

Because most current handheld devices do not support graphics acceleration hardware, per-pixel operations must all be performed in software. The procedure for rendering is a completely different level than that we implemented when using, for example, OpenGL, Performer, or Direct3D, although some of the ideas and utility software modules are the same.

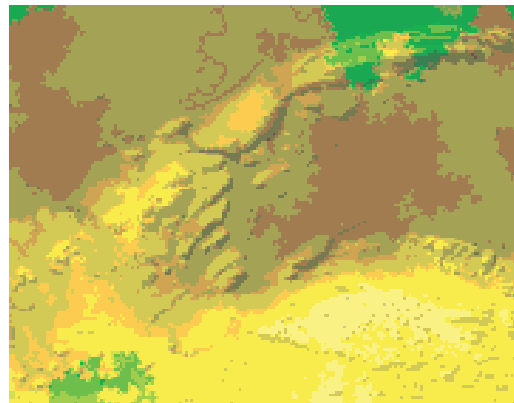


Figure 1: 2D Software Rendering

Cybernet's Software Terrain Renderer displays terrain in both orthographic and perspective 3D mode. 2D orthographic terrain is simply blitted directly to the screen. In 3D mode, access to per-pixel operation gives us the ability to display some useful cueing graphics, including the ability to show realtime dynamic shadows.

The goal of the OpenSkies terrain project is to develop graphical software that will effectively display topographic information on handheld computers or other small displays rather than paper maps. Our objective is to present topographic information in a way that optimizes the perception of three-dimensional topography while looking at a small computer screen. The approach was to leverage Cybernet's previous work on computer game and simulation technology and adapt it to generate the illusion of 3-dimensional images on a small flat computer screen.

Features

- No hardware acceleration required.
- Uses Cybernet's Terrain Management SDK.
- Per-pixel texturing, shading and shadows.
- Supported Platforms: Win32, Linux, WinCE

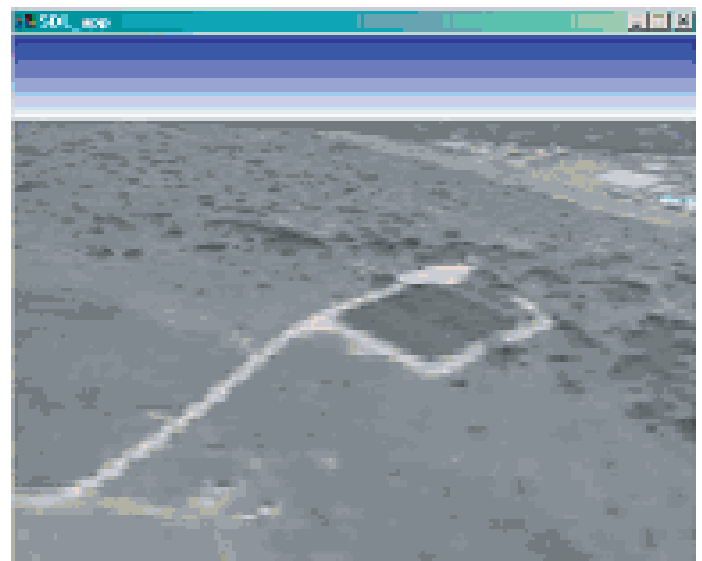
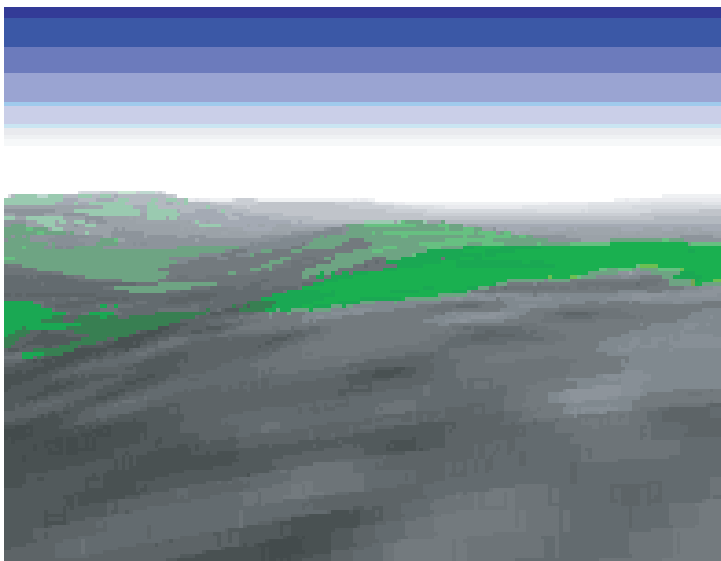


