



# Portfolio



VINCENT DUCROS

# About me

Hi, I'm Vincent Ducros, a computer science engineering student at ÉTS. I'm currently looking for an internship as an engine programmer, mostly to gain experience in modern real-time rendering technique before graduating.

## RELEVANT TECHNICAL SKILLS

OpenGL

C++

Unreal Engine

## HUMAN SKILLS

Autonomous

Perfectionnist

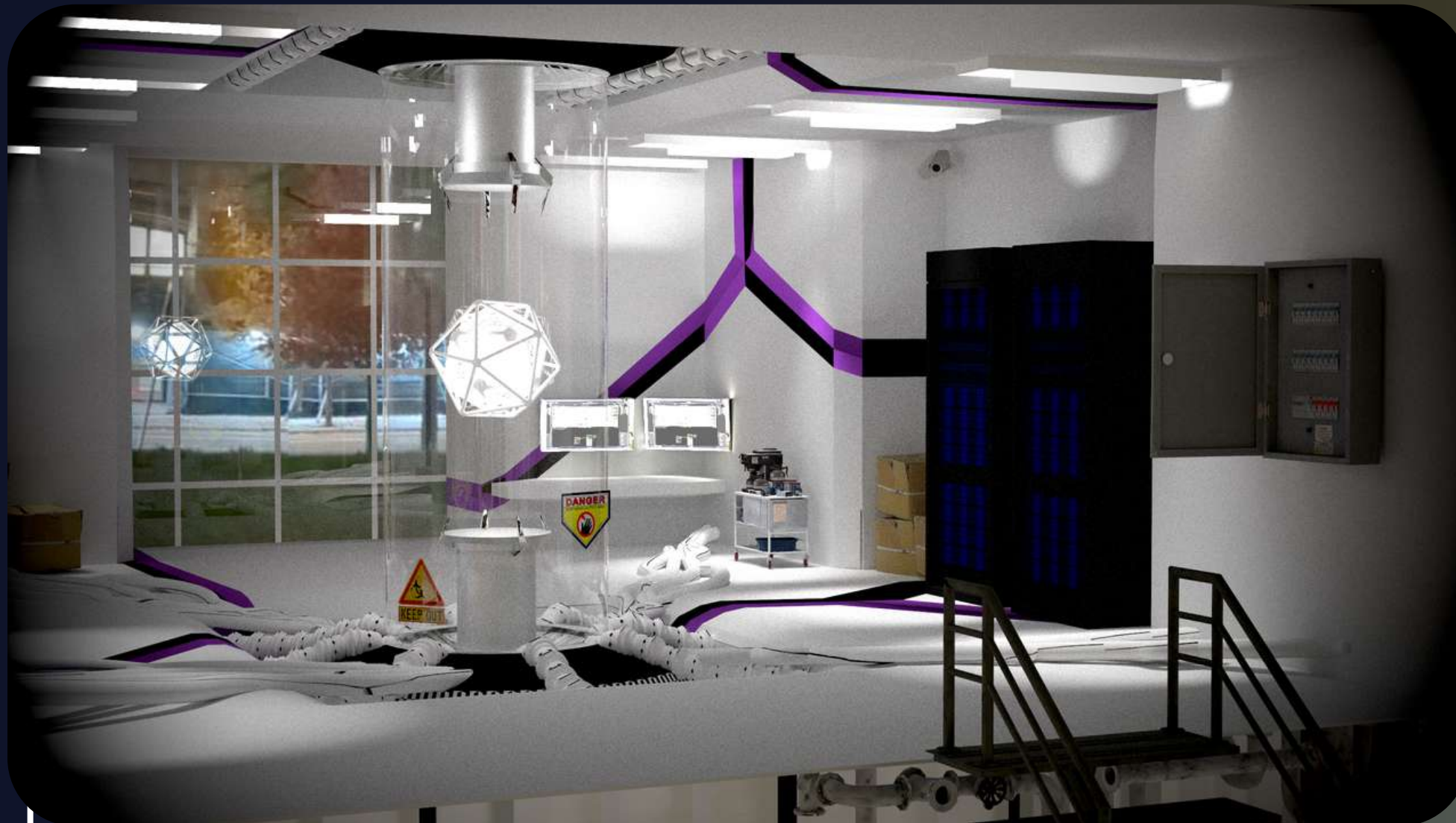
Hard-working

Team player

Curious

# Path-traced Renderer

[PROJECT LINK](#)



