{escapeSpChars} method in \texttt{TeXOSQuery.java}). The \texttt{t} prefix indicates textual commands and the \texttt{f} prefix indicates literal characters, for example, in file names.

\let\fbks{\texosquerybackslash}
\let\tbks{\texosquerytextbackslash}
\let\flbr{\texosqueryleftbrace}
\let\tlbr{\texosquerytextleftbrace}
\let\frbr{\texosqueryrightbrace}
\let\trbr{\texosquerytextrightbrace}
\let\fhsh{\texosqueryhash}
\let\thsh{\texosquerytexthash}
\let\fsc{\texosqueryunderscore}
\let\tsc{\texosquerytextunderscore}
\let\fgv{\texosquerybacktick}
\let\tgrv{\texosquerytextbacktick}
\let\faop{\texosqueryclosequote}
\let\taop{\texosquerytextclosequote}
\let\fdqt{\texosquerydoublequote}
\let\tdqt{\texosquerytextdoublequote}
\let\fspc{\texosqueryliteralspace}
\let\tspc{\texosquerytextspace}
\let\fcln{\texosquerycolon}
\let\tcln{\texosquerytextcolon}
\let\fscl{\texosquerysemicolon}
\let\tscl{\texosquerytextsemicolon}
\TeXOSQuery Use texosquery with the option given in the second argument and store the result in control sequence given in the first argument.
\def\TeXOSQuery\textversion{1#2\%}
Locally redefine short commands used by `texosquery`

\@tesosquery@enableshortcs

Change the category code of some potentially awkward characters. (This should no longer be an issue with the new commands that are now used in the returned text, but `texosquery` might be run with the backward compatibility mode on, so this is still needed just in case.)

\catcode`\-=12\relax
\catcode`_=12\relax
\catcode`^=12\relax
\catcode`~=12\relax
\catcode`\$=12\relax
\catcode`\&=12\relax
\catcode`\.=12\relax
\catcode`\/=12\relax
\catcode`\:=12\relax
\catcode`\"=12\relax
\catcode`\'=12\relax
\catcode`\;=12\relax
\catcode`\%=12\relax
\everyeof{\noexpand}\relax
\@tesosquery@edef\x{\endgroup\def\noexpand#1{\TeXOSQueryInvoker{#2}}}\x
\fi

`\TeXOSQueryFromFile` This is like `\TeXOSQuery` but doesn’t use the piped shell escape. Instead, it’s for cases where `texosquery` is run before TeX and the results have been captured in a file. For example, `texosquery -b > texosqueryresult.tex` The second argument is the file name.

\def\TeXOSQueryFromFile#1#2{%
First check that the file exists.
\openin0=#2
\ifeof0\relax
  \def#1{}%
\else
  \closein0\relax
  \begingroup
  \endlinechar=-1\relax
  \@tesosquery@enableshortcs
  \catcode`\-=12\relax
  \catcode`\%=12\relax
  \XeTeXOSQueryFromFile\x
  \fi
}
3.1.1 Currency

The ⟨\TeX currency⟩ element of --numeric and --locale-data identifies the currency symbol using

\texosquerycurrency{⟨label⟩}

which simply expands to the appropriate command.

\texosquerycurrency

\def\texosquerycurrency#1{\%  
\expandafter\noexpand\csname texosquerycurrency#1\endcsname
}

Provide the currency commands that may be returned texosquery (on expansion of \texosquerycurrency). Most of these will need redefining as there’s no appropriate generic code to use as a default. The fontawesome package has the most support for currency symbols, so these are checked first.

\texosquerycurrencydollar

\ifx\faDollar\undefined  
\def\texosquerycurrencydollar{\$}  
\else  
\def\texosquerycurrencydollar{\faDollar}  
\fi

\texosquerycurrencycent

\ifx\textcent\undefined  
\def\texosquerycurrencycent{\textcent}  
\else  
\def\texosquerycurrencycent{\textcent}  
\fi
\textosquerycurrencypound
\ifs\faGbp\undefined
\ifs\pounds\undefined
\def\textosquerycurrencypound{pound}
\else
\def\textosquerycurrencypound{\pounds}
\fi
\else
\def\textosquerycurrencypound{\faGbp}
\fi
\textosquerycurrencysign
\ifs\textcurrency\undefined
\def\textosquerycurrencysign{currency-sign}
\else
\def\textosquerycurrencysign{\textcurrency}
\fi
\textosquerycurrencyyen
\ifs\faYen\undefined
\ifs\textyen\undefined
\def\textosquerycurrencyyen{yen}
\else
\def\textosquerycurrencyyen{\textyen}
\fi
\else
\def\textosquerycurrencyyen{\faYen}
\fi
\textosquerycurrencyecu
\def\textosquerycurrencyecu{ecu}
\textosquerycurrencycolon
\def\textosquerycurrencycolon{colon}
\textosquerycurrencycruzeiro
\def\textosquerycurrencycruzeiro{cruzeiro}
\textosquerycurrencyFranc
\def\textosquerycurrencyFranc{franc}
\textosquerycurrencylira
\ifs\textlira\undefined
\def\textosquerycurrencylira{lira}
\else
\def\textosquerycurrencylira{\textlira}
\fi
\textosquerycurrencymill
543 \def\textosquerycurrencymill{mill}
\textosquerycurrencynaira
544 \ifx\textnaira\undefined
545 \def\textosquerycurrencynaira{naira}
546 \else
547 \def\textosquerycurrencynaira{\textnaira}
548 \fi
\textosquerycurrencypeseta
549 \def\textosquerycurrencypeseta{peseta}
\textosquerycurrencyrupee
550 \ifx\faRupee\undefined
551 \def\textosquerycurrencyrupee{rupee}
552 \else
553 \def\textosquerycurrencyrupee{\faRupee}
554 \fi
\textosquerycurrencywon
555 \ifx\faWon\undefined
556 \ifx\textwon\undefined
557 \def\textosquerycurrencywon{won}
558 \else
559 \def\textosquerycurrencywon{\textwon}
560 \fi
561 \else
562 \def\textosquerycurrencywon{\faWon}
563 \fi
\textosquerycurrencynewsheqel
564 \ifx\faSheqel\undefined
565 \def\textosquerycurrencynewsheqel{newsheqel}
566 \else
567 \def\textosquerycurrencynewsheqel{\faSheqel}
568 \fi
\textosquerycurrencydong
569 \ifx\textdong\undefined
570 \def\textosquerycurrencydong{dong}
571 \else
572 \def\textosquerycurrencydong{\textdong}
573 \fi
\textosquerycurrencyeuro
574 \ifx\faEuro\undefined
575 \ifx\texteuro\undefined
61
\def\texosquerycurrencyeuro{\euro}
\def\texosquerycurrencykip{kip}
\def\texosquerycurrencytugrik{tugrik}
\def\texosquerycurrencydrachma{drachma}
\def\texosquerycurrencygermanpenny{german-penny}
\def\texosquerycurrencypeso{peso}
\def\texosquerycurrencyguarani{guarani}
\def\texosquerycurrencyaustral{austral}
\def\texosquerycurrencyhryvnia{hryvnia}
\def\texosquerycurrencycedi{cedi}
3.1.2 Shortcut Commands

Now for some convenient shortcuts so the user doesn’t have to remember the command line options. `\string` is used in case the hyphen character has been made active.

\TeXOSQueryLocale \quad Query the locale and store the result in the control sequence provided in the argument.
\TeXOSQueryLocale#1{\TeXOSQuery[#1]{\string-l}}

\TeXOSQueryLangTag \quad Query the language tag and store the result in the control sequence provided in the argument.
\TeXOSQueryLangTag#1{\TeXOSQuery[#1]{\string-b}}

\TeXOSQueryNumeric \quad Query the numeric settings for the locale given in the second argument and store the result in the control sequence provided in the argument. Leave the second argument empty for the default locale.
\TeXOSQueryNumeric#1#2{\TeXOSQuery[#1]{\string-N #2}}
\TeXOSQueryLocaleData \TeXOSQueryCwd \TeXOSQueryHome \TeXOSQueryTmpDir \TeXOSQueryVersion \TeXOSQueryArch \TeXOSQueryName \TeXOSQueryDateTime \TeXOSQueryTimeZones \TeXOSQueryNow

The \texttt{\TeXOSQueryLocaleData} command queries the data for the locale given in the second argument and stores the result in the control sequence provided in the argument. Leave the second argument empty for the default locale.

\begin{verbatim}
def\TeXOSQueryLocaleData#1#2{\TeXOSQuery{#1}{\string-D #2}}
\end{verbatim}

The \texttt{\TeXOSQueryCwd} command queries the current working directory.

\begin{verbatim}
def\TeXOSQueryCwd#1{\TeXOSQuery{#1}{\string-c}}
\end{verbatim}

The \texttt{\TeXOSQueryHome} command queries the user’s home directory.

\begin{verbatim}
def\TeXOSQueryHome#1{\TeXOSQuery{#1}{\string-m}}
\end{verbatim}

The \texttt{\TeXOSQueryTmpDir} command queries the temporary directory.

\begin{verbatim}
def\TeXOSQueryTmpDir#1{\TeXOSQuery{#1}{\string-t}}
\end{verbatim}

The \texttt{\TeXOSQueryVersion} command queries the operating system version.

\begin{verbatim}
def\TeXOSQueryVersion#1{\TeXOSQuery{#1}{\string-r}}
\end{verbatim}

The \texttt{\TeXOSQueryArch} command queries the operating system architecture.

\begin{verbatim}
def\TeXOSQueryArch#1{\TeXOSQuery{#1}{\string-a}}
\end{verbatim}

The \texttt{\TeXOSQueryName} command queries the operating system name.

\begin{verbatim}
def\TeXOSQueryName#1{\TeXOSQuery{#1}{\string-o}}
\end{verbatim}

The \texttt{\TeXOSQueryDateTime} command queries the current date and time.

\begin{verbatim}
def\TeXOSQueryDateTime#1{%
\TeXOSQuery{#1}{\string-M}%
}
\end{verbatim}

The \texttt{\TeXOSQueryTimeZones} command queries the current time zone mappings. Leave the second argument empty for the default locale.

\begin{verbatim}
def\TeXOSQueryTimeZones#1#2{%
\TeXOSQuery{#1}{\string-Z #2}%
}
\end{verbatim}

The \texttt{\TeXOSQueryNow} command queries the current time stamp.

\begin{verbatim}
def\TeXOSQueryNow#1{%
\edef\@texosquery@restore@D{\noexpand\catcode'\D=\the\catcode'\D\relax}%
\catcode'\D=12\relax
\TeXOSQuery{#1}{\string-n}%
\@texosquery@restore@D
}
\end{verbatim}

If the file name is supplied using \texttt{\jobname} it may have double-quotes which will interfere with things.
\textosquerystripquotes
\def\texosquery@stripquotes#1{% 
@texosquery@stripquotes#1\@mid@texosquery@stripquotes 
"\relax"\relax\end@texosquery@stripquotes 
} 
\def\@texosquery@stripquotes#1"#2"{% 
@@texosquery@stripquotes#1#2% 
} 
\def\@@texosquery@stripquotes#1\@mid@texosquery@stripquotes#2\@end@texosquery@stripquotes{#1} 
\fi

The restricted mode doesn’t permit quotes in the shell escape, so arguments are only quoted in unrestricted mode.

