

The luamplib package

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Abstract

Package to have metapost code typeset directly in a document with LuaTeX.

1 Documentation

This packages aims at providing a simple way to typeset directly metapost code in a document with LuaTeX. LuaTeX is built with the lua mplib library, that runs metapost code. This package is basically a wrapper (in Lua) for the Lua mplib functions and some TeX functions to have the output of the mplib functions in the pdf.

The package needs to be in PDF mode in order to output something, as PDF specials are not supported by the DVI format and tools.

The metapost figures are put in a TeX hbox with dimensions adjusted to the metapost code.

The code is from the luatex-mplib.lua and luatex-mplib.tex files from ConTeXt, they have been adapted to XeTeX and Plain by Elie Roux and Philipp Gesang, new functionalities have been added by Kim Dohyun. The changes are:

- a XeTeX environment
- all TeX macros start by mplib
- use of luatexbase for errors, warnings and declaration
- possibility to use btex . . . etex to typeset TeX code. textext() is a more versatile macro equivalent to TEX() from TEX.mp. TEX() is also allowed unless TEX.mp is loaded, which should be always avoided.

Using this package is easy: in Plain, type your metapost code between the macros mplibcode and endmplibcode, and in XeTeX in the mplibcode environment.

There are (basically) two formats for metapost: *plain* and *metafun*. By default, the *plain* format is used, but you can set the format to be used by future figures at any time using \mplibsetformat{<format name>}.

2 Implementation

2.1 Lua module

Use the `luamplib` namespace, since `mplib` is for the metapost library itself. ConT_EXt uses metapost.

```
1
2 luamplib          = luamplib or { }
3
```

Identification.

```
4
5 local luamplib    = luamplib
6 luamplib.showlog  = luamplib.showlog or false
7 luamplib.lastlog  = ""
8
9 local err, warn, info, log = luatexbase.provides_module({
10   name           = "luamplib",
11   version        = 2.1,
12   date           = "2013/12/19",
13   description    = "Lua package to typeset Metapost with LuaTeX's MPLib.",
14 })
15
16
```

This module is a stripped down version of libraries that are used by ConT_EXt. Provide a few “shortcuts” expected by the imported code.

```
17
18 local format, abs = string.format, math.abs
19
20 local stringgsub   = string.gsub
21 local stringfind   = string.find
22 local stringmatch  = string.match
23 local stringgmatch = string.gmatch
24 local tableconcat  = table.concat
25 local teksprint    = tex.sprint
26
27 local mplib = require ('mplib')
28 local kpse  = require ('kpse')
29
30 local file = file
31 if not file then
32
```

This is a small trick for L^AT_EX. In L^AT_EX we read the metapost code line by line, but it needs to be passed entirely to `process()`, so we simply add the lines in `data` and at the end we call `process(data)`.

A few helpers, taken from `l-file.lua`.

```
33
```

```

34 file = { }
35
36 function file.replacesuffix(filename, suffix)
37     return (stringgsub(filename,"%.[%a%d]+$","", "")) .. "." .. suffix
38 end
39
40 function file.stripsuffix(filename)
41     return (stringgsub(filename,"%.[%a%d]+$","", ""))
42 end
43 end

```

As the finder function for mplib, use the kpse library and make it behave like as if MetaPost was used (or almost, since the engine name is not set this way—not sure if this is a problem).

```

44
45 local mpkpse = kpse.new("luatex", "mpost")
46
47 local function finder(name, mode, ftype)
48     if mode == "w" then
49         return name
50     else
51         return mpkpse.find_file(name, ftype)
52     end
53 end
54 luamplib.finder = finder
55

```

The rest of this module is not documented. More info can be found in the LuaTeX manual, articles in user group journals and the files that ship with ConTeXt.

```

56
57 function luamplib.resetlastlog()
58     luamplib.lastlog = ""
59 end
60

```

Below included is section that defines fallbacks for older versions of mplib.

```

61 local mplibone = tonumber(mplib.version()) <= 1.50
62
63 if mplibone then
64
65     luamplib.make = luamplib.make or function(name, mem_name, dump)
66         local t = os.clock()
67         local mpx = mplib.new {
68             ini_version = true,
69             find_file = luamplib.finder,
70             job_name = file.stripsuffix(name)
71         }
72         mpx:execute(format("input %s ;", name))
73         if dump then
74             mpx:execute("dump ;")
75         end
76     end
77 end