As part of a class on physically based rendering, I've built a path-traced renderer. With a colleague, we pushed it a bit further for an end of semester rendering competition in the same course. The final scene was created in Blender and rendered at 1440p with 4096 samples.

The theme for the rendering competition was : "Les grandes avancées technologiques", and we were inspired by the *Westworld* movie. This scene depicts a futuristic data-centre, with the centrepiece being an AI super-brain, connected through thick cables to the exterior world



**Runner-up**

# Path-traced Renderer

In this project, I implemented the following features :

Multiple importance sampling  
( material + lightning )

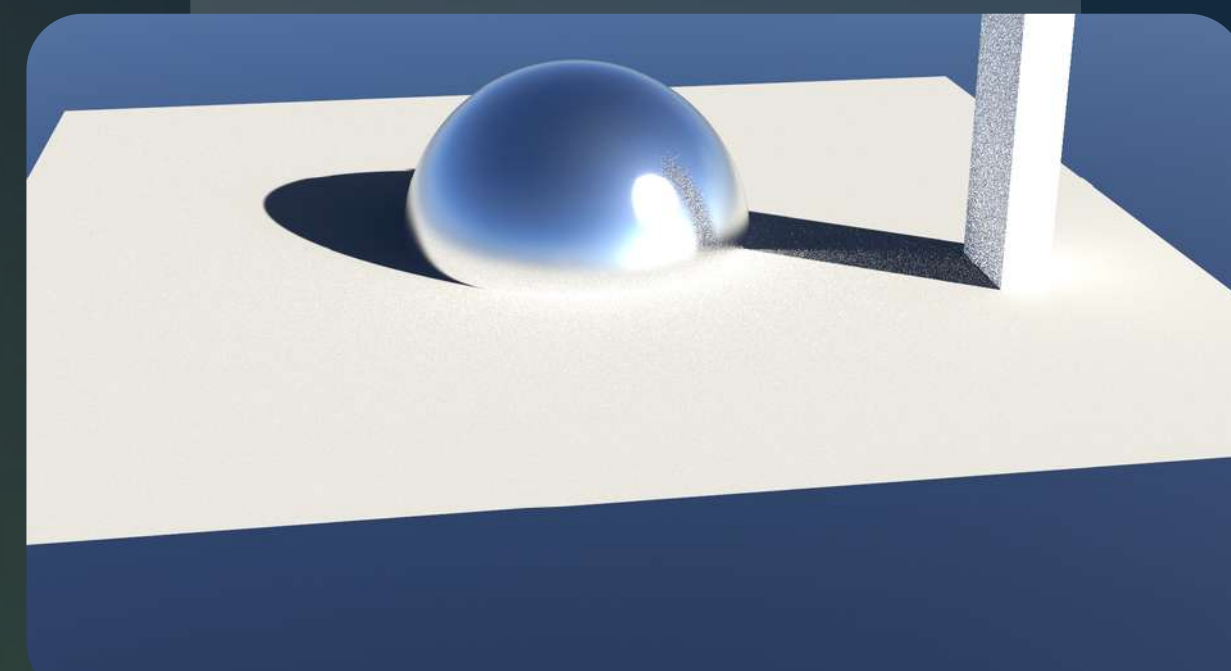
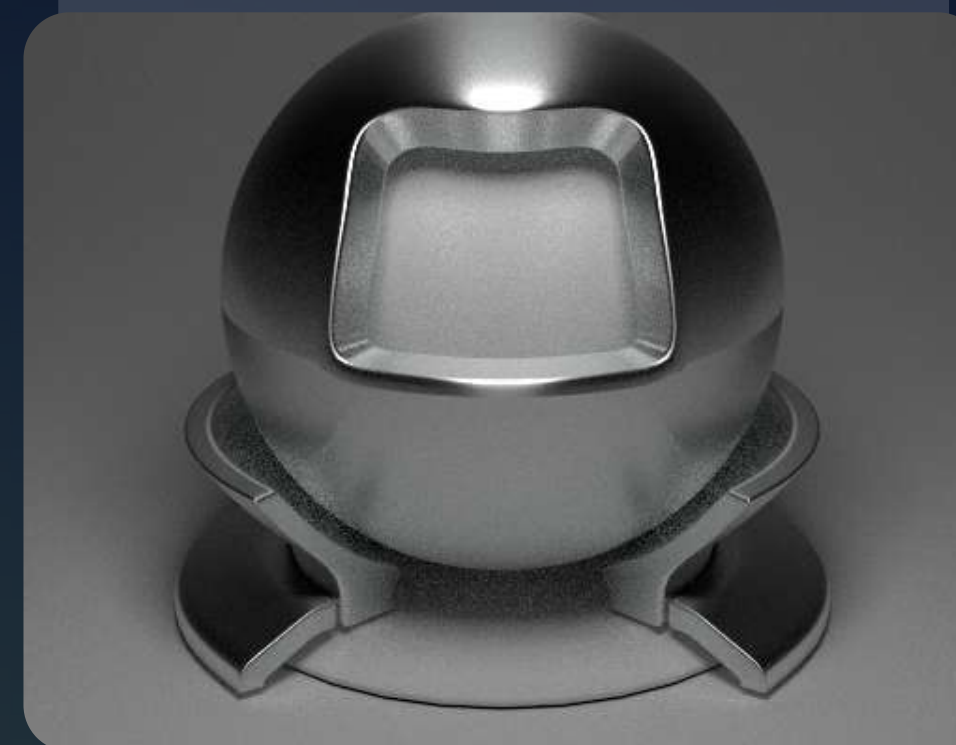
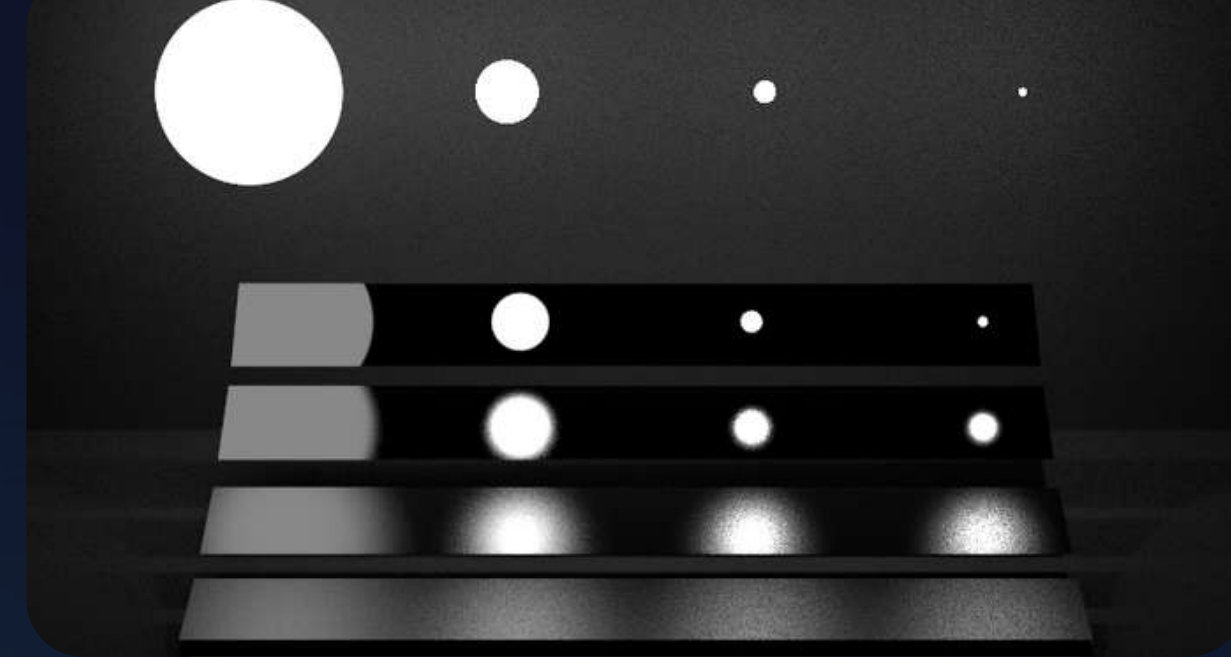
Efficient ray-triangle intersection  
using a BVH and AABB

