

his seems like a good place to talk a bit about the .scn format. Since MacRTrace now supports .scn (mostly), people creating scenes for MacRTrace may want to use the .scn format, which is a higher-level format and is easier to use. The best source I know for information on the .scn format is on the World Wide Web: [http://www.cica.indiana.edu/graphics/object\\_specs/scn/SCN.format.html](http://www.cica.indiana.edu/graphics/object_specs/scn/SCN.format.html). You can also find information on the .scn and .sff formats at <ftp://asterix.inescn.pt/pub/RTrace>.

Below is the standard document describing the .sff format.

This document describes the SFF (Simple File Format) used on the RTRACE ray tracer (Version 8). This a plain text line oriented format, with a file inclusion capability. As present, it is very simple to read and write this format from languages like C and Pascal, which was my main concern...

(^ represents start of line!)

```
***** Format SFF (Simple File Format) *****
[Start of File]
^... Comment
^Eye(X Y Z)
^Look(X Y Z)
^Up(X Y Z)
^View_angle(H V) [1,89 degrees]
^... Comment
^Background(R G B)
^Ambient(R G B)
^... Comment
^Light_type(Type) Position(X Y Z) Bright(R G B) ...
  |
  | /-----/
  | |
  V V
1-POINT:
2-DIRECTIONAL: Direction(X Y Z) Angle(La) Light_Factor(Lf)
3-EXTENDED: Radius(R) Samples(N)
^Etc
```

