Special effects

Shadow mapping with PCF

1. Render shadow map
2. Draw actual shadows in the scene with shadow map.

PCF was used for eliminating shadow acne.

Source: TU Vienna - Realtime Rendering / Repetitorium Slides

Bloom

1. Multiple render targets (1 default, 1 bright = elements exceeding threshold)
2. Gaussian Blur of bright elements
3. Mixing both together in post-processing shader

Note that this effect was disabled in the video because the effect would be too strong with the skybox, even then adjusting the threshold! For enabling/disabling bloom press “Tab”, then under “Shaders” click on the “bloom checkbox”. The “gaussian blur checkbox” is only for debugging purposes.

Source: TU Vienna - Realtime Rendering / Repetitorium Slides

Particle System (Snow)

This effect was implemented with a gpu based particle system (1.000.000 particles, 200 particles per second). The spawn rate is framerate independent by using the delta time.

Source: TU Vienna - Realtime Rendering / Repetitorium Slides

Other requirements

Automatic camera movement

This requirement was realized by using quaternions for SLERPs. A build in keyframe capture system makes it easier to define paths.

Performance

The demo was tested with two different GPUs at 1280x768 with solid 60FPS.

Additional libraries

GLEW / GLFW / GLM

The usual suspects for window and input management (GLFW), an openGL math library (GLM) and an extension loading library (Glew).

Assimp

A modelloader library that was used for importing .obj and .fbx files.
http://www.assimp.org/

IMGUI

An easy to use GUI library that was used mainly for visual debugging and changes without recompiling.
https://github.com/ocornut/imgui

SPDLOG

A logging library used as window logger in combination with ImGUI as well as the console.
https://github.com/gabime/spdlog

STB_Image

An image loading library for loading different textures.
https://github.com/nothings/stb

3D Models

Models were either created with Blender and or modified from well known CG asset sites:
https://www.cgtrader.com/
https://www.turbosquid.com/
https://sketchfab.com/

Controls

Tab	Access GUI
1	Play Animation
2	Pause Animation

3	Reset Animation
F1	Wireframe
F2	Face Culling

Testing

The application was tested with a GTX 560 TI as well as a GTX 1060 and maintained a constant 60FPS throughout the demo.

Further notes

- The engine (RTREngine) is mostly separated from the application (RTRDemo) itself.
- Different programming patterns for reasons such as decoupling were applied (Observer, Publisher Subscriber Model).
- Additional features
    - Logging system
    - Event system
    - GUI
    - Premake (as Build Tool)