Microfacet material model, used  
for anisotropic rough conductors

Environment map with  
Multiple importance sampling

Solid angle sampling of  
spherical light sources

Multiple other materials models :  
Phong, (thin) glass, specular metal

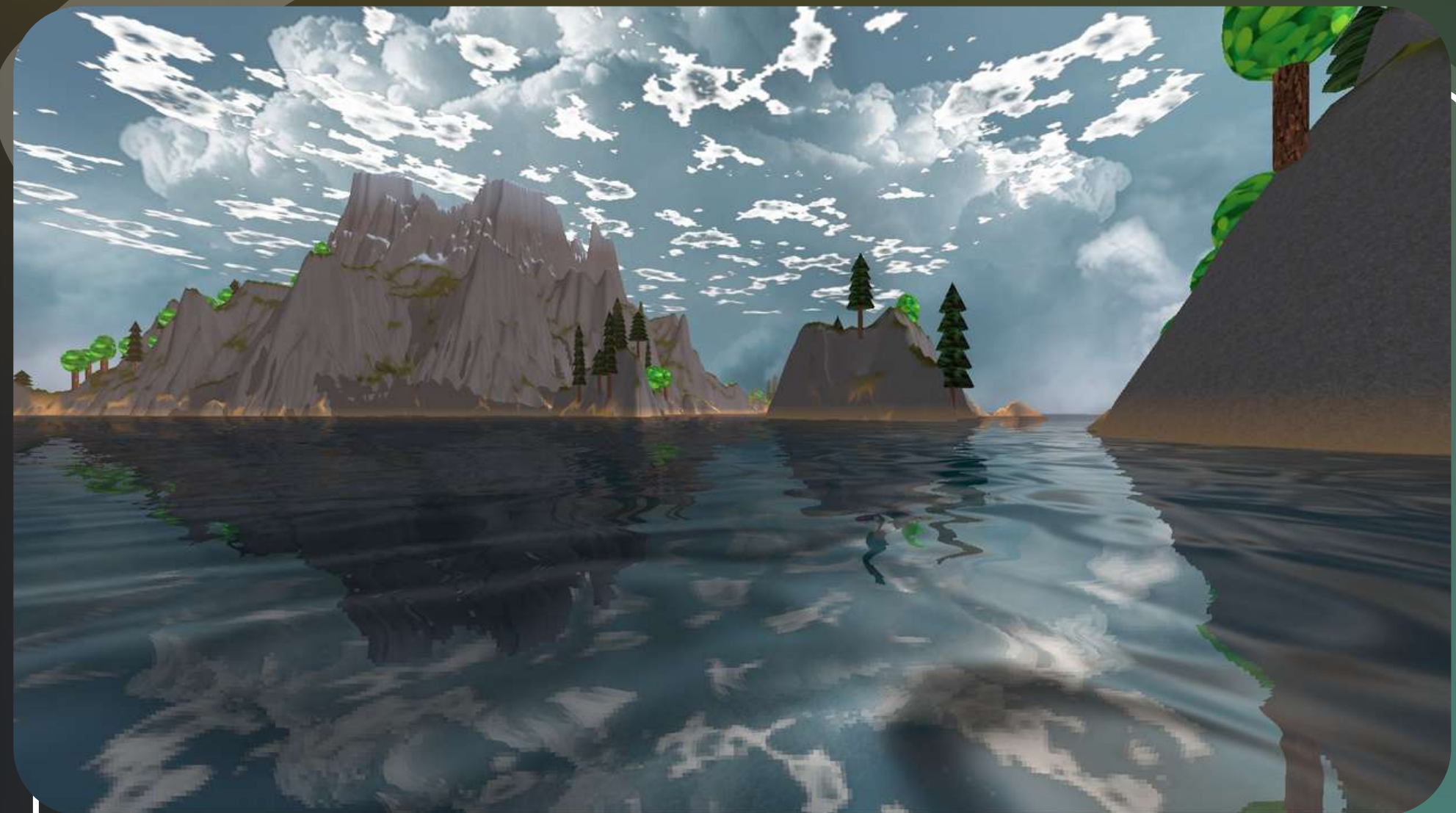


[PROJECT LINK](#)

# 3D Volcano Scene

Recently, I've had the opportunity to bring to life a 3D scene using OpenGL. The goal of the project was to provide solutions for the modeling, rendering, animation and interaction of a volcano scene, with animated and/or interactive elements. I was the main developer in a group of three people and provided support to my teammates and other class members.

Below are most of the features I was responsible for.



