Results
Additionally, the networking classes simplify packet sending so network games can be developed with up to 8 people playing highly interactive, fast, 3D first person shooter games. The OpenGL toolkit has been used successfully for over five years in the undergraduate courses CS375 3D Graphics and CS475 Game Development and Computer Animation. These toolkits allow students to focus on programming the game play, computer animation, artificial intelligence, and overall compelling 3D virtual world interaction. The success of the OpenGL toolkit inspired the creation of a complementary toolkit using DirectX. Demos of the games and more information can be found at http://cs.millersville.edu/~webster/gametechnologytrack/resources.html.

Abstract
Programming a 3D video game or graphical application using the OpenGL or DirectX API's can be daunting. To facilitate development, we have created object-oriented toolkits for OpenGL and DirectX that abstract away many of the low-level details and provide enhanced functionality. For example, both of the MU-developed toolkits (MUopengl Toolkit and MUDirectX Toolkit) provide easy-to-use objects such as camera; moveable with MoveForward(), MoveBackward(), MoveX(), MoveY(), MoveZ(), Pitch(), Roll(), and Yaw(); positional 3D sound; 3D Studio model loading; skyboxes; billboards; animated TGA textures with alpha channel support; Cal3D animated characters with quaternion interpolation; MD3 Quake-animated characters; explosions; particle systems for smoke, fire, fog, and simple fluid dynamics; weapons; and collision detection. The toolkits also have an extensive library of vector and matrix operations.

Tools
- Dual Pentium processors with Windows XP
- Nvidia GeForce graphics OpenGL accelerator.
- C++ OpenGL graphics software.
- MUopengl Toolkit and MUDirectX Toolkit API.

Figure 1. (left) Screenshot of networked doom2 game where up to 8 players can play in the same virtual world.
Figure 2. (right) Screen shot of Cal3D animated characters. Animations include: walk, run, jump, shoot, skip, walk backwards, pain left, pain right, shot front, shot back, shoot, and taunt.

Figure 3. (left) Screenshot showing 3DS model of city.
Figure 4. (right) Animated character in 3D world.

References:

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