RT

The goal of this project is to build a Raytracing engine with which you can create computer generated images.
Those computer generated images will each represent a scene, as seen from a specific angle and position, defined by simple geometric objects, and each with its own lighting system.

The graphic library used in this project is the Minilibx (adapted from the original XLib).
This program is only compatible on Mac OS Sierra devices.

First of all, you need to compile the program using the makefile :

```
$ make
```

When it's done :

```
$ ./RT scene/camera scene/objets
```

Controls

Keyboard

- You may have to refresh the image (if you select an other object and you just want to refresh the effect on this one (Perlin Noise, Wave, checkerboard…) press “enter” on the numpad

CAMERA

- You can look up with “E”, down with “D”, left with “S” and right with “F”.
- You can also rotate around the camera axes with “W” and “R”.
- You can move the position of the camera with the arrow keys.

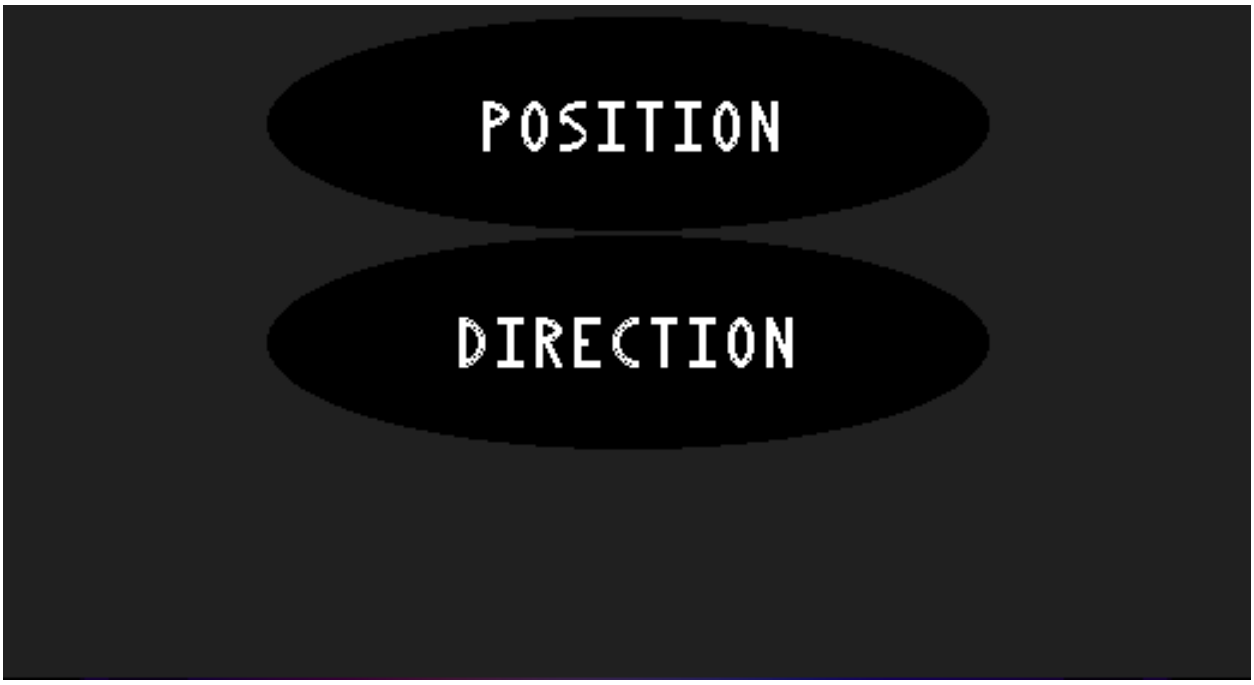
*The camera moves towards the point of view.