\textosquery@argquote
\ifnum\texosquery@shellescape=2\relax 
\def\@texosquery@argquote#1{#1} 
\else 
\def\@texosquery@argquote#1{\string'#1\string'} 
\fi

\TeXOSQueryFileDate Query the time stamp of the file given in the second argument.
\def\TeXOSQueryFileDate#1#2{% 
The D needs category code 12 just in case texosquery is running in a backward compatibility mode that doesn’t use \pdfd. 
\edef\@texosquery@restore@D{% 
\noexpand\catcode'\noexpand\D=\the\catcode'\D\relax} % 
\catcode'\D=12\relax 
\TeXOSQuery{#1}{\string-d\@texosquery@argquote{\texosquerystripquotes{#2}}} % 
\@texosquery@restore@D 
} 

\TeXOSQueryFileSize Query the size of the file given in the second argument.
\def\TeXOSQueryFileSize#1#2{% \TeXOSQuery{#1}{\string-s\@texosquery@argquote{\texosquerystripquotes{#2}}} 
} 

\textosquery@filelist
\def\@texosquery@filelist#1#2#3#4#5{% \TeXOSQuery{#1}{\string#2\@texosquery@argquote{\texosquerystripquotes{#3}}\@texosquery@argquote{\texosquerystripquotes{#4}}\@texosquery@argquote{\texosquerystripquotes{#5}}} 
} 

\TeXOSQueryFileList List all files in the directory given in the third argument, separated by the second argument.
\def\TeXOSQueryFileList#1#2#3{% \TeXOSQuery{#1}{\string-i\{#2\}#3} % 
}
\TeXOSQueryFileListDateAsc\ As above, but sort by date.
\begin{verbatim}
\def\TeXOSQueryFileListDateAsc#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{date}}\end{verbatim}

\TeXOSQueryFileListDateDes\ As above, but sort by date in descending order.
\begin{verbatim}
\def\TeXOSQueryFileListDateDes#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{date\string-des}}\end{verbatim}

\TeXOSQueryFileListSizeAsc\ As above, but sort by size.
\begin{verbatim}
\def\TeXOSQueryFileListSizeAsc#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{size}}\end{verbatim}

\TeXOSQueryFileListSizeDes\ As above, but sort by size in descending order.
\begin{verbatim}
\def\TeXOSQueryFileListSizeDes#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{size\string-des}}\end{verbatim}

\TeXOSQueryFileListNameAsc\ As above, but sort by name.
\begin{verbatim}
\def\TeXOSQueryFileListNameAsc#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{name}}\end{verbatim}

\TeXOSQueryFileListNameDes\ As above, but sort by name in descending order.
\begin{verbatim}
\def\TeXOSQueryFileListNameDes#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{name\string-des}}\end{verbatim}

\TeXOSQueryFileListNameIgnoreCaseAsc\ As above, but sort by case-insensitive name.
\begin{verbatim}
\def\TeXOSQueryFileListNameIgnoreCaseAsc#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{iname}}\end{verbatim}

\TeXOSQueryFileListNameIgnoreCaseDes\ As above, but sort by case-insensitive name in descending order.
\begin{verbatim}
\def\TeXOSQueryFileListNameIgnoreCaseDes#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{iname\string-des}}\end{verbatim}

\TeXOSQueryFileListExtAsc\ As above, but sort by extension.
\begin{verbatim}
\def\TeXOSQueryFileListExtAsc#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{ext}}\end{verbatim}

\TeXOSQueryFileListExtDes\ As above, but sort by extension in descending order.
\begin{verbatim}
\def\TeXOSQueryFileListExtDes#1#2#3{\@texosquery@filelist{#1}{-i}{#2}{#3}{ext\string-des}}\end{verbatim}
\TeXOSQueryRegularFileList  List all regular files.
\def\TeXOSQueryRegularFileList#1#2#3{\
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{}\}

\TeXOSQuerySubDirList  List all sub-directories.
\def\TeXOSQuerySubDirList#1#2#3{\
  \@texosquery@filelist{#1}{-id}{#2}{#3}{}\}

\TeXOSQueryRegularFileListDateAsc  List all regular files sorted by date.
\def\TeXOSQueryRegularFileListDateAsc#1#2#3{\
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{date}\}

\TeXOSQuerySubDirListDateAsc  List all sub-directories sorted by date.
\def\TeXOSQuerySubDirListDateAsc#1#2#3{\
  \@texosquery@filelist{#1}{-id}{#2}{#3}{date}\}

\TeXOSQueryRegularFileListDateDes  List all regular files sorted by date in descending order.
\def\TeXOSQueryRegularFileListDateDes#1#2#3{\
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{date\string-des}\}

\TeXOSQuerySubDirListDateDes  List all sub-directories sorted by date in descending order.
\def\TeXOSQuerySubDirListDateDes#1#2#3{\
  \@texosquery@filelist{#1}{-id}{#2}{#3}{date\string-des}\}

\TeXOSQueryRegularFileListSizeAsc  List all regular files sorted by size.
\def\TeXOSQueryRegularFileListSizeAsc#1#2#3{\
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{size}\}

\TeXOSQuerySubDirListSizeAsc  List all sub-directories sorted by size.
\def\TeXOSQuerySubDirListSizeAsc#1#2#3{\
  \@texosquery@filelist{#1}{-id}{#2}{#3}{size}\}

\TeXOSQueryRegularFileListSizeDes  List all regular files sorted by size in descending order.
\def\TeXOSQueryRegularFileListSizeDes#1#2#3{\
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{size\string-des}\}

\TeXOSQuerySubDirListSizeDes  List all sub-directories sorted by size in descending order.
\def\TeXOSQuerySubDirListSizeDes#1#2#3{\
  \@texosquery@filelist{#1}{-id}{#2}{#3}{size\string-des}\}
\TeXOSQueryRegularFileListNameAsc List all regular files sorted by file name.
\begin{verbatim}
\def\TeXOSQueryRegularFileListNameAsc#1#2#3{%
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{name}%
}\end{verbatim}

\TeXOSQuerySubDirListNameAsc List all sub-directories sorted by file name.
\begin{verbatim}
\def\TeXOSQuerySubDirListNameAsc#1#2#3{%
  \@texosquery@filelist{#1}{-id}{#2}{#3}{name}%
}\end{verbatim}

\TeXOSQueryRegularFileListNameDes List all regular files sorted by file name in descending order.
\begin{verbatim}
\def\TeXOSQueryRegularFileListNameDes#1#2#3{%
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{name\string-des}%
}\end{verbatim}

\TeXOSQuerySubDirListNameDes List all sub-directories sorted by name in descending order.
\begin{verbatim}
\def\TeXOSQuerySubDirListNameDes#1#2#3{%
  \@texosquery@filelist{#1}{-id}{#2}{#3}{name\string-des}%
}\end{verbatim}

\TeXOSQueryRegularFileListNameIgnoreCaseAsc List all regular files sorted by file case-insensitive name.
\begin{verbatim}
\def\TeXOSQueryRegularFileListNameIgnoreCaseAsc#1#2#3{%
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{iname}%
}\end{verbatim}

\TeXOSQuerySubDirListNameIgnoreCaseAsc List all sub-directories sorted by file case-insensitive name.
\begin{verbatim}
\def\TeXOSQuerySubDirListNameIgnoreCaseAsc#1#2#3{%
  \@texosquery@filelist{#1}{-id}{#2}{#3}{iname}%
}\end{verbatim}

\TeXOSQueryRegularFileListNameIgnoreCaseDes List all regular files sorted by case-insensitive name in descending order.
\begin{verbatim}
\def\TeXOSQueryRegularFileListNameIgnoreCaseDes#1#2#3{%
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{iname\string-des}%
}\end{verbatim}

\TeXOSQuerySubDirListNameIgnoreCaseDes List all sub-directories sorted by case-insensitive name in descending order.
\begin{verbatim}
\def\TeXOSQuerySubDirListNameIgnoreCaseDes#1#2#3{%
  \@texosquery@filelist{#1}{-id}{#2}{#3}{iname\string-des}%
}\end{verbatim}

\TeXOSQueryRegularFileListExtAsc List all regular files sorted by file extension.
\begin{verbatim}
\def\TeXOSQueryRegularFileListExtAsc#1#2#3{%
  \@texosquery@filelist{#1}{-ir}{#2}{#3}{ext}%
}\end{verbatim}

\TeXOSQuerySubDirListExtAsc List all sub-directories sorted by file extension.
\begin{verbatim}
\def\TeXOSQuerySubDirListExtAsc#1#2#3{%
  \@texosquery@filelist{#1}{-id}{#2}{#3}{ext}%
}\end{verbatim}
\TeXOSQueryRegularFileListExtDes \ List all regular files sorted by file extension in descending order.
768 \def\TeXOSQueryRegularFileListExtDes#1#2#3{%
769 \@texosquery@filelist{#1}{-ir}{#2}{#3}{ext\string-des}%
770 }

\TeXOSQuerySubDirListExtDes \ List all sub-directories sorted by extension in descending order.
771 \def\TeXOSQuerySubDirListExtDes#1#2#3{%
772 \@texosquery@filelist{#1}{-id}{#2}{#3}{ext\string-des}%
773 }

@\textosquery@filterfilelist
774 \def@\textosquery@filterfilelist#1#2#3#4#5#6{%
775 \TeXOSQuery{#1}%
776 {%
777 \string#2
778 \@\textosquery@argquote{#3}
779 \@\textosquery@argquote{#4}
780 \@\textosquery@argquote{\textosquerystripquotes{#5}} #6%
781 }
782 }

\TeXOSQueryFilterFileList \ Filtered list files in the directory given in the fourth argument, separated by the second argument. The third argument is the regular expression used to filter the list. \textit{Take care of backslashes in the regular expression!}
783 \def\TeXOSQueryFilterFileList#1#2#3#4{%
784 \@\textosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{%}
785 }

\TeXOSQueryFilterFileListDateAsc \ As above, but sort by date.
786 \def\TeXOSQueryFilterFileListDateAsc#1#2#3#4{%
787 \@\textosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{date}%
788 }