```

```

75         info("format %s made and dumped for %s in %0.3f seconds",mem_name,name,os.clock()-t)
76     else
77         info("%s read in %0.3f seconds",name,os.clock()-t)
78     end
79     return mpx
80 end
81
82 function luamplib.load(name)
83     local mem_name = file.replacesuffix(name,"mem")
84     local mpx = mplib.new {
85         ini_version = false,
86         mem_name = mem_name,
87         find_file = luamplib.finder
88     }
89     if not mpx and type(luamplib.make) == "function" then
90         -- when i have time i'll locate the format and dump
91         mpx = luamplib.make(name,mem_name)
92     end
93     if mpx then
94         info("using format %s",mem_name,false)
95         return mpx, nil
96     else
97         return nil, { status = 99, error = "out of memory or invalid format" }
98     end
99 end
100
101 else
102

```

These are the versions called with sufficiently recent mplib.

```

103
104     local preamble = [[
105         boolean mplib ; mplib := true ;
106         let dump = endinput ;
107         input %s ;
108     ]]
109
110     luamplib.make = luamplib.make or function()
111     end
112
113     function luamplib.load(name)
114         local mpx = mplib.new {
115             ini_version = true,
116             find_file = luamplib.finder,
117         }
118         local result
119         if not mpx then
120             result = { status = 99, error = "out of memory"}
121         else
122             result = mpx:execute(format(preamble, file.replacesuffix(name,"mp")))

```

```

123         end
124         luamplib.reporterror(result)
125         return mpx, result
126     end
127
128 end
129
130 local currentformat = "plain"
131
132 local function setformat (name) --- used in .sty
133     currentformat = name
134 end
135 luamplib.setformat = setformat
136
137
138 luamplib.reporterror = function (result)
139     if not result then
140         err("no result object returned")
141     elseif result.status > 0 then
142         local t, e, l = result.term, result.error, result.log
143         if t then
144             info(t)
145         end
146         if e then
147             err(e)
148         end
149         if not t and not e and l then
150             luamplib.lastlog = luamplib.lastlog .. "\n " .. l
151             log(l)
152         else
153             err("unknown, no error, terminal or log messages")
154         end
155     else
156         return false
157     end
158     return true
159 end
160
161 local function process_indeed (mpx, data)
162     local converted, result = false, {}
163     local mpx = luamplib.load(mpx)
164     if mpx and data then
165         local result = mpx:execute(data)
166         if not result then
167             err("no result object returned")
168         elseif result.status > 0 then
169             err("%s", (result.term or "no-term") .. "\n" .. (result.error or "no-error"))
170         elseif luamplib.showlog then
171             luamplib.lastlog = luamplib.lastlog .. "\n" .. result.term
172             info("%s", result.term or "no-term")

```

```

173     elseif result.fig then
174         converted = luamplib.convert(result)
175     else
176         err("unknown error, maybe no beginfig/endfig")
177     end
178 else
179     err("Mem file unloadable. Maybe generated with a different version of mplib?")
180 end
181 return converted, result
182 end
183 local process = function (data)
184     return process_indeed(currentformat, data)
185 end
186 luamplib.process = process
187
188 local function getobjects(result, figure, f)
189     return figure:objects()
190 end
191
192 local function convert(result, flusher)
193     luamplib.flush(result, flusher)
194     return true -- done
195 end
196 luamplib.convert = convert
197
198 local function pdf_startfigure(n, llx, lly, urx, ury)

```

The following line has been slightly modified by Kim.

```

199     texsprint(format("\mplibstarttoPDF{%f}{%f}{%f}{%f}", llx, lly, urx, ury))
200 end
201
202 local function pdf_stopfigure()
203     texsprint("\mplibstoptoPDF")
204 end
205
206 local function pdf_literalcode(fmt, ...) -- table
207     texsprint(format("\mplibtoPDF{%s}", format(fmt, ...)))
208 end
209 luamplib.pdf_literalcode = pdf_literalcode
210
211 local function pdf_textfigure(font, size, text, width, height, depth)
212     text = text:gsub(".", "\hbox{%1}") -- kerning happens in metapost

