Introduction to Graphics Programming and its Applications

繪圖程式設計與應用

Final Project

Instructor: Hung-Kuo Chu

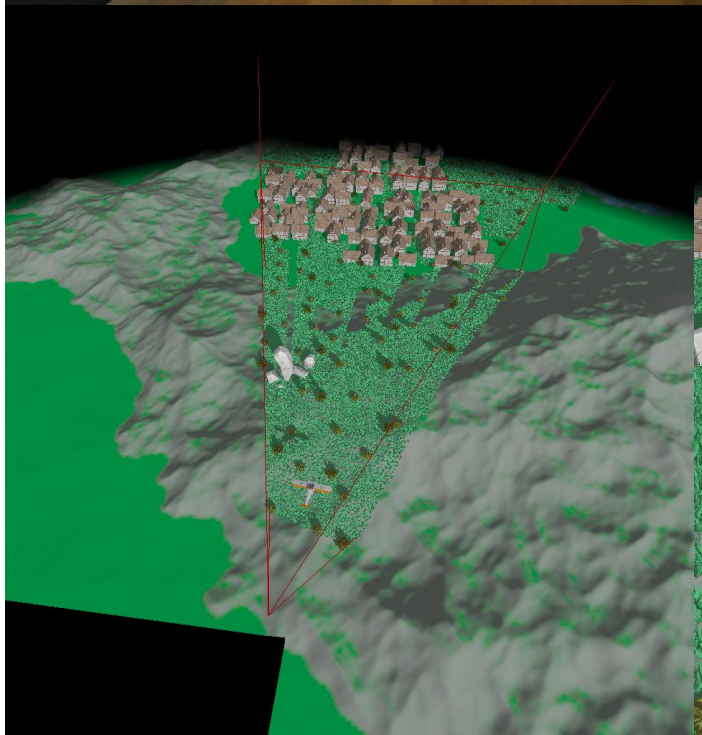
Department of Computer Science

