

texosquery: query OS information from T_EX

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Abstract

The texosquery bundle provides the `texosquery.jar` application (and variations `texosquery-jre8.jar` and `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 T_EX's shell escape mechanism, through the `\TeXOSQuery` command provided by the texosquery package (`texosquery.tex` and `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 `texosquery` in backward compatibility mode 0 or 1 (using `--compatible 1`). The first two versions of `texosquery` didn't use those short commands.

Important Note: You will need T_EX's shell escape enabled, and you will also need the Java Runtime Environment (JRE) installed.

There are three variations of the `texosquery` application provided:

- `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);
- `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);
- `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 \XeLaTeX or \LuaLaTeX :

- 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 L^AT_EX 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 \TeX OSQuery 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 \TeX OSQuery 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 (`\fslh`) 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 \TeX OSQuery 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 `uname`, `texosquery` also obeys the order of the command line switches, which makes it easier to define the helper command (`\parseresult` 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). If you don’t have write permission for this file you can copy it to $\langle \text{\textit{TEXMFHOME}} \rangle / \text{tex/generic/texosquery/}$ (that directory path may need to be created if it doesn’t already exist). You can find the correct value of $\langle \text{\textit{TEXMFHOME}} \rangle$ using

```
kpsewhich -var-value=TEXMFHOME
```

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

```
kpsewhich texosquery.cfg
```

This bundle contains the following files:

- `texosquery.dtx`

The DTX file contains the source code for this document, and also the files:

- `texosquery.tex` (generic \TeX code)
- `texosquery.sty` (\LaTeX package wrapper)
- `texosquery.cfg` (configuration file)

The bash scripts (which will need the extensions removed):

- `texosquery-jre8.sh`
- `texosquery.sh`
- `texosquery-jre5.sh`

Windows batch files (which will need the extensions changed to `.bat`)

- `texosquery-jre8.batch`
- `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 ($\langle \text{TEXMF} \rangle$ indicates the TEXMF directory):

1. Run

```
tex texosquery.ins
```

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

Windows Change the extension of the `.batch` files to `.bat` (T_EX 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.

Unix-like Make the `.sh` files executable:

```
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`):

```
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 $\langle \text{TEXMF} \rangle/\text{tex}/\text{generic}/\text{texosquery}/$

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

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

Or if you only have Java 5 or 6 installed:

```
\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 $\langle\text{TEXMF}\rangle/\text{tex}/\text{generic}/\text{texosquery}/$
5. Move `texosquery.sty` to $\langle\text{TEXMF}\rangle/\text{tex}/\text{latex}/\text{texosquery}/$
6. Move the `.jar` files to $\langle\text{TEXMF}\rangle/\text{scripts}/\text{texosquery}/$

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 $\text{T}_{\text{E}}\text{X}$ document called `test.tex`:

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

and compile using:

```
pdftex --shell-escape test
```

Alternatively, create the follow $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ 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 `(|texosquery -b)` or `(|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 `--shell-escape` switch was used when calling `pdftex` or `pdflatex`.

If you are using `texosquery` or `texosquery-jre8` and your chosen application has been added to the restricted list, make sure that the line

```
\TeXOSQueryAllowRestricted
```

hasn't been commented out in the `texosquery.cfg` file and try the above example documents in restricted mode. (Note that `texosquery-jre5` should not be added to the restricted list as Java 5 and 6 are now deprecated and considered security risks, so the above command should be commented out in the `texosquery.cfg` file if `\TeXOSInvokerName` has been set to `texosquery-jre5`.)

1.3 Accessing file information

If an input file name is required (for example, with the `--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 's path (in which case, `kpsewhich` is used to locate it). As from version 1.2, `texosquery` honours the `openin_any` attribute set in the `texmf.cnf` configuration file. This value is fetched using

```
kpsewhich -var-value=openin_any
```

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

```
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 Return Values

The return values may include literal text where special characters need to have their category 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@enablesortcs`.

The output produced by the `texosquery` application will be returned using the system's default input 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, `uft8` 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`. $X_{\text{y}}\LaTeX$ and $\text{Lua}\LaTeX$ users may need to load `fontspec`.

You can change the default encoding by invoking the Java Virtual Machine with the option `-Dfile.encoding=<codeset>`. For example, bash users can modify the `texosquery` (or `texosquery.sh`) script to set the encoding to `UTF-8` as follows:

```
#!/bin/sh

jarpath=`kpsewhich --progname=texosquery --format=texmfscripts texosquery.jar`
java -Dfile.encoding=UTF-8 -jar "$jarpath" "$@"
```

Similarly for the corresponding `.bat` file for Windows users.

If the script file can't be modified or you have only `.exe` instead of `.jar` files then you can set the `JAVA_TOOL_OPTIONS` environment variable. For example:

```
declare -x JAVA_TOOL_OPTIONS=-Dfile.encoding=UTF-8
```

Note that, unlike the edit to the bash or `.bat` file, this will affect all your Java applications.

1.5 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` (or `texosquery-jre8.sh`) 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.

1.6 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**.) 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>* \geq 1, error messages are written to `STDERR`. If *<n>* \geq 2, any exceptions encountered will additionally write the stack trace to `STDERR`. If *<n>* \geq 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, etc) 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.

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
```

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 `--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 `--debug` for further information. Available actions are listed below.

Action -b or --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

<lang>-<region>.<codeset>@<modifier>

where *<lang>* is the **ISO** code for the language (e.g. en), *<region>* is the ISO code for the region (e.g. GB), *<codeset>* is the default code set (e.g. UTF-8) and *<modifier>* is the modifier. Elements may be omitted if unavailable. For example, en-GB.UTF-8 has the *<modifier>* 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).

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).

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
```

This action is used by the locale package to determine the option to use when it needs to automatically load the inputenc package.

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\fdot 1\fdot 13\fhyn 100\fdot fc21\fdot 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 `\texosqueryfmtdate-time`. (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

$\{\langle id_1 \rangle\}\{\langle short\ name \rangle\}\{\langle long\ name \rangle\}\{\langle dst\ short\ name \rangle\}\{\langle dst\ long\ name \rangle\}\} \dots \{\langle id_n \rangle\}\{\langle short\ name \rangle\}\{\langle long\ name \rangle\}\{\langle dst\ short\ name \rangle\}\{\langle dst\ long\ name \rangle\}\}$

The $\langle id \rangle$ 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`).

Action `-n` or `--pdfnow`

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

`\pdfd \fcln 20160704131006\fp1s 01\fapo 00\fapo`

This uses the shorthand tags `\pdfd`, `\fcln`, `\fp1s` 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 time stamp 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 `\pdffilemdate{<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 `\pdffilesize{<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 $\langle dir \rangle$ for security reasons. For all three applications, `texosquery-jre8`, `texosquery` and `texosquery-jre5`, the `openin_any` setting is checked. If read access to $\langle dir \rangle$ 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 $\langle dir \rangle$ 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 $\langle dir \rangle$, so if $\langle dir \rangle$ 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 deprecated), so if you really need $\langle dir \rangle$ 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 $\langle sort \rangle$, which indicates how the returned list should be sorted. If omitted default is assumed. Available values of $\langle sort \rangle$:

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** *<sep>* *<dir>* [*<sort>*] **or** **--list-dir** *<sep>* *<dir>* [*<sort>*]

This action is like **--list** but only includes sub-directories of *<dir>*. The caveats and security notes for **--list** also apply here.

Action **-ir** *<sep>* *<dir>* [*<sort>*] **or** **--list-regular** *<sep>* *<dir>* [*<sort>*]

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

Action `-f <sep> <regex> <dir> [<sort>]` or `--filterlist <sep> <regex> <dir> [<sort>]`

This action is like `--list` but only lists those files whose name matches the **regular expression** given in `<regex>`. 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 `<regex>` 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 `<sort>`, which indicates how to sort the returned list. The available values for `<sort>` are the same as for `--list`, described above.

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

Action `-fd <sep> <regex> <dir> [<sort>]` or `--filterlist-dir <sep> <regex> <dir> [<sort>]`

This action is like `--filterlist` but only includes sub-directories of `<dir>`.

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

Action `-fr <sep> <regex> <dir> [<sort>]` or `--filterlist-regular <sep> <regex> <dir> [<sort>]`

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

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

Action `-w <sep> <regex> <dir> [<sort>]` or `--walk <sep> <regex> <dir> [<sort>]`

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

This action starts from the directory `<dir>` *which must be on the current working directory's path* and returns a list separated by `<sep>` of all the regular files whose basename matches the regular expression `<regex>` (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 `<sort>`, which is as for the file listing actions described above. Note that `<dir>` 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:

$\{ \langle \textit{locale tag} \rangle \} \{ \langle \textit{group sep} \rangle \} \{ \langle \textit{decimal sep} \rangle \} \{ \langle \textit{exp sep} \rangle \} \{ \langle \textit{use group} \rangle \} \{ \langle \textit{currency code} \rangle \} \{ \langle \textit{regional currency code} \rangle \} \{ \langle \textit{currency sym} \rangle \} \{ \langle \textit{TeX currency} \rangle \} \{ \langle \textit{currency sep} \rangle \}$

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).
- *<TeX currency>* the currency symbol using `TeX` 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 \TeX 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 `\texosquerynonasciwrap`. 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}{M\twrp{£}}{M\texosquerycurrency{pound}}{.}
```

If Java doesn't support the given locale, the currency code will appear as `XXX` with the symbol \pounds (generic currency sign).

Important Note: This option and the following (`--locale-data`) are best used with \XeTeX or \LuaTeX to deal with the non-**ASCII** characters. Make sure the file encoding used by Java matches the \TeX file.

(See section 1.5 for the difference in locale providers.)

Action -D [*⟨language tag⟩*] or --locale-data [*⟨language tag⟩*]

(New to v1.2.) This action provides more extensive information than --numeric. The result has nested groups to assist parsing. Again the *⟨language tag⟩* 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 T_EX to interpret. The information is returned in the following format:

```
{⟨locale block⟩}{⟨current date block⟩}{⟨date pattern block⟩}{⟨current time block⟩}
{⟨time pattern block⟩}{⟨current date time block⟩}{⟨date time pattern block⟩}{⟨days of
the week block⟩}{⟨abbreviated dates of the week block⟩}{⟨month names
block⟩}{⟨abbreviated month names block⟩}{⟨standalone days of the week
block⟩}{⟨abbreviated standalone days of the week block⟩}{⟨standalone month names
block⟩}{⟨abbreviated standalone month names block⟩}{⟨numeric block⟩}{⟨numeric
patterns block⟩}
```

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 \texosquerynonasciwrap. 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:

⟨locale block⟩

The locale information in the form:

```
{⟨tag⟩}{⟨language name⟩}{⟨locale language name⟩}{⟨region name⟩}{⟨locale
region name⟩}{⟨variant name⟩}{⟨locale variant name⟩}
```

The *⟨tag⟩* is the language tag (the same format as --bcp47).

The *⟨language name⟩* is the language name in the operating system's default locale.

The *⟨locale language name⟩* is the language name in the locale's language.

For example, my locale is en-GB, so if I use

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

then both $\langle language name \rangle$ and $\langle locale language name \rangle$ will be English, but if I use:

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

then $\langle language name \rangle$ will be French and the $\langle locale language name \rangle$ will be `fran\trp{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 $\langle region name \rangle$ is the region's name in the operating system's default language.

The $\langle locale region name \rangle$ is the region's name in the locale's language.

So for me with `-D en-GB` I get `United\tspc Kingdom` for both $\langle region name \rangle$ and $\langle locale region name \rangle$. 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 $\langle region name \rangle$, but $\langle locale region name \rangle$ is now `Royaume-Uni`.

The $\langle variant name \rangle$ 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 $\langle locale variant name \rangle$ is the variant in the locale's language. In the case of `de-CH-1996` this is still 1996.

$\langle current date block \rangle$

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:

```
{\langle full date \rangle}{\langle long date \rangle}{\langle medium date \rangle}{\langle short date \rangle}{\langle first day \rangle}
```

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

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

(Tuesday, 8 November 2016). The $\langle long date \rangle$ is

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

(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 `texosquery-jre8.sh` 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 `\TeXOSQuery`. 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 `\texosqueryfmtdate`. 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\tspc o\csq clock\tspc GMT}{15:59:41\tspc GMT}{15:59:41}{15:59}
```

with the **JRE**. If I switch to **CLDR** (`texosquery-jre8.sh`) I get:

```
{16:00:51\tspc Greenwich\tspc Mean\tspc Time}{16:00:51\tspc 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`.

{\langle Monday \rangle}{\langle Tuesday \rangle}{\langle Wednesday \rangle}{\langle Thursday \rangle}{\langle Friday \rangle}{\langle Saturday \rangle}{\langle Sunday \rangle}

\langle abbreviated days of the week block \rangle

As above, but abbreviated.

\langle month names block \rangle

The month names.

\langle abbreviated month names block \rangle

The abbreviated month names.

\langle standalone days of the week block \rangle

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

\langle abbreviated standalone days of the week block \rangle

As above, but abbreviated.

\langle standalone month names block \rangle

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

\langle abbreviated standalone month names block \rangle

As above but abbreviated.

\langle numeric block \rangle

The numeric data similar to `--numeric` but it's missing the *\langle tag \rangle* (which is provided in the earlier *\langle locale block \rangle*) and there are two extra items:

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

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

\langle numeric patterns block \rangle

The patterns used to format decimals, integers, currency and percentages.

$\{\langle decimal pattern \rangle\}\{\langle integer pattern \rangle\}\{\langle currency pattern \rangle\}\{\langle percentages pattern \rangle\}$

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 $\langle numeric block \rangle$, this command can be redefined to the $\{\langle currency sym \rangle\}$ or $\{\langle currency tex \rangle\}$ elements.

`\texosquerypatfmtgroupsep`

The group separator (defaults to `,`). For example, when parsing the previous $\langle numeric block \rangle$, this command can be redefined to the $\{\langle group sep \rangle\}$ element.

`\texosquerypatfmtdecsep`

The decimal separator (defaults to `.`). For example, when parsing the previous $\langle numeric block \rangle$, this command can be redefined to the $\{\langle dec sep \rangle\}$ element.

`\texosquerypatfmtcurdecsep`

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

`\texosquerypatfmtexp`

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

`\texosquerypatfmtpercentsign`

The percent symbol. For example, when parsing the previous $\langle numeric block \rangle$, this command can be redefined to the $\{\langle percent sym \rangle\}$ element.

`\texosquerypatfmtpermillsign`

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

`\texosquerypatfmtcurrencysign`

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

`\texosquerypatfmtminus`

The minus sign.

`\texosquerypatfmtplus`

The plus sign.

2 texosquery.tex: generic T_EX code

You can run `texosquery` directly from T_EX's shell escape. For example:

```
\input|"texosquery --locale"
```

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

Plain T_EX users can input this file through the usual `\input` method:

```
\input texosquery
```

L^AT_EX users may also simply input this file:

```
\input{texosquery}
```

but may prefer the standard package approach:

```
\usepackage{texosquery}
```

Important Note: The commands described below are all fragile.

The basic command to run `texosquery` and capture its output in a control sequence is:

```
\TeXOSQuery{<cs>}{<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\fpls 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 the command failed, $\langle cs \rangle$ will be set to empty. It's best to always test for success after using `\TeXOSQuery` (or one of the shortcut commands described below). For example:

```
\TeXOSQuery{\result}{-b}
\ifx\result\empty
  Failed!
\else
  Result: \result.
\fi
```

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. 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.sh -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.

`\ifTeXOSQueryDryRun` 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 `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 \fi
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 `\shellescape` or `\pdfshellescape`).

If `texosquery` is added to the restricted list, you can add

```
\TeXOSQueryAllowRestricted
```

to the `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 `\TeXOSQueryAllowRestricted` in your `texosquery.cfg` file;
- make sure you run `TeX` with the shell escape enabled;
- check the definition of `\TeXOSInvokerName`;
- try using the application directly from the command prompt or terminal. For example, in the above message, the bit between ``"|` and `"'` (that is, `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.

`\TeXOSInvokerName`

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.sh` (Unix-like with Java 7) or `texosquery-jre8` (Windows with 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. If the argument actually contains any single-quote characters, make sure you use `\string\'` to prevent interference.

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

2.1 Locale

`\TeXOSQueryLocale` 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}
```

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

```
\TeXOSQueryLangTag{<cs>}
```

`\TeXOSQueryNumeric` 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.

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

```
\TeXOSQueryLocaleData{<cs>}{<locale>}
```

2.2 Operating System Information

`\TeXOSQueryName` The OS name (`-o` or `--osname`) can be obtained using:

```
\TeXOSQueryName{<cs>}
```

`\TeXOSQueryVersion` The OS version (`-r` or `--osversion`) can be obtained using:

```
\TeXOSQueryVersion{<cs>}
```

`\TeXOSQueryArch` The OS architecture (`-a` or `--osarch`) can be obtained using:

```
\TeXOSQueryArch{<cs>}
```


2.3 Dates and Times

`\TeXOSQueryDateTime` 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.

`\TeXOSQueryTimeZones` 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`

```
\TeXOSQueryNow{<cs>}
```

This is provided for the benefit of users who don't have `\pdfcreationdate` defined by their \TeX format (for example, \XeTeX).

`\TeXOSQueryFileDate` 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 `\pdffilemoddate` defined by their \TeX format.

2.4 File Operations

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

```
\TeXOSQueryCwd{<cs>}
```

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

```
\TeXOSQueryHome{<cs>}
```

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

```
\TeXOSQueryTmpDir{<cs>}
```

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

`\TeXOSQueryFileSize{<cs>}{<filename>}`

where *<filename>* is the name of the file. This is provided for the benefit of users who don't have `\pdffilesize` defined by their \TeX format.

`\TeXOSQueryFileURI` The URI of a file (`-u` or `--uri`) can be obtained using:

`\TeXOSQueryFileURI{<cs>}{<filename>}`

where *<filename>* is the name of the file. (Any percent symbols `%` contained in the URI will have their category code set to 12.)

`\TeXOSQueryFilePath` The canonical path of a file (`-p` or `--path`) can be obtained using:

`\TeXOSQueryFilePath{<cs>}{<filename>}`

where *<filename>* is the name of the file.

`\TeXOSQueryDirName` The canonical path of a file's parent (`-e` or `--dirname`) can be obtained using:

`\TeXOSQueryDirName{<cs>}{<filename>}`

where *<filename>* is the name of the file.

`\TeXOSQueryFileList` The list of files in a given directory (`-i` or `--list`) can be obtained using:

`\TeXOSQueryFileList{<cs>}{<sep>}{<dir>}`

where *<sep>* is the separator and *<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 `\result`.

`\TeXOSQueryRegularFileList` To omit directories (`-ir` or `--list-regular`):

`\TeXOSQueryRegularFileList{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirFileList` To omit regular files (`-id` or `--list-dir`):

`\TeXOSQuerySubDirList{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileList` A filtered list of files in a given directory (`-f` or `--filterlist`) can be obtained using:

`\TeXOSQueryFilterFileList{<cs>}{<sep>}{<regex>}{<dir>}`

where *<regex>* 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{\result}{,}{.+\\string\\. *} {.}`

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

`\TeXOSQueryFilterFileList{\result}{,}{.+\\string\\. (jpg|png)} {images}`

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 $\backslash\backslash$ as the separator, you'll need to use $\backslash string\ noexpand\ string\backslash\backslash$ in the $\langle sep \rangle$ part.

