CPLOT User's Manual

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CPLOT is a simple C++ program (actually, it is pretty much just C) that reads in a file of commands and creates a PostScript file. CPLOT provides a framework that will allow you to implement algorithms such as de Casteljau, degree elevation, curve intersection, NURBS knot insertion, etc. and to write the results to a PostScript file for viewing.

The source code for CPLOT is in a single file, under 200 lines in length. It will compile and run in Windows, Mac OS X, and Linux. If the executable is named cplot and the input data file is named test.dat, the command line

```
cplot test.dat test.eps
```

will process the input file and create a PostScript file called test.eps.

CPLOT Input File Format

Each CPLOT command occupies a line by itself. Commands are not case sensitive, and only the first four characters are significant. Most commands are followed by data values found on subsequent lines. The commands are:

CIRC
r
x y z
Plot a circle of radius r centered at (x, y, z)

STORe
ncurve
degree
x_0 y_0 w_0
x_1 y_1 w_1
x_2 y_2 w_2
. . .
x_n y_n w_n
Store the control points of a degree n rational Bézier curve and assign it a curve number of **ncurve** for future reference. The reason that curves are stored rather than plotted immediately is to allow us to more easily perform such operations as subdivision and

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degree elevation. The w values are *weights*. For a conventional *polynomial* Bézier curve, simply set all w values to 1.

COLOr
r g b
Set the color to red = r; green = g; blue = b. All values between 0 and 1.

CPLOt
ncurve
Plot curve # *ncurve* as a Bézier curve.

CPPL
ncurve
Plot the control polygon of curve # *ncurve*.

VIEW

x_{min} y_{min} x_{max} y_{max}

WIND

x_{min} y_{min} x_{max} y_{max}

A window is a rectangle that encloses the scene. The window's corner coordinate values x_{min}, x_{max}, y_{min}, y_{max} are given in scene coordinates.

A viewport is a second rectangle that specifies where the scene contained in the window should be plotted on the page. The page is taken to be a square sheet of paper, with page coordinates running from $(0, 0)$ in the lower left corner to $(1, 1)$ in the upper right corner. The viewport is defined in terms of its values x_{min}, x_{max}, y_{min}, y_{max} in page coordinates.

The value $\frac{y_{max}-y_{min}}{x_{max}-x_{min}}$ is called the *aspect ratio*. If the window and viewport do not have the same aspect ratio, the resulting picture will be distorted.

Window and viewport commands should appear prior to any CIRC or CPLOT commands.

Sample File

The file `eg1.dat` contains the following drawing commands:

```
VIEW
.2 .2 .8 .8
WIND
0 0 150 150
colo
1 0 0
widt
3
bord
colo
0 0 0
text
18 50 100
Hello World!
circ
100 100 70
STOR
5
3
40 45   1.0
50 90   1.0
95 90   1.0
95 45   1.0
CPLOT
5
CPPL
5
EXIT
```

When this file is processed using cplot:

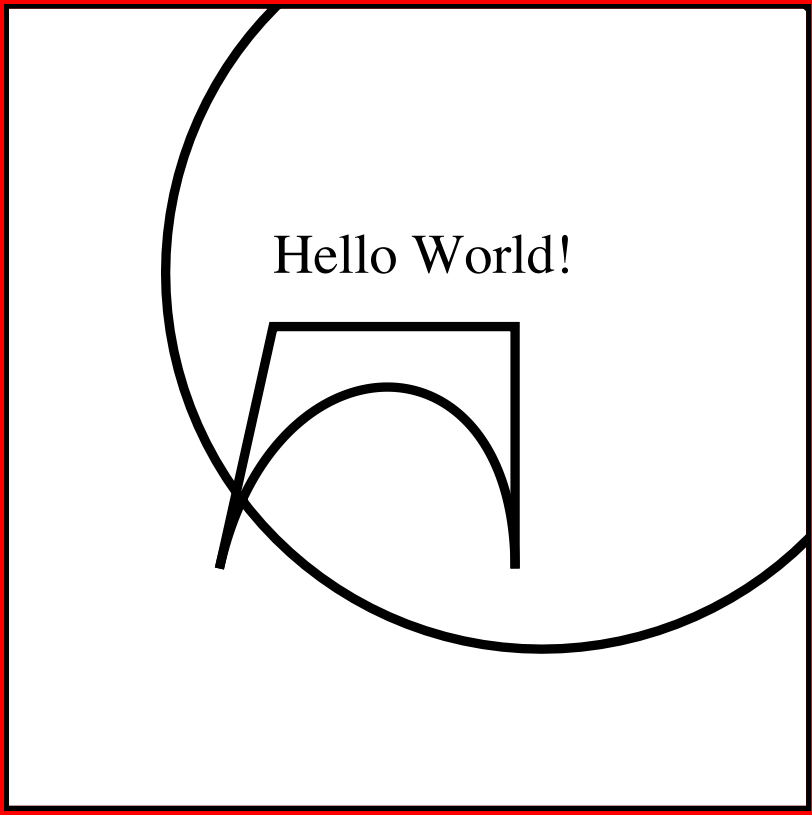`cplot eg1.dat eg1.eps`

an eps file named eg1.eps is created that contains the following picture:

Figure 1: Scene from file `eg1.dat`