National Tsing Hua University

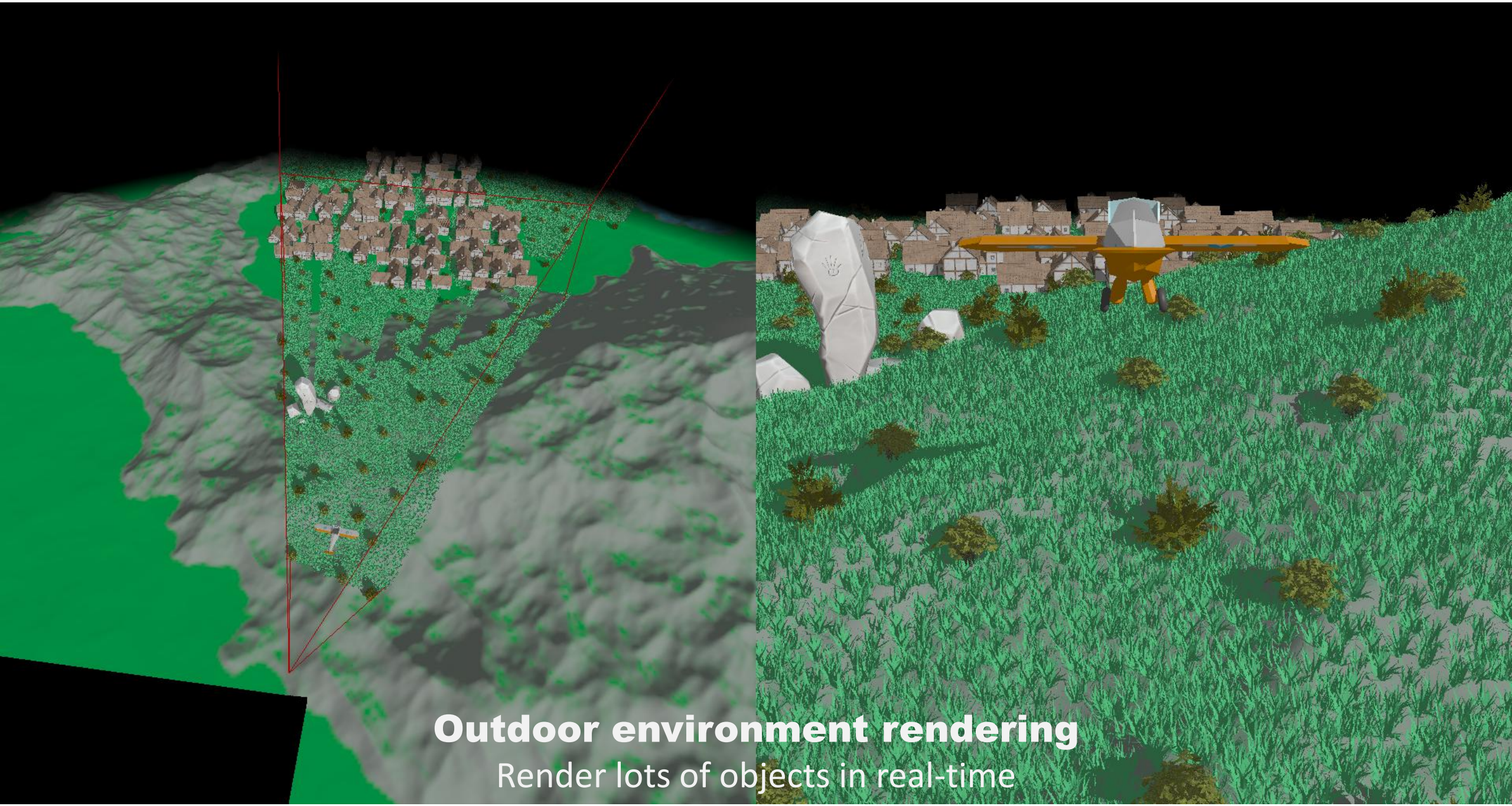
CS5507

Final project

Append various rendering techniques to the given scene to produce the impressive rendering result