```
\TeXOSQueryFilterFileList{\result}{\string\ noexpand\ string\backslash\backslash}{.*\string\ .tex}{.}
```

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

$\backslash\TeX OSQueryFileListDateAsc$ Order by last modified date starting with the oldest (date-ascending):

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

$\backslash\TeX OSQueryRegularFileListDateAsc$ or the regular files only list:

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

$\backslash\TeX OSQuerySubDirListDateAsc$ or the sub-directories only list:

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

$\backslash\TeX OSQueryFilterFileListDateAsc$ or for the filtered list:

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

$\backslash\TeX OSQueryFilterRegularFileListDateAsc$ or for the filtered regular files only list:

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

$\backslash\TeX OSQueryFilterSubDirListDateAsc$ or for the filtered sub-directories only list:

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

$\backslash\TeX OSQueryFileListDateDes$ Order by last modified date starting with the newest (date-descending):

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

$\backslash\TeX OSQueryRegularFileListDateDes$ or the regular files only list:

```
\TeXOSQueryRegularFileListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}
```

$\backslash\TeX OSQuerySubDirListDateDes$ or the sub-directories only list:

```
\TeXOSQuerySubDirListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle dir \rangle}
```

$\backslash\TeX OSQueryFilterFileListDateDes$ or for the filtered list:

```
\TeXOSQueryFilterFileListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}
```

$\backslash\TeX OSQueryFilterRegularFileListDateDes$ or for the filtered regular files only list:

```
\TeXOSQueryFilterRegularFileListDateDes{\langle cs \rangle}{\langle sep \rangle}{\langle regex \rangle}{\langle dir \rangle}
```

$\backslash\TeX OSQueryFilterSubDirListDateDes$ or for the filtered sub-directories only list:

`\TeXOSQueryFilterRegularFileListDateDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFileListSizeAsc` Order by file size starting with the smallest (size-ascending):

`\TeXOSQueryFileListSizeAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListSizeAsc` or the regular files only list:

`\TeXOSQueryRegularFileListSizeAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListSizeAsc` or the sub-directories only list:

`\TeXOSQuerySubDirListSizeAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListSizeAsc` or for the filtered list:

`\TeXOSQueryFilterFileListSizeAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterRegularFileListSizeAsc` or the filtered regular files only list:

`\TeXOSQueryFilterRegularFileListSizeAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterSubDirListSizeAsc` or the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListSizeAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFileListSizeDes` Order by file size starting with the largest (size-descending):

`\TeXOSQueryFileListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListSizeDes` or the regular files only list:

`\TeXOSQueryRegularFileListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListSizeDes` or the sub-directories only list:

`\TeXOSQuerySubDirListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListSizeDes` or for the filtered list:

`\TeXOSQueryFilterFileListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterRegularFileListSizeDes` or the filtered regular files only list:

`\TeXOSQueryFilterRegularFileListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterSubDirListSizeDes` or the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListSizeDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFileListNameAsc` Order by file name in alphabetical order (name-ascending):

`\TeXOSQueryFileListNameAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListNameAsc` or the regular files only list:

`\TeXOSQueryRegularFileListNameAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListNameAsc` or the sub-directories only list:

`\TeXOSQuerySubDirListNameAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListNameAsc` for the filtered list:

`\TeXOSQueryFilterFileListNameAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterRegularFileListNameAsc` regular files only list:

`\TeXOSQueryFilterRegularFileListNameAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterSubDirListNameAsc` the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListNameAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFileListNameDes` Order by file name in reverse alphabetical order (name-descending):

`\TeXOSQueryFileListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListNameDes` the regular files only list:

`\TeXOSQueryRegularFileListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListNameDes` or the sub-directories only list:

`\TeXOSQuerySubDirListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListNameDes` for the filtered list:

`\TeXOSQueryFilterFileListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterRegularFileListNameDes` regular files only list:

`\TeXOSQueryFilterRegularFileListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterSubDirListNameDes` the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListNameDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFileListNameIgnoreCaseAsc` Order by file name in case-insensitive alphabetical order (iname-ascending):

`\TeXOSQueryFileListNameIgnoreCaseAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListNameIgnoreCaseAsc` the regular files only list:

`\TeXOSQueryRegularFileListNameIgnoreCaseAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListNameIgnoreCaseAsc` or the sub-directories only list:

`\TeXOSQuerySubDirListNameIgnoreCaseAsc{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListNameIgnoreCaseAsc` for the filtered list:

\TeXOSQueryFilterFileListNameIgnoreCaseAsc{<cs>}{<sep>}{<regex>}{<dir>}

\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc for the regular files only list:

\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc{<cs>}{<sep>}{<regex>}{<dir>}

\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc for the sub-directories only list:

\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc{<cs>}{<sep>}{<regex>}{<dir>}

Order by file name in reverse case-insensitive alphabetical order (iname-descending):

\TeXOSQueryFileListNameIgnoreCaseDes

\TeXOSQueryFileListNameIgnoreCaseDes{<cs>}{<sep>}{<dir>}

\TeXOSQueryRegularFileListNameIgnoreCaseDes for the regular files only list:

\TeXOSQueryRegularFileListNameIgnoreCaseDes{<cs>}{<sep>}{<dir>}

\TeXOSQuerySubDirListNameIgnoreCaseDes for the sub-directories only list:

\TeXOSQuerySubDirListNameIgnoreCaseDes{<cs>}{<sep>}{<dir>}

\TeXOSQueryFilterFileListNameIgnoreCaseDes for the filtered list:

\TeXOSQueryFilterFileListNameIgnoreCaseDes{<cs>}{<sep>}{<regex>}{<dir>}

\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes for the regular files only list:

\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes{<cs>}{<sep>}{<regex>}{<dir>}

\TeXOSQueryFilterSubDirListNameIgnoreCaseDes for the sub-directories only list:

\TeXOSQueryFilterSubDirListNameIgnoreCaseDes{<cs>}{<sep>}{<regex>}{<dir>}

\TeXOSQueryFileListExtAsc Order by file extension in alphabetical order (ext-ascending):

\TeXOSQueryFileListExtAsc{<cs>}{<sep>}{<dir>}

\TeXOSQueryRegularFileListExtAsc for the regular files only list:

\TeXOSQueryRegularFileListExtAsc{<cs>}{<sep>}{<dir>}

\TeXOSQuerySubDirListExtAsc for the sub-directories only list:

\TeXOSQuerySubDirListExtAsc{<cs>}{<sep>}{<dir>}

\TeXOSQueryFilterFileListExtAsc for the filtered list:

\TeXOSQueryFilterFileListExtAsc{<cs>}{<sep>}{<regex>}{<dir>}

`\TeXOSQueryFilterRegularFileListExtAsc` or the filtered regular files only list:

`\TeXOSQueryFilterRegularFileListExtAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterSubDirListExtAsc` or the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListExtAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFileListExtDes` Order by file extension in reverse alphabetical order (ext-descending):

`\TeXOSQueryFileListExtDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryRegularFileListExtDes` or the regular files only list:

`\TeXOSQueryRegularFileListExtDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQuerySubDirListExtDes` or the sub-directories only list:

`\TeXOSQuerySubDirListExtDes{<cs>}{<sep>}{<dir>}`

`\TeXOSQueryFilterFileListExtDes` or the filtered list:

`\TeXOSQueryFilterFileListExtDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterRegularFileListExtDes` or the filtered regular files only list:

`\TeXOSQueryFilterRegularFileListExtDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryFilterSubDirListExtDes` or the filtered sub-directories only list:

`\TeXOSQueryFilterSubDirListExtDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalk` 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.

`\TeXOSQueryWalkDateAsc` To sort according to last modified date:

`\TeXOSQueryWalkDateAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkDateDes` or in reverse order:

`\TeXOSQueryWalkDateDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkSizeAsc` To sort according to file size:

`\TeXOSQueryWalkSizeAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkSizeDes` or in reverse order:

`\TeXOSQueryWalkSizeDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkNameAsc` To sort according to path name (case-sensitive):

`\TeXOSQueryWalkNameAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkNameDes` or in reverse order:

`\TeXOSQueryWalkNameDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkNameIgnoreCaseAsc` To sort according to path name (case-insensitive):

`\TeXOSQueryWalkNameIgnoreCaseAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkNameIgnoreCaseDes` in reverse order:

`\TeXOSQueryWalkNameIgnoreCaseDes{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkExtAsc` To sort according to file extension:

`\TeXOSQueryWalkExtAsc{<cs>}{<sep>}{<regex>}{<dir>}`

`\TeXOSQueryWalkExtDes` or in reverse order:

`\TeXOSQueryWalkExtDes{<cs>}{<sep>}{<regex>}{<dir>}`

3 The Code

3.1 Generic T_EX Code

Change category code of @ if necessary.

```
1 \ifnum\catcode'\@=11\relax
2   \def\@texosquery@restore@at{}%
3 \else
4   \expandafter\edef\csname @texosquery@restore@at\endcsname{%
5     \noexpand\catcode'\noexpand\@=\number\catcode'\@ \relax
6   }%
7 \catcode'\@=11\relax
8 \fi
```

Check if already loaded.

```
9 \ifx\TeXOSQuery\undefined \else
10  \@texosquery@restore@at
11  \expandafter\endinput
12 \fi
```

Version info.

```
13 \expandafter\def\csname ver@texosquery.tex\endcsname{2017/03/23 v1.2 (NLCT)}
```

`\@texosquery@warn` Generate warning message. Use tracklang's warning if available (so that the warnings can be disabled for both packages at the same time).

```
14 \ifx\@tracklang@pkgwarn\undefined
15   \ifx\PackageWarning\undefined
16     \def\@texosquery@warn#1{%
17       {%
```



```

18     \newlinechar='\^^J
19     \def\MessageBreak{^^J}%
20     \message{^^Jtexosquery Warning: #1 on line \the\inputlineno.^^J}%
21 }%
22 }
23 \else
24     \def\@texosquery@warn#1{%
25         \PackageWarning{texosquery}{#1}%
26     }
27 \fi
28 \else
29     \def\@texosquery@warn#1{%
30         \@tracklang@pkgwarn{texosquery}{#1}%
31     }
32 \fi

\@texosquery@err
33 \ifx\PackageError\undefined
34     \def\@texosquery@err#1#2{%
35         \errhelp{#2}%
36         \errmessage{texosquery: #1}}
37 \else
38     \def\@texosquery@err#1#2{\PackageError{texosquery}{#1}{#2}}
39 \fi

\@texosquery@ifundef This is defined in the same way as tracklang's \@tracklang@ifundef. (Can't assume
tracklang has been loaded.)
40 \long\def\@texosquery@ifundef#1#2#3{%
41     \ifcsname#1\endcsname
42         \expandafter\ifx\csname #1\endcsname\relax
43             #2%
44         \else
45             #3%
46         \fi
47     \else
48         \expandafter\ifx\csname #1\endcsname\relax
49             #2%
50         \else
51             #3%
52         \fi
53     \fi
54 }
55 \ifx\ifcsname\undefined
56     \long\def\@texosquery@ifundef#1#2#3{%
57         \expandafter\ifx\csname #1\endcsname\relax
58             #2%
59         \else
60             #3%
61         \fi
62     }

```

```

63 \fi

\TeXOSInvokerName The name of the texosquery application.
64 \def\TeXOSInvokerName{texosquery}

\TeXOSQueryInvoker If we're using LATEX, we'll need to use \@@input rather than \input.
65 \ifx\@@input\undefined
66   \def\TeXOSQueryInvoker#1{\input|" \TeXOSInvokerName\space#1" }
67 \else
68   \def\TeXOSQueryInvoker#1{\@@input|" \TeXOSInvokerName\space#1" }
69 \fi

\ifTeXOSQueryDryRun Provide a dry-run mode.
70 \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.
71 \def\TeXOSQueryAllowRestricted{%
72   \def\@texosquery@allowrestricted##1##2{##1}%
73 }

\TeXOSQueryDenyRestricted Switch it off.
74 \def\TeXOSQueryDenyRestricted{%
75   \def\@texosquery@allowrestricted##1##2{##2}%
76 }

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

Load the configuration file if it exists.
78 \openin0=texosquery.cfg \ifeof0\relax \else
79   \closein0\relax
80   \begingroup
81     \newlinechar='^^J
82     \message{^^JTeXOSQuery: reading configuration file^^J}%
83   \endgroup
84   \input texosquery.cfg
85 \fi

Disable cfg-only commands:
86 \def\TeXOSQueryAllowRestricted{%
87   \@texosquery@warn{\string\TeXOSQueryAllowRestricted\space
88     ignored (only allowed in texosquery.cfg)}}%
89 }
90 \def\TeXOSQueryDenyRestricted{%
91   \@texosquery@warn{\string\TeXOSQueryDenyRestricted\space
92     ignored (only allowed in texosquery.cfg)}}%
93 }

```

If shell escape is unrestricted, automatically switch off dry-run mode, unless the cfg file has allowed it.

```

94 \ifx\shellescape\undefined
95 \ifx\pdfshellescape\undefined
96 \else
97 \ifnum\pdfshellescape=1\relax
98 \TeXOSQueryDryRunfalse
99 \else
100 \@texosquery@allowrestricted
101 {%
102 \ifnum\pdfshellescape=2\relax
103 \TeXOSQueryDryRunfalse
104 \fi
105 }
106 {}
107 \fi
108 \fi
109 \else
110 \ifnum\shellescape=1\relax
111 \TeXOSQueryDryRunfalse
112 \else
113 \@texosquery@allowrestricted
114 {%
115 \ifnum\shellescape=2\relax
116 \TeXOSQueryDryRunfalse
117 \fi
118 }
119 {}
120 \fi
121 \fi

```

`\@texosquery@edef` Need to provide some protection (if available) against non-ASCII characters that have been made active by inputenc when reading in the results of the shell escape. This command may be defined before loading texosquery, otherwise it's set to `\protected@edef`, if defined, or `\edef`.

```

122 \ifx\@texosquery@edef\undefined
123 \ifx\protected@edef\undefined
124 \let\@texosquery@edef\edef
125 \else
126 \let\@texosquery@edef\protected@edef
127 \fi
128 \fi

```

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

`\@texosquery@gobble`

```

129 \def\@texosquery@gobble#1{}

```

`\@texosquery@firstofone`

```
130 \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 context.

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.

`\texosquerynonasciwrap`

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.

```
131 \def \texosquerynonasciwrap#1{#1}
```

`\texosquerynonasciidetokwrap`

We also need to allow for non-ASCII characters in file names. In this case the argument needs detokenizing. With `eTeX`, we can simply use `\detokenize` but we need to allow for plain non-extended `TEX`, so check for the existence of `\detokenize` first.

```
132 \ifx\detokenize\undefined
```

This won't work for characters consisting of multiple octets, but if users want UTF-8 support then they really need eTeX at the very least (but ideally XeTeX or LuaTeX).

```
133 \def\texosquerynonasciidetokwrap#1{\string#1}
134 \else
135 \def\texosquerynonasciidetokwrap#1{\detokenize{#1}}
136 \fi
```

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.

<code>\texosquerybackslash</code>	Literal backslash. 137 \edef\texosquerybackslash{\expandafter\@texosquery@gobble\string\}}
<code>\texosquerytextbackslash</code>	Textual backslash. 138 \ifx\textbackslash\undefined 139 \def\texosquerytextbackslash{\texosquerybackslash} 140 \else 141 \def\texosquerytextbackslash{\noexpand\textbackslash} 142 \fi
<code>\texosqueryleftbrace</code>	Literal left brace. 143 \edef\texosqueryleftbrace{\expandafter\@texosquery@gobble\string\{}}
<code>\texosquerytextleftbrace</code>	Textual left brace. 144 \def\texosquerytextleftbrace{\{}
<code>\texosqueryrightbrace</code>	Literal right brace. 145 \edef\texosqueryrightbrace{\expandafter\@texosquery@gobble\string\}}
<code>\texosquerytextrightbrace</code>	Textual right brace. 146 \def\texosquerytextrightbrace{\}}
<code>\texosqueryhash</code>	Literal hash. 147 \edef\texosqueryhash{\expandafter\@texosquery@gobble\string\#}
<code>\texosquerytexthash</code>	Textual hash. 148 \def\texosquerytexthash{\#}
<code>\texosqueryunderscore</code>	Literal underscore. 149 \edef\texosqueryunderscore{\expandafter\@texosquery@gobble\string_}
<code>\texosquerytextunderscore</code>	Textual underscore. 150 \def\texosquerytextunderscore{_}
<code>\texosquerybacktick</code>	Literal grave. 151 \edef\texosquerybacktick{\string`}

<code>\texosquerytextbacktick</code>	Textual open quote. 152 <code>\def\texosquerytextbacktick{'}</code>
<code>\texosqueryclosequote</code>	Literal apostrophe. 153 <code>\edef\texosqueryclosequote{\string'}</code>
<code>\texosquerytextclosequote</code>	Textual apostrophe / single closing quote. 154 <code>\def\texosquerytextclosequote{'}</code>
<code>\texosquerydoublequote</code>	Literal double-quote. 155 <code>\edef\texosquerydoublequote{\string"}</code>
<code>\texosquerytextdoublequote</code>	Textual double-quote. 156 <code>\def\texosquerytextdoublequote{"}</code>
<code>\texosquerycolon</code>	Literal colon. 157 <code>\edef\texosquerycolon{\string:}</code>
<code>\texosquerytextcolon</code>	Textual colon. 158 <code>\def\texosquerytextcolon{:}</code>
<code>\texosquerysemicolon</code>	Literal semi-colon. 159 <code>\edef\texosquerysemicolon{\string;}</code>
<code>\texosquerytextsemicolon</code>	Textual semi-colon. 160 <code>\def\texosquerytextsemicolon{;}</code>
<code>\texosqueryequals</code>	Literal equals. 161 <code>\edef\texosqueryequals{\string=}</code>
<code>\texosquerytextequals</code>	Textual equals. 162 <code>\def\texosquerytextequals{=}</code>
<code>\texosqueryslash</code>	Literal slash. 163 <code>\edef\texosqueryslash{\string/}</code>
<code>\texosquerytextslash</code>	Textual slash. 164 <code>\def\texosquerytextslash{/}</code>
<code>\texosqueryhyphen</code>	Literal hyphen. 165 <code>\edef\texosqueryhyphen{\string-}</code>
<code>\texosquerytexthyphen</code>	Textual hyphen. 166 <code>\def\texosquerytexthyphen{-}</code>
<code>\texosqueryplus</code>	Literal plus. 167 <code>\edef\texosqueryplus{\string+}</code>

