

ALGORITHMS FOR RUN TIME TERRAIN DEFORMATION

STATUS REPORT

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Prepared for AFRL/HEAE, Air Force Research Laboratory
Attn: Steve Stephens, 6030 South Kent Street, Mesa, AZ 85212-6061
Tel: (480) 988-6561 ext. 146 e-mail: steve.stephens@mesa.afmc.af.mil

Prepared by Computer Graphics Systems Development Corp.
Attn: Roy Latham, 2483 Old Middlefield Way #140, Mtn. View CA 94043
Tel: 650-903-4922 Fax: 650-967-5252 e-mail: rwl@cgsd.com SkypeID: rlatham001

Project Abstract

The goals of Phase II are to develop and implement algorithms for a real time mission rehearsal simulation which will deform the terrain database to match target data. A correction function $c(x,y)$ that is added to every vertex in view. The correction function must (1) adjust the terrain surface to meet the specified features, (2) appear smooth and continuous so that the adjustments appear natural, and (3) do not distort aspects of the database that must be preserved. The implementation is to be in C++ and compatible with Open Scene Graph. The code will be placed in the public domain in keeping with an open source philosophy.

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• Previously Completed Work

The Phase II contract was signed on April 8, 2005 and work started immediately. ▪ A kickoff meeting was held in May '05, and the program plans were reviewed. ▪ Don Burns, one of the originators of Open Scene Graph was added to the project team. ▪ Completed the first draft PDL that links to OSG and deals with database layers and tiles. ▪ The SHAPE file input software was written and debugged. An algorithm to find the shape of the object contact to the terrain was devised and programmed, with the terrain modified abruptly. ▪ The comprehensive algorithm for real time terrain modification was completed and documented. ▪ The correction function and recursive subdivision algorithms have been implemented and demonstrated.

• Work Accomplished This Reporting Period

IMAGE 2006

Roy presented the paper on the dynamic terrain algorithm at the IMAGE Conference in Scottsdale, July 9-13. The paper was presented as part of the database session.

The paper was well received. People especially liked the video clips of the dynamic terrain algorithm in action. Another comment was that the paper was one of one a few papers that had significant new technology.

We also had a brief status meeting with Steve Stephens at the Conference.

Update of the OpenFLIGHT Loader

Testing and enhancing of the new OpenFlight Loader plugin continued through July.

Application notes were provided to OSG developers regarding code modifications that boosted the load-time and render-time performance of OpenFlight models. OSG's current OpenFlight plugin loads models in about 60% of the time of the old plugin, and rendering performance is generally the same or better than that of the old plugin.

External reference palette override support was implemented and tested. This allows parent models to override the palettes of child models, thereby reducing OpenFlight model size. This feature is required to conform to the OpenFlight specification and includes support for shader palettes (OpenFlight v16.0).

We used a large complex database from a previous game development project to test the new loader plugin. The database loaded correctly and was viewed in OSG successfully.

During the course of testing, one model was discovered that renders incorrectly with the latest OSG release. That problem is currently being resolved.

The new plugin has been enabled by default in OSG v1.1, released 19 July 2006.

TDS Release

The terrain deformation software (TDS) is being moved from a test and prototype form to a more usable permanent form. This involves a more strict definition of the .tds file format. The .tds file is now written in XML format. The TDS loader allows only one .tds file to be used per application instance. Within the file any number of targets may be specified within a **<Target>** tag. Terrain is then specified as a pattern which will be used by the TDS loader to filter any future requests for terrain loading.

Note that file loaders in OpenSceneGraph are not necessarily tied to file extension or file content and can be placed in an order of precedence for file loading. So the TDS loader is loaded first and each subsequent terrain tile that is loaded, from a paging database, for example, can be sorted by the file name filter specified in the **<Terrain>** tag of the TDS file. The TDS loader can either reject the loading of the terrain tile, or call the appropriate loader for the terrain tile (e.g. an OpenFlight file would call the OpenFlight loader), depending on whether the file name fits the regular expression specified in the **<Terrain>** tag. If the tile is loaded, it is then processed against the target database.

Progress this month includes the use of XML parsers to parse the TDS file format, and testing of simple databases, both paging and non-paging to work against the criteria of the TDS file definition.

Documentation Project

We are planning to take up the documentation task with a new recording session this week.

• Summary of Status

The project is on schedule. The status of tasks is summarized below:

ID	Description	04/06
Task 1	Research & verify the timeliness of the full-scale Algorithm/technique	100%
Task 2	Verify the accuracy of the full-scale algorithm or technique	100%
Task 3	Design, code and test the full-scale algorithm	90%
Task 4	Develop a web site for the release of open source code	85%
Task 5	Examine the compatibility of the open source code with the existing IG hardware	65%
Task 6	Demonstrate the prototype	42%
Task 7	Write Interim Report(s)	64%
Task 8	Write Final Report and Summary Report	0%

• Problems

No significant problems or information that might impact schedule have been encountered in this reporting period.

• Interim Results

There were no new interim results to report.

• Recommendations and Proposals

There are no recommendations or proposals as a result of efforts in this reporting period.

• Summary of Future Plans

We expect to complete the OpenFLIGHT loader work in the next, with possibly a little clean up work in following months.

The documentation effort will taken up as a focus next month.