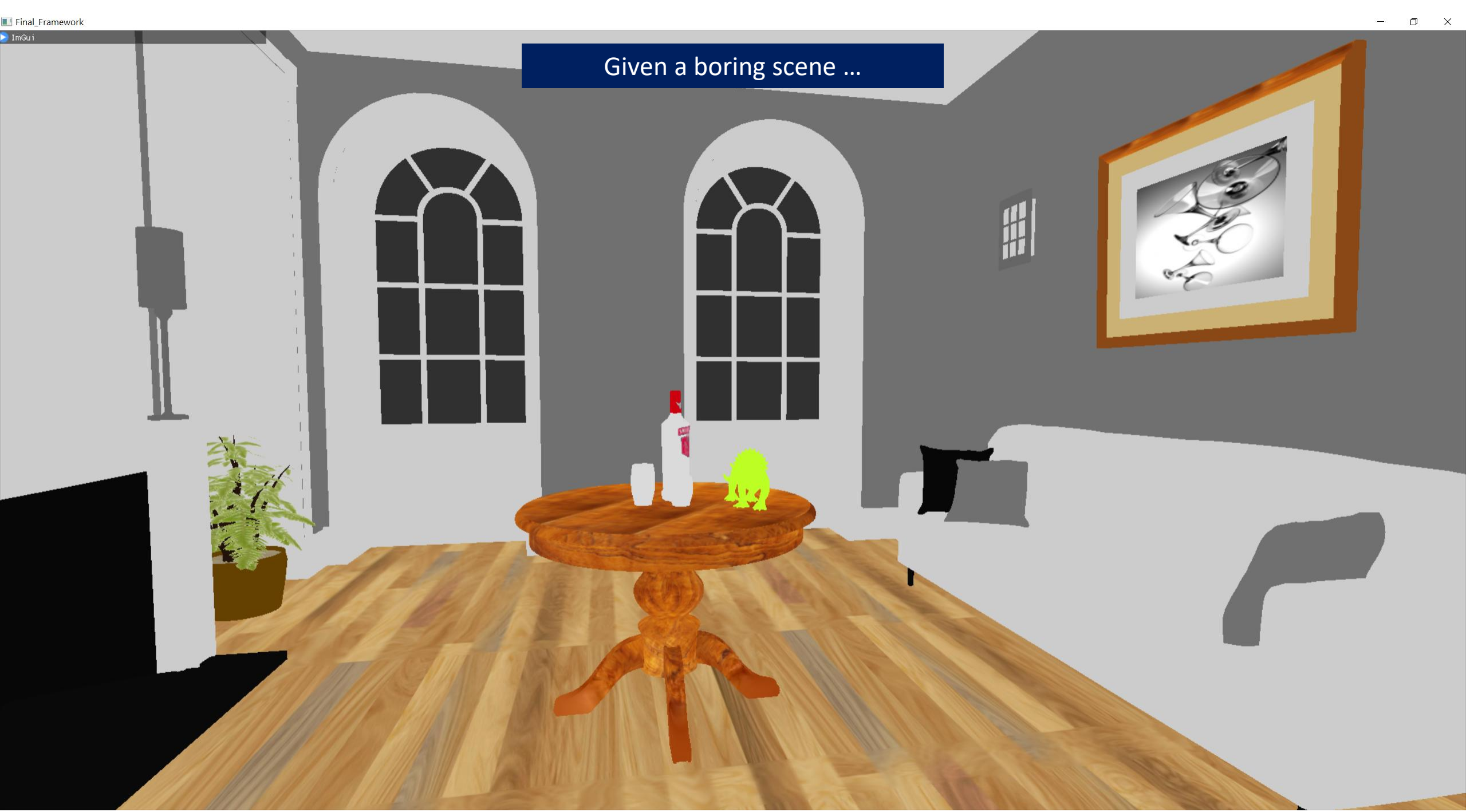

Final_Framework
ImGui
Indoor architecture rendering
Render everything exquisitely



