
SwigLib
basics

Contents

1 Introduction

The SwigLib project is related to LuaTEX and aims as adding portable library support to this TEX engine without too much fixed binding. The project does not provide Lua code, unless really needed, because it assumes that macro packages have different demands. It also fits in the spirit of TEX and Lua to minimize the core components.

The technical setup is by Luigi Scarso and documentation about how to build the libraries is (will be) part of the SwigLib repository. Testing happens with help of the ConTEXt (garden) infrastructure. This short document only deals with usage in ConTEXt but also covers rather plain usage.

The set of supported libraries in the SwigLib subversion trunk is just a subset of what is possible and we don't see it as the responsibility of the LuaTEX team to support all that is around. The subset also serves as an example for other libraries. We also don't ship wrappers (other that those used in ConTEXt) as this is delegated to the macro packages.

2 Inside CONTEXT

The recommended way to load a library in ConTEXt is by using the `swiglib` function. This function lives in the global namespace.

```
local gm = swiglib("gmwand.core")
```

After this call you have the functionality available in the `gm` namespace. This way of loading makes ConTEXt aware that such a library has been loading and it will report the loaded libraries as part of the statistics.

If you want, you can use the more ignorant `require` instead but in that case you need to be more explicit.

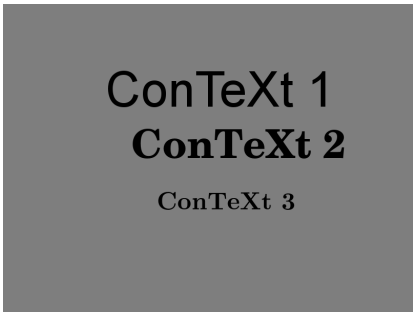
```
local gm = require("swiglib.gmwand.core")
```

Here is an example of using such a library (by Luigi):

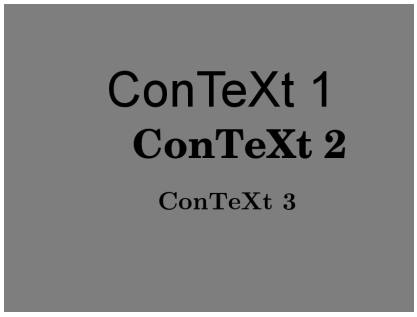
```
\startluacode
local gm       = swiglib("gmwand.core")
```

```
local findfile = resolvers.findfile

if not gm then
    -- no big deal for this manual as we use a system in flux
    logs.report("swiglib","no swiglib libraries loaded")
    return
end

gm.InitializeMagick(".")

local magick_wand  = gm.NewMagickWand()
local drawing_wand = gm.NewDrawingWand()
local pixel_wand   = gm.NewPixelWand();

gm.MagickSetSize(magick_wand,800,600)
gm.MagickReadImage(magick_wand,"xc:gray")

gm.DrawPushGraphicContext(drawing_wand)

gm.DrawSetFillColor(drawing_wand,pixel_wand)

gm.DrawSetFont(drawing_wand,findfile("dejavuserifbold.ttf"))
gm.DrawSetFontSize(drawing_wand,96)
gm.DrawAnnotation(drawing_wand,200,200,"ConTeXt 1")

gm.DrawSetFont(drawing_wand,findfile("texgyreschola-bold.otf"))
gm.DrawSetFontSize(drawing_wand,78)
gm.DrawAnnotation(drawing_wand,250,300,"ConTeXt 2")

gm.DrawSetFont(drawing_wand,findfile("lmroman10-bold.otf"))
gm.DrawSetFontSize(drawing_wand,48)
gm.DrawAnnotation(drawing_wand,300,400,"ConTeXt 3")

gm.DrawPopGraphicContext(drawing_wand)

gm.MagickDrawImage(magick_wand,drawing_wand)

gm.MagickWriteImages(magick_wand,"./swiglib-mkiv-gm-1.png",1)
gm.MagickWriteImages(magick_wand,"./swiglib-mkiv-gm-1.jpg",1)
gm.MagickWriteImages(magick_wand,"./swiglib-mkiv-gm-1.pdf",1)

gm.DestroyDrawingWand(drawing_wand)
gm.DestroyPixelWand(pixel_wand)
gm.DestroyMagickWand(magick_wand)
\stopluacode
```

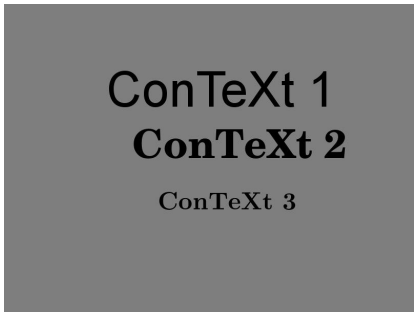
In practice you will probably stay away from manipulating text this way, but it illustrates that you can use the regular ConTEXt helpers to locate files.



png



pdf



jpg

You'd better make sure to use unique filenames for such graphics. Of course a more clever mechanism would only run time consuming tasks once for each iteration of a document.