<code>\texosquerytextplus</code>	Textual plus. 168 <code>\def\texosquerytextplus{+}</code>
<code>\texosqueryperiod</code>	Literal period. 169 <code>\edef\texosqueryperiod{\string.}</code>
<code>\texosquerytextperiod</code>	Textual period. 170 <code>\def\texosquerytextperiod{.}</code>
<code>\texosquerycomma</code>	Literal comma. 171 <code>\edef\texosquerycomma{\string,}</code>
<code>\texosquerytextcomma</code>	Textual comma. 172 <code>\def\texosquerytextcomma{,}</code>
<code>\texosqueryopenparen</code>	Literal open bracket. 173 <code>\edef\texosqueryopenparen{\string(}</code>
<code>\texosquerytextopenparen</code>	Textual open bracket. 174 <code>\def\texosquerytextopenparen{(}</code>
<code>\texosquerycloseparen</code>	Literal close bracket. 175 <code>\edef\texosquerycloseparen{\string)}</code>
<code>\texosquerytextcloseparen</code>	Textual close bracket. 176 <code>\def\texosquerytextcloseparen{)}</code>
<code>\texosqueryopensq</code>	Literal open square bracket. 177 <code>\edef\texosqueryopensq{\string[}</code>
<code>\texosquerytextopensq</code>	Textual open square bracket. 178 <code>\def\texosquerytextopensq{[}</code>
<code>\texosqueryclosesq</code>	Literal close square bracket. 179 <code>\edef\texosqueryclosesq{\string]}</code>
<code>\texosquerytextclosesq</code>	Textual close square bracket. 180 <code>\def\texosquerytextclosesq{]}</code>
<code>\texosqueryasterisk</code>	Literal asterisk. 181 <code>\edef\texosqueryasterisk{\string*}</code>
<code>\texosquerytextasterisk</code>	Textual asterisk. 182 <code>\def\texosquerytextasterisk{*}</code>
<code>\texosqueryatchar</code>	Literal at character. 183 <code>\edef\texosqueryatchar{\string @}</code>

<code>\texosquerytextatchar</code>	Textual at character. 184 <code>\def\texosquerytextatchar{@}</code>
<code>\texosquerybar</code>	Literal bar. 185 <code>\edef\texosquerybar{\string }</code>
<code>\texosquerytextbar</code>	Textual bar. 186 <code>\ifx\undefined\textbar</code> 187 <code>\def\texosquerytextbar{ }</code> 188 <code>\else</code> 189 <code>\def\texosquerytextbar{\ifmmode \else\textbar\fi}</code> 190 <code>\fi</code>
<code>\texosquerylessthan</code>	Literal less than. 191 <code>\edef\texosquerylessthan{\string<}</code>
<code>\texosquerytextlessthan</code>	Textual less than. 192 <code>\ifx\undefined\textless</code> 193 <code>\def\texosquerytextlessthan{<}</code> 194 <code>\else</code> 195 <code>\def\texosquerytextlessthan{\ifmmode<\else\textless\fi}</code> 196 <code>\fi</code>
<code>\texosquerygreaterthan</code>	Literal greater than. 197 <code>\edef\texosquerygreaterthan{\string>}</code>
<code>\texosquerytextgreaterthan</code>	Textual greater than. 198 <code>\ifx\undefined\textgreater</code> 199 <code>\def\texosquerytextgreaterthan{>}</code> 200 <code>\else</code> 201 <code>\def\texosquerytextgreaterthan{\ifmmode<\else\textgreater\fi}</code> 202 <code>\fi</code>
<code>\texosquerytilde</code>	Literal tilde. 203 <code>\edef\texosquerytilde{\string~}</code>
<code>\texosquerytexttilde</code>	Textual tilde. 204 <code>\ifx\textasciitilde\undefined</code> 205 <code>\def\texosquerytexttilde{\string~}</code> 206 <code>\else</code> 207 <code>\def\texosquerytexttilde{\textasciitilde}</code> 208 <code>\fi</code>
<code>\texosquerycircum</code>	Literal circumflex. 209 <code>\edef\texosquerycircum{\string^}</code>

<code>\texosquerytextcircum</code>	Textual circumflex. <pre> 210 \ifx\textasciicircum\undefined 211 \def\texosquerytextcircum{\string^} 212 \else 213 \def\texosquerytextcircum{\textasciicircum} 214 \fi </pre>
<code>\texosqueryampersand</code>	Literal ampersand. <pre> 215 \edef\texosqueryampersand{\string&} </pre>
<code>\texosquerytextampersand</code>	Textual ampersand. <pre> 216 \def\texosquerytextampersand{\&} </pre>
<code>\texosquerydollar</code>	Literal dollar. (This could just be defined as <code>\string\$</code> , but that plays havoc with the syntax highlighting!) <pre> 217 \edef\texosquerydollar{\expandafter\@texosquery@gobble\string\\$} </pre>
<code>\texosquerytextdollar</code>	Textual dollar. <pre> 218 \def\texosquerytextdollar{\\$} </pre>
<code>\texosquerypercent</code>	Literal percent. <pre> 219 \edef\texosquerypercent{\expandafter\@texosquery@gobble\string\%} </pre>
<code>\texosquerytextpercent</code>	Textual percent. <pre> 220 \def\texosquerytextpercent{\%} </pre>
<code>\texosqueryexclam</code>	Literal exclamation. <pre> 221 \edef\texosqueryexclam{\string!} </pre>
<code>\texosquerytextexclam</code>	Textual exclamation. <pre> 222 \def\texosquerytextexclam{!} </pre>
<code>\texosqueryquestion</code>	Literal question mark. <pre> 223 \edef\texosqueryquestion{\string?} </pre>
<code>\texosquerytextquestion</code>	Textual question mark. <pre> 224 \def\texosquerytextquestion{?} </pre>
<code>\texosqueryliteralspace</code>	Literal space. <pre> 225 \edef\texosqueryliteralspace{\expandafter\string\space} </pre>
<code>\texosquerytextspace</code>	Textual space. (Don't allow it to expand while it's being fetched from <code>\texosquery</code> just in case it disappears.) <pre> 226 \def\texosquerytextspace{\noexpand\space} </pre>
<code>\@texosquery@D</code>	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: $D:\langle YYYY\rangle\langle MM\rangle\{\langle DD\rangle\}\langle HH\rangle\langle mm\rangle\langle ss\rangle\langle TZh\rangle'\langle TZm\rangle'$ <pre> 227 \edef\@texosquery@D{\string D} </pre>

`\@texosquery@enablesortcs` Enable shortcut commands.

```
228 \def\@texosquery@enablesortcs{%
```

These are for the date-time and numeric patterns.

```
229 \def\patdtff{\noexpand\texosquerydtf}%
230 \def\patpmnumfmt{\noexpand\texosquerypatplusminus}%
231 \def\patnumfmt{\noexpand\texosquerypatnum}%
232 \def\patsinumfmt{\noexpand\texosquerypatsinum}%
233 \def\patdecfmt{\noexpand\texosquerypatdec}%
234 \def\patpcur{\noexpand\texosquerypatprefixcurrency}%
235 \def\patpicur{\noexpand\texosquerypatprefixcurrency}%
236 \def\patscur{\noexpand\texosquerypatsuffixcurrency}%
237 \def\patsicur{\noexpand\texosquerypatsuffixcurrency}%
238 \def\patstr{\noexpand\texosquerypatstr}%
239 \def\patapo{\noexpand\texosquerypatquote}%
240 \def\patdgt{\noexpand\texosquerypatdigit}%
241 \def\patdgtz{\noexpand\texosquerypatdigitnozero}%
242 \def\patmsg{\noexpand\texosquerypatminus}%
243 \def\patngp{\noexpand\texosquerypatgroupsep}%
244 \def\patpct{\noexpand\texosquerypatprefixpercent}%
245 \def\patspct{\noexpand\texosquerypatsuffixpercent}%
246 \def\patpml{\noexpand\texosquerypatprefixpermil}%
247 \def\patspml{\noexpand\texosquerypatsuffixpermil}%
```

Hook to adjust the processing of non-ASCII characters.

```
248 \def\twrp{\texosquerynonasciwrap}%
249 \def\fwrp{\texosquerynonasciidetokwrap}%
```

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

```
250 \let\fbks\texosquerybackslash
251 \let\tbks\texosquerytextbackslash
252 \let\flbr\texosqueryleftbrace
253 \let\tlbr\texosquerytextleftbrace
254 \let\frbr\texosqueryrightbrace
255 \let\trbr\texosquerytextrightbrace
256 \let\fhsh\texosqueryhash
257 \let\thsh\texosquerytexthash
258 \let\fusc\texosqueryunderscore
259 \let\tusc\texosquerytextunderscore
260 \let\fgvr\texosquerybacktick
261 \let\tgrv\texosquerytextbacktick
262 \let\fapo\texosqueryclosequote
263 \let\tapo\texosquerytextclosequote
264 \let\fdqt\texosquerydoublequote
265 \let\tdqt\texosquerytextdoublequote
266 \let\fspc\texosqueryliteralspace
267 \let\tspc\texosquerytextspace
268 \let\fcln\texosquerycolon
269 \let\tcln\texosquerytextcolon
```

```

270 \let\fscl\texosquerysemicolon
271 \let\tsc1\texosquerytextsemicolon
272 \let\feql\texosqueryequals
273 \let\teql\texosquerytextequals
274 \let\fhyn\texosqueryhyphen
275 \let\thyn\texosquerytextthyphen
276 \let\fp1s\texosqueryplus
277 \let\tp1s\texosquerytextplus
278 \let\ftld\texosquerytilde
279 \let\ttld\texosquerytexttilde
280 \let\fcir\texosquerycircum
281 \let\tcir\texosquerytextcircum
282 \let\famp\texosqueryampersand
283 \let\tamp\texosquerytextampersand
284 \let\fslh\texosqueryslash
285 \let\tslh\texosquerytextslash
286 \let\fpct\texosquerypercent
287 \let\tpct\texosquerytextpercent
288 \let\fexc\texosqueryexclam
289 \let\texc\texosquerytextexclam
290 \let\fqe\texosqueryquestion
291 \let\tqe\texosquerytextquestion
292 \let\files\texosquerylessthan
293 \let\tles\texosquerytextlessthan
294 \let\fgre\texosquerygreaterthan
295 \let\tgre\texosquerytextgreaterthan
296 \let\fdol\texosquerydollar
297 \let\tdol\texosquerytextdollar
298 \let\fdot\texosqueryperiod
299 \let\tdot\texosquerytextperiod
300 \let\fcom\texosquerycomma
301 \let\tcom\texosquerytextcomma
302 \let\fopb\texosqueryopenparen
303 \let\topb\texosquerytextopenparen
304 \let\fc1b\texosquerycloseparen
305 \let\tclb\texosquerytextcloseparen
306 \let\fosb\texosqueryopensq
307 \let\tosb\texosquerytextopensq
308 \let\fc1s\texosqueryclosesq
309 \let\tcsb\texosquerytextclosesq
310 \let\fast\texosqueryasterisk
311 \let\tast\texosquerytextasterisk
312 \let\fatc\texosqueryatchar
313 \let\tatc\texosquerytextatchar
314 \let\pdfd\@texosquery@D
315 }

```

`\TeXOSQuery` Use `texosquery` with the option given in the second argument and store the result in control sequence given in the first argument.

```

316 \def\TeXOSQuery#1#2{%

```

```

317 \ifTeXOSQueryDryRun
318   \begingroup
319     \newlinechar='\^^J
320     \message{^^JTeXOSQuery: \TeXOSInvokerName\space#2^^J}%
321   \endgroup
322   \def#1{}%
323 \else
324   \begingroup
325   \endlinechar=-1\relax

```

Locally redefine short commands used by texosquery

```

326   \@texosquery@enablesshortcs

```

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.)

```

327   \catcode'\-=12\relax
328   \catcode'\_ =12\relax
329   \catcode'\^ =12\relax
330   \catcode'\~ =12\relax
331   \catcode'\$=12\relax
332   \catcode'\&=12\relax
333   \catcode'\.=12\relax
334   \catcode'\/=12\relax
335   \catcode'\:=12\relax
336   \catcode'\ "=12\relax
337   \catcode'\ ' =12\relax
338   \catcode'\;=12\relax
339   \catcode'\%=12\relax
340   \everyeof{\noexpand}\relax
341   \@texosquery@edef\x{\endgroup\def\noexpand#1{\TeXOSQueryInvoker{#2}}}\x
342 \fi
343 }

```

3.1.1 Currency

The $\langle\textit{TEX currency}\rangle$ element of `--numeric` and `--locale-data` identifies the currency symbol using

`\texosquerycurrency{ $\langle\textit{label}\rangle$ }`

which simply expands to the appropriate command.

`\texosquerycurrency`

```

344 \def\texosquerycurrency#1{%
345   \expandafter\noexpand\csname texosquerycurrency#1\endcsname
346 }

```

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

```
347 \ifx\faDollar\undefined
348 \def\texosquerycurrencydollar{\$}
349 \else
350 \def\texosquerycurrencydollar{\faDollar}
351 \fi
```

\texosquerycurrencycent

```
352 \ifx\textcent\undefined
353 \def\texosquerycurrencycent{cent}
354 \else
355 \def\texosquerycurrencycent{\textcent}
356 \fi
```

\texosquerycurrencypound

```
357 \ifx\faGbp\undefined
358 \ifx\pounds\undefined
359 \def\texosquerycurrencypound{pound}
360 \else
361 \def\texosquerycurrencypound{\pounds}
362 \fi
363 \else
364 \def\texosquerycurrencypound{\faGbp}
365 \fi
```

\texosquerycurrencysign

```
366 \ifx\textcurrency\undefined
367 \def\texosquerycurrencysign{currency-sign}
368 \else
369 \def\texosquerycurrencysign{\textcurrency}
370 \fi
```

\texosquerycurrencyyen

```
371 \ifx\faYen\undefined
372 \ifx\textyen\undefined
373 \def\texosquerycurrencyyen{yen}
374 \else
375 \def\texosquerycurrencyyen{\textyen}
376 \fi
377 \else
378 \def\texosquerycurrencyyen{\faYen}
379 \fi
```

\texosquerycurrencyecu

```
380 \def\texosquerycurrencyecu{ecu}
```

\texosquerycurrencycolon

```
381 \def\texosquerycurrencycolon{colon}
```

```

\texosquerycurrencycruzeiro
382 \def\texosquerycurrencycruzeiro{cruzeiro}

\texosquerycurrencyfranc
383 \def\texosquerycurrencyfranc{franc}

\texosquerycurrencylira
384 \ifx\textlira\undefined
385   \def\texosquerycurrencylira{lira}
386 \else
387   \def\texosquerycurrencylira{\textlira}
388 \fi

\texosquerycurrencymill
389 \def\texosquerycurrencymill{mill}

\texosquerycurrencynaira
390 \ifx\textnaira\undefined
391   \def\texosquerycurrencynaira{naira}
392 \else
393   \def\texosquerycurrencynaira{\textnaira}
394 \fi

\texosquerycurrencypeseta
395 \def\texosquerycurrencypeseta{peseta}

\texosquerycurrencyrupee
396 \ifx\faRupee\undefined
397   \def\texosquerycurrencyrupee{rupee}
398 \else
399   \def\texosquerycurrencyrupee{\faRupee}
400 \fi

\texosquerycurrencywon
401 \ifx\faWon\undefined
402   \ifx\textwon\undefined
403     \def\texosquerycurrencywon{won}
404   \else
405     \def\texosquerycurrencywon{\textwon}
406   \fi
407 \else
408   \def\texosquerycurrencywon{\faWon}
409 \fi

\texosquerycurrencynewsheqel
410 \ifx\faSheqel\undefined
411   \def\texosquerycurrencynewsheqel{newsheqel}
412 \else
413   \def\texosquerycurrencynewsheqel{\faSheqel}
414 \fi

```

`\texosquerycurrencydong`

```
415 \ifx\textdong\undefined
416   \def\texosquerycurrencydong{dong}
417 \else
418   \def\texosquerycurrencydong{\textdong}
419 \fi
```

`\texosquerycurrencyeuro`

```
420 \ifx\faEuro\undefined
421   \ifx\texteuro\undefined
422     \ifx\euro\undefined
423       \def\texosquerycurrencyeuro{euro}
424     \else
425       \def\texosquerycurrencyeuro{\euro}
426     \fi
427   \else
428     \def\texosquerycurrencyeuro{\texteuro}
429   \fi
430 \else
431   \def\texosquerycurrencyeuro{\faEuro}
432 \fi
```

`\texosquerycurrencykip`

```
433 \def\texosquerycurrencykip{kip}
```

`\texosquerycurrencytugrik`

```
434 \def\texosquerycurrencytugrik{tugrik}
```

`\texosquerycurrencydrachma`

```
435 \def\texosquerycurrencydrachma{drachma}
```

`\texosquerycurrencygermanpenny`

```
436 \def\texosquerycurrencygermanpenny{german-penny}
```

`\texosquerycurrencypeso`

```
437 \ifx\textpeso\undefined
438   \def\texosquerycurrencypeso{peso}
439 \else
440   \def\texosquerycurrencypeso{\textpeso}
441 \fi
```

`\texosquerycurrencyguarani`

```
442 \ifx\textguarani\undefined
443   \def\texosquerycurrencyguarani{guarani}
444 \else
445   \def\texosquerycurrencyguarani{\textguarani}
446 \fi
```

```

\texosquerycurrencyaustral
447 \def\texosquerycurrencyaustral{austral}

\texosquerycurrencyhryvnia
448 \def\texosquerycurrencyhryvnia{hryvnia}

\texosquerycurrencycedi
449 \ifx\textcolonmonetary\undefined
450   \def\texosquerycurrencycedi{cedi}
451 \else
452   \def\texosquerycurrencycedi{\textcolonmonetary}
453 \fi

\texosquerycurrencylivretournois
454 \def\texosquerycurrencylivretournois{livre-tournois}

\texosquerycurrencyspesmilo
455 \def\texosquerycurrencyspesmilo{spesmilo}

\texosquerycurrencytenge
456 \def\texosquerycurrencytenge{tenge}

\texosquerycurrencyrupee
457 \def\texosquerycurrencyrupee{rupee}

\texosquerycurrencyturkishlira
458 \ifx\faTurkishLira\undefined
459   \def\texosquerycurrencyturkishlira{turkish-lira}
460 \else
461   \def\texosquerycurrencyturkishlira{\faTurkishLira}
462 \fi

\texosquerycurrencynordicmark
463 \def\texosquerycurrencynordicmark{nordic-mark}

\texosquerycurrencymanat
464 \def\texosquerycurrencymanat{manat}

\texosquerycurrencyruble
465 \ifx\faRuble\undefined
466   \def\texosquerycurrencyruble{ruble}
467 \else
468   \def\texosquerycurrencyruble{\faRuble}
469 \fi

```


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.

