

Graphics

Hans Hagen

Introduction

This manual is about integrating graphics your document. Doing this is not really that complex so this manual will be short. Because graphic inclusion is related to the backend some options will discussed. It's typical one of these manuals that can grow over time.

Inclusion

The command to include an image is:

```
\externalfigure [1...] [2...] [3...,...,...]
                OPT          OPT
1  FILE
2  NAME
3  inherits: \setupexternalfigure
```

and its related settings are:

```
\setupexternalfigure [1...,...] [2...,...,...]
                    OPT
1  NAME
2  width           = DIMENSION
   height          = DIMENSION
   label           = NAME
   page            = NUMBER
   object          = yes no
   prefix          = TEXT
   method          = pdf mps jpg png jp2 jbig svg eps gif tif mov buffer tex cld auto
   controls        = yes no
   preview         = yes no
   mask            = none
   resolution      = NUMBER
   color           = COLOR
   arguments       = TEXT
   repeat          = yes no
   factor          = fit broad max auto default
   hfactor         = fit broad max auto default
   wfactor         = fit broad max auto default
   maxwidth        = DIMENSION
   maxheight       = DIMENSION
   equalwidth      = DIMENSION
   equalheight     = DIMENSION
   scale           = NUMBER
   xscale          = NUMBER
   yscale          = NUMBER
   s               = NUMBER
   sx              = NUMBER
   sy              = NUMBER
   lines           = NUMBER
   location        = local global default
   directory       = PATH
   option          = test frame empty
   foregroundcolor = COLOR
```

```

reset           = yes no
background      = color foreground NAME
frame          = on off
backgroundcolor = COLOR
xmax           = NUMBER
ymax           = NUMBER
frames         = on off
interaction     = yes all none reference layer bookmark
bodyfont       = DIMENSION
comment        = COMMAND TEXT
size           = none media crop trim art
cache          = PATH
resources      = PATH
display        = FILE
conversion     = TEXT
order          = LIST
crossreference  = yes no NUMBER
transform      = auto NUMBER
userpassword   = TEXT
ownerpassword  = TEXT

```

So you can say:

```
\externalfigure[cow.pdf][width=4cm]
```

The suffix is optional, which means that this will also work:

```
\externalfigure[cow][width=4cm]
```

Defining

todo

```

\useexternalfigure [1...] [2...] [3...] [4...=...]
                  OPT      OPT
1  NAME
2  FILE
3  NAME
4  inherits: \setupexternalfigure

```

```

\defineexternalfigure [1...] [2...] [3...=...]
                    OPT      OPT
1  NAME
2  NAME
3  inherits: \setupexternalfigure

```

```

\registerexternalfigure [1...] [2...] [3...=...]
                      OPT      OPT
1  FILE
2  NAME
3  inherits: \setupexternalfigure

```

Analyzing

todo

```
\getfiguredimensions [...1.] [...2...OPT...]
1 FILE
2 inherits: \setupexternalfigure
```

```
\figurefilename
```

```
\figurefilepath
```

```
\figurefiletype
```

```
\figurefullname
```

```
\figureheight
```

```
\figurenaturalheight
```

```
\figurenaturalwidth
```

```
\figuresymbol [...1.] [...2...OPT...]
1 FILE NAME
2 inherits: \externalfigure
```

```
\figurewidth
```

```
\noffigurepages
```

Collections

todo

```
\externalfigurecollectionmaxheight {...}
```

```
* NAME
```

```
\externalfigurecollectionmaxwidth {...}
```

```
* NAME
```

```
\externalfigurecollectionminheight {...}
```

```
* NAME
```

```
\externalfigurecollectionminwidth {...}
```

```
* NAME
```

```
\externalfigurecollectionparameter {...} {...}
```

```
1 NAME
```

```
2 KEY
```

```
\startexternalfigurecollection [...] ... \stopexternalfigurecollection
```

```
* NAME
```

Conversion

todo

Figure databases

todo

```
\usefigurebase [...]
```

```
* reset FILE
```

Overlays

todo

```
\overlayfigure {...}
```

```
* FILE
```

```
\pagefigure [...]1 [...,2...]OPT
```

```
1 FILE
```

```
2 offset = default overlay none DIMENSION
```

Scaling

Images are normally scaled proportionally but if needed you can give an explicit height and width. The `\scale` command shares this property and can be used to scale in the same way as `\externalfigure`. I will illustrate this with an example.

You can define your own bitmaps, like I did with the cover of this manual:

```
\startluacode
```

```
local min, max, random = math.min, math.max, math.random
```

```
-- kind of self-explaining:
```

```
local xsize = 210
```

```
local ysize = 297
```

```
local colordepth = 1
```

```
local usemask = true
```

```
local colorspace = "rgb"
```

```
-- initialization:
```

```
local bitmap = graphics.bitmaps.new(xsize,ysize,colorspace,colordepth,usemask)
```

```
-- filling the bitmap:
```

```
local data = bitmap.data
```

```
local mask = bitmap.mask
```

```
local minmask = 100
```

```
local maxmask = 200
```

```
for i=1,ysize do
```

```
  local d = data[i]
```

```
  local m = mask[i]
```

```
  for j=1,xsize do
```

```
    d[j] = { i, max(i,j), j, min(i,j) }
```

```
    m[j] = random(minmask,maxmask)
```

```
  end
```

```
end
```

```
-- flushing the lot:
```

```
graphics.bitmaps.tocontext(bitmap)
```

```
\stoptluacode
```

The actual inclusion of this image happened with:

```
\scale
  [width=\paperwidth]
  {\getbuffer[image]}
```

The backend

Traditionally \TeX sees an image as just a box with dimensions and in Lua \TeX it is actually a special kind of rule that carries information about what to inject in the final (pdf) file. In regular Lua \TeX the core formats pdf, png, jpg and jp2 are dealt with by the backend but in Con \TeX t we can use Lua instead. We might default to that method at some point but for now you need to enable that explicitly:

```
\enabledirectrive[graphics.pdf.uselua]
\enabledirectrive[graphics.jpg.uselua]
\enabledirectrive[graphics.jp2.uselua]
\enabledirectrive[graphics.png.uselua]
```

All four can be enabled with:

```
\enabledirectrive[graphics.uselua]
```

Performance-wise only png inclusion can be less efficient, but only when you use interlaced images or large images with masks. It makes no real sense in a professional workflow to use the (larger) interlaced images, and masks are seldom used at high resolutions, so in practice one will not really notice loss of performance.

The advantage of this method is that we can provide more options, intercept bad images that make the backend abort and lessen the dependency on libraries.