3 Outside CONTEXT

In the ConTEXt distribution we ship some generic macros and code for usage in plain TEX but there is no reason why they shouldn't work in other macro packages as well. A rather plain example is this:

```
\input luatex-swiglib.tex

\directlua {
    dofile("luatex-swiglib-test.lua")
}

\pdfximage {luatex-swiglib-test.jpg} \pdfrefximage\pdflastximage

\end
```

Assuming that you made the `luatex-plain` format, such a file can be processed using:

```
luatex --fmt=luatex=plain luatex-swiglib-test.tex
```

The loaded Lua file `luatex-swiglib-test.lua` liike like this:

```
local gm = swiglib("gmwand.core")

gm.InitializeMagick(".")

local magick_wand  = gm.NewMagickWand()
local drawing_wand = gm.NewDrawingWand()

gm.MagickSetSize(magick_wand,800,600)
gm.MagickReadImage(magick_wand,"xc:red")
```

```
gm.DrawPushGraphicContext(drawing_wand)
gm.DrawSetFillColor(drawing_wand,gm.NewPixelWand())
gm.DrawPopGraphicContext(drawing_wand)
gm.MagickDrawImage(magick_wand,drawing_wand)
gm.MagickWriteImages(magick_wand,"./luatex-swiglib-test.jpg",1)

gm.DestroyDrawingWand(drawing_wand)
gm.DestroyMagickWand(magick_wand)
```

Instead of loading a library with the `swiglib` function, you can also use `require`:

```
local gm = require("swiglib.gmwand.core")
```

Watch the explicit `swiglib` reference. Both methods are equivalent.

4 The libraries

Most libraries are small but some can be rather large and have additional files. This is why we keep them separated. On my system they are collected in the platform binary tree:

```
e:/tex-context/tex/texmf-mswin/bin/lib/luatex/lua/swiglib/gmwand
e:/tex-context/tex/texmf-mswin/bin/lib/luatex/lua/swiglib/mysql
e:/tex-context/tex/texmf-mswin/bin/lib/luatex/lua/swiglib/....
```

One can modulate on this:

```
...tex/texmf-mswin/bin/lib/luatex/lua/swiglib/mysql/core.dll
...tex/texmf-mswin/bin/lib/luajittex/lua/swiglib/mysql/core.dll
...tex/texmf-mswin/bin/lib/luatex/context/lua/swiglib/mysql/core.dll
```

are all valid. When versions are used you can provide an additional argument to the `swiglib` loader:

```
tex/texmf-mswin/bin/lib/luatex/lua/swiglib/mysql/5.6/core.dll
```

This works with:

```
local mysql = swiglib("mysql.core","5.6")
```

as well as:

```
local mysql = swiglib("mysql.core")
```

It is hard to predict how operating systems look up libraries and especially nested loads, but as long as the root of the `swiglib` path is known to the file search routine. We've kept the main conditions for success simple: the core library is called `core.dll` or `core.so`. Each library has an (automatically called) initialize function named `luaopen_core`. There is no reason why (sym)links from the `swiglib` path to someplace else shouldn't work.

In `texmfcnf.lua` you will find an entry like:

```
CLUAINPUTS = ".;$SELFAUTOLOC/lib/{$engine/context,$engine}/lua//"
```

Which in practice boils down to a search for `luatex` or `luajittex` specific libraries. When both binaries are compatible and there are no `luajittex` binaries, the regular `luatex` libraries will be used.

The `swiglib` loader function mentioned in previous sections load libraries in a special way: it changes dir to the specific path and then loads the library in the usual way. After that it returns to the path where it started out. After this, when the library needs additional libraries (and for instance graphicmagick needs a lot of them) it will first look on its own path (which is remembered).

The MkIV lookups are somewhat more robust in the sense that they first check for matches on engine specific paths. This comes in handy when the search patterns are too generic and one can match on for instance `luajittex` while `luatex` is used.