```

The following line has been slightly modified by Kim.

```

213     texsprint(format("\mplibtexttext{%s}{%f}{%s}{%s}{%f}", font, size, text, 0, -( 7200/ 7227)/65536*depth))
214 end
215 luamplib.pdf_textfigure = pdf_textfigure
216
217 local bend_tolerance = 131/65536
218

```

```

219 local rx, sx, sy, ry, tx, ty, divider = 1, 0, 0, 1, 0, 0, 1
220
221 local function pen_characteristics(object)
222     local t = mplib.pen_info(object)
223     rx, ry, sx, sy, tx, ty = t.rx, t.ry, t.sx, t.sy, t.tx, t.ty
224     divider = sx*sy - rx*ry
225     return not (sx==1 and rx==0 and ry==0 and sy==1 and tx==0 and ty==0), t.width
226 end
227
228 local function concat(px, py) -- no tx, ty here
229     return (sy*px-ry*py)/divider, (sx*py-rx*px)/divider
230 end
231
232 local function curved(ith,pth)
233     local d = pth.left_x - ith.right_x
234     if abs(ith.right_x - ith.x_coord - d) <= bend_tolerance and abs(pth.x_coord - pth.left_x - d) <= bend_tolerance then
235         d = pth.left_y - ith.right_y
236         if abs(ith.right_y - ith.y_coord - d) <= bend_tolerance and abs(pth.y_coord - pth.left_y - d) <= bend_tolerance then
237             return false
238         end
239     end
240     return true
241 end
242
243 local function flushnormalpath(path,open)
244     local pth, ith
245     for i=1,#path do
246         pth = path[i]
247         if not ith then
248             pdf_literalcode("%f %f m",pth.x_coord,pth.y_coord)
249         elseif curved(ith,pth) then
250             pdf_literalcode("%f %f %f %f %f c",ith.right_x,ith.right_y,pth.left_x,pth.left_y,pth.x_coord,pth.y_coord)
251         else
252             pdf_literalcode("%f %f l",pth.x_coord,pth.y_coord)
253         end
254         ith = pth
255     end
256     if not open then
257         local one = path[1]
258         if curved(pth,one) then
259             pdf_literalcode("%f %f %f %f %f %f c",pth.right_x,pth.right_y,one.left_x,one.left_y,one.x_coord,one.y_coord)
260         else
261             pdf_literalcode("%f %f l",one.x_coord,one.y_coord)
262         end
263     elseif #path == 1 then
264         -- special case .. draw point
265         local one = path[1]
266         pdf_literalcode("%f %f l",one.x_coord,one.y_coord)

```

```

267     end
268     return t
269 end
270
271 local function flushconcatpath(path,open)
272     pdf_literalcode("%f %f %f %f %f %f cm", sx, rx, ry, sy, tx ,ty)
273     local pth, ith
274     for i=1,#path do
275         pth = path[i]
276         if not ith then
277             pdf_literalcode("%f %f m",concat(pth.x_coord,pth.y_coord))
278         elseif curved(ith,pth) then
279             local a, b = concat(ith.right_x,ith.right_y)
280             local c, d = concat(pth.left_x,pth.left_y)
281             pdf_literalcode("%f %f %f %f %f %f c",a,b,c,d,concat(pth.x_coord, pth.y_co-
ord))
282         else
283             pdf_literalcode("%f %f l",concat(pth.x_coord, pth.y_coord))
284         end
285         ith = pth
286     end
287     if not open then
288         local one = path[1]
289         if curved(pth,one) then
290             local a, b = concat(pth.right_x,pth.right_y)
291             local c, d = concat(one.left_x,one.left_y)
292             pdf_literalcode("%f %f %f %f %f %f c",a,b,c,d,concat(one.x_coord, one.y_co-
ord))
293         else
294             pdf_literalcode("%f %f l",concat(one.x_coord,one.y_coord))
295         end
296     elseif #path == 1 then
297         -- special case .. draw point
298         local one = path[1]
299         pdf_literalcode("%f %f l",concat(one.x_coord,one.y_coord))
300     end
301     return t
302 end
303

```

Below code has been contributed by Dohyun Kim. It implements btex / etex functions.