\TeXOSQueryFilterFileListDateDes \ As above, but sort by date in descending order.
789 \def\TeXOSQueryFilterFileListDateDes#1#2#3#4{%
790 \@\textosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{date\string-des}%
791 }

\TeXOSQueryFilterFileListSizeAsc \ As above, but sort by size.
792 \def\TeXOSQueryFilterFileListSizeAsc#1#2#3#4{%
793 \@\textosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{size}%
794 }

\TeXOSQueryFilterFileListSizeDes \ As above, but sort by size in descending order.
795 \def\TeXOSQueryFilterFileListSizeDes#1#2#3#4{%
796 \@\textosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{size\string-des}%
797 }
TeXOSQueryFilterFileListNameAsc\ As above, but sort by file name.
\def\TeXOSQueryFilterFileListNameAsc#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{name}\
}

TeXOSQueryFilterFileListNameDes\ As above, but sort by name in descending order.
\def\TeXOSQueryFilterFileListNameDes#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{name\string-des}\
}

FilterFileListNameIgnoreCaseAsc\ As above, but sort by file name (case-insensitive).
\def\FilterFileListNameIgnoreCaseAsc#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{iname}\
}

FilterFileListNameIgnoreCaseDes\ As above, but sort by name in descending order (case-insensitive).
\def\FilterFileListNameIgnoreCaseDes#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{iname\string-des}\
}

TeXOSQueryFilterFileListExtAsc\ As above, but sort by file extension.
\def\TeXOSQueryFilterFileListExtAsc#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{ext}\
}

TeXOSQueryFilterFileListExtDes\ As above, but sort by extension in descending order.
\def\TeXOSQueryFilterFileListExtDes#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{ext\string-des}\
}

TeXOSQueryFilterRegularFileList\ Filtered list or regular files.
\def\TeXOSQueryFilterRegularFileList#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{}\
}

TeXOSQueryFilterSubDirList\ Filtered list of sub-directories.
\def\TeXOSQueryFilterSubDirList#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{}\
}

TeXOSQueryFilterSubDirListDateAsc\ Filtered sort of sub-directories by file date.
\def\TeXOSQueryFilterSubDirListDateAsc#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{date}\
}

TeXOSQueryFilterRegularFileListDateAsc\ Filtered sort of regular files by file date.
\def\TeXOSQueryFilterRegularFileListDateAsc#1#2#3#4{\
  \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{date}\
}
Filtered sort of sub-directories by file date in descending order.
\[
\def\TeXOSQueryFilterSubDirListDateDes#1#2#3#4{\@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{date\string-des}}
\]

Filtered sort of regular files by file date in descending order.
\[
\def\TeXOSQueryFilterRegularFileListDateDes#1#2#3#4{\@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{date\string-des}}
\]

Filtered sort of sub-directories by file size.
\[
\def\TeXOSQueryFilterSubDirListSizeAsc#1#2#3#4{\@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{size}}
\]

Filtered sort of regular files by file size.
\[
\def\TeXOSQueryFilterRegularFileListSizeAsc#1#2#3#4{\@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{size}}
\]

Filtered sort of sub-directories by file size in descending order.
\[
\def\TeXOSQueryFilterSubDirListSizeDes#1#2#3#4{\@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{size\string-des}}
\]

Filtered sort of regular files by file size in descending order.
\[
\def\TeXOSQueryFilterRegularFileListSizeDes#1#2#3#4{\@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{size\string-des}}
\]
\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc Filtered sort of sub-directories by case-insensitive file name.
858 \def\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc#1#2#3#4{%
859 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{iname}%
860 }

\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc Filtered sort of regular files by case-insensitive file name.
861 \def\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc#1#2#3#4{%
862 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{iname}%
863 }

\TeXOSQueryFilterSubDirListNameIgnoreCaseDes Filtered sort of sub-directories by case-insensitive file name in descending order.
864 \def\TeXOSQueryFilterSubDirListNameIgnoreCaseDes#1#2#3#4{%
865 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{iname\string-des}%
866 }

\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes Filtered sort of regular files by case-insensitive file name in descending order.
867 \def\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes#1#2#3#4{%
868 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{iname\string-des}%
869 }

\TeXOSQueryFilterSubDirListExtAsc Filtered sort of sub-directories by file extension. (Added for completeness as directories
don't tend to have extensions.)
870 \def\TeXOSQueryFilterSubDirListExtAsc#1#2#3#4{%
871 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext}%
872 }

\TeXOSQueryFilterRegularFileListExtAsc Filtered sort of regular files by file extension.
873 \def\TeXOSQueryFilterRegularFileListExtAsc#1#2#3#4{%
874 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext}%
875 }

\TeXOSQueryFilterSubDirListExtDes Filtered sort of sub-directories by file extension in descending order.
876 \def\TeXOSQueryFilterSubDirListExtDes#1#2#3#4{%
877 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext\string-des}%
878 }

\TeXOSQueryFilterRegularFileListExtDes Filtered sort of regular files by file extension in descending order.
879 \def\TeXOSQueryFilterRegularFileListExtDes#1#2#3#4{%
880 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{ext\string-des}%
881 }

\@texosquery@walk
882 \def\@texosquery@walk#1#2#3#4#5{%
883 \TeXOSQuery{#1}%
884 {%
885 \string-w
886 \@texosquery@argquote{#2}
887 \@texosquery@argquote{#3}
\TeXOSQueryWalk Recursive filtered listing of regular files.
\def\TeXOSQueryWalk#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{}}

\TeXOSQueryWalkDateAsc As above, but sort by date.
\def\TeXOSQueryWalkDateAsc#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{date}}

\TeXOSQueryWalkDateDes As above, but sort by date in descending order.
\def\TeXOSQueryWalkDateDes#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{date\string-des}}

\TeXOSQueryWalkSizeAsc As above, but sort by file size.
\def\TeXOSQueryWalkSizeAsc#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{size}}

\TeXOSQueryWalkSizeDes As above, but sort by file size in descending order.
\def\TeXOSQueryWalkSizeDes#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{size\string-des}}

\TeXOSQueryWalkNameAsc As above, but sort by file name.
\def\TeXOSQueryWalkNameAsc#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{name}}

\TeXOSQueryWalkNameDes As above, but sort by file name in descending order.
\def\TeXOSQueryWalkNameDes#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{name\string-des}}

\TeXOSQueryWalkNameIgnoreCaseAsc As above, but sort by file name (case-insensitive).
\def\TeXOSQueryWalkNameIgnoreCaseAsc#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{iname}}

\TeXOSQueryWalkNameIgnoreCaseDes As above, but sort by file name (case-insensitive) in descending order.
\def\TeXOSQueryWalkNameIgnoreCaseDes#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{iname\string-des}}
\TeXOSQueryWalkExtAsc  As above, but sort by file extension.
918 \def\TeXOSQueryWalkExtAsc#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{ext}}
920 
\TeXOSQueryWalkExtDes  As above, but sort by file extension in descending order.
921 \def\TeXOSQueryWalkExtDes#1#2#3#4{\@texosquery@walk{#1}{#2}{#3}{#4}{ext\string-des}}

\TeXOSQueryFileURI  Get the URI of the file given in the second argument.
923 \def\TeXOSQueryFileURI#1#2{\TeXOSQuery{#1}{\string-u\@texosquery@argquote{\texosquerystripquotes{#2}}}}

\TeXOSQueryFilePath  Get the canonical path of the file given in the second argument.
926 \def\TeXOSQueryFilePath#1#2{\TeXOSQuery{#1}{\string-p\@texosquery@argquote{\texosquerystripquotes{#2}}}}

\TeXOSQueryDirName  Get the canonical path of the directory containing the file given in the second argument.
928 \def\TeXOSQueryDirName#1#2{\TeXOSQuery{#1}{\string-e\@texosquery@argquote{\texosquerystripquotes{#2}}}}

3.1.3 Pattern Formats

There are two basic types of patterns: date/time or numeric. A pattern is stored in a control sequence using custom markup that’s easier for \TeX{} to parse than it would be to parse strings in the form YYYY-MM or #, #0. This internal pattern format can be obtained through capturing the output of \texosquery’s \texttt{-D} action, but patterns can also be constructed using
\texosquerydefpattern\{\langle cs \rangle\}\{\langle pattern specs \rangle\}

The pattern is stored in \langle cs \rangle. The \langle pattern specs \rangle depend on whether a date-time or numeric pattern is required. For a date-time pattern, each date/time element is identified using
\texosquerydtf\{\langle n \rangle\}\{\langle identifier \rangle\}

where \langle identifier \rangle identifies the element type (such as \texttt{M} for month or \texttt{s} for seconds) and \langle n \rangle indicates how the element should be formatted, where \langle n \rangle is an integer from 1 to 4. For example if \langle n \rangle is 2 and \langle identifier \rangle is \texttt{M}, then this indicates the \texttt{MM} format, which produces a two-digit number.

Since it’s rather cumbersome to keep typing \texosquerydtf and it can make for rather hard to read code, \texosquerydefpattern locally redefines \texttt{\%} to expand to \texosquerydtf. This means that if you do, for example:
\texosquerydefpattern\{\texttt{\%2d/\%2M/\%4y}\}
then \texttt{\%2d/\%2M/\%4y} is defined to
\texosquerydtf 2d/\texosquerydtf 2M/\texosquerydtf 4y
When simply used within the document, this just expands to the pattern format. For example:

**Pattern:** \texttt{\textbackslash pattern}.

will display "Pattern: dd/MM/yyyy" in the PDF. However, when used with \texttt{\textbackslash texosqueryfmtdatetime}, the definition of \texttt{\textbackslash texosquerydtf} changes to reproduce the required date/time element.

