

TRAFFIC 3.1

Enhancing Visualization and Performance of Traffic

PROJECT PLAN

Masters project
Project period April 1 – September 30
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1. PROJECT DESCRIPTION

Overview

Since winter semester 2003 the members of the Chair of Software Engineering take a novel approach to teaching introductory programming for their first semester computer science students. The approach (called the Inverted Curriculum) heavily relies on a software system - Traffic - that has been specially developed for this purpose. Traffic is a library that models life in a city. So far it provides facilities to simulate the public transportation system of a city, buildings, passengers and 3d/2d visualization of the city. The aim of this project is to enhance the performance, modeling and visualization capabilities of Traffic.

Scope of the work

- **Analysis:** As a start, a literature review shall be conducted to familiarize with the current state of the art of city (or similar systems) simulation with respect to enhancing performance and visualization of Traffic.
- **Development:** The insights of the analysis phase must be implemented in Traffic.
- **Report:** Documentation of the results of analysis and development

Intended results

- **Traffic 3.1:** An enhanced version of Traffic
- **Report:** Documentation of the results of analysis and development

2. BACKGROUND MATERIAL

Reading list

- Teaching introductory programming with the inverted curriculum approach [4]
- Touch of Class [3]

3. PROJECT MANAGEMENT

Objectives and priorities

- Find possible performance improvements in Traffic
- Implement performance improvements
- Implement improvements in visualization
- A good programming style must be maintained with respect to object-oriented principles as the Traffic library is used for the introductory programming course (top priority).

Criteria for success

It is a stated goal of this project to enhance the performance of Traffic. It is also a goal to enhance the visualization. While measuring performance enhancements for features which haven't changed can be done, it is difficult to compare performance for changed features. As enhancing visual effects usually comes at the cost of computation time, comparing performance may not be possible for all parts of the system.

However, a required result shall be a measurable increase in performance for part of the system. A tool for measuring such results must also be provided.

Method of work

ISE Eiffel Studio will be used for the project as well as the EiffelMedia library. A testing framework should be developed to evaluate the performance of Traffic (and Eiffel programs in general).

Quality management

Documentation

A final report will be written, documenting the insights of the analysis phase as well as the decisions and experiences of the development phase.

Validation steps

After the analysis phase there will be a meeting with the supervising assistant to discuss the design and project plan for the development phase. Regular follow-up meetings shall ensure the quality of the development.

4. PLAN WITH MILESTONES

Project steps

- Analysis, done by May 20
 - Develop a testing framework for evaluating performance of Eiffel programs
 - Report of analysis
 - Requirements for Traffic development
 - Project plan for development phase
- Development, done by August 31
 - Freeze date for Traffic (no new features)
 - Implementation
 - Testing
- Final Documentation, done by September 30
 - Final report
 - Presentation

Deadline

September 30, 2006

REFERENCES

- [1] Chair of Software Engineering: *Semester-/Diplomarbeiten*; Online at: <http://se.inf.ethz.ch/projects/index.html>, consulted in April 2006.
- [2] Bertrand Meyer: *Object-Oriented Software Construction, 2nd edition*, Prentice Hall, 1997.
- [3] Bertrand Meyer: *Touch of Class*, working draft
- [4] Michela Pedroni: *Teaching introductory programming with the inverted curriculum approach*, Chair of Software Engineering, ETH Zurich, 2003
- [5] EiffelMedia, Chair of Software Engineering, ETH Zurich, <http://eiffelmedia.origo.ethz.ch/> consulted in April 2006
- [6] Ursula Kretschmer: *Tracking einer Person im urbanen Umfeld mit Positions- und Blickrichtungsbestimmung auf Basis eines 3D-Stadtmodells*, Fraunhofer Institute for Computer Graphics, Technical University of Darmstadt, 2004
- [7] Mohammad S. Obaidat: *Applied system simulation : methodologies and applications*, Kluwer Academic, Boston, 2003
- [8] Tomas Akenine-Moeller, *Real-Time Rendering*, 2nd edition, A K Peters, Natick MA, 2002