Outdoor environment rendering

Render lots of objects in real-time

Indoor architecture rendering


Final_Framework
ImGui
Given a boring scene …


Final_Framework
ImGui
Shading & shadowing


Final_Framework
ImGui
Area light


Final_Framework
ImGui
Area light + volumetric light

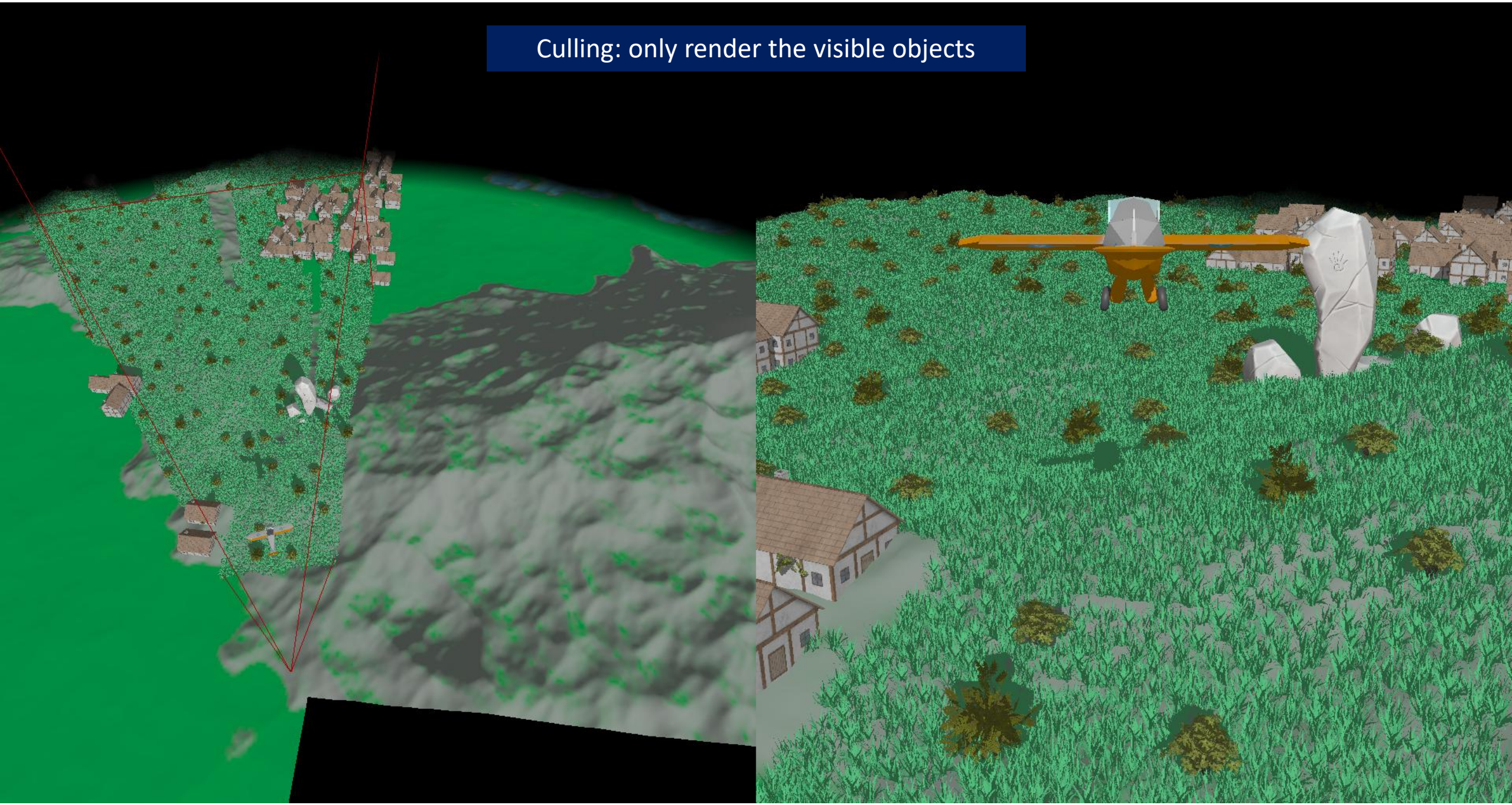

Final_Framework
ImGui
Interesting NPR

Indoor architecture rendering Technique list