Planar water shader

Advanced texturing

Random tree generation

Particle system

Day/Night Skyboxes

Shadow mapping

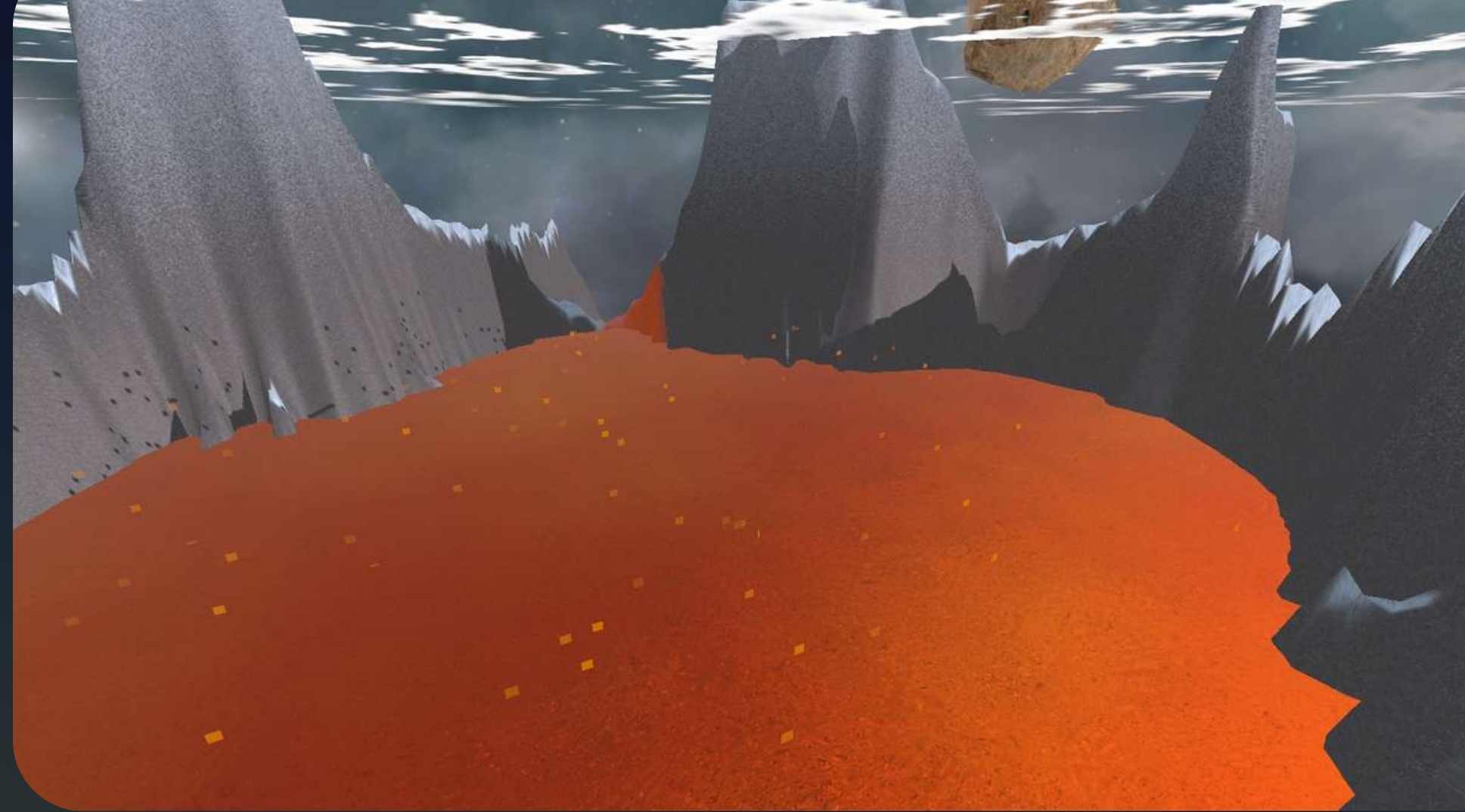
Terrain generation

Flyout camera

Normal mapping

# 3D Volcano Scene

- Simple shadow map that follows the origin of the world, moves in accordance with the time of day and fades out at a distance. [\[Link1\]](#) [\[Link2\]](#)
- Realistic water shader featuring reflections, refractions, distortions, fresnel effect and a normal map. [\[Link\]](#)



- Basic particle system tied to the rising lava animation, all particles stored in one buffer. [\[Link\]](#)
- Advanced texturing using triplanar mapping, normal mapping, texture splatting and Phong based illumination model. [\[Link\]](#)
- Random tree generation where all trunks are stored in one mesh and each leaf type is stored in one as well. [\[Link\]](#)