v2.1: texttext() is now available, which is equivalent to TEX() macro from TEX.mp. TEX() is synonym of texttext() unless TEX.mp is loaded.

```

304
305 local mplibcodepreamblefirst = [[
306 def texttext (expr t) =
307     image( special "%mkTEXbox:"&t; )
308 enddef;
309 let TEX = texttext;
310 def VerbatimTeX (text t) = enddef;

```



```

311 ]]
312
313 local mplibcodepreamblesecond = [[
314 vardef texttext (text t) =
315     TEXBOX_ := TEXBOX_ + 1;
316     image (
317         addto currentpicture doublepath unitsquare
318         xscaled TEXBOX_wd[TEXBOX_]
319         yscaled (TEXBOX_ht[TEXBOX_] + TEXBOX_dp[TEXBOX_])
320         shifted (0, -TEXBOX_dp[TEXBOX_])
321         withprescript "%%TEXTxtbox:" &
322             decimal TEXBOX_ & ":" &
323             decimal TEXBOX_wd[TEXBOX_] & ":" &
324             decimal(TEXBOX_ht[TEXBOX_]+TEXBOX_dp[TEXBOX_]);
325     )
326 enddef;
327 def TEX (text t) = texttext (t) enddef;
328 def VerbatimTeX (text t) =
329     message "verbatimtex '" & t & "' is ignored";
330 enddef;
331 ]]
332
333 local factor = 65536*(7227/7200)
334
335 local function putTEXboxes (object)
336     local n,tw,th = stringmatch(object.prescript,
337         "%%%TEXTxtbox:({d+}):({d%.%+%-}+):({d%.%+%-}+)"
338     if n and tw and th then
339         local op = object.path
340         local first, second, fourth = op[1], op[2], op[4]
341         local tx, ty = first.x_coord, first.y_coord
342         local sx, sy = (second.x_coord - tx)/tw, (fourth.y_coord - ty)/th
343         local rx, ry = (second.y_coord - ty)/tw, (fourth.x_coord - tx)/th
344         if sx == 0 then sx = 0.00001 end
345         if sy == 0 then sy = 0.00001 end
346         local cs = object.color
347         if cs and #cs > 0 then
348             cs = luamplib.colorconverter(cs)
349         end
350         pdf_literalcode("q %f %f %f %f %f %f cm",sx,rx,ry,sy,tx,ty)
351         if cs then pdf_literalcode(cs) end
352         texpstrprintf(format("\mplibputtextbox{%i}",n))
353         pdf_literalcode("Q")
354     end
355 end
356
357 local function domakeTEXboxes (data)
358     local num = tex.count[14] -- newbox register
359     if data and data.fig then
360         local figures = data.fig

```

```

361     for f=1, #figures do
362         local figure = figures[f]
363         local objects = getobjects(data,figure,f)
364         if objects then
365             for o=1,#objects do
366                 local object = objects[o]
367                 local prescript = object.prescript
368                 local str = prescript and stringmatch(prescript, "%%mktEXbox:(.*)")
369                 if str then
370                     num = num + 1
371                     texsprint(format("\\setbox%i\\hbox{%s}", num, str))
372                 end
373             end
374         end
375     end
376 end
377 end
378
379 local function makeTEXboxes (data)
380     data = stringgsub(data, "([A-Z_a-z])bteX([A-Z_a-z])",
381     function(pre,post)
382         post = stringgsub(post,"%s","")
383         return pre .. 'texttext("' .. post
384     end)
385     data = stringgsub(data, "([A-Z_a-z])verbatimtex([A-Z_a-z])",
386     function(pre,post)
387         post = stringgsub(post,"%s","")
388         return pre .. 'VerbatimTeX("' .. post
389     end)
390     data = stringgsub(data, "([A-Z_a-z])etex([A-Z_a-z])",
391     function(pre,post)
392         pre = stringgsub(pre,"%s","")
393         return pre .. ')"' .. post
394     end)
395     local mpx = luamplib.load(currentformat)
396     if mpx and data then
397         local result = mpx:execute(mplibcodepreamblefirst .. data)
398         domakeTEXboxes(result)
399     end
400     return data
401 end
402
403 luamplib.makeTEXboxes = makeTEXboxes
404
405 local function processwithTEXboxes (data)
406     local num = tex.count[14] -- the same newbox register
407     local prepreamble = "TEXBOX_ := "..num..";\n"
408     while true do
409         num = num + 1
410         local box = tex.box[num]