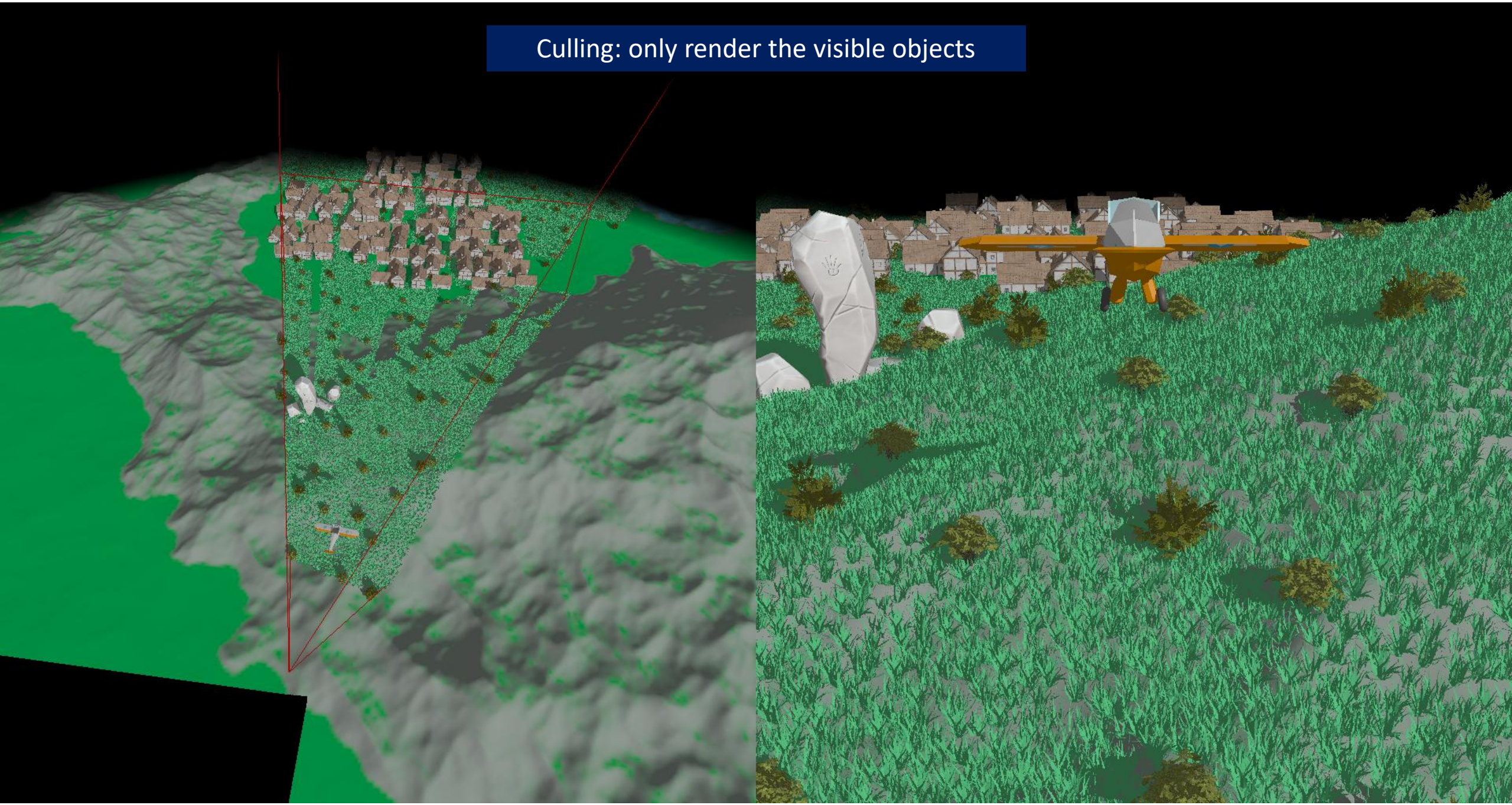
- Basic
  - Blinn-Phone shading
  - Directional light shadow
  - Deferred shading
  - Normal mapping
  - Bloom effect
- Advanced
  - Screen Space Ambient Occlusion
  - Real-time point light shadow
  - Screen Space Reflection
  - Non-photorealistic rendering
  - Fast Approximate Anti-Aliasing
  - Area light
  - Volumetric light

