UrbanRise

Introduction

Urban Rise is a procedurally generated city scape that will be fully explorable by the user in a first person perspective. PCG, or Procedural Content Generation will be used to generate the road map for the city as well as the building placement.

Project Scope and Objectives

The objectives of this project will work upon the theories and methods presented by Parish and Muller in their paper Procedural Modeling of Cities. The approach they use includes L-Systems along with Global Goals and Local Constraints to generate a road map of a city. [1][5][6]

The scope of the project will be to produce a procedurally generated city scape that allows the player to explore it. To accomplish this a few goals have been set including:

- To have a street layout similar to that in the real world.
- Buildings of different shapes and sizes will be randomly placed along the streets.
- The user will be able to navigate around the city in a first person view.
- The cityscape will be generated on game load
- Generation time will be as minimal as possible.

Due to time constraints I have decided not to implement any kind of loot system or AI but will be looking to do this in the future if the project is a success.

Design Methodology

I will use Scrum Methodology to develop my product. This will give me a greater scope for flexibility when developing my product allowing me to refine my goals and tasks as needed throughout the cycle. It will also allow me to adapt my planning and test aspects of the program regularly resulting in a more defined and solid product. [2][3]

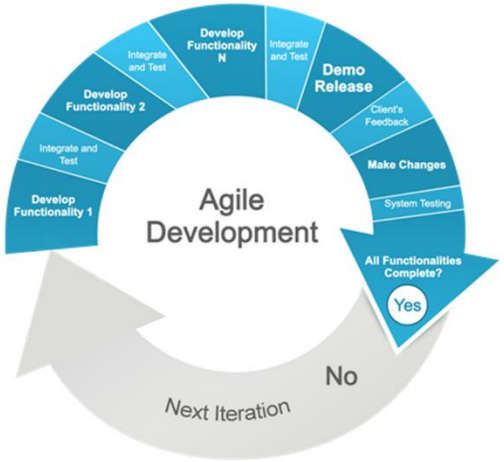


Image from TPlex [4]

Hardware and Software

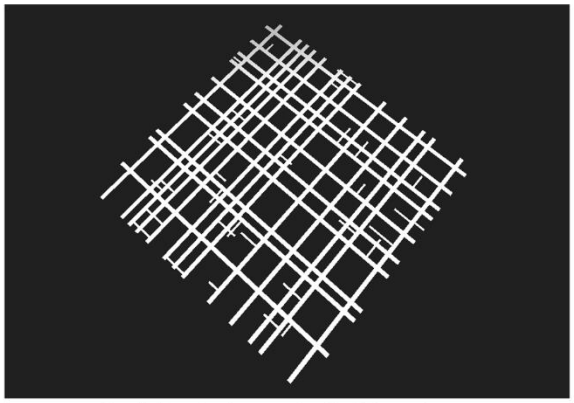
The application will be primarily built for a Windows PC. The PC will require at least 4GB of RAM and a Duel Core Processor along with the necessary peripherals. For movement, the user can opt to either use a Mouse and Keyboard or any support Controller.

The engine that the product will use is Unity 4.5, using this engine enables the product to be deployed to multiple platforms in the future if required. C# is the language of choice as it is one of the three that Unity supports and is the one that I have the most experience with.

Project Progress

So far the basic layout of the project has been implemented and a start has been made to generating the road maps in two different approaches.

Example of current roadmap generation using an L-System approach



Example of current roadmap generation using a Grid approach

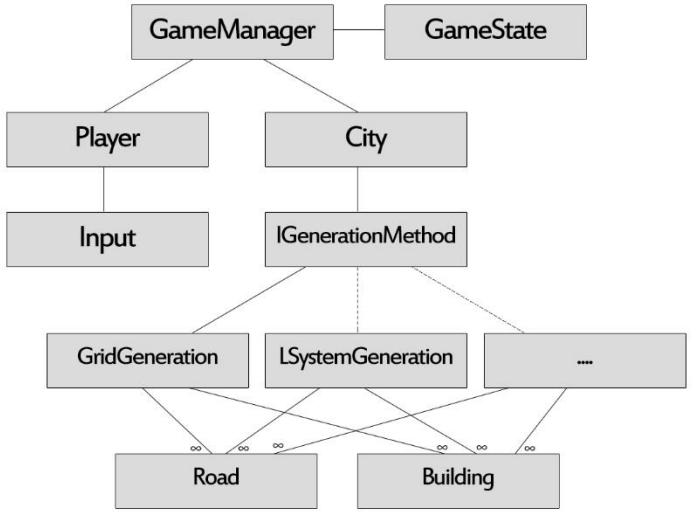
Boundaries and Constraints

Due to the time constraints and the lack of previous experience in the area of Procedural Content Generation, any AI and loot-based generation are not possible within the timeframe of this project.

As there is not artist involved in the project, the city environment may not look too appealing to the user with basic textures and models being used in the majority of places.

Application Structure

Below is a diagram showing a brief look at how the internal structure of the program will look in terms of classes and interfaces.



Project Plan

Project Proposal	29th September - 24th October
Analysis and Design	25th October - 24th November
Implementation	25th November - 27th February
Testing and Evaluation	28th February - 7th March

Steven Jackson L1018977 Computing Project Teesside University

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Legal, Social and Ethical Issues

No legal, social or ethical issues have been identified for the duration of this project. If the cities that will be generated contained buildings of actual business or corporations then some legal issues could be introduced. Another problem could be if the city layouts being created are similar or identical to real cities.

Professional Skills

This project will help me to develop skills that could be useful in the games and software development industry. A few areas that are particular useful include:

- Procedural Content Generation is becoming increasingly popular within games and used in a wider variety of areas within those games.
- Planning my use of time, assigning tasks to be completed and sticking to deadlines is an important aspect of the industry.
- C# is a commonly used language in games, web and software development. Widening my knowledge and gaining more experience will be extremely useful.
- Unity is a very popular game engine that is used a fair amount. Gaining knowledge of how this works, what it is capable of and how to develop with it could open the door to jobs in the games industry.

References

[1] PARISH, Y I H. & MÜLLER (2001) Procedural Modeling of Cities [Online] Available from: http://www.cs.berkeley.edu/~sequin/PAPERS/Parish_Mueller_Cities.pdf
[2] UDEMY BLOG (2013) Agile Vs. Waterfall: Evaluating The Pros And Cons [Online] Available from: https://www.udemy.com/blog/agile-vs-waterfall [Accessed: 4th December 2014]
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[4] TPLEX (2014) AgileDevelopment.png [Online] http://tplex.com/images/tplex/AgileDevelopment.png [Accessed: 4th December 2014]
[5] PRUSINKIEWICZ, P & JAMES, M & MECH, R (1994) Synthetic Topiary [Online] Available from: http://algorithmicbotany.org/papers/topiary.sig94.pdf
[6] LECHNER, T. & WATSON, B. & WILENSKY, U. & FELSON, M. (2004) Procedural Modelling of Land Use in Cities [Online] Available from: https://ccl.northwestern.edu/papers/ProceduralCityMod.pdf