```

```

411     if not box then break end
412     prepreamble = prepreamble ..
413     "TEXBOX_wd["..num.."] := "..box.width /factor..";\n"..
414     "TEXBOX_ht["..num.."] := "..box.height/factor..";\n"..
415     "TEXBOX_dp["..num.."] := "..box.depth /factor..";\n"
416   end
417   process(prepreamble .. mplibcodepreamblesecond .. data)
418 end
419
420 luamplib.processwithTEXboxes = processwithTEXboxes
421

```

End of btex – etex patch.

```

422
423 local function flush(result,flusher)
424   if result then
425     local figures = result.fig
426     if figures then
427       for f=1, #figures do
428         info("flushing figure %s",f)
429         local figure = figures[f]
430         local objects = getobjects(result,figure,f)
431         local fignum = tonumber(stringmatch(figure:filename(),"([%d]+)$") or figure:charcode() or 0)
432         local miterlimit, linecap, linejoin, dashed = -1, -1, -1, false
433         local bbox = figure:boundingbox()
434         local llx, lly, urx, ury = bbox[1], bbox[2], bbox[3], bbox[4] -- faster than unpack
435         if urx < llx then
436           -- invalid
437           pdf_startfigure(fignum,0,0,0,0)
438           pdf_stopfigure()
439         else
440           pdf_startfigure(fignum,llx,lly,urx,ury)
441           pdf_literalcode("q")
442           if objects then
443             for o=1,#objects do
444               local object = objects[o]
445               local objecttype = object.type

```

Change from ConT_EXt code: the following 3 lines are part of the btex...etex patch.

```

446         local prescript = object.prescript --- [be]tex patch
447         if prescript and stringfind(prescript,"%%%%TEXTxtbox:") then
448           putTEXboxes(object)
449         elseif objecttype == "start_bounds" or objecttype == "stop_bounds" then
450           -- skip
451         elseif objecttype == "start_clip" then
452           pdf_literalcode("q")
453           flushnormalpath(object.path,t,false)
454           pdf_literalcode("W n")

```

```

455         elseif objecttype == "stop_clip" then
456             pdf_literalcode("Q")
457             miterlimit, linecap, linejoin, dashed = -1, -1, -1, false
458         elseif objecttype == "special" then
459             -- not supported
460         elseif objecttype == "text" then
461             local ot = object.transform -- 3,4,5,6,1,2

```

Change from ConT_EXt code: the ‘cs’ stuffs are for supporting ‘withcolor’ option

```

462             local cs = object.color
463             if cs and #cs > 0 then
464                 cs = luamplib.colorconverter(cs)
465             end
466             pdf_literalcode("q %f %f %f %f %f %f cm",ot[3],ot[4],ot[5],ot[6],ot[1],ot[2])
467             if cs then pdf_literalcode(cs) end
468             pdf_textfigure(object.font,object.dsize,object.text,object.width,object.height)
469             pdf_literalcode("Q")
470         else

```

Change from ConT_EXt code: the following 5 lines are for properly supporting ‘withcolor’ option

```

471             local cs, cr = object.color, nil
472             if cs and #cs > 0 then
473                 cs, cr = luamplib.colorconverter(cs)
474                 pdf_literalcode(cs)
475             end
476             local ml = object.miterlimit
477             if ml and ml ~= miterlimit then
478                 miterlimit = ml
479                 pdf_literalcode("%f M",ml)
480             end
481             local lj = object.linejoin
482             if lj and lj ~= linejoin then
483                 linejoin = lj
484                 pdf_literalcode("%i j",lj)
485             end
486             local lc = object.linecap
487             if lc and lc ~= linecap then
488                 linecap = lc
489                 pdf_literalcode("%i J",lc)
490             end
491             local dl = object.dash
492             if dl then
493                 local d = format("[%s] %i d",tableconcat(dl.dashes or {}, " "),dl.offset)
494                 if d ~= dashed then
495                     dashed = d
496                     pdf_literalcode(dashed)
497                 end
498             elseif dashed then
499                 pdf_literalcode("[ ] 0 d")