For example:

\begin{verbatim}
\texttt{\textbackslash texosquerydefpattern\{\textbackslash pattern\}\{\texttt{\%2d/\%2M/\%4y \textbackslash \%2H:\%2m:\%2s \%2Z}\}}
\end{verbatim}

**Pattern:** \texttt{\textbackslash pattern}.

\texttt{\TeXOSQueryDateTime\{\texttt{\textbackslash datetimedata}\}}

\begin{verbatim}
\texttt{\textbackslash ifx\texttt{\textbackslash datetimedata\empty}}
Query Failed!
\texttt{\textbackslash else}
\texttt{\textbackslash expandafter\texttt{\textbackslash texosqueryfmtdatetime\textbackslash expandafter\textbackslash pattern\texttt{\textbackslash datetimedata}}}
\texttt{\textbackslash fi}
\end{verbatim}

The numeric patterns are rather more complicated. The \texttt{\langle pattern specs \rangle} now needs to use the following formats:

\begin{verbatim}
\texttt{\textbackslash texosquerypatnum\{\langle +ve/-ve numeric pattern \rangle\}}
\end{verbatim}

This is a numeric pattern applied to a number regardless of whether the number is positive or negative. (If negative, the minus sign is automatically inserted.) This is rather a long and cumbersome command to type, so \texttt{\textbackslash texosquerydefpattern} locally defines \texttt{\numfmt} to expand to it.

\begin{verbatim}
\texttt{\textbackslash texosquerypatplusminus\{\langle +ve numeric pattern \rangle\}\{\langle -ve numeric pattern \rangle\}}
\end{verbatim}

This provides a pattern \texttt{\langle +ve numeric pattern \rangle} to use if the number is positive and a pattern \texttt{\langle -ve numeric pattern \rangle} to use if the number is negative. Again \texttt{\textbackslash texosquerydefpattern} locally defines a shortcut, \texttt{\pmnumfmt}, to expand to this command.

\begin{verbatim}
\texttt{\textbackslash texosquerypatsinum\{\langle decimal pattern \rangle\}\{\langle mantissa pattern \rangle\}}
\end{verbatim}

This provides a pattern to use for SI numbers where \texttt{\langle decimal pattern \rangle} is a pattern for the decimal number part (before the exponent symbol) and \texttt{\langle mantissa \rangle} is the pattern for the integer part in the mantissa (after the exponent symbol). The locally defined shortcut is \texttt{\sinumfmt}. The \texttt{\langle decimal pattern \rangle} will typically be in the form:

\begin{verbatim}
\texttt{\textbackslash texosquerypatdec\{\langle integer pattern \rangle\}\{\langle fraction pattern \rangle\}}
\end{verbatim}

This indicates a decimal pattern where the \texttt{\langle integer pattern \rangle} is applied to the part before the decimal separator and \texttt{\langle fraction pattern \rangle} is applied to the part after the separator. The shortcut is \texttt{\decfmt}.

\begin{verbatim}
\texttt{\textbackslash texosquerypatprefixcurrency\{\langle decimal pattern \rangle\}\{\langle text \rangle\}}
\end{verbatim}
This indicates a currency pattern with a prefixed currency symbol where \textit{(text)} is inserted before the currency symbol. The shortcut is \texttt{\pcur}. The \textit{(decimal pattern)} will typically use \texttt{\texosquerypatdec{\langle int\rangle}{\langle frac\rangle}}. (Similarly for the following.)

\texttt{\texosquerypatprefixicurrency{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates an international currency pattern with a prefixed international currency symbol where \textit{(text)} is inserted before the symbol. The shortcut is \texttt{\picur}.

\texttt{\texosquerypatsuffixcurrency{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates a currency pattern with a suffixed international currency symbol where \textit{(text)} is inserted after the currency symbol. The shortcut is \texttt{\scur}.

\texttt{\texosquerypatsuffixicurrency{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates an international currency pattern with a suffixed international currency symbol where \textit{(text)} is inserted after the symbol. The shortcut is \texttt{\aicur}.

\texttt{\texosquerypatprefixpercent{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates a percentage pattern with a prefixed percent symbol where \textit{(text)} is inserted before the symbol. The shortcut is \texttt{\ppct}.

\texttt{\texosquerypatsuffixpercent{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates a percentage pattern with a suffixed percent symbol where \textit{(text)} is inserted after the symbol. The shortcut is \texttt{\spct}.

\texttt{\texosquerypatprefixpermill{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates a per-mill pattern with a prefixed per-mill symbol where \textit{(text)} is inserted before the symbol. The shortcut is \texttt{\ppml}.

\texttt{\texosquerypatsuffixpermill{\langle decimal pattern\rangle}{\langle text\rangle}}

This indicates a per-mill pattern with a suffixed per-mill symbol where \textit{(text)} is inserted after the symbol. The shortcut is \texttt{\spml}.

\textbf{Important Note:} The integer parts \textit{(integer part)}, \textit{(fraction part)} and \textit{(mantissa)} must have exactly ten digit identifiers. (\LaTeX{} can’t reach 11 digit numbers.)

There are two types of digit identifiers:

\texttt{\texosquerypatdigit}

This indicates a digit that must be displayed, even if it’s not significant (for example a leading zero). The shortcut command is \texttt{\0} (backslash zero).
This indicates a digit that should only be displayed if it’s significant. (For example, if it’s a leading zero, it’s not shown.) The shortcut command is \# (backslash hash).

The number group separator can be inserted using

The shortcut command is \, (backslash comma).

The sign can be inserted using

This ensures the sign is displayed even if the number is positive. The shortcut command is \- (backslash hyphen).

Here’s an example of a decimal pattern:

The pattern can be applied to a number using \textosqueryfmtnumber:

which produces: 12,345.67 (the group and decimal separators can be redefined as appropriate).

Here’s an example of a scientific number:

The pattern can be applied to a number:

which produces: 1.234567E+03

Here’s an integer pattern:

The pattern applied to a number:

which produces: 12,345 (the fractional part has been omitted).

Here's a currency pattern that applies a different format for positive and negative numbers:

Here's an example of a scientific number:

The pattern can be applied to a number:

which produces: 1.234567E+03

Here’s an integer pattern:

The pattern applied to a number:

which produces: 12,345 (the fractional part has been omitted).

Here’s a currency pattern that applies a different format for positive and negative numbers:
This uses the \( \text{text} \) part of \pcur to insert the sign before the currency symbol (but only for negative values).

\textosqueryfmtnumber{\curpattern}{-1234567}{0}{0}

This produces: $-12,345,678.00$ (again the symbol and separators can be redefined as appropriate).

Here's an example of a percentage pattern:

\textosquerydefpattern{\pcpattern}{\numfmt{\spct{\#\#\#\#\#\#\#\0}}}{}

The pattern can similarly be applied to a number using \textosqueryfmtnumber.

\textosquerydtf \( \text{Date/time format placeholder. The second argument is the placeholder character and the first argument is the number of occurrences of that character in the placeholder. The default definition just converts it back to pattern format used by Java's \textbf{SimpleDateFormat class.} The pattern interprets \( \geq 4 \) as a single case, so this will only produce a maximum of four characters.} \)

\textosquerypatstr \( \text{Quoted string contained in number format.} \)
\textosquerypatquote \( \text{Literal quote contained in number format.} \)
\textosquerypatplusminus \( \text{Number format place holders.} \)

The following commands are used to display the pattern in the document text to reproduce the pattern string recognised by Java. This is provided for debugging to check the pattern. In most cases the pattern will be applied to a number rather than simply displayed.

\textosquerypatnum \( \text{\def \textosquerypatnum#1{#1}} \)

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\textosquerypatsinum
\def\textosquerypatsinum#1#2{#1E\textsuperscript{#2}}

\textosquerypatdec
\def\textosquerypatdec#1#2{#1.\text{\textsuperscript{#2}}}

\textosquerypatprefixcurrency
First argument is a number, the second is optional text before the currency symbol. This will require UTF-8 support otherwise it will need redefining as appropriate. (Similarly for the other currency commands and for the per-mill commands.)
\def\textosquerypatprefixcurrency#1#2{#2\text{	extcurrency\textsuperscript{#1}}}

\textosquerypatprefixicurrency
As above but use international currency symbol.
\def\textosquerypatprefixicurrency#1#2{#2\text\textcurrency\textsuperscript{#1}}

\textosquerypatsuffixcurrency
First argument is a number, the second is optional text after the currency symbol.
\def\textosquerypatsuffixcurrency#1#2{#1\text{\textcurrency\textsuperscript{#2}}}

\textosquerypatsuffixicurrency
As above but use international currency symbol.
\def\textosquerypatsuffixicurrency#1#2{#1\text\textcurrency\textsuperscript{#2}}

\textosquerypatdigit
\def\textosquerypatdigit{0}

\textosquerypatdigitnozero
\def\textosquerypatdigitnozero{\#}

\textosquerypatminus
\def\textosquerypatminus{-}

\textosquerypatgroupsep
\def\textosquerypatgroupsep{,}

\textosquerypatprefixpercent
The first argument is the value, the second argument is optional text before the percent symbol.
\def\textosquerypatprefixpercent#1#2{#2\%\textsuperscript{#1}}

\textosquerypatsuffixpercent
The first argument is the value, the second argument is optional text after the percent symbol.
\def\textosquerypatsuffixpercent#1#2{#1\%\textsuperscript{#2}}

\textosquerypatprefixpermill
The first argument is the value, the second argument is optional text before the per-mill symbol.
\def\textosquerypatprefixpermill#1#2{#2\‰\textsuperscript{#1}}

\textosquerypatsuffixpermill
The first argument is the value, the second argument is optional text after the per-mill symbol.
\def\textosquerypatsuffixpermill#1#2{#1\‰\textsuperscript{#2}}
Provide much shorter cuts for the convenience of directly defining patterns with \texosquerydefpattern.

\def\@texosquery@pattern@shortcuts{%
\def\%{\noexpand\texosquerydtf}%
\def\0{\noexpand\texosquerypatdigit}%
\def\#{\noexpand\texosquerypatdigitnozero}%
\def\-{\noexpand\texosquerypatminus}%
\def\,{\noexpand\texosquerypatgroupsep}%
\def\numfmt{\noexpand\texosquerypatnum}%
\def\pmnumfmt{\noexpand\texosquerypatplusminus}%
\def\sinumfmt{\noexpand\texosquerypatsinum}%
\def\decfmt{\noexpand\texosquerypatdec}%
\def\pcur{\noexpand\texosquerypatprefixcurrency}%
\def\picur{\noexpand\texosquerypatprefixicurrency}%
\def\scur{\noexpand\texosquerypatsuffixcurrency}%
\def\sicur{\noexpand\texosquerypatsuffixicurrency}%
\def\ppct{\noexpand\texosquerypatprefixpercent}%
\def\spct{\noexpand\texosquerypatsuffixpercent}%
\def\ppml{\noexpand\texosquerypatprefixpermill}%
\def\spml{\noexpand\texosquerypatsuffixpermill}%
}

\def\texosquerydefpattern#1#2{%
\begingroup
\@texosquery@pattern@shortcuts
\@texosquery@edef\x{\endgroup\def\noexpand#1{#2}}x
\endgroup
}

3.1.4 Applying Date-Time Patterns

In order to apply date-time patterns, we need all the information about the date or time we're trying to format.

