FINAL PRACTICE

Realistic Rendering of a Room in Maya

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Computer Graphics 2020-2021

Degree in Computer Science & Engineering

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Introduction

In this practice, we were presented with the task of generating a realistic render that comprised all or most of the concepts viewed throughout the course.

Given that we were given the option to use any computer graphics software, we have chosen to make use of Maya given that one of the members of our group had some background working with the tool. We consider Maya to be an ‘enhanced’ Blender: simpler UI, easier to get started with and better UX overall. It is also the undisputed leader of the sector, so we figured it would be more useful to have some understanding of Maya over Blender. Although the software is not free, we managed to get a student's license and were able to begin working.

As so, we will begin with the design. We will divide the development into 2 major parts:

- Modelling: process of giving shape to the room and all objects in it.
- Shading: processes of texturing, lighting and shading.

Modelling

We will divide modelling into two parts: the room itself and the objects contained in it.

Room

We begin the design with a single cube that we will scale to serve as flooring. From there, we will use the Modelling Toolkit → Multicut tool to cut faces on the edges of the cube from which we use the Extrude tool to raise the walls. On the wall in the back of the image, we cut a hole to serve as a window and extrude the window edges. We also modelled some beams on the roof by scaling and transforming cubes.
This way we have the skeleton of our room that we will have to fill with objects either created by us or imported.

Objects

As we have included a lot of objects, we will not be going over the modelling for each one of them individually. Instead, we will describe the most important ones and briefly explain the general procedure taken for other objects.

We have mostly applied the same *multicut-to-extrude* technique we used for room modelling to objects. For example:

- For the big table, we scaled and transformed an initial cube into a plane which serves as the table's top. We then use the multicut tool to select the faces under the plane from which to extrude the table legs.
- For the computer, we again transformed a cube into a plane and used the same technique multiple times so we could achieve the desired shape. To create a non-sharp edge for the screen, we use the corresponding tool provided by Maya.
- For the lamps on both tables as well as for the coffee mug we part from a cylinder that we cut, scale and transform according to our needs. The lamp stem is another cylinder put under the main lamp cone cylinder.
- For the books, keyboard, bedside table, bed and paintings on the wall we once again scale and transform an initial cube from which we use the multicut and extrude technique. We add two knobs to the drawers of the bedside table for more detail. To smooth the mattress' edges, we once more make use of the corresponding tool the software offers.
- The carpet on the floor is simply a cube scaled and transformed into a plane.
- The blind hanging from above the window is a collection of scaled and transformed cubes topped by a scaled cylinder.
- We decided to import an office chair model we found on the Internet (https://www.turbosquid.com/3d-models/free-max-model-ea-108-aluminium-chair/620426) as it could prove especially difficult to manually design a realistic-looking office chair by ourselves. This way we also have the chance to make use of more of the functionalities that this software offers.
- We also imported a Menger Sponge cube fractal model: https://www.turbosquid.com/3d-models/fractal-cube-dxf-free/696411. We initially tried to design a fractal object or texture by ourselves, but after many hours of trying with different fractal forms we gave up as Maya was apparently totally unable to render

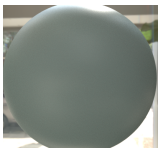
the model correctly and we did not figure out how to correct it. Therefore, we decided to import the Menger Sponge fractal form as a model and use it as a sort of paperweight on top of the bedside table's books.

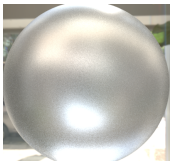
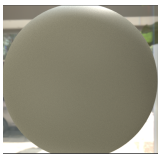
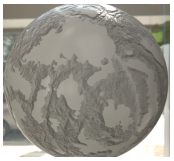
Shading

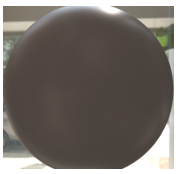
After modelling, the next task to complete is shading. We understand this stage to include texturing and lighting, and as such we will describe them separately.

Texturing

We have designed and used a total of 19 textures, reflected in the following table:

Name	Sample image	Used in
I_Terragen		Painting behind the PC, containing the landscape we made on Terragen as an 'easter egg'
M_Book_Cover_Green M_Book_Cover_Red M_Book_Cover_Yellow		Book covers
M_clay		Coffee mug
M_Clay_Wall		Wall on the right
M_Cracked_Metal		Roof beams, legs of both tables, bed base, desktop plane
M_Floor		Floor
M_Floormat		Carpet

M_Fractal_Cube		Menger Sponge cube. It is supposed to contain a Mandelbrot fractal, but as commented above Maya cannot seem to render it properly.
M_Window_Frame		Window frame.
M_Glass		Roof, which is made of glass. We took this decision so more light could enter the room.
M_Keyboard		Keyboard.
M_Lamp_Diffuser		Lamp cones. Translucent so light can go through.
M_Mirror		Mirrors
M_Paper		Books paper pages.
M_Wall_Scratches		Walls on the back and left.
M_Frames__White		Painting or mirror frames.

M_Window_Blinds		Window blinds. Somewhat translucent.
Screen		PC screen.
VEA108AC_01 VEA108AC_03 VEA108AC_04 [...]	[...]	Textures associated with the office chair, which were all imported along with the model we downloaded from Turbosquid as specified in the previous section.

Lighting

We have decided to include four sources of light:

- Sunlight: directional light coming from outside the window and through the glass ceiling towards the inside of the room
- Bedside lamp: point light coming from the bedside and desk lamps. Thanks to the translucent texture of the lamps' cones, these sources can properly illuminate the room. We have two of these.
- HDRI light: light coming from an HDRI object, which is a sphere with a mapped image. In this case, the HDRI object is simulating the landscape of Barcelona. The object also has some light assigned to it, which is emitted on the whole scene and more specifically on the room.

By using these 4 sources we manage to achieve a very pleasant and realistic effect on the final render of the scene.

Final render

Although the render preview is viewed correctly, when exported to a file it seemed to be obscured, resulting in this image:

As we could not find neither reason nor a solution to this and every time we wanted to render the image it took around 10 minutes, we decided to correct the raw output gamma manually, resulting in the following final corrected output which is almost exactly equal to the one offered by the Maya render preview:

Both images are delivered within the project file.

Conclusion

During the course of this final practice, we have found that development of scenes on either Maya or Blender can be interesting enough as well as definitely easier than on PovRay. Especially the lack of online tutorials for PovRay, probably due to it being obsolete and having no real use cases anymore, made our first practice harder than we expected it to be and hence made the result worse than we expected. We understand though that PovRay might be needed to get a basic understanding of the ‘real’ way in which modelling, texturing or lighting work, as well as to really appreciate the commodities that more advanced software like Maya provide to its users.

Overall, we are happy with the final result obtained. Despite the problems that we encountered, derived mostly from basically having to learn how to use a completely new tool in a matter of a couple of weeks (even though one of the members had a slight background on it), we feel like the use of a more advanced rendering software has helped us see the ‘wonders’ that can be achieved through the Computer Graphics technologies studied in this course.