Performance editing default scenery's

By vSkyChek 2023/9/24

Introduction

The world of flight simulation has evolved significantly over the years, offering virtual pilots the chance to experience the skies in breathtaking detail. However, as the complexity of these simulations has increased, so too have the demands they place on our hardware. In this article, we dive into the journey of an enthusiastic X-Plane enthusiast, vSkyChek, who discovered the art of perfecting sceneries for improved performance and stability.

A Struggle for Smooth Sailing

It all began in 2022 when vSkyChek fired up X-Plane 12, then in its beta stage. The excitement of exploring the virtual skies was soon overshadowed by warnings from his PC's cooling system. The issue? Spiking wattage. With a newly bought NVIDIA 3080 card, consuming 750-800 watts while juggling two monitors and extra USB hardware, it was clear that something needed to be done.

The Road to Optimization

vSkyChek embarked on a mission to unravel the source of this bottleneck. Armed with a top-of-the-line 5900X CPU, he set his sights on GPU processes. Through meticulous observation using VRAM profiler and Windows system measurement tools, vSkyChek pinpointed certain airports that heavily impacted FPS, a puzzling discovery considering all his sceneries were default.

One such problem airport was Manchester EGGC, riddled with doubled vertices, errors, overlapping taxiways and polygons. Armed with determination, vSkyChek began learning how to edit these sceneries using World Editor WED. He meticulously removed unnecessary elements, referencing Google Maps and Jeppesen charts to ensure accuracy.

The Impact of Editing

After hours of effort and running validation checks on WED, vSkyChek created custom sceneries on his hard drive. The results were astounding. X-Plane 12 started up seamlessly without warnings, even allowing him to jump straight into his favourite plane, the Zibo mod, without first enduring a lengthy Cessna loading sequence.

The impact on performance was equally impressive. Before his edits, FPS reported about 25 with the Zibo mod loaded, but after optimization, the FPS increased to well above 40. The improvements were large, and vSkyChek was hooked.

This is EGCC before edit.

This is EGCC after edit.

This is ESSA before edit.

This is ESSA after edit.

The Dawn of XP12 Mesh and Airport Classification

In 2023, a new X-Plane beta brought something intriguing. A blog post hinted at a future of scenery design, mentioning the inclusion of airport area classification within XP12's mesh from OpenStreetMap OSM data. This piqued vSkyChek's curiosity, leading him to delve deeper into the differences between XP11 and XP12 mesh.

XP11 mesh lacked airport classifications, needing the use of Airport boundaries to prevent runway and ground vehicle placement issues. However, XP12's mesh had this classification, making Airport boundaries redundant.

Unleashing the Potential

With this newfound knowledge, vSkyChek experimented further. He removed airport boundaries in selected scenes and experienced no validation errors. The results were remarkable - a scenery free from airport boundaries and a 5-10% boost in FPS. The optimization was a success.

Tips and Recommendations for Scenery Editing

Having explored the art of scenery optimization extensively, vSkyChek offers some valuable tips:

Convert to XP12: Use the menu system in World Editor to convert all assets to XP12.

Mind Taxiways and Draped Polygons: Avoid transparent taxiways and minimize the creation of several taxiways and draped polygons. Use the MERGE function judiciously for best results.

Minimize Nodes: Use as few nodes as possible for straight lines and Bezier curves where ground contours change. 2 nodes for a straight line, and one(!) Bezier-curve where ground is turning.

Separate Lines and Markings: Create lines and markings in separate .lin for easier management and merging.

Limit Taxi and Ground Routes: Keep taxi routes and ground vehicle routes to a minimum, as excessive routes can affect performance.

Avoid TerrainFX and Autogen: XP12 adds these automatically if missing from the WED file, so there's no need to include them separately.

Optimize Grass and Soil: Extra grass and soil textures are often unnecessary, as they're hardly visible during the pre-flight phase.

Ortho Considerations: If using Ortho inside WED, keep areas relatively small for better performance.

Consider Contrast: Ensure taxiway and draped polygon contrasts are visible, especially for players with lower visual acuity.

Beware of Static Objects: Static objects like "cars.obj" and certain autogen can be FPS killers.

Airport Boundaries: Experiment with removing airport boundaries, especially in XP12, to potentially gain FPS improvements.

Conclusion

vSkyChek's journey into perfecting X-Plane 12 sceneries offers a fascinating glimpse into the world of flight simulation. By following these tips and recommendations, you too can enhance your virtual flying experience, unlocking better performance and smoother flights. As X-Plane continues to evolve, so do the possibilities for creating more immersive and efficient virtual worlds in the skies.

Examples:

Here is a good example of default scenery of ESSA Arlanda recommended from 2020. The reason the taxiway isn't visible is because an error in design with doubled vertices, as 2 nodes on top of each other. South of this image is another taxiway which easy could have been MERGED. All these errors cost a lot in resources.
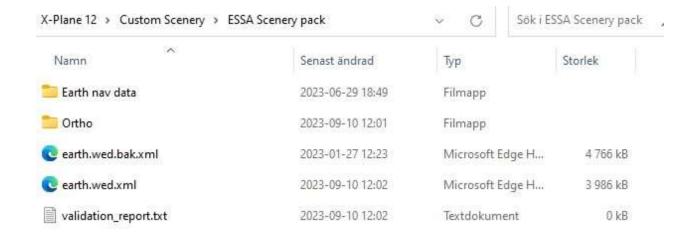
Here I have removed the doubled vertices/nodes and MERGED with the south taxiway. By doing that I save a whole area in WED XML-file and 2 different renderings in X-plane.

This is taxi routes that are completely unnecessary as described above. The only reason to keep any taxi route is addons like world traffic and the internal ATC AI. The ground vehicle routes could also be very sparse since they only prevent ground vehicles from driving on runway or over grass areas. That's a lot of nodes saving.

Here I have peeled off a lot of unnecessary nodes and saved a lot of textures. On some default scenery creators even add taxi routes to places without ramps. Completely unnecessary.

Namn	Senast ändrad	Typ	Storlek
Earth nav data	2023-06-29 18:49	Filmapp	
Ortho	2023-09-10 12:01	Filmapp	
earth.wed.bak.xml	2023-01-27 12:23	Microsoft Edge H...	4 766 kB
earth.wed.xml	2023-09-10 12:02	Microsoft Edge H...	3 986 kB
validation_report.txt	2023-09-10 12:02	Textdokument	0 kB

You can clearly see the difference in file size in Custom Scenery before and after edit. And the best part is that I don't even have to touch any buildings.

Inside VRAM-profiler I look a lot on Textures which are loaded into memory and cache. And if you like me always start with the same plane (Zibo mod) then you can clearly see how many textures and Gb are loaded into memory and cache. My experience tells me that if I'm able to edit down to about 1600 - 1700 textures on a scenery, then I know I will get a pretty good FPS.
Then of course its all about checks and balances to ensure everything is working as intended.