1. Era needed by the \texttt{G} designator. Java identifies the era by an integer (0 = BC and 1 = AD).
2. Era text (e.g. AD) can be supplied by a macro.
3. Year needed by the \texttt{y} designator.
4. Week year needed by the \texttt{Y} designator.
5. Month in year needed by the \texttt{M} or \texttt{L} designators.
6. Month name needed by the \texttt{M} or \texttt{L} designators. This can be provided as macros that convert the month number to the name. Four macros are needed: short, full, standalone short and standalone full.
7. Week in year needed by the \( w \) designator.
8. Week in month needed by the \( W \) designator.
9. Day in year needed by the \( D \) designator.
10. Day in month needed by the \( d \) designator.
11. Day of week in month needed by the \( F \) designator.
12. Day name in week needed by the \( E \) designator. This can be provided as a macro that accepts the day of week number. The full form is needed for 4 letter patterns otherwise a short form.
13. Day number of week (1 = Monday, 7 = Sunday) needed by the \( u \) designator. This means that the above day of week name macros need to use Monday=1 base indexing. This means that \texttt{\pgfcalendarweekdayname} can’t be used directly.
14. AM/PM identifier needed by the \( a \) designator. Assume 0 = AM and 1 = PM to match Java.
15. AM/PM text can be provided by a macro.
16. Hour of the day (0-23) needed by the \( H \) designator.
17. Hour in day (1-24) needed by the \( k \) designator.
18. Hour in am/pm (0-11) needed by the \( K \) designator.
19. Hour in am/pm (1-12) needed by the \( h \) designator.
20. Minute in hour needed by the \( m \) designator.
21. Second in minute needed by the \( s \) designator.
22. Millisecond needed by the \( S \) designator.
23. Time zone needed by the \( z \), \( Z \) and \( X \) designators. This will require macros for converting the time zone to each of those formats.

Supply a general utility command that has enough arguments to pass all the above information. A higher level user command can then be provided that determines all the arguments to provide an easier interface.

The arguments need to be the pattern followed by \{\langle era id\rangle\}\{\langle year\rangle\}\{\langle week year\rangle\}\{\langle month\rangle\}\{\langle week in year\rangle\}\{\langle week in month\rangle\}\{\langle day in year\rangle\}\{\langle day in month\rangle\}\{\langle day of week in month\rangle\}\{\langle day number of week\rangle\}\{\langle am/pm id\rangle\}\{\langle hour of day \( H \)\rangle\}\{\langle hour in day \( k \)\rangle\}\{\langle hour in am/pm \( K \)\rangle\}\{\langle hour in am/pm \( h \)\rangle\}\{\langle minute in hour\rangle\}\{\langle second in minute\rangle\}\{\langle millisecond\rangle\}\{\langle time zone\rangle\}\). The arguments must all be integers except for the time zone which must be in the form \{\langle TZh\rangle\}\{\langle TZm\rangle\}\{\langle id\rangle\}\{\langle dst flag\rangle\}. These are the time zone hour and min offsets, time zone ID and daylight saving flag (1 if daylight saving in effect otherwise 0). These arguments can all be obtained using the --date-time / -M action.

We’ll need some helper macros to get around the nine argument maximum limit.
The general utility command to format a pattern. The first argument is the pattern. After that are the date-time data arguments.

All the remaining arguments except for the time zone must be integers. These are padded using `\textosquery@paddigits`.
\@textosquery@fmt@getdayinyear
1013 \def\@textosquery@fmt@getdayinyear#1{%
1014 \edef\@textosquery@fmt@D{\@textosquery@paddigits{#1}}%
1015 \@textosquery@fmt@getdayinmonth
1016 }
\@textosquery@fmt@getdayinmonth
1017 \def\@textosquery@fmt@getdayinmonth#1{%
1018 \edef\@textosquery@fmt@d{\@textosquery@paddigits{#1}}%
1019 \@textosquery@fmt@getdayofweekinmonth
1020 }
\@textosquery@fmt@getdayofweekinmonth
1021 \def\@textosquery@fmt@getdayofweekinmonth#1{%
1022 \edef\@textosquery@fmt@F{\@textosquery@paddigits{#1}}%
1023 \@textosquery@fmt@getdaynumberofweek
1024 }
\@textosquery@fmt@getdaynumberofweek
1025 \def\@textosquery@fmt@getdaynumberofweek#1{%
1026 \edef\@textosquery@fmt@u{\@textosquery@paddigits{#1}}%
1027 \let\@textosquery@fmt@E\@textosquery@fmt@u
1028 \@textosquery@fmt@getampm
1029 }
\@textosquery@fmt@getampm
1030 \def\@textosquery@fmt@getampm#1{%
1031 \edef\@textosquery@fmt@a{\@textosquery@paddigits{#1}}%
1032 \@textosquery@fmt@gethourindayH
1033 }
\@textosquery@fmt@gethourindayH
1034 \def\@textosquery@fmt@gethourindayH#1{%
1035 \edef\@textosquery@fmt@H{\@textosquery@paddigits{#1}}%
1036 \@textosquery@fmt@gethourindayk
1037 }
\@textosquery@fmt@gethourindayk
1038 \def\@textosquery@fmt@gethourindayk#1{%
1039 \edef\@textosquery@fmt@k{\@textosquery@paddigits{#1}}%
1040 \@textosquery@fmt@gethourinampmK
1041 }
\@textosquery@fmt@gethourinampmK
1042 \def\@textosquery@fmt@gethourinampmK#1{%
1043 \edef\@textosquery@fmt@K{\@textosquery@paddigits{#1}}%
1044 \@textosquery@fmt@gethourinampmh
1045 }
\@texosquery@fmt@gethourinampmh
\begin{verbatim}
def\@texosquery@fmt@gethourinampmh#1{%
  \edef\@texosquery@h{\@texosquery@paddigits{#1}}%
  \@texosquery@fmt@getminute
}
\end{verbatim}

\@texosquery@fmt@getminute
\begin{verbatim}
def\@texosquery@fmt@getminute#1{%
  \edef\@texosquery@m{\@texosquery@paddigits{#1}}%
  \@texosquery@fmt@getsecond
}
\end{verbatim}

\@texosquery@fmt@getsecond
\begin{verbatim}
def\@texosquery@fmt@getsecond#1{%
  \edef\@texosquery@s{\@texosquery@paddigits{#1}}%
  \@texosquery@fmt@getmillisecond
}
\end{verbatim}

\@texosquery@fmt@getmillisecond
\begin{verbatim}
def\@texosquery@fmt@getmillisecond#1{%
  \edef\@texosquery@S{\@texosquery@paddigits{#1}}%
  \@texosquery@fmt@gettimezone
}
\end{verbatim}

\@texosquery@fmt@gettimezone
\begin{verbatim}
def\@texosquery@fmt@gettimezone#1{%
  \def\@texosquery@Z{#1}%
  \def\@texosquery@z{#1}%
  \def\@texosquery@X{#1}
}
\end{verbatim}

All data now supplied. Temporarily redefine pattern markup and process the pattern.
\begin{verbatim}
\begingroup
\@texosquery@setup@dtpattern
\@texosquery@fmt@dt@pattern
\endgroup
\end{verbatim}

\@texosquery@setup@dtpattern
\begin{verbatim}
def\@texosquery@setup@dtpattern{%
  \let\texosquerydtf@\@texosquery@fmt@dtf
  \let\texosquerypatstr@\@texosquery@paddigits@pos
  \let\texosquerypatquote@\@texosquery@paddigits@pos
}
\end{verbatim}

\@texosquery@paddigits@pos  Pad positive number to 10 digits. \TeX{} can’t reach 11 digits, so this is the maximum representation.
\begin{verbatim}
def\@texosquery@paddigits@pos#1{%
  \ifnum#1<10
    000000000\number#1
  \else
    \number#1
  \fi
\end{verbatim}
This will expand to 11 characters (sign followed by 10 digits).
\def\@texosquery@paddigits#1\{
\ifnum#1<0
 Move the minus sign outside.
 -\expandafter\@texosquery@paddigits@pos\expandafter
 {\@texosquery@gobble#1}\%
 \else
 +\@texosquery@paddigits@pos{#1}\%
 \fi
\}
\@texosquery@paddigits@trailing Pad trailing zeros.
Provide commands to select certain digits. (Sign not included.)

\@texosquery@firstoften

First of ten.
\def\@texosquery@firstoften#1#2#3#4#5#6#7#8#9{% #1%
Grab tenth argument and discard.
\@texosquery@gobble}

\@texosquery@secondoften

Second of ten.
\def\@texosquery@secondoften#1#2#3#4#5#6#7#8#9{% #2%
Grab tenth argument and discard.
\@texosquery@gobble}

\@texosquery@thirdoften

Third of ten.
\def\@texosquery@thirdoften#1#2#3#4#5#6#7#8#9{% #3%
Grab tenth argument and discard.
\@texosquery@gobble}

\@texosquery@fourthoften

Fourth of ten.
\def\@texosquery@fourthoften#1#2#3#4#5#6#7#8#9{% #4%
Grab tenth argument and discard.
\@texosquery@gobble}

\@texosquery@fifthoften

Fifth of ten.
\def\@texosquery@fifthoften#1#2#3#4#5#6#7#8#9{% #5%
Grab tenth argument and discard.
\@texosquery@gobble
}

Sixth of ten.
\def\@texosquery@sixthoften#1#2#3#4#5#6#7#8#9{\%#6\}
Grab tenth argument and discard.
\@texosquery@gobble
}

Seventh of ten.
\def\@texosquery@seventhoften#1#2#3#4#5#6#7#8#9{\%#7\}
Grab tenth argument and discard.
\@texosquery@gobble
}

Eighth of ten.
\def\@texosquery@eighthoften#1#2#3#4#5#6#7#8#9{\%#8\}
Grab tenth argument and discard.
\@texosquery@gobble
}

Ninth of ten.
\def\@texosquery@ninthoften#1#2#3#4#5#6#7#8#9{\%#9\}
Grab tenth argument and discard.
\@texosquery@gobble
}

Tenth of ten.
\def\@texosquery@tenthoften#1#2#3#4#5#6#7#8#9{\%
\@texosquery@firstofone
}

Now macros to select first \textit{n} of ten.

