Magrathea Engine

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Document :	**Project Sheet**
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Abstract

This documentation is a overview of the Magrathea Engine project. It covers preliminary aspects of this project's future organization and describe his goals. The Magrathea Engine is an environmental engine designed with powerful tools to provide a complete solution for managing realistic simulations.

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1. Context and stakes

1.1 – Context

Currently, there is a growing demand in realistic environmental simulations, particularly in military, scientific or town planning domains. Existing solutions are becoming old, or costs a lot of money. And none of them are open source. That is why we want to develop a new solution, based on the open source philosophy to provide an environmental engine and a flexible graphical designer to create a real alternative. It will be based around the OpenSceneGraph project, an open source, cross platform graphics toolkit for the development of high performance graphics applications such as flight simulators, virtual reality and scientific visualization.

1.2 – Stakes

The stakes of this project are multiples :

- First, we want to help the open source community by improving the OpenSceneGraph project with a environmental engine.
- Currently, OpenSceneGraph need a graphical tool for improving, and testing the created 3d scenes.
- We want to fill a current leak in open source engines by developing a fast, reliable and easy-to-use solution for realistic simulations.
- We will try to promote our work to become a standard in this domains.
- Finally, this project involve a lot of human stakes, like managing a group during one year and half in parallel of our studies or works.

2. Awaited results

This project will be composed of two main parts, an environmental engine and the graphical designer. Here is the awaited results for each of them.

2.1 – Engine results

The main goal of the engine is to provide realistic and customizable environments in real time by :

- Rendering realistic water comportments.
- Managing atmospheres and weather effects.
- Providing terrains without size limits, and with high zoom possibilities.
- Rendering realistic vegetation.

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2.2 – Tools results

The tools' goals are to :

- Provide an universal platform for editing OpenSceneGraph elements, using the reflection framework for dynamically generating the user interface and integrating a plug-in system.
- Provide plug-ins to edit each kind of OpenSceneGraph objects and objects exported by OpenSceneGraph-based libraries.

3. Description

3.1 – What is the Magrathea Engine ?

This project is a real-time 3D terrain engine able to create user-defined, true-to-life landscapes with accurate topography, local vegetation and variable weather conditions. Here are some of his technical specifications :

- Use of the OpenSceneGraph rendering engine.
- Written in C++.
- Cross platform.



Example of terrain generation

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3.2 – What tools will it provide ?

It will principally provide an universal editor for the OpenSceneGraph engine : osgDesigner. This editor will allow to customize any of the objects exported by OpenSceneGraph. The plugin system will allow developpers to improve and test parts of the 3d engine. The first plugin will permit to edit the environment engine's objects, and to precisely control the terrains' render. Here are some of his technical specifications :

- Use of the OpenSceneGraph reflection framework : will allow us discover and call any objects at run-time.
- Very flexible plugin system : plugin developpers will be able to improve and extend osgDesigner at need.
- Written in C++, possibility to write plugins in Python.
- Cross platform.

3.3 – What will be the course of the project ?

- First of December : return the existing study.
- 15 December : return the schedule of conditions.
- 15 December to 31 January : validation of the schedule of conditions.
- 2-6 January : 2 minutes presentation.
- 12-24 February : 20 minutes defense.
- End of March : presentation.
- May : defense.
- June : presentation.
- July : finale Tech4 defense.

4. Constraints and limits

Here are the main technicals constraints :

- Cross platform : we have to provide both engine and tools compatible with Windows and Linux systems.
- Hardware : we are limited by the hardware material found in EPITA buildings.
- Quality : we must develop a powerful, stable and easy to maintain project.

In a human point of view, we have to take care about :

- Time : we have to manage our time in order to be the most effective possible.
- People : our goals must be adapted to our manpower.
- Project's duration : we will need realizable objectives in the time that we have.

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5. Human organization

The team working on this project is composed by 6 Epitech's students :



Serge Lages – **Group leader**



David Callu – Lead osgDesigner programmer



Louise Jacquot



Laurent Marchal

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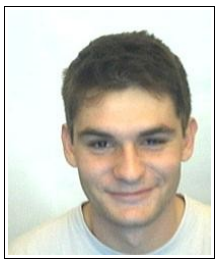

Nicolas Remia



Fabien Rioli – Quality manager

6. Material supplies

Concerning hardware material, we first dispose of all the computers present in the EPITA buildings. There are 15000 stations principally equipped with the NetBSD operating system, and computers with rackable slots, that let us choose the operating system to use.

We are developing on two different operating systems, with there own applications :

- On Windows : Visual Studio .NET 2005 for editing and compiling our work.
- On Linux : GNU/Emacs for editing and gcc for compilation.

For the source's management, we are using Tigris' SVN, a version control system that is a compelling replacement for CVS in the open source community.

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7. Communication plan

We are planning to promote and to communicate around this project with :

- SourceForge : it is the world's largest open source software development web site, hosting more than 100,000 projects and over 1,000,000 registered users with a centralized resource for managing projects, issues, communications, and code. By putting our project on this site, we hope to make it more easy to find and to contribute to the open source community.
- Web sites : we will develop web sites to promote and to present the functionalities and the work done on the engine and his tools.
- OpenSceneGraph : by working with this project, we hope that he may present us to his community with his web site.

8. References

- OpenSceneGraph :
  http://www.openscenegraph.org/
- SVN :
  http://subversion.tigris.org/
- SourceForge :
  http://sourceforge.net/
- Visual Studio .NET 2005 :
  http://msdn.microsoft.com/vstudio/
- Eclipse
  http://www.eclipse.org
- Emacs :
  http://www.gnu.org/software/emacs/emacs.html
- Gcc :
  http://gcc.gnu.org/
- STL
  http://www.sgi.com/tech/stl/
- Boost
  http://www.boost.org

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