Figure 2: 3D Software Rendering

Terrain Management SDK

Cybernet's Terrain management SDK is at the back-end of both the software and hardware renderers. It includes a MovingGrid structure for rendering purposes as well as utilities for reading elevation and vector data.

MovingGrid

The MovingGrid architecture is a paging mechanism that allows the host application to instantiate one or more 2-dimensional paging systems called MovingGrids. A MovingGrid is simply a 2D grid whose rows and columns are updated as the user moves over the terrain. Each element in the grid contains the elevation and the terrain type at that

DTED, VPF

The terrain management library includes a reader for DTED elevation data. The separate DTED files are paged in such that there is enough information to cover the existing grid structures being rendered. We are currently adding a Vector Product Format (VPF) data reader.

Features:

- Reads DTED elevation file format.
- Reads and rasterizes VPF format data (coming soon).
- Facilitates on-the-fly moving texture generation.
- Provides query functionality for determining elevation, terrain type and closest feature information
- Provides micro-terrain capability that pseudo-randomly (repeatably) generates higher resolution terrain than what is available in the data files.

vmgrids

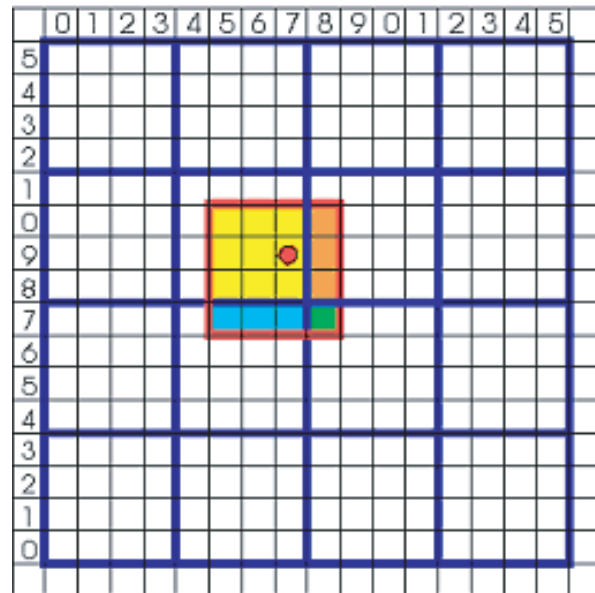


Figure 1: MovingGrid Structure

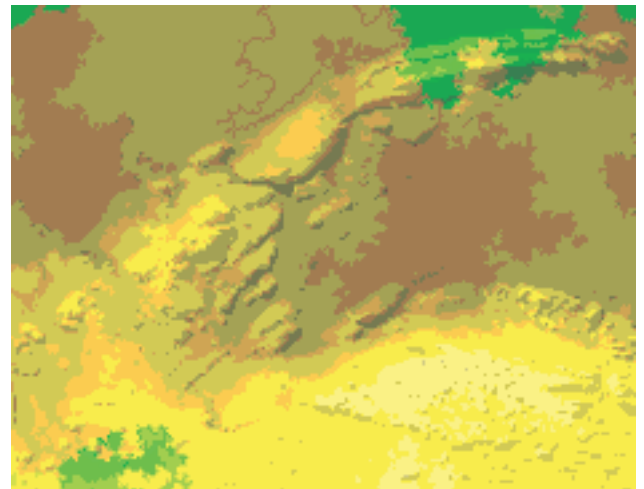


Figure 2: DTED Level 0 Elevation Data