First two of ten.
\def\@texosquery@firsttwooften#1#2#3#4#5#6#7#8#9{\%#1#2\}
Grab tenth argument and discard.
\@texosquery@gobble
}
@texosquery@firstthreeoften  First three of ten.
1175 \def\@texosquery@firstthreeoften#1#2#3#4#5#6#7#8#9{\% 
1176  #1#2#3\%
1177  \@texosquery@gobble 
1178 }

@texosquery@firstfouroften   First four of ten.
1179 \def\@texosquery@firstfouroften#1#2#3#4#5#6#7#8#9{\% 
1180  #1#2#3#4\%
1181  \@texosquery@gobble 
1182 }

@texosquery@firstfiveoften  First five of ten.
1183 \def\@texosquery@firstfiveoften#1#2#3#4#5#6#7#8#9{\% 
1184  #1#2#3#4#5\%
1185  \@texosquery@gobble 
1186 }

@texosquery@firstsixoften  First six of ten.
1187 \def\@texosquery@firstsixoften#1#2#3#4#5#6#7#8#9{\% 
1188  #1#2#3#4#5#6\%
1189  \@texosquery@gobble 
1190 }

@texosquery@firstsevenoften  First seven of ten.
1191 \def\@texosquery@firstsevenoften#1#2#3#4#5#6#7#8#9{\% 
1192  #1#2#3#4#5#6#7\%
1193  \@texosquery@gobble 
1194 }

@texosquery@firsteightoften  First eight of ten.
1195 \def\@texosquery@firsteightoften#1#2#3#4#5#6#7#8#9{\% 
1196  #1#2#3#4#5#6#7#8\%
1197  \@texosquery@gobble 
1198 }

@texosquery@firstnineoften  First nine of ten.
1199 \def\@texosquery@firstnineoften#1#2#3#4#5#6#7#8#9{\% 
1200  #1#2#3#4#5#6#7#8#9\%
Grab tenth argument and discard.
\@texosquery@gobble
}

@texosquery@alltenoften All ten.
\def\@texosquery@alltenoften#1#2#3#4#5#6#7#8#9{%
#1#2#3#4#5#6#7#8#9%
\@texosquery@firstofone
}

Select last \textit{n} of ten.

@texosquery@lasttwooften Last two of ten.
\def\@texosquery@lasttwooften#1#2#3#4#5#6#7#8#9{%
#9%
\@texosquery@firstofone
}

@texosquery@lastthreeoften Last three of ten.
\def\@texosquery@lastthreeoften#1#2#3#4#5#6#7#8#9{%
#8#9%
\@texosquery@firstofone
}

@texosquery@lastfouroften Last four of ten.
\def\@texosquery@lastfouroften#1#2#3#4#5#6#7#8#9{%
#7#8#9%
\@texosquery@firstofone
}

@texosquery@lastfiveoften Last five of ten.
\def\@texosquery@lastfiveoften#1#2#3#4#5#6#7#8#9{%
#6#7#8#9%
\@texosquery@firstofone
}

@texosquery@lastsixoften Last six of ten.
\def\@texosquery@lastsixoften#1#2#3#4#5#6#7#8#9{%
#5#6#7#8#9%
\@texosquery@firstofone
}

@texosquery@lastsevenoften Last seven of ten.
\def\@texosquery@lastsevenoften#1#2#3#4#5#6#7#8#9{%
#4#5#6#7#8#9%
\@texosquery@firstofone
}
\@texosquery@lasteightoften \ Last eight of ten.
\begin{verbatim}
1231 \def\@texosquery@lasteightoften#1#2#3#4#5#6#7#8#9{%
1232 #3#4#5#6#7#8#9%
1233 \@texosquery@firstofone
1234 }
\end{verbatim}

\@texosquery@lastnineoften \ Last nine of ten.
\begin{verbatim}
1235 \def\@texosquery@lastnineoften#1#2#3#4#5#6#7#8#9{%
1236 #2#3#4#5#6#7#8#9%
1237 \@texosquery@firstofone
1238 }
\end{verbatim}

\@texosquery@fmtminus \ Minus symbol for use in date-time patterns.
\begin{verbatim}
1239 \def\@texosquery@fmtminus{\texosquerypatfmtminus}
\end{verbatim}

\@texosquery@fmtplus \ Plus symbol for use in date-time patterns. Omit by default.
\begin{verbatim}
1240 \def\@texosquery@fmtplus{}
\end{verbatim}

\@texosquery@fmtsign \ Plus or minus sign for use in date-time patterns.
\begin{verbatim}
1241 \def\@texosquery@fmtsign#1{%
1242 \ifx#1+\@texosquery@fmtplus%
1243 \else\@texosquery@fmtminus%
1244 \fi
1245 }
\end{verbatim}

\@texosquery@atleastonedigit \ At least one digit with leading zeros removed.
\begin{verbatim}
1244 \def\@texosquery@atleastonedigit#1{%
1245 \ifnum#1<0
1246 \@texosquery@fmtminus\number-#1
1247 \else
1248 \number#1
1249 \fi
1250 }
\end{verbatim}

\@texosquery@atleastfourdigits \ At least four digits, possible padded with zeros to make up four. The first argument is the sign, then follow the ten digits.
\begin{verbatim}
1251 \def\@texosquery@atleastfourdigits#1{%
1252 \@texosquery@at@leastfourdigits#1\@texosquery@end@atleastfourdigits
1253 }
\end{verbatim}

\@texosquery@at@leastfourdigits \ At least four digits, possible padded with zeros to make up four. The first argument is the sign, then follow the ten digits.
\begin{verbatim}
1254 \def\@texosquery@at@leastfourdigits#1#2\@texosquery@end@atleastfourdigits{%
1255 \@texosquery@fmtsign(#1)%
1256 \ifnum#2<1000
1257 \@texosquery@lastfouroften#2%
1258 \else
1259 \number#2
1260 \fi
1261 }
\end{verbatim}
\@texosquery@threedigitsexactly  \ Texosquery@threedigitsexactly

Exactly three digits.

\@texosquery@twodigitsexactly  \ Texosquery@twodigitsexactly

Exactly two digits.

\@texosquery@fmt@dtf  \ Texosquery@fmt@dtf

\@texosquery@fmt@dtf \langle \, n \, \rangle \{ \langle \, \text{designator} \, \rangle \}

When formatting a date-time pattern \texosquery@dtf will temporarily be redefined to this command. This command indicates the format obtained by \langle \, n \, \rangle instances of \langle \, \text{designator} \, \rangle. For example, \{2\}{M} indicates the format MM. This command tests for \texosquery@fmtpat\langle \, \text{format} \, \rangle, which should take a single argument. If defined, that’s used, otherwise use one of the numeric commands defined above. The locale package defines \texosquery@fmtpatMMM and so on to use the locale’s month names etc.
Provide default commands for the time zone designators, since the time zone isn’t supplied as a single integer.

\texosqueryfmttimezonehr\ Allow for -0 so append 1 to hour in test.

\def\texosqueryfmttimezonehr#1{% 
  \ifnum#1<0\@texosquery@fmtminus
  \ifnum#1>-10 0\fi
  \number-#1
  \else
  \def\texosqueryfmttimezonehr#1{% 
    \@texosquery@atleastfourdigits
    \number-#1
    \else
    \fi
  \fi
  \fi
}
Like the above, but don’t zero-pad or prefix with plus sign.

```
\def\texosqueryfmttimezone{\number#1}
```

Maps id to short time zone display name. This will need redefining as appropriate. The default simply expands to the ID. Mappings can be obtained for a particular locale using the \texttt{-Z} or \texttt{--time-zones} action.

```
\def\texosqueryshorttimezone{#1}
```

Maps id to long time zone display name. This will need redefining as appropriate. The default simply expands to the ID.

```
\def\texosquerylongtimezone{#1}
```

Maps id to long daylight saving time zone display name. This will need redefining as appropriate. The default simply expands to the ID followed by (DST).

```
\def\texosquerylongdstzone{#1 (DST)}
```

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\def\texosquerytimesep{::}

\def\texosqueryfmtpatz{\text{Default time zone format for $z$ designator.}}
\expandafter\ifnum\@texosquery@fourthoffour#1=0
\expandafter\texosqueryshorttimezone\expandafter{\@texosquery@thirdoffour#1}\else
\expandafter\texosqueryshortdstzone\expandafter{\@texosquery@thirdoffour#1}\fi

\def\texosqueryfmtpatzz{\text{Default time zone format for $zz$ designator.}}
\expandafter\ifnum\@texosquery@fourthoffour#1=0
\expandafter\texosqueryshorttimezone\expandafter{\@texosquery@thirdoffour#1}\else
\expandafter\texosqueryshortdstzone\expandafter{\@texosquery@thirdoffour#1}\fi

\def\texosqueryfmtpatzzz{\text{Default time zone format for $zzz$ designator.}}
\expandafter\ifnum\@texosquery@fourthoffour#1=0
\expandafter\texosquerylongtimezone\expandafter{\@texosquery@thirdoffour#1}\else
\expandafter\texosquerylongdstzone\expandafter{\@texosquery@thirdoffour#1}\fi

\def\texosqueryfmtpatzzzz{\text{Default time zone format for $zzzz$ designator.}}
\expandafter\ifnum\@texosquery@fourthoffour#1=0
\expandafter\texosquerylongtimezone\expandafter{\@texosquery@thirdoffour#1}\else
\expandafter\texosquerylongdstzone\expandafter{\@texosquery@thirdoffour#1}\fi

\def\texosqueryfmtpatZ{\text{Default time zone format for $Z$ designator.}}
\expandafter\ifnum\@texosquery@fourthoffour#1=0
\expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\else
\fi

\def\texosqueryfmtpatZZ{\text{Default time zone format for $ZZ$ designator.}}
Default time zone format for \textit{ZZZ} designator.
\begin{verbatim}
\def\texosqueryfmtpatZZZ#1{%
  \expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\
  \expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\}
\end{verbatim}

Default time zone format for \textit{ZZZZ} designator.
\begin{verbatim}
\def\texosqueryfmtpatZZZZ#1{%
  \expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\
  \expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\}
\end{verbatim}

Default time zone format for \textit{X} designator.
\begin{verbatim}
\def\texosqueryfmtpatX#1{%
  \expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\
  \texosquerytimesep\expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\}
\end{verbatim}

Default time zone format for \textit{XX} designator.
\begin{verbatim}
\def\texosqueryfmtpatXX#1{%
  \expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\
  \expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\}
\end{verbatim}

Default time zone format for \textit{XXX} designator.
\begin{verbatim}
\def\texosqueryfmtpatXXX#1{%
  \expandafter\texosqueryfmttimezonehr\expandafter{\@texosquery@firstoffour#1}\
  \expandafter\texosqueryfmttimezonemin\expandafter{\@texosquery@secondoffour#1}\}
\end{verbatim}
\texttt{\textbackslash texosqueryfmtpatXXXX} Default time zone format for XXXX designator.

\begin{verbatim}
1435 \def\texosqueryfmtpatXXXX#1{\
1436 \expandafter\texosqueryfmttimezonehr\expandafter\
1437 \{[@texosquery@firstoffour#1]\%\n1438 \texosquerytimesep\n1439 \expandafter\texosqueryfmttimezoneomin\expandafter\
1440 \{[@texosquery@secondoffour#1]\%\n1441 }\end{verbatim}

\texttt{\textbackslash texosqueryfmtpata} Default am/pm designator for the a designator.

\begin{verbatim}
1442 \def\texosqueryfmtpata#1{\
1443 \ifnum#1=0 \text{AM}\else \text{PM}\fi
1444 }\end{verbatim}