MOUSE (raytracer)

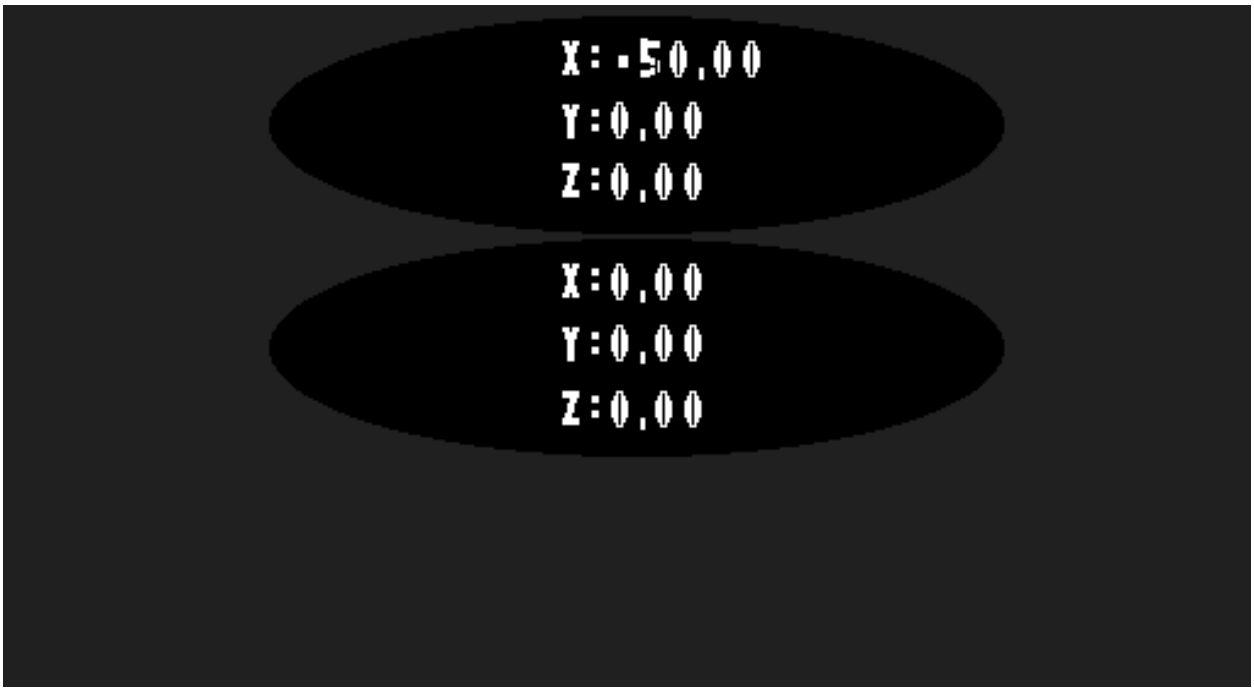
- You can select an object with the left click and move (on the x and y axes) with the arrow keys in the same way as the camera.
- You can move on the z axe with “+” an “-”
- To select the camera back again you need to click in the void (basically the black part of the image)

MOUSE (UI)