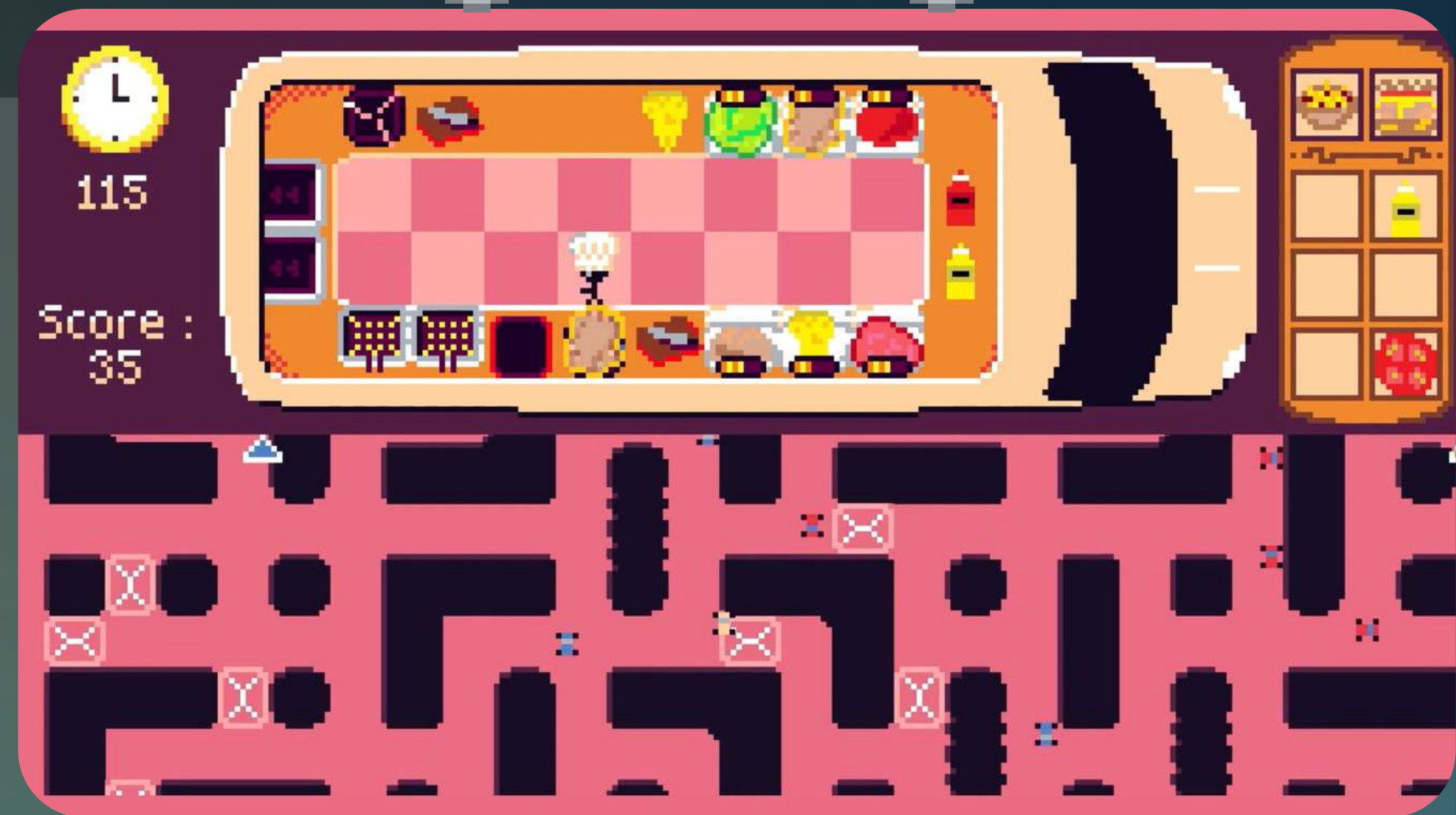
# Patatruck

[PROJECT LINK](#)