<code>\TeXOSQueryLocale</code>	Query the locale and store the result in the control sequence provided in the argument. 470 <code>\def\TeXOSQueryLocale#1{\TeXOSQuery{#1}{\string-l}}</code>
<code>\TeXOSQueryLangTag</code>	Query the language tag and store the result in the control sequence provided in the argument. 471 <code>\def\TeXOSQueryLangTag#1{\TeXOSQuery{#1}{\string-b}}</code>
<code>\TeXOSQueryNumeric</code>	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. 472 <code>\def\TeXOSQueryNumeric#1#2{\TeXOSQuery{#1}{\string-N #2}}</code>
<code>\TeXOSQueryLocaleData</code>	Query the data 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. 473 <code>\def\TeXOSQueryLocaleData#1#2{\TeXOSQuery{#1}{\string-D #2}}</code>
<code>\TeXOSQueryCwd</code>	Query the current working directory. 474 <code>\def\TeXOSQueryCwd#1{\TeXOSQuery{#1}{\string-c}}</code>
<code>\TeXOSQueryHome</code>	Query the user's home directory. 475 <code>\def\TeXOSQueryHome#1{\TeXOSQuery{#1}{\string-m}}</code>
<code>\TeXOSQueryTmpDir</code>	Query the temporary directory. 476 <code>\def\TeXOSQueryTmpDir#1{\TeXOSQuery{#1}{\string-t}}</code>
<code>\TeXOSQueryVersion</code>	Query the operating system version. 477 <code>\def\TeXOSQueryVersion#1{\TeXOSQuery{#1}{\string-r}}</code>
<code>\TeXOSQueryArch</code>	Query the operating system architecture. 478 <code>\def\TeXOSQueryArch#1{\TeXOSQuery{#1}{\string-a}}</code>
<code>\TeXOSQueryName</code>	Query the operating system name. 479 <code>\def\TeXOSQueryName#1{\TeXOSQuery{#1}{\string-o}}</code>
<code>\TeXOSQueryDateTime</code>	Query the current date and time. 480 <code>\def\TeXOSQueryDateTime#1{% 481 \TeXOSQuery{#1}{\string-M}% 482 }</code>
<code>\TeXOSQueryTimeZones</code>	Query the current time zone mappings. Leave the second argument empty for the default locale. 483 <code>\def\TeXOSQueryTimeZones#1#2{% 484 \TeXOSQuery{#1}{\string-Z #2}% 485 }</code>

`\TeXOSQueryNow` Query the current time stamp.

```
486 \def\TeXOSQueryNow#1{%  
The D needs category code 12 just in case texosquery is running in a backward compat-  
ibility mode that doesn't use \pdfd.  
487 \edef\@texosquery@restore@D{%  
488 \noexpand\catcode'\noexpand\D=\the\catcode'\D\relax}%  
489 \catcode'\D=12\relax  
490 \TeXOSQuery{#1}{\string-n}%  
491 \@texosquery@restore@D  
492 }
```

If the file name is supplied using `\jobname` it may have double-quotes which will interfere with things.

`\texosquerystripquotes`

```
493 \def\texosquerystripquotes#1{%  
494 \@texosquery@stripquotes#1\@mid\texosquery@stripquotes  
495 "relax"relax\@end\texosquery@stripquotes  
496 }  
497 \def\@texosquery@stripquotes#1"#2"{%  
498 \@@texosquery@stripquotes#1#2%  
499 }  
500 \def\@@texosquery@stripquotes#1\@mid\texosquery@stripquotes#2\@end\texosquery@stripquotes{%  
501 #1%  
502 }
```

`\TeXOSQueryFileDate` Query the time stamp of the file given in the second argument.

```
503 \def\TeXOSQueryFileDate#1#2{%  
The D needs category code 12 just in case texosquery is running in a backward compat-  
ibility mode that doesn't use \pdfd.  
504 \edef\@texosquery@restore@D{%  
505 \noexpand\catcode'\noexpand\D=\the\catcode'\D\relax}%  
506 \catcode'\D=12\relax  
507 \TeXOSQuery{#1}{\string-d \string'\texosquerystripquotes{#2}\string'}%  
508 \@texosquery@restore@D  
509 }
```

`\TeXOSQueryFileSize` Query the size of the file given in the second argument.

```
510 \def\TeXOSQueryFileSize#1#2{\TeXOSQuery{#1}{\string-s  
511 \string'\texosquerystripquotes{#2}\string'}}
```

`\@texosquery@filelist`

```
512 \def\@texosquery@filelist#1#2#3#4#5{\TeXOSQuery{#1}{%  
513 \string#2 \string'#3\string'  
514 \string'\texosquerystripquotes{#4}\string' #5}}
```

<code>\TeXOSQueryFileList</code>	List all files in the directory given in the third argument, separated by the second argument. <pre> 515 \def\TeXOSQueryFileList#1#2#3{% 516 \@texosquery@filelist{#1}{-i}{#2}{#3}{}% 517 } </pre>
<code>\TeXOSQueryFileListDateAsc</code>	As above, but sort by date. <pre> 518 \def\TeXOSQueryFileListDateAsc#1#2#3{% 519 \@texosquery@filelist{#1}{-i}{#2}{#3}{date}% 520 } </pre>
<code>\TeXOSQueryFileListDateDes</code>	As above, but sort by date in descending order. <pre> 521 \def\TeXOSQueryFileListDateDes#1#2#3{% 522 \@texosquery@filelist{#1}{-i}{#2}{#3}{date\string-des}% 523 } </pre>
<code>\TeXOSQueryFileListSizeAsc</code>	As above, but sort by size. <pre> 524 \def\TeXOSQueryFileListSizeAsc#1#2#3{% 525 \@texosquery@filelist{#1}{-i}{#2}{#3}{size}% 526 } </pre>
<code>\TeXOSQueryFileListSizeDes</code>	As above, but sort by size in descending order. <pre> 527 \def\TeXOSQueryFileListSizeDes#1#2#3{% 528 \@texosquery@filelist{#1}{-i}{#2}{#3}{size\string-des}% 529 } </pre>
<code>\TeXOSQueryFileListNameAsc</code>	As above, but sort by name. <pre> 530 \def\TeXOSQueryFileListNameAsc#1#2#3{% 531 \@texosquery@filelist{#1}{-i}{#2}{#3}{name}% 532 } </pre>
<code>\TeXOSQueryFileListNameDes</code>	As above, but sort by name in descending order. <pre> 533 \def\TeXOSQueryFileListNameDes#1#2#3{% 534 \@texosquery@filelist{#1}{-i}{#2}{#3}{name\string-des}% 535 } </pre>
<code>\TeXOSQueryFileListNameIgnoreCaseAsc</code>	As above, but sort by case-insensitive name. <pre> 536 \def\TeXOSQueryFileListNameIgnoreCaseAsc#1#2#3{% 537 \@texosquery@filelist{#1}{-i}{#2}{#3}{iname}% 538 } </pre>
<code>\TeXOSQueryFileListNameIgnoreCaseDes</code>	As above, but sort by case-insensitive name in descending order. <pre> 539 \def\TeXOSQueryFileListNameIgnoreCaseDes#1#2#3{% 540 \@texosquery@filelist{#1}{-i}{#2}{#3}{iname\string-des}% 541 } </pre>
<code>\TeXOSQueryFileListExtAsc</code>	As above, but sort by extension. <pre> 542 \def\TeXOSQueryFileListExtAsc#1#2#3{% 543 \@texosquery@filelist{#1}{-i}{#2}{#3}{ext}% 544 } </pre>

```

\TeXOSQueryFileListExtDes  As above, but sort by extension in descending order.
545 \def\TeXOSQueryFileListExtDes#1#2#3{%
546 \@texosquery@filelist{#1}{-i}{#2}{#3}{ext\string-des}%
547 }

\TeXOSQueryRegularFileList  List all regular files.
548 \def\TeXOSQueryRegularFileList#1#2#3{%
549 \@texosquery@filelist{#1}{-ir}{#2}{#3}{}%
550 }

\TeXOSQuerySubDirList  List all sub-directories.
551 \def\TeXOSQuerySubDirList#1#2#3{%
552 \@texosquery@filelist{#1}{-id}{#2}{#3}{}%
553 }

\TeXOSQueryRegularFileListDateAsc  List all regular files sorted by date.
554 \def\TeXOSQueryRegularFileListDateAsc#1#2#3{%
555 \@texosquery@filelist{#1}{-ir}{#2}{#3}{date}%
556 }

\TeXOSQuerySubDirListDateAsc  List all sub-directories sorted by date.
557 \def\TeXOSQuerySubDirListDateAsc#1#2#3{%
558 \@texosquery@filelist{#1}{-id}{#2}{#3}{date}%
559 }

\TeXOSQueryRegularFileListDateDes  List all regular files sorted by date in descending order.
560 \def\TeXOSQueryRegularFileListDateDes#1#2#3{%
561 \@texosquery@filelist{#1}{-ir}{#2}{#3}{date\string-des}%
562 }

\TeXOSQuerySubDirListDateDes  List all sub-directories sorted by date in descending order.
563 \def\TeXOSQuerySubDirListDateDes#1#2#3{%
564 \@texosquery@filelist{#1}{-id}{#2}{#3}{date\string-des}%
565 }

\TeXOSQueryRegularFileListSizeAsc  List all regular files sorted by size.
566 \def\TeXOSQueryRegularFileListSizeAsc#1#2#3{%
567 \@texosquery@filelist{#1}{-ir}{#2}{#3}{size}%
568 }

\TeXOSQuerySubDirListSizeAsc  List all sub-directories sorted by size.
569 \def\TeXOSQuerySubDirListSizeAsc#1#2#3{%
570 \@texosquery@filelist{#1}{-id}{#2}{#3}{size}%
571 }

\TeXOSQueryRegularFileListSizeDes  List all regular files sorted by size in descending order.
572 \def\TeXOSQueryRegularFileListSizeDes#1#2#3{%
573 \@texosquery@filelist{#1}{-ir}{#2}{#3}{size\string-des}%
574 }

```

```

\TeXOSQuerySubDirListSizeDes  List all sub-directories sorted by size in descending order.
575 \def\TeXOSQuerySubDirListSizeDes#1#2#3{%
576 \@texosquery@filelist{#1}{-id}{#2}{#3}{size\string-des}%
577 }

\TeXOSQueryRegularFileListNameAsc  List all regular files sorted by file name.
578 \def\TeXOSQueryRegularFileListNameAsc#1#2#3{%
579 \@texosquery@filelist{#1}{-ir}{#2}{#3}{name}%
580 }

\TeXOSQuerySubDirListNameAsc  List all sub-directories sorted by file name.
581 \def\TeXOSQuerySubDirListNameAsc#1#2#3{%
582 \@texosquery@filelist{#1}{-id}{#2}{#3}{name}%
583 }

\TeXOSQueryRegularFileListNameDes  List all regular files sorted by file name in descending order.
584 \def\TeXOSQueryRegularFileListNameDes#1#2#3{%
585 \@texosquery@filelist{#1}{-ir}{#2}{#3}{name\string-des}%
586 }

\TeXOSQuerySubDirListNameDes  List all sub-directories sorted by name in descending order.
587 \def\TeXOSQuerySubDirListNameDes#1#2#3{%
588 \@texosquery@filelist{#1}{-id}{#2}{#3}{name\string-des}%
589 }

\TeXOSQueryRegularFileListNameIgnoreCaseAsc  List all regular files sorted by file case-insensitive name.
590 \def\TeXOSQueryRegularFileListNameIgnoreCaseAsc#1#2#3{%
591 \@texosquery@filelist{#1}{-ir}{#2}{#3}{iname}%
592 }

\TeXOSQuerySubDirListNameIgnoreCaseAsc  List all sub-directories sorted by file case-insensitive name.
593 \def\TeXOSQuerySubDirListNameIgnoreCaseAsc#1#2#3{%
594 \@texosquery@filelist{#1}{-id}{#2}{#3}{iname}%
595 }

\TeXOSQueryRegularFileListNameIgnoreCaseDes  List all regular files sorted by file case-insensitive name in descending order.
596 \def\TeXOSQueryRegularFileListNameIgnoreCaseDes#1#2#3{%
597 \@texosquery@filelist{#1}{-ir}{#2}{#3}{iname\string-des}%
598 }

\TeXOSQuerySubDirListNameIgnoreCaseDes  List all sub-directories sorted by case-insensitive name in descending order.
599 \def\TeXOSQuerySubDirListNameIgnoreCaseDes#1#2#3{%
600 \@texosquery@filelist{#1}{-id}{#2}{#3}{iname\string-des}%
601 }

\TeXOSQueryRegularFileListExtAsc  List all regular files sorted by file extension.
602 \def\TeXOSQueryRegularFileListExtAsc#1#2#3{%
603 \@texosquery@filelist{#1}{-ir}{#2}{#3}{ext}%
604 }

```

`\TeXOSQuerySubDirListExtAsc` List all sub-directories sorted by file extension.

```

605 \def\TeXOSQuerySubDirListExtAsc#1#2#3{%
606 \@texosquery@filelist{#1}{-id}{#2}{#3}{ext}%
607 }

```

`\TeXOSQueryRegularFileListExtDes` List all regular files sorted by file extension in descending order.

```

608 \def\TeXOSQueryRegularFileListExtDes#1#2#3{%
609 \@texosquery@filelist{#1}{-ir}{#2}{#3}{ext\string-des}%
610 }

```

`\TeXOSQuerySubDirListExtDes` List all sub-directories sorted by extension in descending order.

```

611 \def\TeXOSQuerySubDirListExtDes#1#2#3{%
612 \@texosquery@filelist{#1}{-id}{#2}{#3}{ext\string-des}%
613 }

```

`\@texosquery@filterfilelist`

```

614 \def\@texosquery@filterfilelist#1#2#3#4#5#6{%
615 \TeXOSQuery{#1}%
616 {%
617 \string#2 \string'#3\string' \string'#4\string'
618 \string'\texosquerystripquotes{#5}\string' #6%
619 }%
620 }

```

`\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. *Take care of backslashes in the regular expression!*

```

621 \def\TeXOSQueryFilterFileList#1#2#3#4{%
622 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{}%
623 }

```

`\TeXOSQueryFilterFileListDateAsc` As above, but sort by date.

```

624 \def\TeXOSQueryFilterFileListDateAsc#1#2#3#4{%
625 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{date}%
626 }

```

`\TeXOSQueryFilterFileListDateDes` As above, but sort by date in descending order.

```

627 \def\TeXOSQueryFilterFileListDateDes#1#2#3#4{%
628 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{date\string-des}%
629 }

```

`\TeXOSQueryFilterFileListSizeAsc` As above, but sort by size.

```

630 \def\TeXOSQueryFilterFileListSizeAsc#1#2#3#4{%
631 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{size}%
632 }

```

`\TeXOSQueryFilterFileListSizeDes` As above, but sort by size in descending order.

```

633 \def\TeXOSQueryFilterFileListSizeDes#1#2#3#4{%
634 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{size\string-des}%
635 }

```

TeXOSQueryFilterFileListNameAsc As above, but sort by file name.

```

636 \def\TeXOSQueryFilterFileListNameAsc#1#2#3#4{%
637 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{name}%
638 }

```

TeXOSQueryFilterFileListNameDes As above, but sort by name in descending order.

```

639 \def\TeXOSQueryFilterFileListNameDes#1#2#3#4{%
640 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{name\string-des}%
641 }

```

FilterFileListNameIgnoreCaseAsc As above, but sort by file name (case-insensitive).

```

642 \def\TeXOSQueryFilterFileListNameIgnoreCaseAsc#1#2#3#4{%
643 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{iname}%
644 }

```

FilterFileListNameIgnoreCaseDes As above, but sort by name in descending order (case-insensitive).

```

645 \def\TeXOSQueryFilterFileListNameIgnoreCaseDes#1#2#3#4{%
646 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{iname\string-des}%
647 }

```

TeXOSQueryFilterFileListExtAsc As above, but sort by file extension.

```

648 \def\TeXOSQueryFilterFileListExtAsc#1#2#3#4{%
649 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{ext}%
650 }

```

TeXOSQueryFilterFileListExtDes As above, but sort by extension in descending order.

```

651 \def\TeXOSQueryFilterFileListExtDes#1#2#3#4{%
652 \@texosquery@filterfilelist{#1}{-f}{#2}{#3}{#4}{ext\string-des}%
653 }

```

TeXOSQueryFilterRegularFileList Filtered list or regular files.

```

654 \def\TeXOSQueryFilterRegularFileList#1#2#3#4{%
655 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{}%
656 }

```

\TeXOSQueryFilterSubDirList Filtered list of sub-directories.

```

657 \def\TeXOSQueryFilterSubDirList#1#2#3#4{%
658 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{}%
659 }

```

TeXOSQueryFilterSubDirListDateAsc Filtered sort of sub-directories by file date.

```

660 \def\TeXOSQueryFilterSubDirListDateAsc#1#2#3#4{%
661 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{date}%
662 }

```

TeXOSQueryFilterRegularFileListDateAsc Filtered sort of regular files by file date.

```

663 \def\TeXOSQueryFilterRegularFileListDateAsc#1#2#3#4{%
664 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{date}%
665 }

```

TeXOSQueryFilterSubDirListDateDes Filtered sort of sub-directories by file date in descending order.

```

666 \def\TeXOSQueryFilterSubDirListDateDes#1#2#3#4{%
667   \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{date\string-des}%
668 }

```

TeXOSQueryFilterRegularFileListDateDes Filtered sort of regular files by file date in descending order.

```

669 \def\TeXOSQueryFilterRegularFileListDateDes#1#2#3#4{%
670   \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{date\string-des}%
671 }

```

TeXOSQueryFilterSubDirListSizeAsc Filtered sort of sub-directories by file size.

```

672 \def\TeXOSQueryFilterSubDirListSizeAsc#1#2#3#4{%
673   \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{size}%
674 }

```

TeXOSQueryFilterRegularFileListSizeAsc Filtered sort of regular files by file size.

```

675 \def\TeXOSQueryFilterRegularFileListSizeAsc#1#2#3#4{%
676   \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{size}%
677 }

```

TeXOSQueryFilterSubDirListSizeDes Filtered sort of sub-directories by file size in descending order.

```

678 \def\TeXOSQueryFilterSubDirListSizeDes#1#2#3#4{%
679   \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{size\string-des}%
680 }

```

TeXOSQueryFilterRegularFileListSizeDes Filtered sort of regular files by file size in descending order.

```

681 \def\TeXOSQueryFilterRegularFileListSizeDes#1#2#3#4{%
682   \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{size\string-des}%
683 }

```

TeXOSQueryFilterSubDirListNameAsc Filtered sort of sub-directories by file name.

```

684 \def\TeXOSQueryFilterSubDirListNameAsc#1#2#3#4{%
685   \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{name}%
686 }

```

TeXOSQueryFilterRegularFileListNameAsc Filtered sort of regular files by file name.

```

687 \def\TeXOSQueryFilterRegularFileListNameAsc#1#2#3#4{%
688   \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{name}%
689 }

```

TeXOSQueryFilterSubDirListNameDes Filtered sort of sub-directories by file name in descending order.

```

690 \def\TeXOSQueryFilterSubDirListNameDes#1#2#3#4{%
691   \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{name\string-des}%
692 }

```

TeXOSQueryFilterRegularFileListNameDes Filtered sort of regular files by file name in descending order.

```

693 \def\TeXOSQueryFilterRegularFileListNameDes#1#2#3#4{%
694   \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{name\string-des}%
695 }

