The Graphics Window

Lecture 1
Chapter 1; Sections 2.3, 2.7

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Outline

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Intended Audience

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Prerequisites for the book are good programming skills in C++, Java, or C; an understanding of basic structures (linked lists, trees); and a rudimentary knowledge of linear algebra and trigonometry. We have found that the mathematical backgrounds of computer science students, whether undergraduates or graduates, vary considerably. Hence, we have chosen to integrate into the text much of the linear algebra and geometry that is required for fundamental computer graphics.

Outline

Device Independence

Definition (Device-independent)

A library is device-independent if it provides a common API, regardless of the hardware on which it is used.

- The OpenGL API for Windows is identical to the OpenGL API for the Macintosh.
- Of course, the library must be compiled separately for each hardware system.

Windows-Based Programming

- OpenGL consists of three libraries
- `gl` - graphics library
  - Basic functions.
  - All function names begin with `gl`.
- `glu` - graphics library utility
  - Composites of basic GL functions.
  - All function names begin with `glu`.
- `glut` - graphics library utility toolkit
  - Functions that interact with the windowing system.
  - All function names begin with `glut`.

Outline

GLUT-Based Programming

```
int main(int argc, char* argv[])
{
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGBA);
    glutInitWindowSize(screenWidth, screenHeight);
    glutInitWindowPosition(100, 150);
    glutCreateWindow("window title");

    glutDisplayFunc(display);
    glutReshapeFunc(reshape);
    glutKeyboardFunc(keyboard);
    glutMouseFunc(mouse);

    init();
    glutMainLoop();
    return 0;
}
```

GLUT-Based Programming

- `main()` uses the GLUT functions to set things up and get started.
- Functions used to create a graphics window.
  - `glutInit()`
  - `glutInitDisplayWindow()`
  - `glutInitWindowSize()`
  - `glutInitWindowPosition()`
  - `glutCreateWindow()`

GLUT-Based Programming

- `glutInit(&argc, argv)`
  - Initializes the glut library.
  - Must be called before any other glut function.
  - Must receive the command-line arguments.
- `glutInitDisplayWindow(`*`options`*`)`
  - Specifies single or double buffering.
  - Specifies color mode.

GLUT-Based Programming

- `glutInitWindowSize(`*`width`*`, `*`height`*`)`
  - Sets the height and width of the window in pixels, not counting the frame.
- `glutInitWindowPosition(`*`x`*`, `*`y`*`)`
  - Sets the position of the upper left corner of the window.
- `glutCreateWindow(`*`name`*`)`
  - Creates, but does not display, the window.

Creating a Window

The Graphics Window

- The code.
- The executable.

Outline

Homework

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- Read Chapter 1 for an overview of computer graphics.
- Read Section 2.3 – the libraries.
- Read Section 2.7 – the GLUT window functions.