Aventicum VR

With the use of Virtual Reality, it becomes possible to view in 3D how roman sites may have been in the past. Our aim with this project is to use Unreal Engine 5.1's features to bring the Aventicum site back to life in a virtual form for visitors to explore.

The beginning of the project

During Project 2 the essential components of the project were set in place, namely the terrain, mean of travel and the choice of engine and lighting used. However, by the end of that module, the projects frame time were noticeably too long, and the quality was still mediocre, even with the best hardware of the time being used.

Unreal Engine 5.1

Unreal Engine is a game engine with a large amount of features and plugins, allowing the game developer to create games quickly and personalize them according to their desires, needs and goals. UE5 came with two new features which play an important part in the project. Following testing, the 5.1 version was chosen over the 5.0 and 5.2, as it had both performance and stability.

Nanite and Lumen

Nanite is UE5's virtualized geometry system, enabling the engine to generate polygons with different levels of detail, removing the need to create level of detail meshes, improving performance and quality. Lumen's dynamic global illumination is another of UE5 features, allowing the use of mobile lights, and generating reflections and indirect lighting accordingly. The use of Lumen in the project allowed giving the user the ability to choose the month and time of day in the UI and view the result in real time.

Quality, Quantity and Performance

Given the same assets, a path traced scene will give the more truth to life view, with potentially multiple traces for every single pixel of the scene, with diffusion, reflection and bounces done according to physics. However, this method would require several seconds for each frame even with the current best consumer hardware.

When it comes to quantity, the same low performance issue happens when the scene is overloaded, with too many draw calls for the hardware to keep up, leading to a noticeably longer frame time.

Performance is the other side of the same coin, a scene with the lowest quality and polygon quantity would get the most frames per second.

In consequence it was required throughout the project to keep those elements in balance, with performance being the limiting factor, deciding what could be added and requiring optimization and testing of performance costs with each new addition, going beyond enabling only the engine's optimization features and requiring the addition of other methods.

Yann Dara Studer
yanndara.studer@gmail.com
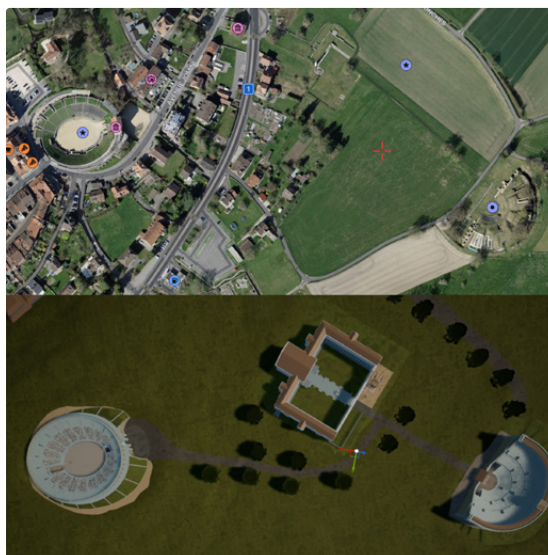
Three buildings, real and virtual