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^<NL>
^... Comment
^Surface_type(Type) Color(R G B) ...
|
| /-----/
|
V      V
1-: Diffuse(R G B) Specular(R G B) Phong(Pf) Metalness(Mf)
Trans.(R G B)
2-: Smoothness(R G B) Metalness(R G B) Transmission(R G B)
^Etc
^<NL>
^... Comment
^Object_type(Type) Surface_ID(S) Refraction(Re) ...
|
| /-----/
|
V      V
1-SPHERE:          Center(X Y Z) Radius(R)
2-PARALLELIPIPED: Center(X Y Z) Size(X Y Z)
3-PATCH:           Origin(X Y Z) Scale(X Y Z) Filename(...)
4-CONE/CYLINDER:  Apex(X Y Z) Apex_Radius(Ra) Base(X Y Z)
                  Base_Radius(Rb)
5-POLYGON:        Origin(X Y Z) Scale(X Y Z) Filename(...)
6-TRIANGLE:       Origin(X Y Z) Scale(X Y Z) Filename(...)
7-TEXT3D:         Filename(...)
64-TEXTURE:       see below
65-TRANSFORMATION: Object_ID(I)
                  Transform(X1 Y1 Z1 W1 ... X4 Y4 Z4 W4)
66-CSG 0:         Surface_ID(S) Refraction(Re) (Union-0 Sub-1
Int-2)
    CSG 1:         Next CSG member
    CSG 2:         End of CSG
67-LIST 0:        Surface_ID(S) Refraction(Re)
    LIST 1:        End of List
^Etc
^<NL>
^... Comment
^Texture_type(Type) Object_ID(I)
|
| Transform(X1 Y1 Z1 W1 ... X4 Y4 Z4 W4)
|
| ...
|
V      V
0-NULL:
1-CHECKER:        Surface_ID(S)
2-BLOTCH:         Scale(K) Surface_ID(S) [Filename(...) or -]
3-BUMP:           Scale(K)

```

4-MARBLE: [Filename(...)] or -]  
 5-FBM: Offset(K) Scale(K) Omega(K) Lambda(L)  
 Threshold(K) Octaves(O)  
 [Filename(...)] or -]  
 6-FBMBUMP: Offset(K) Scale(K) Lambda(L) Octaves(O)  
 7-WOOD: Color(R G B)  
 8-ROUND: Scale(K)  
 9-BOZO: Turbulence(K) [Filename(...)] or -]  
 11-WAVES: Frequency(K) Phase(K) Scale(K)  
 12-SPOTTED: [Filename(...)] or -]  
 13-DENTS: Scale(K)  
 14-AGATE: [Filename(...)] or -]  
 15-WRINKLES: Scale(K)  
 16-GRANITE: [Filename(...)] or -]  
 17-GRADIENT: Turbulence(K) Direction(X Y Z)  
 [Filename(...)] or -]  
 18-IMAGEMAP: Turbulence(K) Mode(K) Axis(X Y) Filename(...)  
 19-GLOSS: Scale(K)  
 20-BUMP3D: Scale(K) Size(K)  
 ^<NL>  
 ^... Comments  
 [End of File]

## 1. Valid ranges or data

RGB must be in [0,1[  
 (Note: RGB brightness of lights may be between ]0,300[;  
 negative values mean to not attenuate with distance)  
 XYZ must be in [-10000,10000]  
 Factor must be in [0,300[

Filename must a valid filename for the operating system, or then  
 '-', in  
 which case data is read from the standard input or the same SFF  
 stream.

## 2. Patch specification

File format for PATCH (bicubic 4-sided patch):

[Start]  
 Patch\_1\_Index(1 2 3 4 5 6 7 8 9 10 11 12)  
 Patch\_2  
 Etc  
 <NL>  
 Patch\_1\_Index\_1\_Coords(X Y Z)  
 Patch\_1\_Index\_2\_Coords(X Y Z)  
 Etc

<NL>

...

[End]

### 3. Polygon specification

File format for POLYGON (n-sided planar polygon):

[Start]

Polygon\_1\_Vertex\_Number Polygon\_1\_Index(1 2 3 ...)

Polygon\_2

Etc

<NL>

Polygon\_1\_Index\_1\_Coords(X Y Z)

Polygon\_1\_Index\_2\_Coords(X Y Z)

Etc

<NL>

...

[End]

### 4. Triangle specification

File format for TRIANGLE (3-sided polygon with vertex normals):

[Start]

Triangle\_1\_Vertice\_1(X Y Z) Normal\_1(X Y Z) Vertice\_2(X Y Z)

Normal\_2(X Y Z) ...

Triangle\_2

<NL>

...

[End]

If the surface index is 0, then 3 surface indices must follow vertices and normals.