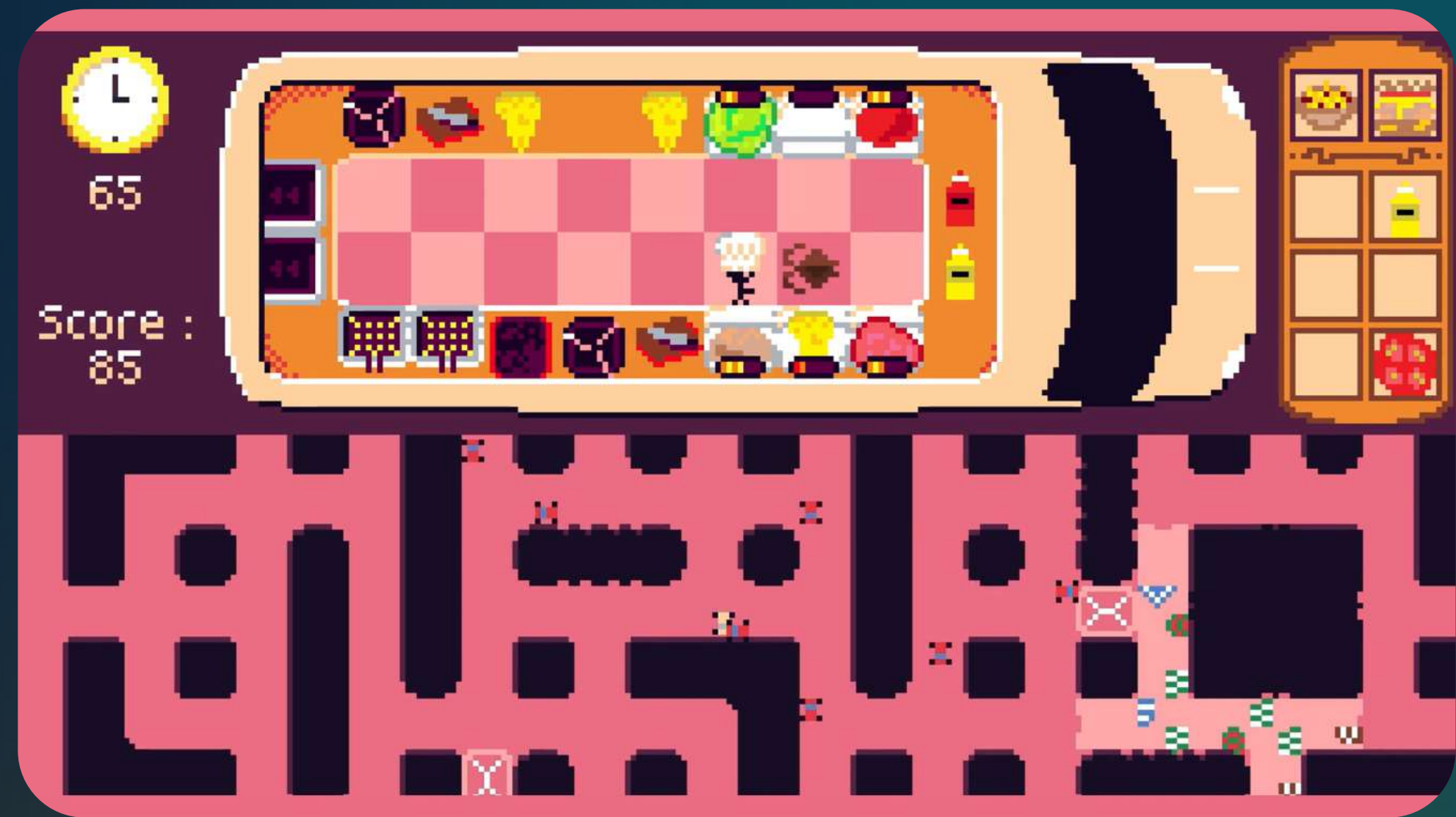
Patatruck is a 2D Java game project developed over the course of 3 weeks with a team of 8 people. It's a local multiplayer, fast paced, scoring based game where every mistake can bring your downfall.

- One player controls a cook and must prepare the recipes that need to be delivered by ...
- The other player who pilots a foodtruck through a randomly generated city and must also drive across markets to resplenish the kitchen's stock
- Both are playing simultaneously and can impact the experience of the other : failed cooking changes the truck handling, meanwhile going over speedbumps too quickly shuffles the kitchen tiles.



# Patatruck

On Patatruck, I worked on the following features, helped my colleagues with the technical challenges they encountered and took a center role in defining the tasks that we should complete to deliver on our vision for the game. You can follow the link to view the main code files for each feature below.



## Automata parsing and method gen.

- Add your own entity script to the game (.gal) and it will work.
- Creates Java objects from the file, methods are called at runtime

[\[Link1\]](#)

[\[Link2\]](#)

## City scene viewport and entity cache

- Local coordinates system around the truck
- Entity cache system to keep track of them / despawn when out of view and update when in view

[\[Link\]](#)

## Foodtruck & other cars physics

- 3 different arcade physics for the truck featuring friction / acceleration
- Seamlessly switch between them
- Basic collision + bounce back when touching walls

[\[Link\]](#)



# Going further

Apart from game related development, over the course of my studies, I learned a variety of languages, algorithms and projects methods, notably :

- Low-level understanding of computer architectures
- Basis in networking and databases
- Signal processing knowledge
- Basis in machine learning
- Web development
- Linear algebra
- Agile methodology
- Git versionning



# Thank you



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