Current objet

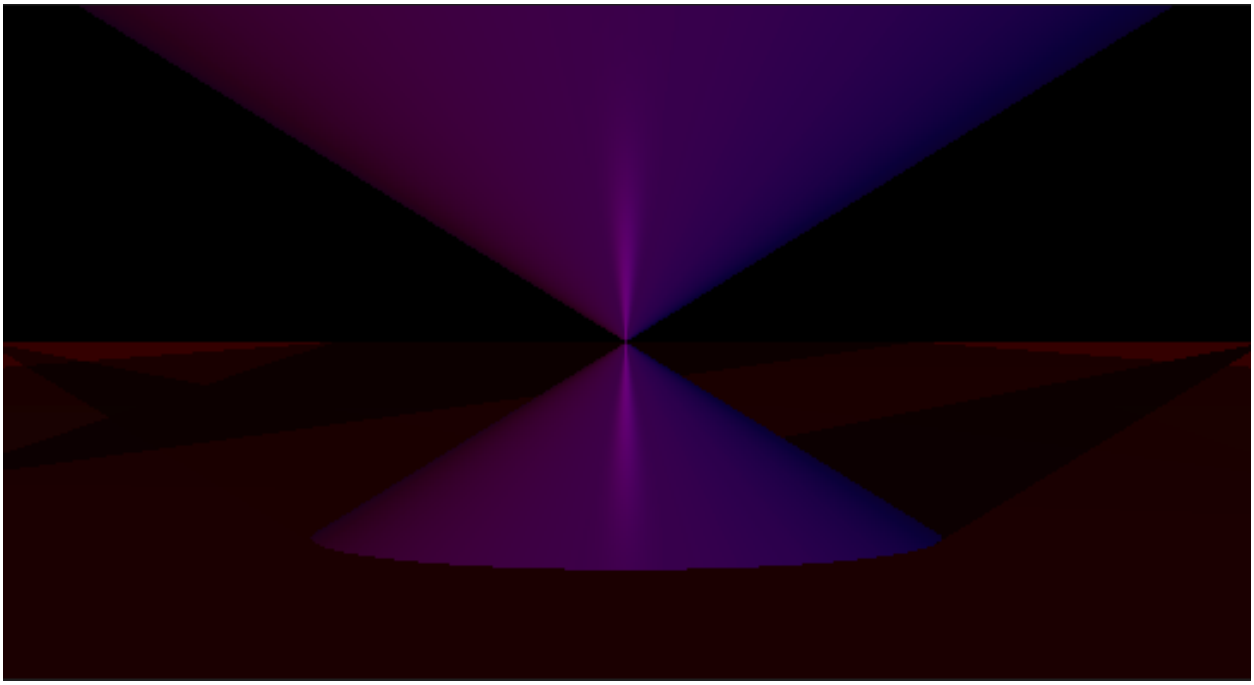


- Reveal the information of the current objet by left clicking on this part of the UI.