```


FilterSubDirListNameIgnoreCaseAsc	<p>Filtered sort of sub-directories by case-insensitive file name.</p> <pre> 696 \def\TeXOSQueryFilterSubDirListNameIgnoreCaseAsc#1#2#3#4{% 697 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{iname}% 698 }</pre>
RegularFileListNameIgnoreCaseAsc	<p>Filtered sort of regular files by case-insensitive file name.</p> <pre> 699 \def\TeXOSQueryFilterRegularFileListNameIgnoreCaseAsc#1#2#3#4{% 700 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{iname}% 701 }</pre>
FilterSubDirListNameIgnoreCaseDes	<p>Filtered sort of sub-directories by case-insensitive file name in descending order.</p> <pre> 702 \def\TeXOSQueryFilterSubDirListNameIgnoreCaseDes#1#2#3#4{% 703 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{iname\string-des}% 704 }</pre>
RegularFileListNameIgnoreCaseDes	<p>Filtered sort of regular files by case-insensitive file name in descending order.</p> <pre> 705 \def\TeXOSQueryFilterRegularFileListNameIgnoreCaseDes#1#2#3#4{% 706 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{iname\string-des}% 707 }</pre>
TeXOSQueryFilterSubDirListExtAsc	<p>Filtered sort of sub-directories by file extension. (Added for completeness as directories don't tend to have extensions.)</p> <pre> 708 \def\TeXOSQueryFilterSubDirListExtAsc#1#2#3#4{% 709 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext}% 710 }</pre>
QueryFilterRegularFileListExtAsc	<p>Filtered sort of regular files by file extension.</p> <pre> 711 \def\TeXOSQueryFilterRegularFileListExtAsc#1#2#3#4{% 712 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext}% 713 }</pre>
TeXOSQueryFilterSubDirListExtDes	<p>Filtered sort of sub-directories by file extension in descending order.</p> <pre> 714 \def\TeXOSQueryFilterSubDirListExtDes#1#2#3#4{% 715 \@texosquery@filterfilelist{#1}{-fd}{#2}{#3}{#4}{ext\string-des}% 716 }</pre>
QueryFilterRegularFileListExtDes	<p>Filtered sort of regular files by file extension in descending order.</p> <pre> 717 \def\TeXOSQueryFilterRegularFileListExtDes#1#2#3#4{% 718 \@texosquery@filterfilelist{#1}{-fr}{#2}{#3}{#4}{ext\string-des}% 719 }</pre>
\@texosquery@walk	<pre> 720 \def\@texosquery@walk#1#2#3#4#5{% 721 \TeXOSQuery{#1}% 722 {% 723 \string-w \string'#2\string' \string'#3\string' 724 \string'\texosquerystripquotes{#4}\string' #5% 725 }% 726 }</pre>

<code>\TeXOSQueryWalk</code>	Recursive filtered listing of regular files. <pre> 727 \def\TeXOSQueryWalk#1#2#3#4{% 728 \@texosquery@walk{#1}{#2}{#3}{#4}{}% 729 } </pre>
<code>\TeXOSQueryWalkDateAsc</code>	As above, but sort by date. <pre> 730 \def\TeXOSQueryWalkDateAsc#1#2#3#4{% 731 \@texosquery@walk{#1}{#2}{#3}{#4}{date}% 732 } </pre>
<code>\TeXOSQueryWalkDateDes</code>	As above, but sort by date in descending order. <pre> 733 \def\TeXOSQueryWalkDateDes#1#2#3#4{% 734 \@texosquery@walk{#1}{#2}{#3}{#4}{date\string-des}% 735 } </pre>
<code>\TeXOSQueryWalkSizeAsc</code>	As above, but sort by file size. <pre> 736 \def\TeXOSQueryWalkSizeAsc#1#2#3#4{% 737 \@texosquery@walk{#1}{#2}{#3}{#4}{size}% 738 } </pre>
<code>\TeXOSQueryWalkSizeDes</code>	As above, but sort by file size in descending order. <pre> 739 \def\TeXOSQueryWalkSizeDes#1#2#3#4{% 740 \@texosquery@walk{#1}{#2}{#3}{#4}{size\string-des}% 741 } </pre>
<code>\TeXOSQueryWalkNameAsc</code>	As above, but sort by file name. <pre> 742 \def\TeXOSQueryWalkNameAsc#1#2#3#4{% 743 \@texosquery@walk{#1}{#2}{#3}{#4}{name}% 744 } </pre>
<code>\TeXOSQueryWalkNameDes</code>	As above, but sort by file name in descending order. <pre> 745 \def\TeXOSQueryWalkNameDes#1#2#3#4{% 746 \@texosquery@walk{#1}{#2}{#3}{#4}{name\string-des}% 747 } </pre>
<code>\TeXOSQueryWalkNameIgnoreCaseAsc</code>	As above, but sort by file name (case-insensitive). <pre> 748 \def\TeXOSQueryWalkNameIgnoreCaseAsc#1#2#3#4{% 749 \@texosquery@walk{#1}{#2}{#3}{#4}{iname}% 750 } </pre>
<code>\TeXOSQueryWalkNameIgnoreCaseDes</code>	As above, but sort by file name (case-insensitive) in descending order. <pre> 751 \def\TeXOSQueryWalkNameIgnoreCaseDes#1#2#3#4{% 752 \@texosquery@walk{#1}{#2}{#3}{#4}{iname\string-des}% 753 } </pre>
<code>\TeXOSQueryWalkExtAsc</code>	As above, but sort by file extension. <pre> 754 \def\TeXOSQueryWalkExtAsc#1#2#3#4{% 755 \@texosquery@walk{#1}{#2}{#3}{#4}{ext}% 756 } </pre>

`\TeXOSQueryWalkExtDes` As above, but sort by file extension in descending order.

```

757 \def\TeXOSQueryWalkExtDes#1#2#3#4{%
758 \@texosquery@walk{#1}{#2}{#3}{#4}{ext\string-des}%
759 }

```

`\TeXOSQueryFileURI` Get the URI of the file given in the second argument.

```

760 \def\TeXOSQueryFileURI#1#2{\TeXOSQuery{#1}{\string-u
761 \string'\texosquerystripquotes{#2}\string'}}

```

`\TeXOSQueryFilePath` Get the canonical path of the file given in the second argument.

```

762 \def\TeXOSQueryFilePath#1#2{\TeXOSQuery{#1}{\string-p
763 \string'\texosquerystripquotes{#2}\string'}}

```

`\TeXOSQueryDirName` Get the canonical path of the directory containing the file given in the second argument.

```

764 \def\TeXOSQueryDirName#1#2{\TeXOSQuery{#1}{\string-e
765 \string'\texosquerystripquotes{#2}\string'}}

```

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 -D` action, but patterns can also be constructed using

```
\texosquerydefpattern{<cs>}{<pattern specs>}
```

The pattern is stored in `<cs>`. The `<pattern specs>` depend on whether a date-time or numeric pattern is required. For a date-time pattern, each date/time element is identified using

```
\texosquerydtf{<n>}{<identifier>}
```

where `<identifier>` identifies the element type (such as M for month or s for seconds) and `<n>` indicates how the element should be formatted, where `<n>` is an integer from 1 to 4. For example if `<n>` is 2 and `<identifier>` is M, then this indicates the 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 `\%` to expand to `\texosquerydtf`. This means that if you do, for example:

```
\texosquerydefpattern{\pattern}{\%2d/\%2M/\%4y}
```

then `\pattern` 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: `\pattern`.

will display “Pattern: dd/MM/yyyy” in the PDF. However, when used with `\texosqueryfmtdatetime`, the definition of `\texosquerydtf` changes to reproduce the required date/time element.

For example:

```
\texosquerydefpattern{\pattern}{\%2d/\%2M/\%4y \%2H:\%2m:\%2s \%2Z}

Pattern: \pattern.

\TeXOSQueryDateTime{\datetimedata}

\ifx\datetimedata\empty
  Query Failed!
\else
  \expandafter\texosqueryfmtdatetime\expandafter\pattern\datetimedata
\fi
```

The numeric patterns are rather more complicated. The *⟨pattern specs⟩* now needs to use the following formats:

```
\texosquerypatnum{⟨+ve/-ve numeric pattern⟩}
```

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 `\texosquerydefpattern` locally defines `\numfmt` to expand to it.

```
\texosquerypatplusminus{⟨+ve numeric pattern⟩}{⟨-ve numeric pattern⟩}
```

This provides a pattern *⟨+ve numeric pattern⟩* to use if the number is positive and a pattern *⟨-ve numeric pattern⟩* to use if the number is negative. Again `\texosquerydefpattern` locally defines a shortcut, `\pmnumfmt`, to expand to this command.

```
\texosquerypatsinum{⟨decimal pattern⟩}{⟨mantissa pattern⟩}
```

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

```
\texosquerypatdec{⟨integer pattern⟩}{⟨fraction pattern⟩}
```

This indicates a decimal pattern where the *⟨integer pattern⟩* is applied to the part before the decimal separator and *⟨fraction pattern⟩* is applied to the part after the separator. The shortcut is `\decfmt`.

```
\texosquerypatprefixcurrency{⟨decimal pattern⟩}{⟨text⟩}
```

This indicates a currency pattern with a prefixed currency symbol where *⟨text⟩* is inserted before the currency symbol. The shortcut is `\pcur`. The *⟨decimal pattern⟩* will typically use `\texosquerypatdec{⟨int⟩}{⟨frac⟩}`. (Similarly for the following.)

`\texosquerypatprefixcurrency{⟨decimal pattern⟩}{⟨text⟩}`

This indicates an international currency pattern with a prefixed international currency symbol where *⟨text⟩* is inserted before the symbol. The shortcut is `\picur`.

`\texosquerypatsuffixcurrency{⟨decimal pattern⟩}{⟨text⟩}`

This indicates a currency pattern with a suffixed international currency symbol where *⟨text⟩* is inserted after the currency symbol. The shortcut is `\scur`.

`\texosquerypatsuffixcurrency{⟨decimal pattern⟩}{⟨text⟩}`

This indicates an international currency pattern with a suffixed international currency symbol where *⟨text⟩* is inserted after the symbol. The shortcut is `\sicur`.

`\texosquerypatprefixpercent{⟨decimal pattern⟩}{⟨text⟩}`

This indicates a percentage pattern with a prefixed percent symbol where *⟨text⟩* is inserted before the symbol. The shortcut is `\ppct`.

`\texosquerypatsuffixpercent{⟨decimal pattern⟩}{⟨text⟩}`

This indicates a percentage pattern with a suffixed percent symbol where *⟨text⟩* is inserted after the symbol. The shortcut is `\spct`.

`\texosquerypatprefixpermill{⟨decimal pattern⟩}{⟨text⟩}`

This indicates a per-mill pattern with a prefixed per-mill symbol where *⟨text⟩* is inserted before the symbol. The shortcut is `\ppml`.

`\texosquerypatsuffixpermill{⟨decimal pattern⟩}{⟨text⟩}`

This indicates a per-mill pattern with a suffixed per-mill symbol where *⟨text⟩* is inserted after the symbol. The shortcut is `\spml`.

Important Note: The integer parts *⟨integer part⟩*, *⟨fraction part⟩* and *⟨mantissa⟩* must have *exactly* ten digit identifiers. (T_EX can't reach 11 digit numbers.)

There are two types of digit identifiers:

`\texosquerypatdigit`

This indicates a digit that must be displayed, even if it's not significant (for example a leading zero). The shortcut command is `\0` (backslash zero).

`\texosquerypatdigitnozero`

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

`\texosquerypatgroupsep`

The shortcut command is `\,` (backslash comma).

The sign can be inserted using

`\texosquerypatminus`

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:

```
\texosquerydefpattern{\numpattern}{%
\numfmt{\decfmt{\#\,\#\#\#\,\#\#\#\,\#\#\0}{\0\#\#\#\#\#\#\#\#\}}}
```

The pattern can be applied to a number using `\texosqueryfmtnumber`:

```
\texosqueryfmtnumber{\numpattern}{123}{4567}{2}
```

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

Here's an example of a scientific number:

```
\texosquerydefpattern{\sinumpattern}{%
\sinumfmt
{\decfmt{\#\,\#\#\#\,\#\#\#\,\#\#\0}{\0\#\#\#\#\#\#\#\#\}}%
{\-\#\#\#\#\#\#\#\0\0}%
}
```

The pattern can be applied to a number:

```
\texosqueryfmtnumber{\sinumpattern}{1}{234567}{3}
```

which produces: 1.234567E+03

Here's an integer pattern:

```
\texosquerydefpattern{\intpattern}{%
\patnumfmt{\#\,\#\#\#\,\#\#\#\,\#\#\0}}
```

The pattern applied to a number:

```
\texosqueryfmtnumber{\intpattern}{123}{4567}{2}
```

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:

```
\texosquerydefpattern{\curpattern}{%
\pmnumfmt
{\pcur{\decfmt{\#\,\#\#\#\,\#\#\#\,\#\#\0}{\0\0\#\#\#\#\#\#\#\}}}{}}%
{\pcur{\decfmt{\#\,\#\#\#\,\#\#\#\,\#\#\0}{\0\0\#\#\#\#\#\#\#\}}}{\-\}}}
```

This uses the *<text>* part of `\pcur` to insert the sign before the currency symbol (but only for negative values).

```
\texosqueryfmtnumber{\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:

```
\texosquerydefpattern{\pcpattern}{%
\numfmt{\spct{\#\,\#\#\#\,\#\#\#\,\#\#\0}{}}}
```

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

`\texosquerydtf` 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 [SimpleDateFormat class](#). The pattern interprets ≥ 4 as a single case, so this will only produce a maximum of four characters.

```
766 \def\texosquerydtf#1#2{%
767   \ifcase#1
768   \or
769   #2%
770   \or
771   #2#2%
772   \or
773   #2#2#2%
774   \else
775   #2#2#2#2%
776   \fi
777 }
```

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.

`\texosquerypatstr` Quoted string contained in number format.

```
778 \def\texosquerypatstr#1{'#1'}
```

`\texosquerypatquote` Literal quote contained in number format.

```
779 \def\texosquerypatquote{' '}
```

Number format place holders.

`\texosquerypatplusminus`

```
780 \def\texosquerypatplusminus#1#2{#1;#2}
```

`\texosquerypatnum`

```
781 \def\texosquerypatnum#1{#1}
```

`\texosquerypatsinum`

```
782 \def\texosquerypatsinum#1#2{#1E#2}
```

`\texosquerypatdec`

```
783 \def\texosquerypatdec#1#2{#1.#2}
```

<code>\texosquerypatprefixcurrency</code>	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.) 784 <code>\def\texosquerypatprefixcurrency#1#2{#2¤#1}</code>
<code>\texosquerypatprefixcurrency</code>	As above but use international currency symbol. 785 <code>\def\texosquerypatprefixcurrency#1#2{#2¤#1}</code>
<code>\texosquerypatsuffixcurrency</code>	First argument is a number, the second is optional text after the currency symbol. 786 <code>\def\texosquerypatsuffixcurrency#1#2{#1¤#2}</code>
<code>\texosquerypatsuffixcurrency</code>	As above but use international currency symbol. 787 <code>\def\texosquerypatsuffixcurrency#1#2{#1¤#2}</code>
<code>\texosquerypatdigit</code>	788 <code>\def\texosquerypatdigit{0}</code>
<code>\texosquerypatdigitnozero</code>	789 <code>\def\texosquerypatdigitnozero{\#}</code>
<code>\texosquerypatminus</code>	790 <code>\def\texosquerypatminus{-}</code>
<code>\texosquerypatgroupsep</code>	791 <code>\def\texosquerypatgroupsep{,}</code>
<code>\texosquerypatprefixpercent</code>	The first argument is the value, the second argument is optional text before the percent symbol. 792 <code>\def\texosquerypatprefixpercent#1#2{#2\%#1}</code>
<code>\texosquerypatsuffixpercent</code>	The first argument is the value, the second argument is optional text after the percent symbol. 793 <code>\def\texosquerypatsuffixpercent#1#2{#1\%#2}</code>
<code>\texosquerypatprefixpermill</code>	The first argument is the value, the second argument is optional text before the per-mill symbol. 794 <code>\def\texosquerypatprefixpermill#1#2{#2‰#1}</code>
<code>\texosquerypatsuffixpermill</code>	The first argument is the value, the second argument is optional text after the per-mill symbol. 795 <code>\def\texosquerypatsuffixpermill#1#2{#1‰#2}</code>
<code>\@texosquery@pattern@shortcuts</code>	Provide much shorter cuts for the convenience of directly defining patterns with <code>\texosquerydefpattern</code> . 796 <code>\def\@texosquery@pattern@shortcuts{%</code> 797 <code>\def\%{\noexpand\texosquerydtf}%</code> 798 <code>\def\0{\noexpand\texosquerypatdigit}%</code>


```

799 \def\#{\noexpand\texosquerypatdigitnozero}%
800 \def\~{\noexpand\texosquerypatminus}%
801 \def\,{\noexpand\texosquerypatgroupsep}%
802 \def\numfmt{\noexpand\texosquerypatnum}%
803 \def\pmnumfmt{\noexpand\texosquerypatplusminus}%
804 \def\sinumfmt{\noexpand\texosquerypatsinum}%
805 \def\decfmt{\noexpand\texosquerypatdec}%
806 \def\pcur{\noexpand\texosquerypatprefixcurrency}%
807 \def\picur{\noexpand\texosquerypatprefixcurrency}%
808 \def\scur{\noexpand\texosquerypatsuffixcurrency}%
809 \def\sicur{\noexpand\texosquerypatsuffixcurrency}%
810 \def\ppct{\noexpand\texosquerypatprefixpercent}%
811 \def\spct{\noexpand\texosquerypatsuffixpercent}%
812 \def\ppml{\noexpand\texosquerypatprefixpermill}%
813 \def\spml{\noexpand\texosquerypatsuffixpermill}%
814 }

```

`\texosquerydefpattern` Define a new pattern using the shortcut markup. The first argument is the name of the control sequence in which to store the pattern provided in the second argument. Be careful of any fragile commands within the second argument. They will need protecting!

```

815 \def\texosquerydefpattern#1#2{%
816 \begingroup
817 \@texosquery@pattern@shortcuts
818 \@texosquery@edef\x{\endgroup\def\noexpand#1{#2}}\x
819 }

```

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 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 y designator.
4. Week year needed by the Y designator.
5. Month in year needed by the M or L designators.
6. Month name needed by the M or 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 macros 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 needs to use Monday=1 base indexing. This means that `\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 `{\era id}{\year}{\week year}{\month}{\week in year}{\week in month}{\day in year}{\day in month}{\day of week in month}{\day number of week}{\am/pm id}{\hour of day (H)}{\hour in day (k)}{\hour in am/pm (K)}{\hour in am/pm (h)}{\minute in hour}{\second in minute}{\millisecond}{\time zone}`. The arguments must all be integers except for the time zone which must be in the form `{\TZh}{\TZm}{\id}{\dst flag}`. 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.