Outdoor environment rendering

Culling: only render the visible objects

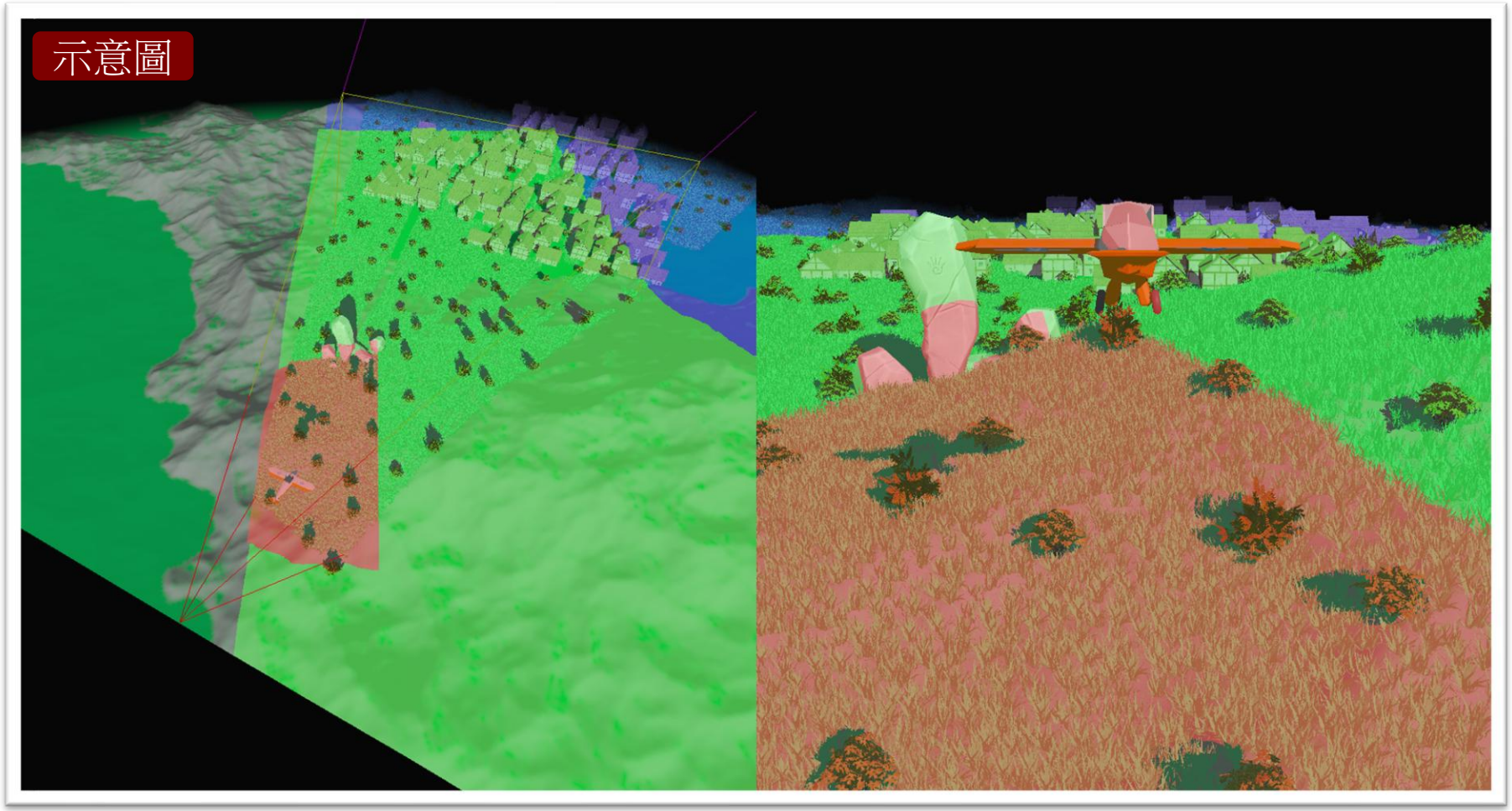


Culling: only render the visible objects



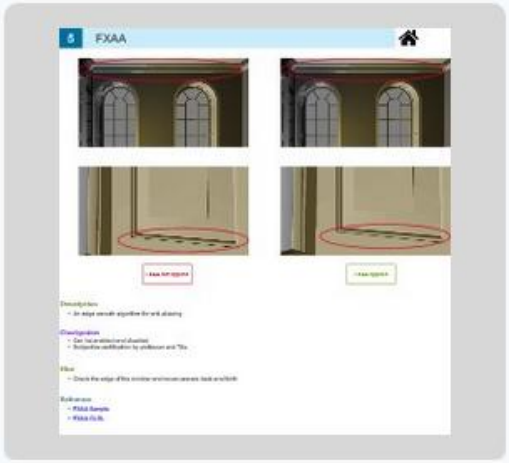
Outdoor environment rendering Technique list

- Basic
  - Blinn-Phone shading
  - Deferred shading
  - Normal mapping
  - Bloom effect
- Advanced
  - GPU-driven foliage and building culling
  - Cascade shadow map