```

```

500         dashed = false
501     end
502     local path = object.path
503     local transformed, penwidth = false, 1
504     local open = path and path[1].left_type and path[#path].right_type
505     local pen = object.pen
506     if pen then
507         if pen.type == 'elliptical' then
508             transformed, penwidth = pen_characteris-
509         tics(object) -- boolean, value
510         pdf_literalcode("%f w", penwidth)
511         if objecttype == 'fill' then
512             objecttype = 'both'
513         end
514         else -- calculated by mplib itself
515             objecttype = 'fill'
516         end
517     end
518     if transformed then
519         pdf_literalcode("q")
520     end
521     if path then
522         if transformed then
523             flushconcatpath(path, open)
524         else
525             flushnormalpath(path, open)
526         end
527         if objecttype == "fill" then
528             pdf_literalcode("h f")
529         elseif objecttype == "outline" then
530             pdf_literalcode((open and "S") or "h S")
531         elseif objecttype == "both" then
532             pdf_literalcode("h B")
533         end
534     end
535     if transformed then
536         pdf_literalcode("Q")
537     end
538     local path = object.htap
539     if path then
540         if transformed then
541             pdf_literalcode("q")
542         end
543         if transformed then
544             flushconcatpath(path, open)
545         else
546             flushnormalpath(path, open)
547         end
548         if objecttype == "fill" then
549             pdf_literalcode("h f")
550         end
551     end

```

```

549             elseif objecttype == "outline" then
550                 pdf_literalcode((open and "S") or "h S")
551             elseif objecttype == "both" then
552                 pdf_literalcode("h B")
553             end
554             if transformed then
555                 pdf_literalcode("Q")
556             end
557         end
558         if cr then
559             pdf_literalcode(cr)
560         end
561     end
562 end
563 end
564 pdf_literalcode("Q")
565 pdf_stopfigure()
566 end
567 end
568 end
569 end
570 end
571 luamplib.flush = flush
572
573 local function colorconverter(cr)
574     local n = #cr
575     if n == 4 then
576         local c, m, y, k = cr[1], cr[2], cr[3], cr[4]
577         return format("%.3f %.3f %.3f %.3f k %.3f %.3f %.3f %.3f K", c, m, y, k, c, m, y, k), "0 g 0 G"
578     elseif n == 3 then
579         local r, g, b = cr[1], cr[2], cr[3]
580         return format("%.3f %.3f %.3f rg %.3f %.3f %.3f RG", r, g, b, r, g, b), "0 g 0 G"
581     else
582         local s = cr[1]
583         return format("%.3f g %.3f G", s, s), "0 g 0 G"
584     end
585 end
586 luamplib.colorconverter = colorconverter

```

2.2 T_EX package

587 \langle *package \rangle

First we need to load some packages.

```

588 \bgroup\expandafter\expandafter\expandafter\egroup
589 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
590     \input luatexbase-modutils.sty
591 \else
592     \NeedsTeXFormat{LaTeX2e}
593     \ProvidesPackage{luamplib}

```

```

594 [2013/12/19 v2.1 mplib package for LuaTeX]
595 \RequirePackage{luatexbase-modutils}
596 \RequirePackage{pdftexcmds}
597 \fi

Loading of lua code.
598 \RequireLuaModule{luamplib}

Set the format for metapost.
599 \def\mplibsetformat#1{%
600 \directlua{luamplib.setformat("\luaTeXluaescapestring{#1}")}}

MPLib only works in PDF mode, we don't do anything if we are in DVI mode, and
we output a warning.
601 \ifnum\pdfoutput>0
602 \let\mplibtoPDF\pdfliteral
603 \else
604 %\def\MPLIBtoPDF#1{\special{pdf:literal direct #1}} % not ok yet
605 \def\mplibtoPDF#1{}
606 \expandafter\ifx\csname PackageWarning\endcsname\relax
607 \write16{}
608 \write16{Warning: MPLib only works in PDF mode, no figure will be output.}
609 \write16{}
610 \else
611 \PackageWarning{mplib}{MPLib only works in PDF mode, no figure will be out-
put.}
612 \fi
613 \fi
614 \def\mplibsetupcatcodes{%
615 \catcode'\{=12 \catcode'\}=12 \catcode'\#=12
616 \catcode'\^=12 \catcode'\~=12 \catcode'\_ =12
617 %\catcode'\%=12 %% don't in Plain!
618 \catcode'\&=12 \catcode'\$=12
619 }

Make btex...etex box zero-metric.
620 \def\mplibputtextbox#1{\vbox to 0pt{\vss\hbox to 0pt{\raise\dp#1\copy#1\hss}}}

The Plain-specific stuff.
621 \bgroup\expandafter\expandafter\expandafter\egroup
622 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
623 \def\mplibcode{%
624 \begingroup
625 \bgroup
626 \mplibsetupcatcodes
627 \mplibdocode %
628 }
629 \long\def\mplibdocode#1\endmplibcode{%
630 \egroup
631 \directlua{
632 luamplib.tempdata = luamplib.makeTEXboxes([==[\unexpanded{#1}]==])
633 }%