```
\texosqueryfmtdatetime The general utility command to format a pattern. The first argument is the pattern. After
that are the date-time data arguments.
820 \def\texosqueryfmtdatetime#1{%
821   \def\texosquery@fmt@dt@pattern{#1}%
822   \texosquery@fmt@getera
823 }
```

All the remaining arguments except for the time zone must be integers. These are padded using \@texosquery@paddigits.

\@texosquery@fmt@getera

```
824 \def\@texosquery@fmt@getera#1{%
825   \edef\@texosquery@fmt@G{\@texosquery@paddigits{#1}}%
826   \@texosquery@fmt@getyear
827 }
```

\@texosquery@fmt@getyear

```
828 \def\@texosquery@fmt@getyear#1{%
829   \edef\@texosquery@fmt@y{\@texosquery@paddigits{#1}}%
830   \@texosquery@fmt@getweekyear
831 }
```

\@texosquery@fmt@getweekyear

```
832 \def\@texosquery@fmt@getweekyear#1{%
833   \edef\@texosquery@fmt@Y{\@texosquery@paddigits{#1}}%
834   \@texosquery@fmt@getmonth
835 }
```

\@texosquery@fmt@getmonth

```
836 \def\@texosquery@fmt@getmonth#1{%
837   \edef\@texosquery@fmt@M{\@texosquery@paddigits{#1}}%
838   \let\@texosquery@fmt@L\@texosquery@fmt@M
839   \@texosquery@fmt@getweekinyear
840 }
```

\@texosquery@fmt@getweekinyear

```
841 \def\@texosquery@fmt@getweekinyear#1{%
842   \edef\@texosquery@fmt@w{\@texosquery@paddigits{#1}}%
843   \@texosquery@fmt@getweekinmonth
844 }
```

\@texosquery@fmt@getweekinmonth

```
845 \def\@texosquery@fmt@getweekinmonth#1{%
846   \edef\@texosquery@fmt@W{\@texosquery@paddigits{#1}}%
847   \@texosquery@fmt@getdayinyear
848 }
```

\@texosquery@fmt@getdayinyear

```
849 \def\@texosquery@fmt@getdayinyear#1{%
850   \edef\@texosquery@fmt@D{\@texosquery@paddigits{#1}}%
851   \@texosquery@fmt@getdayinmonth
852 }
```

\@texosquery@fmt@getdayinmonth

```
853 \def\@texosquery@fmt@getdayinmonth#1{%
854   \edef\@texosquery@fmt@d{\@texosquery@paddigits{#1}}%
```

```

855 \@texosquery@fmt@getdayofweekinmonth
856 }

osquery@fmt@getdayofweekinmonth

857 \def\@texosquery@fmt@getdayofweekinmonth#1{%
858 \edef\@texosquery@fmt@F{\@texosquery@paddigits{#1}}%
859 \@texosquery@fmt@getdaynumberofweek
860 }

osquery@fmt@getdaynumberofweek

861 \def\@texosquery@fmt@getdaynumberofweek#1{%
862 \edef\@texosquery@fmt@u{\@texosquery@paddigits{#1}}%
863 \let\@texosquery@fmt@E\@texosquery@fmt@u
864 \@texosquery@fmt@getampm
865 }

\@texosquery@fmt@getampm

866 \def\@texosquery@fmt@getampm#1{%
867 \edef\@texosquery@fmt@a{\@texosquery@paddigits{#1}}%
868 \@texosquery@fmt@gethourindayH
869 }

\@texosquery@fmt@gethourindayH

870 \def\@texosquery@fmt@gethourindayH#1{%
871 \edef\@texosquery@fmt@H{\@texosquery@paddigits{#1}}%
872 \@texosquery@fmt@gethourindayk
873 }

\@texosquery@fmt@gethourindayk

874 \def\@texosquery@fmt@gethourindayk#1{%
875 \edef\@texosquery@fmt@k{\@texosquery@paddigits{#1}}%
876 \@texosquery@fmt@gethourinampmK
877 }

\@texosquery@fmt@gethourinampmK

878 \def\@texosquery@fmt@gethourinampmK#1{%
879 \edef\@texosquery@fmt@K{\@texosquery@paddigits{#1}}%
880 \@texosquery@fmt@gethourinampmh
881 }

\@texosquery@fmt@gethourinampmh

882 \def\@texosquery@fmt@gethourinampmh#1{%
883 \edef\@texosquery@fmt@h{\@texosquery@paddigits{#1}}%
884 \@texosquery@fmt@getminute
885 }

\@texosquery@fmt@getminute

886 \def\@texosquery@fmt@getminute#1{%
887 \edef\@texosquery@fmt@m{\@texosquery@paddigits{#1}}%

```

```

888 \@texosquery@fmt@getsecond
889 }

\@texosquery@fmt@getsecond
890 \def\@texosquery@fmt@getsecond#1{%
891 \edef\@texosquery@fmt@s{\@texosquery@paddigits{#1}}%
892 \@texosquery@fmt@getmillisecond
893 }

\@texosquery@fmt@getmillisecond
894 \def\@texosquery@fmt@getmillisecond#1{%
895 \edef\@texosquery@fmt@S{\@texosquery@paddigits{#1}}%
896 \@texosquery@fmt@gettimezone
897 }

\@texosquery@fmt@gettimezone
898 \def\@texosquery@fmt@gettimezone#1{%
899 \def\@texosquery@fmt@Z{#1}%
900 \def\@texosquery@fmt@z{#1}%
901 \def\@texosquery@fmt@X{#1}%
All data now supplied. Temporarily redefine pattern markup and process the pattern.
902 \begingroup
903 \@texosquery@setup@dtpattern
904 \@texosquery@fmt@dt@pattern
905 \endgroup
906 }

\@texosquery@setup@dtpattern
907 \def\@texosquery@setup@dtpattern{%
908 \let\texosquerydtf\@texosquery@fmt@dtf
909 \let\texosquerypatstr\texosquerypatfmtstr
910 \let\texosquerypatquote\texosquerypatfmtquote
911 }

\@texosquery@paddigits@pos Pad positive number to 10 digits. TEX can't reach 11 digits, so this is the maximum representation.
912 \def\@texosquery@paddigits@pos#1{%
913 \ifnum#1<10
914 00000000\number#1
915 \else
916 \ifnum#1<100
917 0000000\number#1
918 \else
919 \ifnum#1<1000
920 000000\number#1
921 \else
922 \ifnum#1<10000
923 00000\number#1

```

```

924     \else
925     \ifnum#1<100000
926     00000\number#1
927     \else
928     \ifnum#1<1000000
929     0000\number#1
930     \else
931     \ifnum#1<10000000
932     000\number#1
933     \else
934     \ifnum#1<100000000
935     00\number#1
936     \else
937     \ifnum#1<1000000000
938     0\number#1
939     \else
940     \number#1
941     \fi
942     \fi
943     \fi
944     \fi
945     \fi
946     \fi
947     \fi
948     \fi
949     \fi
950 }

```

\@texosquery@paddigits This will expand to 11 characters (sign followed by 10 digits).

```

951 \def\@texosquery@paddigits#1{%
952 \ifnum#1<0
953     Move the minus sign outside.
954     -\expandafter\@texosquery@paddigits@pos\expandafter
955     {\@texosquery@gobble#1}%
956 \else
957     +\@texosquery@paddigits@pos{#1}%
958 \fi
959 }

```

\@texosquery@paddigits@trailing Pad trailing zeros.

```

959 \def\@texosquery@paddigits@trailing#1{%
960 \expandafter\@texosquery@tenoften@then@gobble
961 #10000000000\@texosquery@end@tenoften
962 }

```

\@texosquery@tenoften@then@gobble

```

963 \def\@texosquery@tenoften@then@gobble#1#2#3#4#5#6#7#8#9{%
964 #1#2#3#4#5#6#7#8#9%
965 \@texosquery@lastoften@gobble

```

966 }

\@texosquery@lastoften@gobble

967 \def \@texosquery@lastoften@gobble#1#2 \@texosquery@end@tenoften{#1}

Provide commands to select certain digits. (Sign not included.)

\@texosquery@firstoften First of ten.

968 \def \@texosquery@firstoften#1#2#3#4#5#6#7#8#9{%

969 #1%

Grab tenth argument and discard.

970 \@texosquery@gobble

971 }

\@texosquery@secondoften Second of ten.

972 \def \@texosquery@secondoften#1#2#3#4#5#6#7#8#9{%

973 #2%

Grab tenth argument and discard.

974 \@texosquery@gobble

975 }

\@texosquery@thirdoften Third of ten.

976 \def \@texosquery@thirdoften#1#2#3#4#5#6#7#8#9{%

977 #3%

Grab tenth argument and discard.

978 \@texosquery@gobble

979 }

\@texosquery@fourthoften Fourth of ten.

980 \def \@texosquery@fourthoften#1#2#3#4#5#6#7#8#9{%

981 #4%

Grab tenth argument and discard.

982 \@texosquery@gobble

983 }

\@texosquery@fifthoften Fifth of ten.

984 \def \@texosquery@fifthoften#1#2#3#4#5#6#7#8#9{%

985 #5%

Grab tenth argument and discard.

986 \@texosquery@gobble

987 }

\@texosquery@sixthoften Sixth of ten.

988 \def \@texosquery@sixthoften#1#2#3#4#5#6#7#8#9{%

989 #6%

Grab tenth argument and discard.

```
990 \@texosquery@gobble
991 }
```

\@texosquery@seventhoften Seventh of ten.

```
992 \def\@texosquery@seventhoften#1#2#3#4#5#6#7#8#9{%
993 #7%
```

Grab tenth argument and discard.

```
994 \@texosquery@gobble
995 }
```

\@texosquery@eighthoften Eighth of ten.

```
996 \def\@texosquery@eighthoften#1#2#3#4#5#6#7#8#9{%
997 #8%
```

Grab tenth argument and discard.

```
998 \@texosquery@gobble
999 }
```

\@texosquery@ninthoften Ninth of ten.

```
1000 \def\@texosquery@ninthoften#1#2#3#4#5#6#7#8#9{%
1001 #9%
```

Grab tenth argument and discard.

```
1002 \@texosquery@gobble
1003 }
```

\@texosquery@tenthoften Tenth of ten.

```
1004 \def\@texosquery@tenthoften#1#2#3#4#5#6#7#8#9{%
1005 \@texosquery@firstofone
1006 }
```

Now macros to select first n of ten.

@texosquery@firsttwooften First two of ten.

```
1007 \def\@texosquery@firsttwooften#1#2#3#4#5#6#7#8#9{%
1008 #1#2%
```

Grab tenth argument and discard.

```
1009 \@texosquery@gobble
1010 }
```

@texosquery@firstthreeoften First three of ten.

```
1011 \def\@texosquery@firstthreeoften#1#2#3#4#5#6#7#8#9{%
1012 #1#2#3%
```

Grab tenth argument and discard.

```
1013 \@texosquery@gobble
1014 }
```



```

@texosquery@firstfouroften  First four of ten.
1015 \def\@texosquery@firstfouroften#1#2#3#4#5#6#7#8#9{%
1016 #1#2#3#4%
    Grab tenth argument and discard.
1017 \@texosquery@gobble
1018 }

@texosquery@firstfiveoften  First five of ten.
1019 \def\@texosquery@firstfiveoften#1#2#3#4#5#6#7#8#9{%
1020 #1#2#3#4#5%
    Grab tenth argument and discard.
1021 \@texosquery@gobble
1022 }

@texosquery@firstsixoften   First six of ten.
1023 \def\@texosquery@firstsixoften#1#2#3#4#5#6#7#8#9{%
1024 #1#2#3#4#5#6%
    Grab tenth argument and discard.
1025 \@texosquery@gobble
1026 }

@texosquery@firstsevenoften First seven of ten.
1027 \def\@texosquery@firstsevenoften#1#2#3#4#5#6#7#8#9{%
1028 #1#2#3#4#5#6#7%
    Grab tenth argument and discard.
1029 \@texosquery@gobble
1030 }

@texosquery@firsteightoften First eight of ten.
1031 \def\@texosquery@firsteightoften#1#2#3#4#5#6#7#8#9{%
1032 #1#2#3#4#5#6#7#8%
    Grab tenth argument and discard.
1033 \@texosquery@gobble
1034 }

@texosquery@firstnineoften  First nine of ten.
1035 \def\@texosquery@firstnineoften#1#2#3#4#5#6#7#8#9{%
1036 #1#2#3#4#5#6#7#8#9%
    Grab tenth argument and discard.
1037 \@texosquery@gobble
1038 }

@texosquery@alltenoften     All ten.
1039 \def\@texosquery@alltenoften#1#2#3#4#5#6#7#8#9{%
1040 #1#2#3#4#5#6#7#8#9%
1041 \@texosquery@firstofone
1042 }

```

Select last n of ten.

@texosquery@lasttwooften Last two of ten.

```
1043 \def\@texosquery@lasttwooften#1#2#3#4#5#6#7#8#9{%
1044 #9%
1045 \@texosquery@firstofone
1046 }
```

@texosquery@lastthreeoften Last three of ten.

```
1047 \def\@texosquery@lastthreeoften#1#2#3#4#5#6#7#8#9{%
1048 #8#9%
1049 \@texosquery@firstofone
1050 }
```

@texosquery@lastfouroften Last four of ten.

```
1051 \def\@texosquery@lastfouroften#1#2#3#4#5#6#7#8#9{%
1052 #7#8#9%
1053 \@texosquery@firstofone
1054 }
```

@texosquery@lastfiveoften Last five of ten.

```
1055 \def\@texosquery@lastfiveoften#1#2#3#4#5#6#7#8#9{%
1056 #6#7#8#9%
1057 \@texosquery@firstofone
1058 }
```

@texosquery@lastsixoften Last six of ten.

```
1059 \def\@texosquery@lastsixoften#1#2#3#4#5#6#7#8#9{%
1060 #5#6#7#8#9%
1061 \@texosquery@firstofone
1062 }
```

@texosquery@lastsevenoften Last seven of ten.

```
1063 \def\@texosquery@lastsevenoften#1#2#3#4#5#6#7#8#9{%
1064 #4#5#6#7#8#9%
1065 \@texosquery@firstofone
1066 }
```

@texosquery@lasteightoften Last eight of ten.

```
1067 \def\@texosquery@lasteightoften#1#2#3#4#5#6#7#8#9{%
1068 #3#4#5#6#7#8#9%
1069 \@texosquery@firstofone
1070 }
```

@texosquery@lastnineoften Last nine of ten.

```
1071 \def\@texosquery@lastnineoften#1#2#3#4#5#6#7#8#9{%
1072 #2#3#4#5#6#7#8#9%
1073 \@texosquery@firstofone
1074 }
```

`\@texosquery@fmtminus` Minus symbol for use in date-time patterns.
1075 `\def\@texosquery@fmtminus{\texosquerypatfmtminus}`

`\@texosquery@fmtplus` Plus symbol for use in date-time patterns. Omit by default.
1076 `\def\@texosquery@fmtplus{}`

`\@texosquery@fmtnsign` Plus or minus sign for use in date-time patterns.
1077 `\def\@texosquery@fmtnsign#1{%`
1078 `\ifx#1+\@texosquery@fmtplus\else\@texosquery@fmtminus\fi`
1079 `}`

`\@texosquery@atleastonedigit` At least one digit with leading zeros removed.
1080 `\def\@texosquery@atleastonedigit#1{%`
1081 `\ifnum#1<0`
1082 `\@texosquery@fmtminus\number-#1`
1083 `\else`
1084 `\number#1`
1085 `\fi`
1086 `}`

`\@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.
1087 `\def\@texosquery@atleastfourdigits#1{%`
1088 `\@texosquery@atleastfourdigits#1\@texosquery@end@atleastfourdigits`
1089 `}`

`\@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.
1090 `\def\@texosquery@atleastfourdigits#1#2\@texosquery@end@atleastfourdigits{%`
1091 `\@texosquery@fmtnsign{#1}%`
1092 `\ifnum#2<1000`
1093 `\@texosquery@lastfouroften#2%`
1094 `\else`
1095 `\number#2`
1096 `\fi`
1097 `}`

`\@texosquery@threedigitsexactly` Exactly three digits.
1098 `\def\@texosquery@threedigitsexactly#1{%`
1099 `\@texosquery@threedigits@exactly#1\@texosquery@threedigits@exactly`
1100 `}%`

`\@texosquery@threedigits@exactly` Exactly three digits.
1101 `\def\@texosquery@threedigits@exactly#1#2\@texosquery@threedigits@exactly{%`
1102 `\@texosquery@fmtnsign{#1}%`
1103 `\@texosquery@lastthreeoften#2%`
1104 `}%`

```

\@texosquery@twodigitsexactly Exactly two digits.
1105 \def\@texosquery@twodigitsexactly#1{%
1106 \@texosquery@twodigits@exactly#1\@texosquery@twodigits@exactly
1107 }%

\@texosquery@twodigits@exactly Exactly two digits.
1108 \def\@texosquery@twodigits@exactly#1#2\@texosquery@twodigits@exactly{%
1109 \@texosquery@fmtsign{#1}%
1110 \@texosquery@lasttwooften#2%
1111 }%

\@texosquery@fmt@dtf \@texosquery@fmt@dtf{<n>}{<designator>}
When formatting a date-time pattern \@texosquerydtf will temporarily be redefined to this command. This command indicates the format obtained by <n> instances of <designator>. For example, {2}{M} indicates the format MM. This command tests for \@texosqueryfmtpat<format>, which should take a single argument. If defined, that's used, otherwise use one of the numeric commands defined above. The locale package defines \@texosqueryfmtpatMMM and so on to use the locale's month names etc.
1112 \def\@texosquery@fmt@dtf#1#2{%
1113 \@texosquery@ifundef\@texosquery@fmt@#2}%
1114 {\@texosquery@warn{Unknown date-time pattern designator '#2'}}%
1115 {%
1116 \ifcase#1
1117 \or
1118 \@texosquery@ifundef\texosqueryfmtpat#2}%
1119 {%
1120 \expandafter\expandafter\expandafter
1121 \@texosquery@atleastonedigit
1122 \expandafter\expandafter\expandafter
1123 {\csname @texosquery@fmt@#2\endcsname}%
1124 }%
1125 {%
1126 \csname texosqueryfmtpat#2\expandafter\expandafter\expandafter\endcsname
1127 \expandafter\expandafter\expandafter
1128 {\csname @texosquery@fmt@#2\endcsname}%
1129 }%
1130 \or
1131 \@texosquery@ifundef\texosqueryfmtpat#2#2}%
1132 {%
1133 \expandafter\expandafter\expandafter
1134 \@texosquery@twodigitsexactly
1135 \expandafter\expandafter\expandafter
1136 {\csname @texosquery@fmt@#2\endcsname}%
1137 }%
1138 {%
1139 \csname texosqueryfmtpat#2#2\expandafter\expandafter\expandafter
1140 \endcsname \expandafter\expandafter\expandafter
1141 {\csname @texosquery@fmt@#2\endcsname}%
1142 }%

```

```

1143 \or
1144 \@texosquery@ifundef{texosqueryfmtpat#2#2#2}%
1145 {%
1146 \expandafter\expandafter\expandafter
1147 \@texosquery@threedigitsexactly
1148 \expandafter\expandafter\expandafter
1149 {\csname @texosquery@fmt@#2\endcsname}%
1150 }%
1151 {%
1152 \csname texosqueryfmtpat#2#2#2\expandafter\expandafter\expandafter
1153 \endcsname \expandafter\expandafter\expandafter
1154 {\csname @texosquery@fmt@#2\endcsname}%
1155 }%
1156 \else
1157 \@texosquery@ifundef{texosqueryfmtpat#2#2#2}%
1158 {%
1159 \expandafter\expandafter\expandafter
1160 \@texosquery@atleastfourdigits
1161 \expandafter\expandafter\expandafter
1162 {\csname @texosquery@fmt@#2\endcsname}%
1163 }%
1164 {%
1165 \csname texosqueryfmtpat#2#2#2\expandafter\expandafter\expandafter
1166 \endcsname \expandafter\expandafter\expandafter
1167 {\csname @texosquery@fmt@#2\endcsname}%
1168 }%
1169 \fi
1170 }%
1171 }

```

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.

```

1172 \def\texosqueryfmttimezonehr#1{%
1173 \ifnum#1<0\@texosquery@fmtminus
1174 \ifnum#1>-10 0\fi\number-#1
1175 \else
1176 +\ifnum#1<10 0\fi\number#1
1177 \fi
1178 }

```

`\texosqueryfmttimezonenumhr` Like the above, but don't zero-pad or prefix with plus sign.

