

INTISARI

Game Forest Keeper dikembangkan sebagai media edukasi berbasis SDGs Life on Land untuk meningkatkan kesadaran tentang pelestarian ekosistem darat. Namun, kompleksitas aset 3D dapat membebani kinerja game, sehingga diperlukan optimasi guna menjaga keseimbangan antara kualitas visual dan performa. Penelitian ini menerapkan Quadric Error Metrics (QEM) untuk menyederhanakan mesh 3D serta Level of Detail (LOD) untuk menyesuaikan detail objek berdasarkan jarak pandang pemain. Pengembangan mengikuti metode eksperimen guna memastikan optimasi dilakukan secara sistematis dalam setiap tahap produksi. Implementasi QEM dan LOD dalam Forest Keeper berhasil meningkatkan frame per second (FPS) dan mengurangi konsumsi memori tanpa mengorbankan kualitas visual. Hasil ini menunjukkan bahwa teknik optimasi aset 3D dapat diterapkan secara efektif dalam game edukasi berbasis Unity untuk menciptakan pengalaman bermain yang lebih efisien dan menarik.

Kata kunci: Optimasi Aset 3D, Quadric Error Metrics (QEM), Level of Detail (LOD), Unity.

ABSTRACT

The Forest Keeper game was developed as an SDGs Life on Land-based educational medium to raise awareness about terrestrial ecosystem conservation. However, the complexity of 3D assets can burden game performance, so optimization is needed to maintain a balance between visual quality and performance. This study applies Quadric Error Metrics (QEM) to simplify 3D meshes and Level of Detail (LOD) to adjust object details based on the player's field of view. Development follows an experimental method to ensure optimization is conducted systematically at every production stage. The implementation of QEM and LOD in Forest Keeper successfully increases frames per second (FPS) and reduces memory consumption without compromising visual quality. These results demonstrate that 3D asset optimization techniques can be effectively applied in Unity-based educational games to create a more efficient and engaging gameplay experience.

Keywords: 3D Asset Optimization, Quadric Error Metrics (QEM), Level of Detail (LOD), Unity.