\texttt{\textbackslash texosqueryfmtpataa} Default am/pm for the aa designator. Just make it the same as the a designator.

\begin{verbatim}
1445 \def\texosqueryfmtpataa{\texosqueryfmtpata}\end{verbatim}

\texttt{\textbackslash texosqueryfmtpataaa} Default am/pm for the aaa designator. Just make it the same as the a designator.

\begin{verbatim}
1446 \def\texosqueryfmtpataaa{\texosqueryfmtpataa}\end{verbatim}

\texttt{\textbackslash texosqueryfmtpatG} Default era designator for the G designator.

\begin{verbatim}
1447 \def\texosqueryfmtpatG#1{\
1448 \ifnum#1=1 \text{AD}\else \text{BC}\fi
1449 }\end{verbatim}

\texttt{\textbackslash texosqueryfmtpatGG} Default era for the GG designator. Just make it the same as the G designator.

\begin{verbatim}
1450 \def\texosqueryfmtpatGG{\texosqueryfmtpatG}\end{verbatim}

\texttt{\textbackslash texosqueryfmtpatGGG} Default era for the GGG designator. Just make it the same as the G designator.

\begin{verbatim}
1451 \def\texosqueryfmtpatGGG{\texosqueryfmtpatGG}\end{verbatim}

\texttt{\textbackslash texosqueryfmtpatGGGG} Default era for the GGGG designator. Just make it the same as the G designator.

\begin{verbatim}
1452 \def\texosqueryfmtpatGGGG{\texosqueryfmtpatGGG}\end{verbatim}

\subsection*{3.1.5 Applying Numeric Patterns}

\texttt{\textbackslash texosqueryfmtnumber\{pattern\}\{int\}\{frac\}\{mantissa\}}

General purpose low-level number formatting command. The first argument \texttt{(pattern)} is the pattern. The other arguments are unformatted integers and must be present and not exceed 10 digits each. The \texttt{(frac)} part must not start with a sign. The minus sign should go at the start of \texttt{(int)} for negative numbers. The plus sign is optional for positive \texttt{(int)} or \texttt{(mantissa)} and not permitted in \texttt{(frac)}. The arguments may each be the actual numerical value or be a single control sequence whose replacement text is the value. Avoid anything more complicated than that.
This package doesn’t provide a higher level command that can split a number into integer, fractional and mantissa parts.

\def\texosqueryfmtnumber#1#2#3#4{% 
\begingroup 
\let\texosquerypatstr\texosqueryfmtstr 
\let\texosquerypatquote\texosqueryfmtquote 
\let\texosquerypatplusminus\texosqueryfmtplusminus 
\let\texosquerypatnum\texosqueryfmtnum 
\let\texosquerypatsinum\texosquery@patsinum 
\let\texosquerypatdec\texosqueryfmtdec 
\let\texosquerypatprefixcurrency\texosquery@patfmt@prefixcurrency 
\let\texosquerypatsuffixcurrency\texosquery@patfmt@suffixcurrency 
\let\texosquerypatprefixicurrency\texosquery@patfmt@prefixicurrency 
\let\texosquerypatsuffixicurrency\texosquery@patfmt@suffixicurrency 
\let\texosquerypatdigit\texosquerypatfmt@digit 
\let\texosquerypatdigitnozero\texosquerypatfmt@digitnozero 
\let\texosquerypatgroupsep\texosqueryfmtgroupsep 
\let\texosquerypatprefixpercent\texosquery@patfmt@prefixpercent 
\let\texosquerypatsuffixpercent\texosquery@patfmt@suffixpercent 
\let\texosquerypatprefixpermill\texosquery@patfmt@prefixpermill 
\let\texosquerypatsuffixpermill\texosquery@patfmt@suffixpermill 
\let\texosquerypatprefixcurrency\texosquery@patfmt@prefixcurrency 
\let\texosquerypatsuffixcurrency\texosquery@patfmt@suffixcurrency 
\let\texosquerypatplusminus\texosquery@patfmt@plusminus 
\let\texosquerypatminus\texosquery@patfmt@sign 
\let\texosquerypatfmt@decsep\texosqueryfmt@decsep 

\edef\@texosquery@sgn{\ifnum#2=0 \expandafter\ifnum#21<0 -\else+\fi \else \ifnum#2<0 -\else+\fi \fi} 

\edef\@texosquery@int{\expandafter\@texosquery@paddigits \expandafter{\number#2}} 
\let\@texosquery@si@int\@texosquery@int 

\edef\@texosquery@frac{\expandafter\@texosquery@paddigits@trailing \expandafter{#3}} 
\let\@texosquery@si@frac\@texosquery@frac 

\edef\@texosquery@mantissa{\expandafter\@texosquery@paddigits \expandafter{\number#4}} 

Is the mantissa non-zero? 
\ifnum#4=0 \relax \else \expandafter/if\@texosquery@sgn-% \edef\@texosquery@int{\expandafter@texosquery@paddigits \expandafter\@texosquery@paddigits@trailing \expandafter{\number#2} \else \expandafter@if\@texosquery@sgn-% \edef\@texosquery@int{\expandafter\@texosquery@paddigits \expandafter\@texosquery@paddigits@trailing \expandafter{\number#2} \fi \fi} 

Allow for negative zero in the \langle int \rangle part. To avoid overflow, first check for 0 and then append 1 to the number to catch \texttt{-0}. 

\edef\@texosquery@sgn{% 
\ifnum#2=0 
\expandafter@ifnum#21<0 -\else+\fi 
\else 
\ifnum#2<0 -\else+\fi 
\fi 
}

Allow for arguments passed as control sequences that expand to a number. 
\edef\@texosquery@int{\expandafter@\@texosquery@paddigits\@texosquery@paddigits@trailing \expandafter{\number#2}} 
\let\@texosquery@si@int\@texosquery@int 

Can’t use \texttt{\number} here as we’ll lose any leading zeros. 
\edef\@texosquery@fract{\expandafter@\@texosquery@paddigits@trailing\@texosquery@paddigits@trailing \expandafter{\number#3}} 
\let\@texosquery@si@fract\@texosquery@fract 
\edef\@texosquery@mantissa{\expandafter\@\@texosquery@paddigits\@texosquery@paddigits@trailing \expandafter{\number#4}} 

Is the mantissa non-zero? 
\ifnum#4=0 \relax \else \expandafter@if\@texosquery@sgn-% 
\edef\@texosquery@int{\expandafter\@\@texosquery@paddigits\@texosquery@paddigits@trailing \expandafter{\number#2}} 
\fi
Shift.
\ifnum#4<0
\expandafter\@texosquery@neg@shift\expandafter\{\number-#4\}\else
\@texosquery@pos@shift\{#4\}\fi
\expandafter\ifx\@texosquery@sgn-%
\edef\@texosquery@int{\expandafter\@texosquery@paddigits\expandafter{\number-\@texosquery@int}}\else
\edef\@texosquery@int{\expandafter\@texosquery@paddigits\expandafter{\number\@texosquery@int}}\fi
\edef\@texosquery@frac{\@texosquery@paddigits@trailing{\@texosquery@frac}}\fi
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}\let\@texosquery@zerodigit\@texosquery@zerodigit@leading\expandafter\ifx\@texosquery@sgn-%
\let\@texosquery@currentsign\texosquerypatfmtminus\else
\let\@texosquery@currentsign\texosquerypatfmtplus\fi
\@texosquery@digitindex=0\relax\let\@texosquery@patfmt@dosep\empty\@texosquery@digitfoundfalse
\endgroup
\@texosquery@digitindex\newcount\@texosquery@digitindex\if@texosquery@digitfound\newif\if@texosquery@digitfound\Macros to shift the decimal place.
\@texosquery@pos@shift
\def\@texosquery@pos@shift#1{%\ifcase#1
\or
\edef\@texosquery@int{%\expandafter\@texosquery@lastnineoften\@texosquery@int\expandafter\@texosquery@firstoften\@texosquery@frac}\edef\@texosquery@frac%
Anything larger will require scientific notation. Hopefully the pattern supports this.
Anything beyond this will require scientific notation. Hopefully the pattern supports it.
\def\@texosquerypat@numfmt@sign{\@texosquery@currentsign\let\@texosquery@currentsign\empty}
\def\texosquerypatfmtstr#1{#1}
\def\texosquerypatfmtquote{'}
\def\texosquerypatfmt@plusminus#1#2{
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}\@texosquery@digitindex=0\relax\@texosquery@digitfoundfalse\expandafter\ifx\@texosquery@sgn-#2\ifnum\@texosquery@digitindex=10\else\@texosquery@invalidpattern{#2}\fi\else#1\ifnum\@texosquery@digitindex=10\else\@texosquery@invalidpattern{#1}\fi\fi}
\def\texosquerypatfmt@num#1{#1}
\def\texosquerypatfmtexp{E}
\def\texosquerypatfmt@sinum#1#2{
\let\@texosquery@int\@texosquery@si@int\let\@texosquery@frac\@texosquery@si@frac\let\@texosquery@current\@texosquery@int#1\texosquerypatfmtexp\ifnum\@texosquery@mantissa<0\relax\let\@texosquery@currentsign\texosquerypatfmtminus\else\fi}
\def\texosquerypatfmt@sinum#1#2{
\let\@texosquery@int\@texosquery@si@int\let\@texosquery@frac\@texosquery@si@frac\let\@texosquery@current\@texosquery@int#1\texosquerypatfmtexp\{\let\@texosquery@zerodigit\@texosquery@zerodigit@leading\let\@texosquery@mantissa<0\relax\let\@texosquery@currentsign\texosquerypatfmtminus\else\fi}
\let\@texosquery@currentsign\texosquerypatfmtplus
\fi
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@mantissa}\
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\empty
\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@leading
\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#1}\
\fi
\let\@texosquery@patfmt@dosep\texosquerypatfmt@decsep
\let\@texosquery@current\@texosquery@frac
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\empty
\let\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@trailing
\let\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#2}\
\fi
\let\@texosquery@patfmt@dosep\empty
\let\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@leading
\let\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#2}\
\fi

\def\texosquerypatfmt{\%
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}\
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\empty
\let\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@leading
\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#1}\
\fi
\fi

\def\texosquerypatfmt@dec#1#2{\%
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}\
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\texosquerypatfmt@decsep
\let\@texosquery@current\@texosquery@frac
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\empty
\let\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@trailing
\let\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#1}\
\fi
\fi

\def\texosquerypatfmt@int{\%
\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}\
\@texosquery@digitindex=0\relax
\let\@texosquery@patfmt@dosep\empty
\let\@texosquery@digitfoundfalse
\let\@texosquery@zerodigit\@texosquery@zerodigit@leading
\@texosquery@digitindex=10
\ifnum\@texosquery@digitindex=10
\else
\@texosquery@invalidpattern{#1}\
\fi
\fi