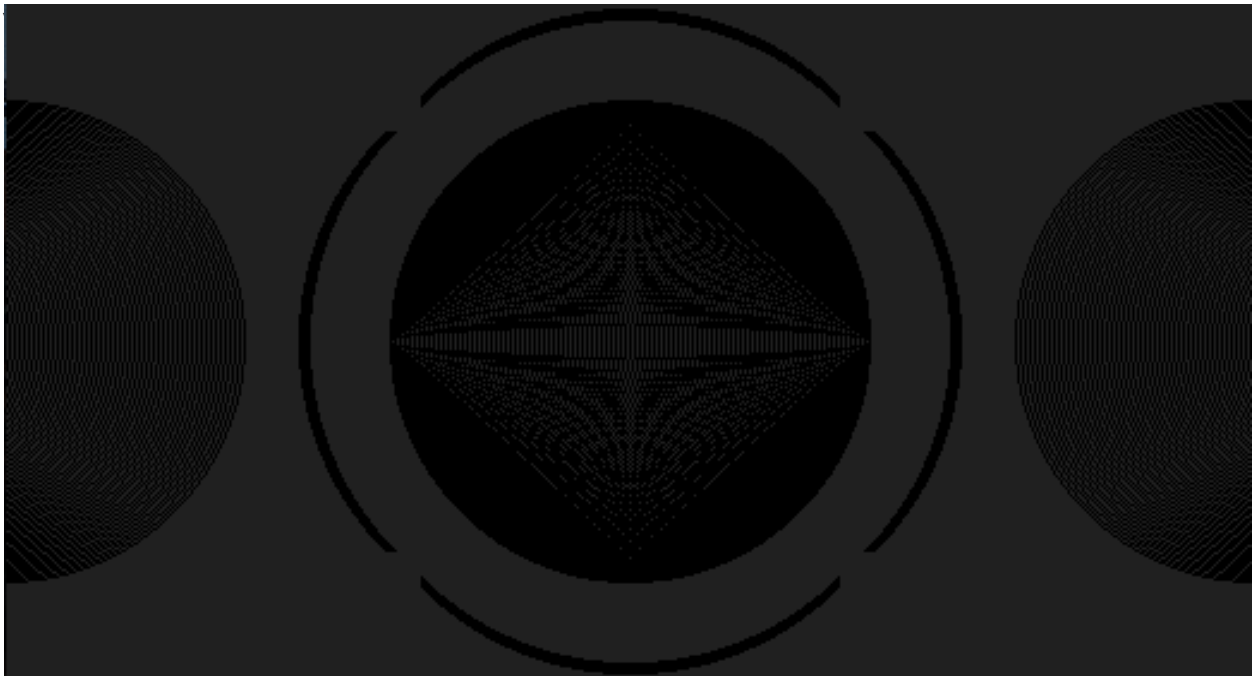


Small raytracer

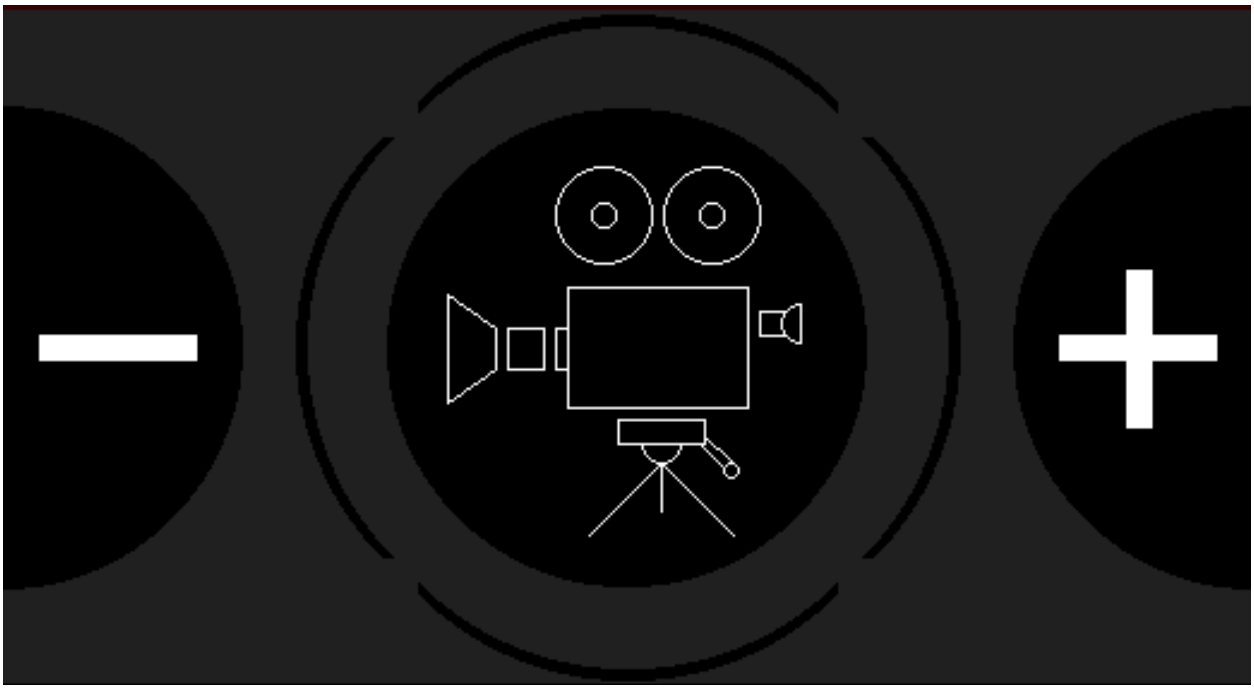
- The small raytracer is exactly the same as the big one but it’s focus is on the object you clicked on, for example the cone.



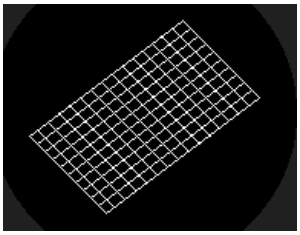
Object Manager

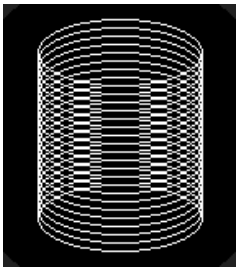


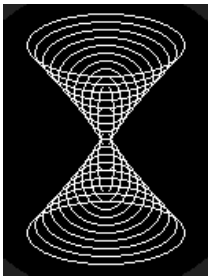
- Reveal by left clicking on this part of the UI

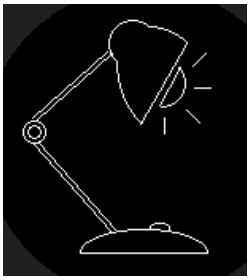


- Change the sort of object with the up/down arrow, it selects in the same time the first objet of each sort (so you can move it !)