```

1179 \def\texosqueryfmttimezonenumhr#1{%
1180 \ifnum#1<0\@texosquery@fmtminus
1181 \number-#1
1182 \else
1183 \number#1
1184 \fi
1185 }

```

```

\texosqueryfmttimezonemin
    1186 \def\texosqueryfmttimezonemin#1{%
    1187   \ifnum#1<10 0\fi\number#1
    1188 }

\@texosquery@firstoffour
    1189 \def\@texosquery@firstoffour#1#2#3#4{#1}

\texosquery@secondoffour
    1190 \def\texosquery@secondoffour#1#2#3#4{#2}

\@texosquery@thirdoffour
    1191 \def\@texosquery@thirdoffour#1#2#3#4{#3}

\texosquery@fourthoffour
    1192 \def\texosquery@fourthoffour#1#2#3#4{#4}

\texosqueryshorttimezone 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 -Z or --time-zones action.
    1193 \def\texosqueryshorttimezone#1{#1}

\texosqueryshortdstzone Maps id to short daylight saving time zone display name. This will need redefining as
    appropriate. The default simply expands to the ID followed by (DST).
    1194 \def\texosqueryshortdstzone#1{#1 (DST)}

\texosquerylongtimezone Maps id to long time zone display name. This will need redefining as appropriate. The
    default simply expands to the ID.
    1195 \def\texosquerylongtimezone#1{#1}

\texosquerylongdstzone 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).
    1196 \def\texosquerylongdstzone#1{#1 (DST)}

\texosquerytimesep
    1197 \def\texosquerytimesep{:}

\texosqueryfmtpatz Default time zone format for z designator.
    1198 \def\texosqueryfmtpatz#1{%
    1199   \expandafter\ifnum\@texosquery@fourthoffour#1=0
    1200     \expandafter\texosqueryshorttimezone\expandafter{\@texosquery@thirdoffour#1}%
    1201   \else
    1202     \expandafter\texosqueryshortdstzone\expandafter{\@texosquery@thirdoffour#1}%
    1203   \fi
    1204 }

```

`\texosqueryfmtpatzz` Default time zone format for zz designator.

```
1205 \def\texosqueryfmtpatzz#1{%  
1206 \expandafter\ifnum\texosquery@fourthoffour#1=0  
1207 \expandafter\texosqueryshorttimezone\expandafter{\texosquery@thirdoffour#1}%  
1208 \else  
1209 \expandafter\texosqueryshortdstzone\expandafter{\texosquery@thirdoffour#1}%  
1210 \fi  
1211 }
```

`\texosqueryfmtpatzzz` Default time zone format for zzz designator.

```
1212 \def\texosqueryfmtpatzzz#1{%  
1213 \expandafter\ifnum\texosquery@fourthoffour#1=0  
1214 \expandafter\texosquerylongtimezone\expandafter{\texosquery@thirdoffour#1}%  
1215 \else  
1216 \expandafter\texosquerylongdstzone\expandafter{\texosquery@thirdoffour#1}%  
1217 \fi  
1218 }
```

`\texosqueryfmtpatzzzz` Default time zone format for zzzz designator.

```
1219 \def\texosqueryfmtpatzzzz#1{%  
1220 \expandafter\ifnum\texosquery@fourthoffour#1=0  
1221 \expandafter\texosquerylongtimezone\expandafter{\texosquery@thirdoffour#1}%  
1222 \else  
1223 \expandafter\texosquerylongdstzone\expandafter{\texosquery@thirdoffour#1}%  
1224 \fi  
1225 }
```

`\texosqueryfmtpatZ` Default time zone format for Z designator.

```
1226 \def\texosqueryfmtpatZ#1{%  
1227 \expandafter\texosqueryfmttimezonehr\expandafter  
1228 {\texosquery@firstoffour#1}%  
1229 \expandafter\texosqueryfmttimezonemin\expandafter  
1230 {\texosquery@secondoffour#1}%  
1231 }
```

`\texosqueryfmtpatZZ` Default time zone format for ZZ designator.

```
1232 \def\texosqueryfmtpatZZ#1{%  
1233 \expandafter\texosqueryfmttimezonehr\expandafter  
1234 {\texosquery@firstoffour#1}%  
1235 \expandafter\texosqueryfmttimezonemin\expandafter  
1236 {\texosquery@secondoffour#1}%  
1237 }
```

`\texosqueryfmtpatZZZ` Default time zone format for ZZZ designator.

```
1238 \def\texosqueryfmtpatZZZ#1{%  
1239 \expandafter\texosqueryfmttimezonehr\expandafter  
1240 {\texosquery@firstoffour#1}%  
1241 \expandafter\texosqueryfmttimezonemin\expandafter  
1242 {\texosquery@secondoffour#1}%  
1243 }
```

`\texosqueryfmpatZZZZ` Default time zone format for ZZZZ designator.

```

1244 \def\texosqueryfmpatZZZZ#1{%
1245   \expandafter\texosqueryfmttimezonehr\expandafter
1246     {\@texosquery@firstoffour#1}%
1247   \expandafter\texosqueryfmttimezonemin\expandafter
1248     {\@texosquery@secondoffour#1}%
1249 }

```

`\texosqueryfmpatX` Default time zone format for X designator.

```

1250 \def\texosqueryfmpatX#1{%
1251   \expandafter\texosqueryfmttimezonehr\expandafter
1252     {\@texosquery@firstoffour#1}%
1253   \texosquerytimesep
1254   \expandafter\texosqueryfmttimezonemin\expandafter
1255     {\@texosquery@secondoffour#1}%
1256 }

```

`\texosqueryfmpatXX` Default time zone format for XX designator.

```

1257 \def\texosqueryfmpatXX#1{%
1258   \expandafter\texosqueryfmttimezonehr\expandafter
1259     {\@texosquery@firstoffour#1}%
1260   \texosquerytimesep
1261   \expandafter\texosqueryfmttimezonemin\expandafter
1262     {\@texosquery@secondoffour#1}%
1263 }

```

`\texosqueryfmpatXXX` Default time zone format for XXX designator.

```

1264 \def\texosqueryfmpatXXX#1{%
1265   \expandafter\texosqueryfmttimezonehr\expandafter
1266     {\@texosquery@firstoffour#1}%
1267   \texosquerytimesep
1268   \expandafter\texosqueryfmttimezonemin\expandafter
1269     {\@texosquery@secondoffour#1}%
1270 }

```

`\texosqueryfmpatXXXX` Default time zone format for XXXX designator.

```

1271 \def\texosqueryfmpatXXXX#1{%
1272   \expandafter\texosqueryfmttimezonehr\expandafter
1273     {\@texosquery@firstoffour#1}%
1274   \texosquerytimesep
1275   \expandafter\texosqueryfmttimezonemin\expandafter
1276     {\@texosquery@secondoffour#1}%
1277 }

```

`\texosqueryfmpata` Default am/pm designator for the a designator.

```

1278 \def\texosqueryfmpata#1{%
1279   \ifnum#1=0 AM\else PM\fi
1280 }

```


`\texosqueryfmtpataa` Default am/pm for the aa designator. Just make it the same as the a designator.
1281 `\def\texosqueryfmtpataa{\texosqueryfmtpata}`

`\texosqueryfmtpataaa` Default am/pm for the aaa designator. Just make it the same as the a designator.
1282 `\def\texosqueryfmtpataaa{\texosqueryfmtpata}`

`\texosqueryfmtpataaaa` Default am/pm for the aaaa designator. Just make it the same as the a designator.
1283 `\def\texosqueryfmtpataaaa{\texosqueryfmtpata}`

`\texosqueryfmtpatG` Default era designator for the G designator.
1284 `\def\texosqueryfmtpatG#1{%`
1285 `\ifnum#1=1 AD\else BC\fi`
1286 `}`

`\texosqueryfmtpatGG` Default era for the GG designator. Just make it the same as the G designator.
1287 `\def\texosqueryfmtpatGG{\texosqueryfmtpatG}`

`\texosqueryfmtpatGGG` Default era for the GGG designator. Just make it the same as the G designator.
1288 `\def\texosqueryfmtpatGGG{\texosqueryfmtpatG}`

`\texosqueryfmtpatGGGG` Default era for the GGGG designator. Just make it the same as the G designator.
1289 `\def\texosqueryfmtpatGGGG{\texosqueryfmtpatG}`

3.1.5 Applying Numeric Patterns

`\texosqueryfmtnumber` `\texosqueryfmtnumber{<pattern>}{<int>}{<frac>}{<mantissa>}`
General purpose low-level number formatting command. The first argument *<pattern>* is the pattern. The other arguments are unformatted integers and must be present and not exceed 10 digits each. The *<frac>* part must not start with a sign. The minus sign should go at the start of *<int>* for negative numbers. The plus sign is optional for positive *<int>* or *<mantissa>* and not permitted in *<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.

1290 `\def\texosqueryfmtnumber#1#2#3#4{%`
1291 `\begingroup`
1292 `\let\texosquerypatstr\texosquerypatfmtstr`
1293 `\let\texosquerypatquote\texosquerypatfmtquote`
1294 `\let\texosquerypatplusminus\texosquerypatfmt@plusminus`
1295 `\let\texosquerypatnum\texosquerypatfmt@num`
1296 `\let\texosquerypatsinum\texosquerypatfmt@sinum`
1297 `\let\texosquerypatdec\texosquerypatfmt@dec`
1298 `\let\texosquerypatprefixcurrency\texosquery@patfmt@prefixcurrency`
1299 `\let\texosquerypatprefixcurrency\texosquery@patfmt@prefixcurrency`
1300 `\let\texosquerypatsuffixcurrency\texosquery@patfmt@suffixcurrency`
1301 `\let\texosquerypatsuffixcurrency\texosquery@patfmt@suffixcurrency`

```

1302 \let\texosquerypatdigit\texosquerypatfmt@digit
1303 \let\texosquerypatdigitnozero\texosquerypatfmt@digitnozero
1304 \let\texosquerypatgroupsep\texosquerypatfmt@groupsep
1305 \let\texosquerypatprefixpercent\texosquery@patfmt@prefixpercent
1306 \let\texosquerypatsuffixpercent\texosquery@patfmt@suffixpercent
1307 \let\texosquerypatprefixpermill\texosquery@patfmt@prefixpermill
1308 \let\texosquerypatsuffixpermill\texosquery@patfmt@suffixpermill
1309 \let\texosquerypatminus\@texosquerypat@numfmt@sign
1310 \let\texosquerypatfmt@decsep\texosquerypatfmtdecsep

```

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 -0.

```

1311 \edef\@texosquery@sgn{%
1312   \ifnum#2=0
1313     \expandafter\ifnum#21<0 -\else+\fi
1314   \else
1315     \ifnum#2<0 -\else+\fi
1316   \fi
1317 }%

```

Allow for arguments passed as control sequences that expand to a number.

```

1318 \edef\@texosquery@int{\expandafter\@texosquery@paddigits
1319   \expandafter{\number#2}}%
1320 \let\@texosquery@si@int\@texosquery@int

```

Can't use \number here as we'll lose any leading zeros.

```

1321 \edef\@texosquery@frac{\expandafter\@texosquery@paddigits@trailing
1322   \expandafter{#3}}%
1323 \let\@texosquery@si@frac\@texosquery@frac
1324 \edef\@texosquery@mantissa{\expandafter\@texosquery@paddigits
1325   \expandafter{\number#4}}%

```

Is the mantissa non-zero?

```

1326 \ifnum#4=0\relax
1327 \else
1328   \expandafter\ifx\@texosquery@sgn-%
1329     \edef\@texosquery@int{\expandafter
1330       \@texosquery@paddigits@pos\expandafter{\number-#2}}%
1331   \else
1332     \edef\@texosquery@int{\@texosquery@paddigits@pos{#2}}%
1333   \fi

```

Shift.

```

1334 \ifnum#4<0
1335   \expandafter\@texosquery@neg@shift\expandafter{\number-#4}%
1336 \else
1337   \@texosquery@pos@shift{#4}%
1338 \fi
1339 \expandafter\ifx\@texosquery@sgn-%
1340   \edef\@texosquery@int{\expandafter\@texosquery@paddigits
1341     \expandafter{\number-\@texosquery@int}}%
1342 \else

```

```

1343     \edef\@texosquery@int{\expandafter\@texosquery@paddigits
1344       \expandafter{\number\@texosquery@int}}%
1345     \fi
1346     \edef\@texosquery@frac{\@texosquery@paddigits@trailing{\@texosquery@frac}}%
1347     \fi
1348     \edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}%
1349     \let\@texosquery@zerodigit\@texosquery@zerodigit@leading
1350     \expandafter\ifx\@texosquery@sgn-%
1351       \let\@texosquery@currentsign\texosquerypatfmtminus
1352     \else
1353       \let\@texosquery@currentsign\texosquerypatfmtplus
1354     \fi
1355     \@texosquery@digitindex=0\relax
1356     \@texosquery@digitfoundfalse
1357     #1%
1358   \endgroup
1359 }

```

\@texosquery@digitindex

```
1360 \newcount\@texosquery@digitindex
```

\if@texosquery@digitfound

```
1361 \newif\if@texosquery@digitfound
```

\@texosquery@pos@shift

```

1362 \def\@texosquery@pos@shift#1{%
1363   \ifcase#1
1364   \or
1365     \edef\@texosquery@int{%
1366       \expandafter\@texosquery@lastnineoften\@texosquery@int
1367       \expandafter\@texosquery@firstoften\@texosquery@frac}%
1368     \edef\@texosquery@frac{%
1369       \expandafter\@texosquery@lastnineoften\@texosquery@frac
1370     }%
1371   \or
1372     \edef\@texosquery@int{%
1373       \expandafter\@texosquery@lasteightoften\@texosquery@int
1374       \expandafter\@texosquery@firsttwooften\@texosquery@frac}%
1375     \edef\@texosquery@frac{%
1376       \expandafter\@texosquery@lasteightoften\@texosquery@frac
1377     }%
1378   \or
1379     \edef\@texosquery@int{%
1380       \expandafter\@texosquery@lastsevenoften\@texosquery@int
1381       \expandafter\@texosquery@firstthreeoften\@texosquery@frac}%
1382     \edef\@texosquery@frac{%
1383       \expandafter\@texosquery@lastsevenoften\@texosquery@frac
1384     }%
1385   \or

```

```

1386 \edef\@texosquery@int{%
1387 \expandafter\@texosquery@lastsixoften\@texosquery@int
1388 \expandafter\@texosquery@firstfouroften\@texosquery@frac}%
1389 \edef\@texosquery@frac{%
1390 \expandafter\@texosquery@lastsixoften\@texosquery@frac
1391 }%
1392 \or
1393 \edef\@texosquery@int{%
1394 \expandafter\@texosquery@lastfiveoften\@texosquery@int
1395 \expandafter\@texosquery@firstfiveoften\@texosquery@frac}%
1396 \edef\@texosquery@frac{%
1397 \expandafter\@texosquery@lastfiveoften\@texosquery@frac
1398 }%
1399 \or
1400 \edef\@texosquery@int{%
1401 \expandafter\@texosquery@lastfouroften\@texosquery@int
1402 \expandafter\@texosquery@firstsixoften\@texosquery@frac}%
1403 \edef\@texosquery@frac{%
1404 \expandafter\@texosquery@lastfouroften\@texosquery@frac
1405 }%
1406 \or
1407 \edef\@texosquery@int{%
1408 \expandafter\@texosquery@lastthreeoften\@texosquery@int
1409 \expandafter\@texosquery@firstsevenoften\@texosquery@frac}%
1410 \edef\@texosquery@frac{%
1411 \expandafter\@texosquery@lastthreeoften\@texosquery@frac
1412 }%
1413 \or
1414 \edef\@texosquery@int{%
1415 \expandafter\@texosquery@lasttwooften\@texosquery@int
1416 \expandafter\@texosquery@firsteightoften\@texosquery@frac}%
1417 \edef\@texosquery@frac{%
1418 \expandafter\@texosquery@lasttwooften\@texosquery@frac
1419 }%
1420 \or
1421 \edef\@texosquery@int{%
1422 \expandafter\@texosquery@tenthoften\@texosquery@int
1423 \expandafter\@texosquery@firstnineoften\@texosquery@frac}%
1424 \edef\@texosquery@frac{%
1425 \expandafter\@texosquery@tenthoften\@texosquery@frac
1426 }%
1427 \or
1428 \let\@texosquery@int\@texosquery@frac
1429 \edef\@texosquery@frac{0}%
1430 % \end{macrocode}
1431 %Anything larger will require scientific notation. Hopefully the
1432 %pattern supports this.
1433 % \begin{macrocode}
1434 \fi
1435 }

```

\@texosquery@neg@shift

```
1436 \def\@texosquery@neg@shift#1{%
1437   \ifcase#1
1438   \or
1439     \edef\@texosquery@frac{%
1440       \expandafter\@texosquery@lastoneoften\@texosquery@int
1441       \expandafter\@texosquery@firstnineoften\@texosquery@frac
1442     }%
1443     \edef\@texosquery@int{%
1444       \expandafter\@texosquery@firstnineoften\@texosquery@int
1445     }%
1446   \or
1447     \edef\@texosquery@frac{%
1448       \expandafter\@texosquery@lasttwooften\@texosquery@int
1449       \expandafter\@texosquery@firsteightoften\@texosquery@frac
1450     }%
1451     \edef\@texosquery@int{%
1452       \expandafter\@texosquery@firsteightoften\@texosquery@int
1453     }%
1454   \or
1455     \edef\@texosquery@frac{%
1456       \expandafter\@texosquery@lastthreeoften\@texosquery@int
1457       \expandafter\@texosquery@firstsevenoften\@texosquery@frac
1458     }%
1459     \edef\@texosquery@int{%
1460       \expandafter\@texosquery@firstsevenoften\@texosquery@int
1461     }%
1462   \or
1463     \edef\@texosquery@frac{%
1464       \expandafter\@texosquery@lastfouroften\@texosquery@int
1465       \expandafter\@texosquery@firstsixoften\@texosquery@frac
1466     }%
1467     \edef\@texosquery@int{%
1468       \expandafter\@texosquery@firstsixoften\@texosquery@int
1469     }%
1470   \or
1471     \edef\@texosquery@frac{%
1472       \expandafter\@texosquery@lastfiveoften\@texosquery@int
1473       \expandafter\@texosquery@firstfiveoften\@texosquery@frac
1474     }%
1475     \edef\@texosquery@int{%
1476       \expandafter\@texosquery@firstfiveoften\@texosquery@int
1477     }%
1478   \or
1479     \edef\@texosquery@frac{%
1480       \expandafter\@texosquery@lastsixoften\@texosquery@int
1481       \expandafter\@texosquery@firstfouroften\@texosquery@frac
1482     }%
1483     \edef\@texosquery@int{%
```

```

1484 \expandafter\@texosquery@firstfouroften\@texosquery@int
1485 }%
1486 \or
1487 \edef\@texosquery@frac{%
1488 \expandafter\@texosquery@lastsevenoften\@texosquery@int
1489 \expandafter\@texosquery@firstthreeoften\@texosquery@frac
1490 }%
1491 \edef\@texosquery@int{%
1492 \expandafter\@texosquery@firstthreeoften\@texosquery@int
1493 }%
1494 \or
1495 \edef\@texosquery@frac{%
1496 \expandafter\@texosquery@lasteightoften\@texosquery@int
1497 \expandafter\@texosquery@firsttwooften\@texosquery@frac
1498 }%
1499 \edef\@texosquery@int{%
1500 \expandafter\@texosquery@firsttwooften\@texosquery@int
1501 }%
1502 \or
1503 \edef\@texosquery@frac{%
1504 \expandafter\@texosquery@lastnineoften\@texosquery@int
1505 \expandafter\@texosquery@firstoften\@texosquery@frac
1506 }%
1507 \edef\@texosquery@int{%
1508 \expandafter\@texosquery@firstoften\@texosquery@int
1509 }%
1510 \or
1511 \edef\@texosquery@frac{\@texosquery@int\@texosquery@frac}%
1512 \edef\@texosquery@int{0}%
1513 % \end{macrocode}
1514 %Anything beyond this will require scientific notation. Hopefully the
1515 %pattern supports it.
1516 % \begin{macrocode}
1517 \fi
1518 }

```

\@texosquerypat@numfmt@sign

```

1519 \def\@texosquerypat@numfmt@sign{%
1520 \@texosquery@currentsign
1521 \let\@texosquery@currentsign\empty
1522 }

```

\texosquerypatfmtstr

```

1523 \def\texosquerypatfmtstr#1{#1}

```

\texosquerypatfmtquote

```

1524 \def\texosquerypatfmtquote{' }

```

\texosquerypatfmt@plusminus

```

1525 \def\texosquerypatfmt@plusminus#1#2{%
1526 \edef\texosquery@current{\expandafter\texosquery@gobble\texosquery@int}%
1527 \@texosquery@digitindex=0\relax
1528 \@texosquery@digitfoundfalse
1529 \expandafter\ifx\texosquery@sgn-%
1530 #2%
1531 \ifnum\texosquery@digitindex=10
1532 \else
1533 \@texosquery@invalidpattern{#2}%
1534 \fi
1535 \else
1536 #1%
1537 \ifnum\texosquery@digitindex=10
1538 \else
1539 \@texosquery@invalidpattern{#1}%
1540 \fi
1541 \fi
1542 }

```

\texosquerypatfmt@num

```

1543 \def\texosquerypatfmt@num#1{#1}

```

\texosquerypatfmtexp Exponent symbol. Change as appropriate.