\def\texosquerypatfmtdecsep {Decimal separator. Change as appropriate.}
\def\texosquerypatfmtcurdecsep {Currency decimal separator. Change as appropriate.}
\@texosquery@setpatdisplay
\def\@texosquery@setpatdisplay{%
  \def\texosquerypatstr##1{'##1'}%
  \def\texosquerypatquote{"}%
  \def\texosquerypatplusminus##1##2{##1;##2}%
  \def\texosquerypatnum##1{##1}%
  \def\texosquerypatsinum##1##2{##1E##2}%
  \def\texosquerypatdec##1##2{##1.##2}%
  \def\texosquerypatprefixcurrency##1##2{##2 \¤ ##1}%
  \def\texosquerypatsuffixcurrency##1##2{##1 \¤ ##2}%
  \def\texosquerypatprefixicurrency##1##2{##2 \¤\¤ ##1}%
  \def\texosquerypatsuffixicurrency##1##2{##1 \¤\¤ ##2}%
  \def\texosquerypatdigit{0}%
  \def\texosquerypatdigitnozero{\#}%
  \def\texosquerypatminus{-}%
  \def\texosquerypatgroupsep{,}%
  \def\texosquerypatprefixpercent##1##2{##2\%##1}%
  \def\texosquerypatsuffixpercent##1##2{##1\%##2}%
  \def\texosquerypatprefixpermill##1##2{##2‰##1}%
  \def\texosquerypatsuffixpermill##1##2{##1‰##2}%
  \def\texosquerypatfmt@decsep{.}%
}
\@texosquery@invalidpattern
\def\@texosquery@invalidpattern#1{%
  \begingroup
    \@texosquery@setpatdisplay
    \@texosquery@err{10 digit specifiers expected in numeric pattern #1. Found \number\@texosquery@digitindex}%
  \endgroup
}
\texosquerypatfmtcurrencysign Currency symbol. Redefine as appropriate.
\def\texosquerypatfmtcurrencysign{$}$
\texosquerypatfmticurrencysign International currency symbol. There's no generic fallback that's independent of the input encoding, so this uses a UTF-8 character on the assumption that if \textcurrency isn't available (for example, through textcomp, then the user may be using X\TeX or Lua\TeX). If this isn't the case, and there's no UTF-8 support, then this command will need to be redefined as appropriate.
\ifx\textcurrency\undefined
  \def\texosquerypatfmticurrencysign{Ø}
\else
  \@texosquery@invalidpattern{#1}%
  \fi
}
\def\texosquerypatfmticurrencysign{\textcurrency}
\fi
\def\texosquery@patfmt@prefixcurrency#1#2{\let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
#2\texosquerypatfmticurrencysign#1\}
\def\texosquery@patfmt@prefixicurrency#1#2{\let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
#2\texosquerypatfmticurrencysign#1\}
\def\texosquery@patfmt@suffixcurrency#1#2{\let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
#1\texosquerypatfmticurrencysign#2\}
\def\texosquery@patfmt@suffixicurrency#1#2{\let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
#1\texosquerypatfmticurrencysign#2\}
\def\texosquerypatfmt@digit{\advance\@texosquery@digitindex by 1\relax
\if\@texosquery@digitfound
\else
\ifx\@texosquery@currentsign\texosquerypatfmtminus
\texosquerypatfmtminus
\let\@texosquery@currentsign\empty
\else
\@texosquery@patfmt@dosep
\let\@texosquery@patfmt@dosep\empty
\fi
\fi
\@texosquery@digitfoundtrue
\ifcase\@texosquery@digitindex
\or
\expandafter\@texosquery@firstoften\@texosquery@current
\or
\expandafter\@texosquery@secondoften\@texosquery@current
\or
\expandafter\@texosquery@thirdoften\@texosquery@current
\else
\fi
\fi
\@texosquery@digitfoundtrue
\ifcase\@texosquery@digitindex
\or
\expandafter\@texosquery@firstoften\@texosquery@current
\or
\expandafter\@texosquery@secondoften\@texosquery@current
\or
\expandafter\@texosquery@thirdoften\@texosquery@current
\else
\fi
\expandafter\@texosquery@firstoften\@texosquery@current
\expandafter\@texosquery@secondoften\@texosquery@current
\expandafter\@texosquery@thirdoften\@texosquery@current
\expandafter\@texosquery@firstoften\@texosquery@current
\expandafter\@texosquery@secondoften\@texosquery@current
\expandafter\@texosquery@thirdoften\@texosquery@current
\@texosquery@patfmt@dosep
\let\@texosquery@patfmt@dosep\empty
\fi
\fi
\@texosquery@digitfoundtrue
0%
\fi
}
\@texosquery@zerodigit@trailing
\def\@texosquery@zerodigit@trailing{%
\edef\@texosquery@digit{%
\ifcase\@texosquery@digitindex
0%
\or
\@texosquery@current
\or
\expandafter\@texosquery@lastnineoften\@texosquery@current
\or
\expandafter\@texosquery@lasteightoften\@texosquery@current
\or
\expandafter\@texosquery@lastsevenoften\@texosquery@current
\or
\expandafter\@texosquery@lastsixoften\@texosquery@current
\or
\expandafter\@texosquery@lastfiveoften\@texosquery@current
\or
\expandafter\@texosquery@lastfouroften\@texosquery@current
\or
\expandafter\@texosquery@lastthreeoften\@texosquery@current
\or
\expandafter\@texosquery@lasttwooften\@texosquery@current
\or
\expandafter\@texosquery@tenthoften\@texosquery@current
\else
0%
\fi
}%
\ifnum\@texosquery@digit>0\relax
\if@texosquery@digitfound
\else
\fxtexosquerypatminus\texosquerypatfmtminus
\texosquerypatfmtminus
\else
\@texosquery@patfmt@dosep
\let\@texosquery@patfmt@dosep\empty
\fi
\fi
\@texosquery@digitfoundtrue
0%
108
\def\texosquerypatfmtminus{\ifmmode-\else$-$\fi}

\def\texosquerypatfmtplus{\ifmmode+\else$+$\fi}

\def\texosquerypatfmtgroupsep{
    \if@texosquery@digitfound\texosquerypatfmtgroupsep\fi
}

\def\texosquerypatfmtpercentsign{\%}

\def\texosquerypatfmtpermillsign{‰}

\def\@texosquery@adjust@per#1{\@texosquery@pos@shift{#1}\edef\@texosquery@int{\expandafter\@texosquery@paddigits\number\@texosquery@int}\edef\@texosquery@frac{\@texosquery@paddigits@trailing{\@texosquery@frac}}\edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}}

\def\texosquery@patfmt@prefixpercent#1#2{\@texosquery@adjust@per{2}\#2\texosquerypatfmtpercentsign#1}

\def\texosquery@patfmt@suffixpercent#1#2{\@texosquery@adjust@per{2}\#1\texosquerypatfmtpercentsign#2}

\def\texosquery@patfmt@prefixpermill#1#2{\@texosquery@adjust@per{3}\#2\texosquerypatfmtpermillsign#1}
3.2 \TeX Code

This is just a simple wrapper for texosquery.tex so that it can be loaded using \TeX's standard \usepackage method. Identify package:

\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{texosquery}[2017/06/20 v1.6 (NLCT)]

Load texosquery.tex:

\input{texosquery}

3.3 Configuration File (texosquery.cfg)

The configuration file. This will need to be edited as appropriate to the system.

\def\TeXOSInvokerName{texosquery}

% 2. If the invoker name given in the definition above is on the
% restricted list, uncomment the line below to allow it to be run
% in restricted mode:"
3.4 Bash Scripts

These are the bash scripts for Unix-like systems. The first line
#!/bin/sh

is added when the files are extracted by texosquery.ins (since \nopreamble automatically inserts a blank line at the start of the file).

3.4.1 texosquery.sh

This now has a check for cygwin.

```bash
kernel='uname -s'
if test "${kernel#*CYGWIN}" != "$kernel"
    jarpath='cygpath -w $(kpsewhich --progname=texosquery --format=texmfscripts texosquery.jar)'
else
    jarpath='kpsewhich --progname=texosquery --format=texmfscripts texosquery.jar'
fi
java -jar "$jarpath" "$@
```

3.4.2 texosquery-jre8.sh

```bash
kernel='uname -s'
if test "${kernel#*CYGWIN}" != "$kernel"
    jarpath='cygpath -w $(kpsewhich --progname=texosquery --format=texmfscripts texosquery-jre8.jar)'
else
    jarpath='kpsewhich --progname=texosquery --format=texmfscripts texosquery-jre8.jar'
fi
java -Djava.locale.providers=CLDR,JRE -jar "$jarpath" "$@
```

3.4.3 texosquery-jre5.sh

```bash
kernel='uname -s'
if test "${kernel#*CYGWIN}" != "$kernel"
    jarpath='cygpath -w $(kpsewhich --progname=texosquery --format=texmfscripts texosquery-jre5.jar)'
else
    jarpath='kpsewhich --progname=texosquery --format=texmfscripts texosquery-jre5.jar'
fi
java -jar "$jarpath" "$@
```
3.5 Windows Batch Scripts

These are the batch scripts for Windows. \TeX on Windows doesn’t allow the creation of .bat files, so .ins file creates these with the extension .batch which will need to be changed to .bat after extraction.

3.5.1 texosquery.bat

2064 @ECHO OFF
2065 FOR /F "tokens=*" %%I IN ('kpsewhich --profilename=texosquery --format=texmfscripts texosquery.jar') DO SET JARPATH=%%I
2066 java -jar "%JARPATH%" %*

3.5.2 texosquery-jre8.bat

2067 @ECHO OFF
2068 FOR /F "tokens=*" %%I IN ('kpsewhich --profilename=texosquery --format=texmfscripts texosquery-jre8.jar') DO SET JARPATH=%%I
2069 java -Djava.locale.providers=CLDR,JRE -jar "%JARPATH%" %*

3.5.3 texosquery-jre5.bat

2070 @ECHO OFF
2071 FOR /F "tokens=*" %%I IN ('kpsewhich --profilename=texosquery --format=texmfscripts texosquery-jre5.jar') DO SET JARPATH=%%I
2072 java -jar "%JARPATH%" %*
Abbreviations

ASCII  American Standard Code for Information Interchange
BCP    Best Common Practice
CLDR   Unicode Consortium’s Common Locale Data Repository
CTAN   Comprehensive \TeX\ Archive Network
IETF   Internet Engineering Task Force
ISO    International Organization for Standardization
JRE    Java Runtime Environment
OS     operating system
POSIX  Portable Operating System Interface
UTF    Unicode Transformation Format
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