Základní informace

Jméno projektu	Public Transport Simulation Game
Zkratka	
Vedoucí	Adam Dingle <adam.dingle@mff.cuni.cz>
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Anotace	The goal of this project is to build a single-player 3D graphical game in which the player must create and manage a public transportation system including buses, metro lines and/or trams. The game will simulate the inhabitants of a city and their movements through the transport system.

Motivace

There is a long history of city simulation games such as SimCity and Cities: Skylines. These games have proven to be very popular, perhaps because it is interesting to see an environment similar to the one we experience in real life. Building and managing a public transportation system is an interesting challenge from a practical and economic perspective, since it will require the player to balance competing demands from passengers who want to travel both quickly and cheaply.

Popis projektu

The essential features of the game will be

Procedurally generated city
: The game will automatically generate a city including urban and geographical features (buildings, streets, parks, rivers) and will expand it over time. Cities will have several kinds of zones (e.g. residential, commercial, industrial).

Realistic world simulation
: The world will be simulated including people, vehicles, and life in the city. Each person will travel daily between their home, workplace and leisure destinations such as restaurants or theaters. Each person will choose a route and mode of transport for each trip, minimizing the time and money they spend. Cars and buses will slow down to avoid colliding as they pass through intersections, and metro lines and/or trams will follow regular routes and schedules. Traffic jams may arise if there is too much traffic at a time on a single road.

Usable interface for building and monitoring a transport system
: The user will easily be able to build bus, metro and/or tram lines and monitor their operation. The user will see metrics reporting economic expense and passenger satisfaction.

Simple graphics
: The game will have simple 3D graphics in which people, vehicles and buildings may be displayed using geometric shapes such as boxes and cylinders. It is **not** a goal of this project to generate a realistic city view using mesh-based models.

Being a director of a transport company
: At a high level, the user will have to manage a transport system on a limited budget, juggling competing demands of economic cost and performance. They will also need to react to events such as vandalism or flooding which may occur periodically.

Platforma, technologie

The game will be written in C# using the Unity framework. It will run on Windows and Linux at

least.

Odhad náročnosti

This is a moderately challenging project and will require a team of at least 5 students with experience in game design and implementation, preferably using Unity. Here are several project areas to which individual students might be assigned:

- procedurally generating a city layout, including expanding the city as the game progresses
- simulating hundreds or thousands of vehicles in the city, including public transport (buses, metro, trams) plus passenger cars
- simulating hundreds or thousands of people in the city, each of whom will have a daily list of travel destinations
- displaying the 3D graphical world efficiently enough to display ~30 frames per second. The interface will include scrolling, zooming and a minimap.
- processing commands from the user via a top-level interface including menus and object selection

Students should complete a detailed specification by the end of April. After that the team will begin development in several-week sprints, building the most essential features first. Development will continue through the summer and the game should be complete by September.

Vymezení projektu

Projekt je zaměřen na následující oblasti (zaškrtněte vyhovující):

Diskrétní modely a algoritmy	
	diskrétní matematika a algoritmy
	geometrie a matematické struktury v informatice
	optimalizace
Teoretická informatika	
	Teoretická informatika
Softwarové a datové inženýrství	
	softwarové inženýrství
	vývoj software
	webové inženýrství
	databázové systémy
	analýza a zpracování rozsáhlých dat
Softwarové systémy	
	systémové programování
	spolehlivé systémy

	výkonné systémy
Matematická lingvistika	
	počítačová a formální lingvistika
	statistické metody a strojové učení v počítačové lingvistice
Umělá inteligence	
	inteligentní agenti
	strojové učení
	robotika
Počítačová grafika a vývoj počítačových her	
	počítačová grafika
✓	vývoj počítačových her

Poznámky

... další informace nezapadající do sekcí výše...