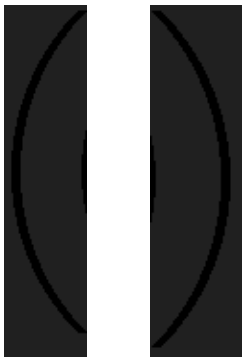






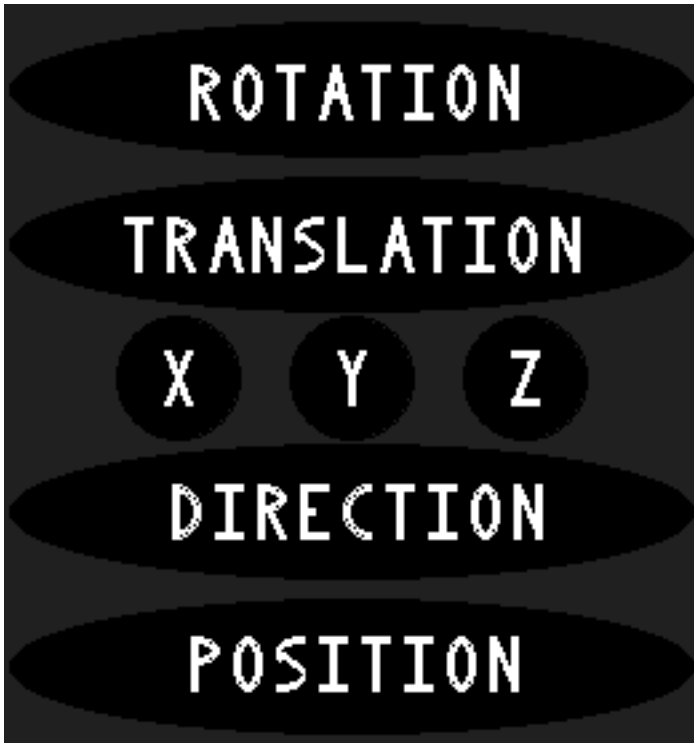


- Switch to the prev/next object of each sort with the left/right arrow



- Delete objects with the “-“ and add one with the “+” , if you choose to add one you need to precise values (c.f. terminal below)

Matrices



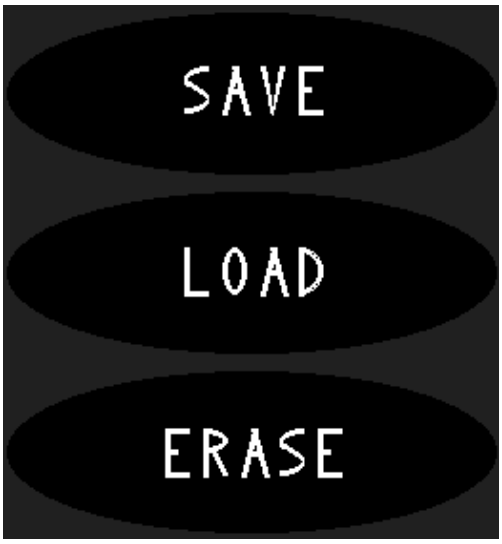
- To use the matrice tool you need to click on rotation or translation and precise a value (c.f. terminal below)

- You need to select the axe (x, y or z)

- Then you need to choose the type of movement you're wishing for (Direction or Position)