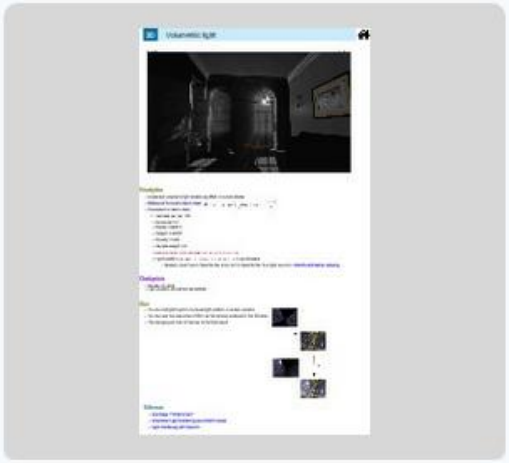
Technical spec online documentation

link

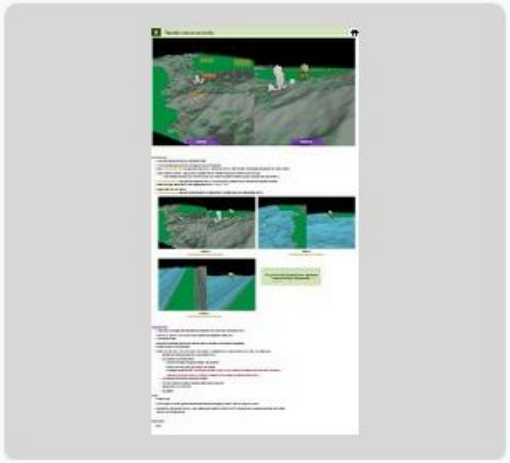


[indoor] FXAA

[indoor] Area light



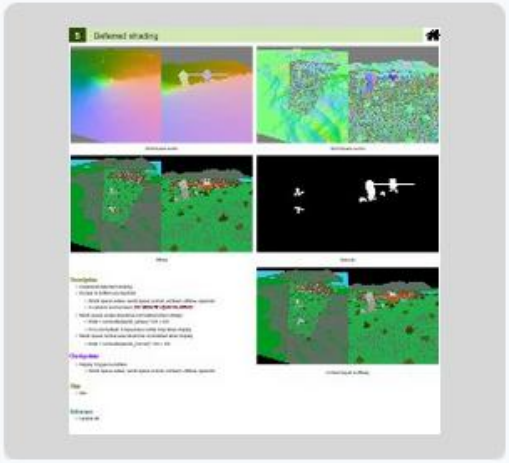
[indoor] Volumetric light



[outdoor] Render scene correctly

[outdoor] Blinn-Phong shading

[outdoor] Normal mapping



[outdoor] Deferred shading

[outdoor] Basic GPU-driven rendering

Final Project

- **You will get 0% if you are not present for the demo**
- Make sure the execution files for your indoor and outdoor projects work on the demo laptop.
- **45%** of final semester score
- The upper bound of the final project score is 110
- Please submit your project & report via **FTP**

CPU	Intel Core i7-12700H
RAM	DDR5 32GB
VGA	GeForce RTX3070Ti/8GB GDDR6
OS	Windows 11 Professional (x64)

Schedule

2025/11/03 (Mon.)	Announce final project
2025/11/10 (Mon.) 23:59	Group sheet modification deadline
2025/12/14 (Sun.) 23:59	Project submit deadline
2025/12/01 (Mon.) 15:30 2025/12/08 (Mon.) 15:30	Execution file testing
2025/12/15 (Mon.) 15:30	Demo

File Structure (Indoor)

- Required File Structure:

```
Group_06_Indoor/
├── assets/
├── shaders/
├── src/
├── main.exe <- Copy this from build/Debug or build/Release etc.
├── builder/
├── build/
└── Group_06_Indoor_Report.pdf
```

- Other file structures will not be accepted
- Do not use your own framework
  - You should start your assignment from the provided template
- We will follow the steps shown in the video to build your projects
- **Do not** upload “builder” or “build” directory to FTP
- The provided main.exe should be built from the provided source code.

File Structure (Outdoor)

- Required File Structure:

```
Group_06_Outdoor/
├── assets/
├── shaders/
├── src/
├── main.exe <- Copy this from build/Debug or build/Release etc.
├── builder/
├── build/
└── Group_06_Outdoor_Report.pdf
```

- Other file structures will not be accepted
- Do not use your own framework
  - You should start your assignment from the provided template
- We will follow the steps shown in the video to build your projects
- **Do not** upload “builder” or “build” directory to FTP
- The provided main.exe should be built from the provided source code.

MD5 checksum

- 除了作業本身外，請透過 MD5 獲得作業checksum 後填入 google 表單
- 如遇各種原因無法在作業期限前完成上傳的同學，我們將比對 checksum。若 checksum 一致則不算遲交。
- 若有多個 checksum 則取時間最晚的為主。
- MD5 online generator
- MD5 checksum 登記表單
- MD5 checksum 登記查看
- MD5 使用方法

Peer Assessment (互評)

- Team up and work together (up to **5** members in a team), TAs will evaluate personal grade from peer assessment (互評)
- TAs will give each team an assessment table as shown below BEFORE demo day, **every team should hand in the table on demo day**.
- All the team members have to sign the form to acknowledge the claimed contribution.

組員	學號	工作	貢獻度
AAA	xxxxxxxx	蒐集模型、安排場景....	25%
BBB	xxxxxxxx	UI、物理系統...	25%
CCC	xxxxxxxx	系統整合、Game、Demo...	25%
DDD	xxxxxxxx	Report、Idea...	25%

Peer Assessment (互評)

假設組員人數為 N
每位組員的期望貢獻度為 Rd = 100 / N
而實際貢獻度為 Rt
定義比例 x = min(Rt/Rd, 1)
再由 x 用下圖的函式計算分數該要乘上多少 (f(x))
使得最後組員成績為 (原始小隊分數) x (f(x))