5 Compiling

Normally you will take the binaries from the ConTEXt garden but if you ever want to compile yourself, it's not that hard to do. For linux you need to install the compilers:

```
apt-get install gcc
apt-get install g++
```

Then you need to make sure you have a copy of the LuaTEX sources (you need to use your own paths):

```
cd /data
svn checkout https://foundry.supelec.fr/svn/luatex/trunk luatex-trunk
```

or update with:

```
cd /data
svn update luatex-trunk
```

and then export with:

```
cd /data
svn export --force /data/luatex-trunk /data/luatex-trunk-export
```

We go to the export directory and compile LuaTEX:

```
cd /data/luatex-trunk-export
./build.sh --jit
```

The binaries are already stripped (i.e. symbols get removed) which makes them much smaller.

```
cp data/luatex/luatex-trunk-export/build/texk/web2c/luatex \
    /data/context/tex/texmf-linux-64/bin
cp data/luatex/luatex-trunk-export/build/texk/web2c/luajittex \
    /data/context/tex/texmf-linux-64/bin
```

The native windows binaries are kept very up-to-date but you can cross compile your own if needed. You need to make sure that the cross compiler is installed.

```
apt-get install gcc-mingw-w64-x86-64
apt-get install g++-mingw-w64-x86-64
apt-get install binutils-mingw-w64
```

Given that you have exported the sources you can now run:

```
./build.sh --jit --mingw64
```

Of course we assume a recent linux installation here but on Windows you can the 'linux subsystem for Windows' too. The files can be found in a dedicated build directory:

```
cp data/luatex/luatex-trunk-export/build-windows64/texk/web2c/luatex.exe \
    /data/context/tex/tex-context/tex/texmf-linux-64/bin
cp data/luatex/luatex-trunk-export/build-windows64/texk/web2c/luajittex.exe \
    /data/context/tex/tex-context/tex/texmf-linux-64/bin
```

You need to wipe out old traces of binaries, because these can confuse the `mtxrun` stub that checks for them, so we do:

```
rm /data/context/tex/tex-context/tex/texmf-win64/bin/luajittex.dll
rm /data/context/tex/tex-context/tex/texmf-win64/bin/luatex.dll
```

The libraries are compiled in a similar way. This time we get the sources from another repository:

```
cd /data
svn checkout https://foundry.supelec.fr/svn/swiglib/trunk swiglib-trunk
```

or update with:

```
cd /data
svn update swiglib-trunk
```

and then export with:

```
cd /data
svn export --force /data/swiglib-trunk /data/swiglib-trunk-export
```

This time you need to be quite explicit with respect to the libraries you want to compile :

```
cd /data/swiglib-trunk-export
```

```
./build.sh --library=helpers --version=1.0.3
```

You can save yourself some work with:

```
mtxrun --script --svnroot=/data/swiglib-trunk-export --make
```

which will create a shell script `swiglib-make.sh` with commands that make all available libraries. After running that script you can update your tree with:

```
mtxrun --script --svnroot=/data/swiglib-trunk-export --update
```

For Windows a similar route is followed but first you need to make sure that your binaries are able to deal with shared libraries:

```
./build-shared.sh --jit --mingw64 --shared
```

Compiling is done as with linux but you need to provide the `--mingw64` flag. Copying is done with:

```
cp /data/luatex/luatex-trunk-export/build-windows64-shared\
    /texk/web2c/.libs/luatex.exe /data/context/tex/texmf-win64/bin
cp /data/luatex/luatex-trunk-export/build-windows64-shared\
    /texk/web2c/.libs/luajittex.exe /data/context/tex/texmf-win64/bin

cp /data/luatex/luatex-trunk-export/build-windows64-shared\
    /libs/lua*/.libs/texlua*dll /data/context/tex/texmf-win64/bin
cp /data/luatex/luatex-trunk-export/build-windows64-shared\
    /libs/luajit/.libs/texluajit*dll /data/context/tex/texmf-win64/bin
cp /data/luatex/luatex-trunk-export/build-windows64-shared\
    /texk/kpathsea/.libs/libkpathsea*dll /data/context/tex/texmf-win64/bin

rm /data/context/tex/texmf-win64/bin/luajittex.dll
rm /data/context/tex/texmf-win64/bin/luatex.dll
```

If you're recompiling `--make` can save you some time. If your machine can handle it `--parallel` can speed up the process.

6 Colofon

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comment the swiglib infrastructure is implemented by Luigi Scarso