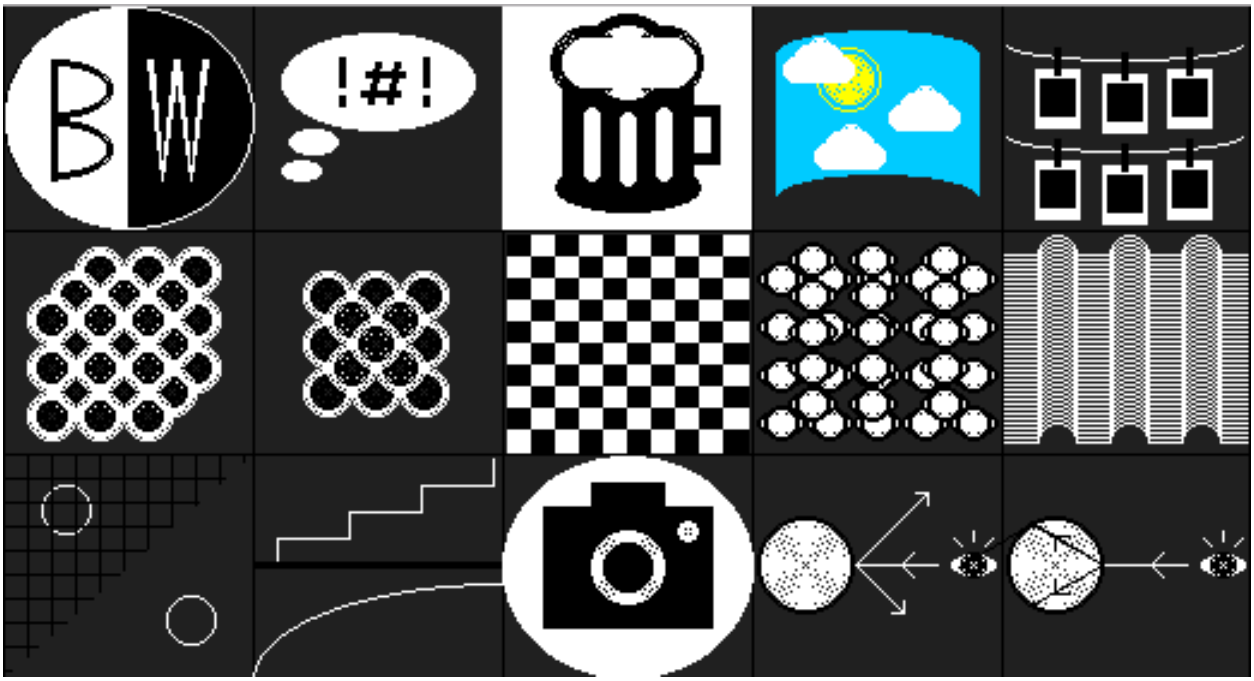
- And finally, to apply this rotation/translation you need to select an object (with the UI or by clicking directly on it) and press "enter" or "return" if your keyboard is in French or English)

Save/Load/Erase scene tool



- If you choose to save the actual scene you need to precise in which directory you want to save the file and the name of this one (c.f terminal below)
- If you choose to load a pre-save scene you need to choose in the contextual menu the directory and the file.
- To erase it's the same process except that erase the file.

Shortcuts



Top row :

From the left to the right :

- Black and white filter
- Cartoon filter
- Blur
- Enable/Disable the skybox (the DeathStar in your back, don't forget to turn the field of vision of the camera)
- Negative filter

Middle row :

From the left to the right :

- Create a cube-sphere (you need to precise values, c.f. terminal below)
- Create a pyra-sphere ((you need to precise values, c.f. terminal below)
- Apply the checkerboard on one object (you need to precise values, c.f. terminal below)
- Apply the perlin noise (you need to precise a value, c.f. terminal below)
- Apply the "wave" effect, basically the wave is on three axes at the same time but you can choose the axe with x, y or z button on the matrice UI

Down row :

From the left to the right :

- Enable or disable the pixelation of the raytracer
- Enable or disable the antialiasing
- Take a screenshot (you need to precise the name of the file in the terminal, c.f. terminal below)
- Enable or disable reflection
- Enable or disable refraction

Terminal

When you click on some features you need to precise in the “Terminal” values needed by the program to do what you want.

- Create an object : you need to precise position, direction, color, etc…

*Values must have this format 0.00 or 1.00 or 154.00 or 8413.455

- Rotation or translation : precise a value

*Values must have this format 0.00 or 1.00 or 154.00 or 8413.455

- Save : You need to enter a filename

- Cubesphere or pyrasphere : you need to precise values of one sphere (replicate on the others) and the size (1, 2, 3, 4, 5)

- Checkerboard : You must to precise 2 RGB colors.

*Values must have this format 0 or 100 or 126 or 213 (without dot)

- Perlin noise : You need to choose if you want to change the value (basically 0.1)

- Screenshot : You need to precise the filename