```

1544 \def\texosquerypatfmtexp{E}

```

\texosquerypatfmt@sinum

```

1545 \def\texosquerypatfmt@sinum#1#2{%
1546 \let\texosquery@int\texosquery@si@int
1547 \let\texosquery@frac\texosquery@si@frac
1548 \let\texosquery@current\texosquery@int
1549 #1%
1550 \texosquerypatfmtexp
1551 {\let\texosquery@zerodigit\texosquery@zerodigit@leading
1552 \ifnum\texosquery@mantissa<0\relax
1553 \let\texosquery@currentsign\texosquerypatfmtminus
1554 \else
1555 \let\texosquery@currentsign\texosquerypatfmtplus
1556 \fi
1557 \edef\texosquery@current{\expandafter\texosquery@gobble\texosquery@mantissa}%
1558 \@texosquery@digitindex=0\relax
1559 \@texosquery@digitfoundfalse
1560 #2}}

```

\texosquerypatfmtdecsep Decimal separator. Change as appropriate.

```

1561 \def\texosquerypatfmtdecsep{.}

```

\texosquerypatfmtcurdecsep Currency decimal separator. Change as appropriate.

```

1562 \def\texosquerypatfmtcurdecsep{.}

```

\texosquerypatfmt@dec

```
1563 \def\texosquerypatfmt@dec#1#2{%
1564 \edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}%
1565 \@texosquery@digitindex=0\relax
1566 \@texosquery@digitfoundfalse
1567 \let\@texosquery@zerodigit\@texosquery@zerodigit@leading
1568 #1%
1569 \ifnum\@texosquery@digitindex=10
1570 \else
1571 \@texosquery@invalidpattern{#1}%
1572 \fi
1573 \texosquerypatfmt@decsep
1574 \let\@texosquery@current\@texosquery@frac
1575 \@texosquery@digitindex=0\relax
1576 \@texosquery@digitfoundfalse
1577 \let\@texosquery@zerodigit\@texosquery@zerodigit@trailing
1578 \let\@texosquery@currentsign\empty
1579 #2%
1580 \ifnum\@texosquery@digitindex=10
1581 \else
1582 \@texosquery@invalidpattern{#2}%
1583 \fi
1584 }
```

\texosquerypatfmtint

```
1585 \def\texosquerypatfmtint#1{%
1586 \edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}%
1587 \@texosquery@digitindex=0\relax
1588 \@texosquery@digitfoundfalse
1589 \let\@texosquery@zerodigit\@texosquery@zerodigit@leading
1590 #1%
1591 \ifnum\@texosquery@digitindex=10
1592 \else
1593 \@texosquery@invalidpattern{#1}%
1594 \fi
1595 }
```

\@texosquery@setpatdisplay

```
1596 \def\@texosquery@setpatdisplay{%
1597 \def\texosquerypatstr##1{'##1'}%
1598 \def\texosquerypatquote{' '%}
1599 \def\texosquerypatplusminus##1##2{##1;##2}%
1600 \def\texosquerypatnum##1{##1}%
1601 \def\texosquerypatsinum##1##2{##1E##2}%
1602 \def\texosquerypatdec##1##2{##1.##2}%
1603 \def\texosquerypatprefixcurrency##1##2{##2¤##1}%
1604 \def\texosquerypatprefixcurrency##1##2{##2¢##1}%
1605 \def\texosquerypatsuffixcurrency##1##2{##1¤##2}%
1606 \def\texosquerypatsuffixcurrency##1##2{##1¢##2}%

```



```

1607 \def\texosquerypatdigit{0}%
1608 \def\texosquerypatdigitnozero{\#}%
1609 \def\texosquerypatminus{-}%
1610 \def\texosquerypatgroupsep{,}%
1611 \def\texosquerypatprefixpercent##1##2{##2\%##1}%
1612 \def\texosquerypatsuffixpercent##1##2{##1\%##2}%
1613 \def\texosquerypatprefixpermill##1##2{##2\%##1}%
1614 \def\texosquerypatsuffixpermill##1##2{##1\%##2}%
1615 \def\texosquerypatfmt@decsep{.}%
1616 }

```

\texosquery@invalidpattern

```

1617 \def\texosquery@invalidpattern#1{%
1618 \begingroup
1619 \texosquery@setpatdisplay
1620 \texosquery@err{10 digit specifiers expected in
1621 numeric pattern #1. Found \number\texosquery@digitindex}%
1622 {Each integer element of a numeric pattern must have exactly
1623 10 digit specifiers (0 or \#)}%
1624 \endgroup
1625 }

```

\texosquerypatfmtcurrencysign Currency symbol. Redefine as appropriate.

```

1626 \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 Xe_{La}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.

```

1627 \ifx\textcurrency\undefined
1628 \def\texosquerypatfmticurrencysign{\$}
1629 \else
1630 \def\texosquerypatfmticurrencysign{\textcurrency}
1631 \fi

```

\texosquery@patfmt@prefixcurrency

```

1632 \def\texosquery@patfmt@prefixcurrency#1#2{%
1633 \let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
1634 #2\texosquerypatfmtcurrencysign#1%
1635 }

```

\texosquery@patfmt@prefixicurrency

```

1636 \def\texosquery@patfmt@prefixicurrency#1#2{%
1637 \let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep
1638 #2\texosquerypatfmticurrencysign#1%
1639 }

```

exosquery@patfmt@suffixcurrency

```
1640 \def\texosquery@patfmt@suffixcurrency#1#2{%  
1641 \let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep  
1642 #1\texosquerypatfmtcurrencysign#2%  
1643 }
```

osquery@patfmt@suffixcurrency

```
1644 \def\texosquery@patfmt@suffixcurrency#1#2{%  
1645 \let\texosquerypatfmt@decsep\texosquerypatfmtcurdecsep  
1646 #1\texosquerypatfmtcurrencysign#2%  
1647 }
```

\texosquerypatfmt@digit

```
1648 \def\texosquerypatfmt@digit{%  
1649 \advance\@texosquery@digitindex by 1\relax  
1650 \if\texosquery@digitfound  
1651 \else  
1652 \ifx\texosquery@currentsign\texosquerypatfmtminus  
1653 \texosquerypatfmtminus  
1654 \let\texosquery@currentsign\empty  
1655 \fi  
1656 \fi  
1657 \@texosquery@digitfoundtrue  
1658 \ifcase\@texosquery@digitindex  
1659 \or  
1660 \expandafter\texosquery@firstoften\texosquery@current  
1661 \or  
1662 \expandafter\texosquery@secondoften\texosquery@current  
1663 \or  
1664 \expandafter\texosquery@thirdoften\texosquery@current  
1665 \or  
1666 \expandafter\texosquery@fourthoften\texosquery@current  
1667 \or  
1668 \expandafter\texosquery@fifthoften\texosquery@current  
1669 \or  
1670 \expandafter\texosquery@sixthoften\texosquery@current  
1671 \or  
1672 \expandafter\texosquery@seventhoften\texosquery@current  
1673 \or  
1674 \expandafter\texosquery@eighthoften\texosquery@current  
1675 \or  
1676 \expandafter\texosquery@ninthoften\texosquery@current  
1677 \or  
1678 \expandafter\texosquery@tenthoften\texosquery@current  
1679 \fi  
1680 }
```

\texosquerypatfmt@digitnozero

```
1681 \def\texosquerypatfmt@digitnozero{%
```

```

1682 \advance\@texosquery@digitindex by 1\relax
1683 \edef\@texosquery@digit{%
1684   \ifcase\@texosquery@digitindex
1685     0%
1686   \or
1687     \expandafter\@texosquery@firstoften\@texosquery@current
1688   \or
1689     \expandafter\@texosquery@secondoften\@texosquery@current
1690   \or
1691     \expandafter\@texosquery@thirdoften\@texosquery@current
1692   \or
1693     \expandafter\@texosquery@fourthoften\@texosquery@current
1694   \or
1695     \expandafter\@texosquery@fifthoften\@texosquery@current
1696   \or
1697     \expandafter\@texosquery@sixthoften\@texosquery@current
1698   \or
1699     \expandafter\@texosquery@seventhoften\@texosquery@current
1700   \or
1701     \expandafter\@texosquery@eighthoften\@texosquery@current
1702   \or
1703     \expandafter\@texosquery@ninthoften\@texosquery@current
1704   \or
1705     \expandafter\@texosquery@tenthoften\@texosquery@current
1706   \else
1707     0%
1708 \fi
1709 }%
1710 \ifnum\@texosquery@digit=0\relax
1711   \@texosquery@zerodigit
1712 \else
1713   \if@texosquery@digitfound
1714   \else
1715     \ifx\@texosquery@currentsign\texosquerypatfmtminus
1716       \texosquerypatfmtminus
1717       \let\@texosquery@currentsign\empty
1718     \fi
1719   \fi
1720   \@texosquery@digitfoundtrue
1721   \@texosquery@digit
1722 \fi
1723 }

```

\@texosquery@zerodigit@leading

```

1724 \def\@texosquery@zerodigit@leading{%
1725 \edef\@texosquery@digit{%
1726   \ifcase\@texosquery@digitindex
1727     0%
1728   \or
1729     \expandafter\@texosquery@firstoften\@texosquery@current

```

```

1730 \or
1731 \expandafter\@texosquery@firsttwooften\@texosquery@current
1732 \or
1733 \expandafter\@texosquery@firstthreeoften\@texosquery@current
1734 \or
1735 \expandafter\@texosquery@firstfouroften\@texosquery@current
1736 \or
1737 \expandafter\@texosquery@firstfiveoften\@texosquery@current
1738 \or
1739 \expandafter\@texosquery@firstsixoften\@texosquery@current
1740 \or
1741 \expandafter\@texosquery@firstsevenoften\@texosquery@current
1742 \or
1743 \expandafter\@texosquery@firsteightoften\@texosquery@current
1744 \or
1745 \expandafter\@texosquery@firstnineoften\@texosquery@current
1746 \or
1747 \@texosquery@current
1748 \else
1749 0%
1750 \fi
1751 }%
1752 \ifnum\@texosquery@digit>0\relax
1753 \if@texosquery@digitfound
1754 \else
1755 \ifx\texosquerypatminus\texosquerypatfmtminus
1756 \texosquerypatfmtminus
1757 \fi
1758 \fi
1759 \@texosquery@digitfoundtrue
1760 0%
1761 \fi
1762 }

```

\@texosquery@zerodigit@trailing

```

1763 \def\@texosquery@zerodigit@trailing{%
1764 \edef\@texosquery@digit{%
1765 \ifcase\@texosquery@digitindex
1766 0%
1767 \or
1768 \@texosquery@current
1769 \or
1770 \expandafter\@texosquery@lastnineoften\@texosquery@current
1771 \or
1772 \expandafter\@texosquery@lasteightoften\@texosquery@current
1773 \or
1774 \expandafter\@texosquery@lastsevenoften\@texosquery@current
1775 \or
1776 \expandafter\@texosquery@lastsixoften\@texosquery@current
1777 \or

```

```

1778     \expandafter\@texosquery@lastfiveoften\@texosquery@current
1779     \or
1780     \expandafter\@texosquery@lastfouroften\@texosquery@current
1781     \or
1782     \expandafter\@texosquery@lastthreeoften\@texosquery@current
1783     \or
1784     \expandafter\@texosquery@lasttwooften\@texosquery@current
1785     \or
1786     \expandafter\@texosquery@tenthoften\@texosquery@current
1787     \else
1788     0%
1789     \fi
1790 }%
1791 \ifnum\@texosquery@digit>0\relax
1792 \if@texosquery@digitfound
1793 \else
1794     \ifx\texosquerypatminus\texosquerypatfmtminus
1795     \texosquerypatfmtminus
1796     \fi
1797     \fi
1798     \@texosquery@digitfoundtrue
1799     0%
1800 \fi
1801 }

\texosquerypatfmtminus Formatted minus sign. Redefined as appropriate.
1802 \def\texosquerypatfmtminus{\ifmode-\else$-\fi}

\texosquerypatfmtplus Formatted plus sign. Redefined as appropriate.
1803 \def\texosquerypatfmtplus{\ifmode+\else$+\fi}

\texosquerypatfmtgroupsep
1804 \def\texosquerypatfmtgroupsep{,}

\texosquerypatfmt@groupsep
1805 \def\texosquerypatfmt@groupsep{%
1806 \if@texosquery@digitfound\texosquerypatfmtgroupsep\fi}

\texosquerypatfmtpercentsign Percent sign used in number format.
1807 \def\texosquerypatfmtpercentsign{\%}

\texosquerypatfmtpermillsign Per-mill sign used in number format. Redefine as appropriate.
1808 \def\texosquerypatfmtpermillsign{\m}

\@texosquery@adjust@per
1809 \def\@texosquery@adjust@per#1{%
1810 \@texosquery@pos@shift{#1}%
1811 \edef\@texosquery@int{\expandafter\@texosquery@paddigits
1812 \expandafter{\number\@texosquery@int}}%

```

```

1813 \edef\@texosquery@frac{\@texosquery@paddigits@trailing{\@texosquery@frac}}%
1814 \edef\@texosquery@current{\expandafter\@texosquery@gobble\@texosquery@int}%
1815 }

```

`@texosquery@patfmt@prefixpercent`

```

1816 \def\@texosquery@patfmt@prefixpercent#1#2{%
1817 \@texosquery@adjust@per{2}%
1818 #2\@texosquery@patfmt@percentsign#1%
1819 }

```

`@texosquery@patfmt@suffixpercent`

```

1820 \def\@texosquery@patfmt@suffixpercent#1#2{%
1821 \@texosquery@adjust@per{2}%
1822 #1\@texosquery@patfmt@percentsign#2%
1823 }

```

`@texosquery@patfmt@prefixpermill`

```

1824 \def\@texosquery@patfmt@prefixpermill#1#2{%
1825 \@texosquery@adjust@per{3}%
1826 #2\@texosquery@patfmt@permillsign#1%
1827 }

```

`@texosquery@patfmt@suffixpermill`

```

1828 \def\@texosquery@patfmt@suffixpermill#1#2{%
1829 \@texosquery@adjust@per{3}%
1830 #1\@texosquery@patfmt@permillsign#2%
1831 }

```

All done. Restore the category code of @:

```

1832 \@texosquery@restore@at

```

3.2 L^AT_EX Code

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

```

1833 \NeedsTeXFormat{LaTeX2e}
1834 \ProvidesPackage{texosquery}[2017/03/23 v1.2 (NLCT)]

```

Load `texosquery.tex`:

```

1835 \input{texosquery}

```

3.3 Configuration File (`texosquery.cfg`)

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

```

1836 %If this configuration file is added to TeX's path, it can
1837 %be used to set up the texosquery defaults for the installation.
1838
1839 %Default application (must be installed on the operating system's

```

```

1840 %path). Change as appropriate. Available options:
1841 % * texosquery-jre8 (at least Java 8 required)
1842 % * texosquery (at least Java 7 required)
1843 % * texosquery-jre5 (at least Java 5 required)
1844 % (bash users need to check that the .sh extension has been removed
1845 % from the bash scripts, or add the extension to the invoker name.)
1846 \def\TeXOSInvokerName{texosquery}
1847
1848 % If the invoker name given above is on the restricted list,
1849 % allow it to be run in restricted mode:
1850 %\TeXOSQueryAllowRestricted

```

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

```

1851 jarpath='kpsewhich --programe=texosquery --format=texmfscripts texosquery.jar'
1852 java -jar "$jarpath" "$@"

```

3.4.2 texosquery-jre8.sh

```

1853 jarpath='kpsewhich --programe=texosquery --format=texmfscripts texosquery-jre8.jar'
1854 java -Djava.locale.providers=CLDR,JRE -jar "$jarpath" "$@"

```

3.4.3 texosquery-jre5.sh

```

1855 jarpath='kpsewhich --programe=texosquery --format=texmfscripts texosquery-jre5.jar'
1856 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

```

1857 @ECHO OFF
1858 FOR /F %%I IN ('kpsewhich --programe=texosquery --format=texmfscripts texosquery.jar') DO SET J=%%I
1859 java -jar "%JARPAT%" %*

```

3.5.2 texosquery-jre8.bat

```

1860 @ECHO OFF
1861 FOR /F %%I IN ('kpsewhich --programe=texosquery --format=texmfscripts texosquery-jre8.jar') DO SET J=%%I
1862 java -Djava.locale.providers=CLDR,JRE -jar "%JARPAT%" %*

```

3.5.3 texosquery-jre5.bat

```
1863 @ECHO OFF
```

```
1864 FOR /F %%I IN ('kpswhich --programe=texosquery --format=txmfscripts texosquery-jre5.jar') DO :
```

```
1865 java -jar "%JARPAT%" %*
```


Abbreviations

ASCII American Standard Code for Information Interchange

BCP Best Common Practice

CLDR Unicode Consortium's Common Locale Data Repository

CTAN Comprehensive T_EX 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

Change History

1.0	General: Initial release	40	\@texosquery@atleastonedigit: new	83
1.1	\TeXOSQueryDirName: new	67	\@texosquery@digitindex: new	91
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	\TeXOSQueryNow: changed catcode of D to 12	58	\@texosquery@eighthoften: new	80
	\ifTeXOSQueryDryRun: dry run mode only false by default if used in unrestricted mode	42	\@texosquery@enablesshortcs: new	50
1.2	@texosquery@alltenoften: new	81	\@texosquery@err: new	41
	@texosquery@firsteightoften: new	81	\@texosquery@fifthoften: new	79
	@texosquery@firstfiveoften: new	81	\@texosquery@filelist: new	58
	@texosquery@firstfouroften: new	81	\@texosquery@filterfilelist: new	62
	@texosquery@firstnineoften: new	81	\@texosquery@firstofffour: new	86
	@texosquery@firstsevenoften: new	81	\@texosquery@firstofone: new	44
	@texosquery@firstsixoften: new	81	\@texosquery@firstoften: new	79
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