```

```

634 \directlua{
635   luamplib.processwithTEXboxes(luamplib.tempdata)
636 }%
637 \endgroup
638 }
639 \else

    The LATEX-specific parts: a new environment.
640 \newenvironment{mplibcode}{\toks@{}\ltxdomplibcode}{}
641 \def\ltxdomplibcode{%
642   \bgroup
643   \mplibsetupcatcodes
644   \ltxdomplibcodeindeed %
645 }
646 %
647 \long\def\ltxdomplibcodeindeed#1\end{%
648   \egroup
649   \toks@\expandafter{\the\toks@#1}\ltxdomplibcodefinally%
650 }%
651 %
652 \def\ltxdomplibcodefinally#1{%
653   \ifnum\pdf@strcmp{#1}{mplibcode}=\z@
654     \directlua{
655       luamplib.tempdata = luamplib.makeTEXboxes([==[\the\toks@]==])
656     }%
657     \directlua{
658       luamplib.processwithTEXboxes(luamplib.tempdata)
659     }%
660     \end{mplibcode}%
661   \else
662     \toks@\expandafter{\the\toks@\end{#1}}\expandafter\ltxdomplibcode
663 \fi%
664 }
665 \fi

    We use a dedicated scratchbox.
666 \ifx\mplibscratchbox\undefined \newbox\mplibscratchbox \fi

    We encapsulate the literals.
667 \def\mplibstarttoPDF#1#2#3#4{%
668   \hbox\bgroup
669   \xdef\MPllx{#1}\xdef\MPlly{#2}%
670   \xdef\MPurx{#3}\xdef\MPury{#4}%
671   \xdef\MPwidth{\the\dimexpr#3bp-#1bp\relax}%
672   \xdef\MPheight{\the\dimexpr#4bp-#2bp\relax}%
673   \parskip0pt%
674   \leftskip0pt%
675   \parindent0pt%
676   \everypar{}%
677   \setbox\mplibscratchbox\vbox\bgroup
678   \noindent

```



```

679 }
680 \def\mplibstoptoPDF{%
681   \egroup %
682   \setbox\mplibscratchbox\hbox %
683     {\hskip-\MPllx bp%
684       \raise-\MPlly bp%
685       \box\mplibscratchbox}%
686   \setbox\mplibscratchbox\vbox to \MPheight
687     {\vfill
688       \hsize\MPwidth
689       \wd\mplibscratchbox0pt%
690       \ht\mplibscratchbox0pt%
691       \dp\mplibscratchbox0pt%
692       \box\mplibscratchbox}%
693   \wd\mplibscratchbox\MPwidth
694   \ht\mplibscratchbox\MPheight
695   \box\mplibscratchbox
696   \egroup
697 }

```

Text items have a special handler.

```

698 \def\mplibtexttext#1#2#3#4#5{%
699   \begingroup
700   \setbox\mplibscratchbox\hbox
701     {\font\temp=#1 at #2bp%
702       \temp
703       #3}%
704   \setbox\mplibscratchbox\hbox
705     {\hskip#4 bp%
706       \raise#5 bp%
707       \box\mplibscratchbox}%
708   \wd\mplibscratchbox0pt%
709   \ht\mplibscratchbox0pt%
710   \dp\mplibscratchbox0pt%
711   \box\mplibscratchbox
712   \endgroup
713 }

```

That's all folks!

```

714 \</package>

```

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