### 5. An example

[Start of File]

View

25 25 7 - Eye point

0 0 0 - Look point

0 1 0 - Up vector

30 30 - View angles

Colors

0.196 0.6 0.8 - Background (Sky Blue)

0.1 0.1 0.1 - Ambient light

Lights

1 0 60 60 0.9 0.9 0.9 - Point Light 1

1 20 40 -7 0.9 0.9 0.9 - Point Light 2

Surfaces

1 0.6 0.8 0.196 0.99 0.99 0.99 0 0 0 0 0 0 0 0 0 0 -  
Yellow Green  
1 0.9 0.9 0.9 0.5 0.5 0.5 0.5 0.5 0.5 50 1 0 0 0 -  
White  
1 0.5 0.5 0.5 0.1 0.1 0.1 0.1 0.1 0.1 200 0.7 0.8 0.8 0.8 - Grey  
1 0.9 0.2 0.2 0.99 0.99 0.99 0 0 0 0 0 0 0 0 0 - Red

Objects

5 1 1.0 0 0 0 15 15 15 - Polygon  
4 1 2 3 4

1 0 1  
1 0 -1  
-1 0 -1  
-1 0 1

2 2 1.0 0 2 0 7 2 3 - Parallelipiped  
2 3 1.5 0 5 10 3 5 3 - Parallelipiped  
1 4 1.0 7 15 -7 3 - Sphere

Textures

2 1 2 0 0 0 0 2 0 0 0 0 2 0 0 0 0 1 0.4 4 -  
Blotch  
4 2 5 0 0 0 0 5 0 0 0 0 5 0 0 0 0 1 -  
Marble  
5 4 10 0 0 0 1 10 0 0 0 1 1 10 0 0 0 0 1 0 0.6 0.5 2 0.1 6 - FBM  
Bump

End

Demo / 11-OCT-1989 / Antonio Costa  
[End of File]

To ray trace without textures, do

rtrace demo.sff demo.pic >&demo.log

else, do

rtrace t2 demo.sff demo.pic >&demo.log

Another example with INESC symbol:

[Start of File]

View

45.0 45.0 81.0 - Eye point

45.0 45.0 -81.0 - Look point  
0.0 1.0 0.0 - Up vector  
30 30 - View angles

Colors

0.196 0.6 0.8 - Background (Sky Blue)  
0.3 0.3 0.3 - Ambient

Lights

1 0.0 100.0 100.0 1 1 1 - Light 1 (White)  
1 90.0 100.0 100.0 1 1 0 - Light 2 (Yellow)

Surfaces

1 0.557 0.420 0.137 0.8 0.7 0.7 0.2 0.3 0.3 30 0.8 0 0 0 - Surf 1  
(Steel Red)  
1 0.137 0.420 0.557 0.5 0.5 0.6 0.5 0.5 0.4 5 0.2 0 0 0 - Surf 2  
(Steel Blue)  
1 0.600 0.800 0.200 0.9 0.9 0.9 0.0 0.0 0.0 1 0 0 0 0 - Surf 3  
(Matte Green)

Objects

1 1 1.0 10.0 09.5 0.0 4.5 - Sphere  
1 1 1.0 10.0 26.5 0.0 4.5  
1 1 1.0 20.0 63.5 0.0 4.5  
1 1 1.0 20.0 80.0 0.0 4.5  
1 1 1.0 40.0 09.5 0.0 4.5  
1 1 1.0 40.0 26.5 0.0 4.5  
1 1 1.0 40.0 43.5 0.0 4.5  
1 1 1.0 50.0 80.0 0.0 4.5  
1 1 1.0 60.0 53.0 0.0 4.5  
1 1 1.0 70.0 09.5 0.0 4.5  
1 1 1.0 70.0 43.5 0.0 4.5  
4 2 1.0 10.0 30.0 0.0 1.5 10.0 70.0 0.0 1.5 - Cylinder  
1 2 1.0 10.0 70.0 0.0 1.5  
4 2 1.0 10.0 70.0 0.0 1.5 17.5 77.5 0.0 1.5  
4 2 1.0 12.5 12.0 0.0 1.5 20.0 19.5 0.0 1.5  
1 2 1.0 20.0 19.5 0.0 1.5  
4 2 1.0 20.0 19.5 0.0 1.5 20.0 60.0 0.0 1.5  
4 2 1.0 22.5 61.0 0.0 1.5 37.5 46.0 0.0 1.5  
4 2 1.0 37.5 12.0 0.0 1.5 30.0 19.5 0.0 1.5  
1 2 1.0 30.0 19.5 0.0 1.5  
4 2 1.0 30.0 19.5 0.0 1.5 30.0 33.5 0.0 1.5  
1 2 1.0 30.0 33.5 0.0 1.5  
4 2 1.0 30.0 33.5 0.0 1.5 37.5 41.0 0.0 1.5  
4 2 1.0 30.0 26.5 0.0 1.5 36.5 26.5 0.0 1.5  
4 2 1.0 40.0 47.0 0.0 1.5 40.0 70.0 0.0 1.5  
1 2 1.0 40.0 70.0 0.0 1.5  
4 2 1.0 40.0 70.0 0.0 1.5 47.5 77.5 0.0 1.5  
4 2 1.0 42.5 12.0 0.0 1.5 50.0 19.5 0.0 1.5

1 2 1.0 50.0 19.5 0.0 1.5  
4 2 1.0 50.0 19.5 0.0 1.5 50.0 43.0 0.0 1.5  
1 2 1.0 50.0 43.0 0.0 1.5  
4 2 1.0 50.0 43.0 0.0 1.5 57.5 50.5 0.0 1.5  
4 2 1.0 67.5 12.0 0.0 1.5 60.0 19.5 0.0 1.5  
1 2 1.0 60.0 19.5 0.0 1.5  
4 2 1.0 60.0 19.5 0.0 1.5 60.0 33.5 0.0 1.5  
1 2 1.0 60.0 33.5 0.0 1.5  
4 2 1.0 60.0 33.5 0.0 1.5 67.5 41.0 0.0 1.5  
5 3 1.0 0.0 4.0 0.0 200.0 200.0 200.0 - Polygon  
4 1 2 3 4

1.0 0.0 1.0  
1.0 0.0 -1.0  
-1.0 0.0 -1.0  
-1.0 0.0 1.0

End  
INESC Logo / 23-FEB-1989 / Antonio Costa  
[End of File]

INESC-Norte, 13 January 1993.