# Animation

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Mar. 7, 2003

## 1 Administrivia

### Announcements

### Assignment

Read 4.1, Appendices B and C (linear algebra concepts).

### From Last Time

Finished `paint.c` lab.

### Outline

1. Animation: `double.c`, `pong.c`

### Coming Up

Objects and transformations.

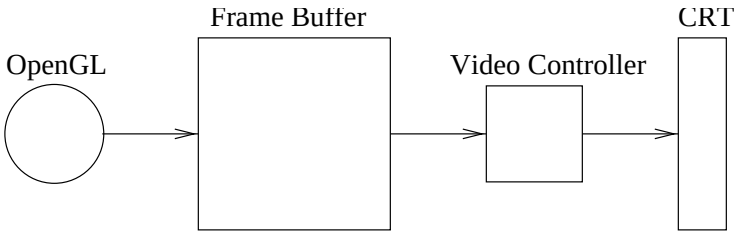
# 2 Animation

Two example programs: `double.c` and `pong.c` .

## 2.1 Double Buffering

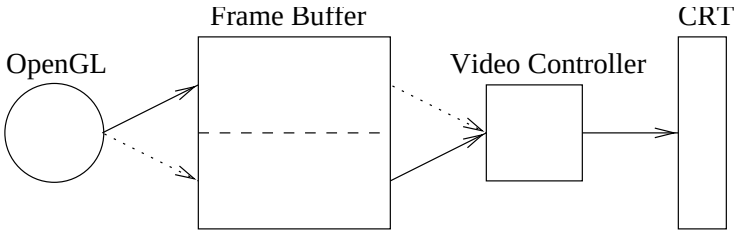
1. Why did the time look so bad in `paint.c`?

2. Consider video refresh and OpenGL refresh:




   Synchronization?

3. Consider double buffering:




4. Is double buffering a cure-all? No, some jitter is possible if render rate is a near multiple of refresh rate.

## 2.2 `double.c`

1. A rotating square.

2. Demo with and without double buffering.

3. Key points:

   (a) Use of `GLUT_DOUBLE` in call to `glutInitDisplayMode`.

   (b) The idle function, `spinDisplay` updates spin factor and posts a display callback.

   (c) `display` re-renders.

4. Use of `glRotate*` to multiply current matrix.

   (a) First parameter is degrees of rotation.

   (b) Next three parameters specify axis of rotation as a vector.

5. Use `glPushMatrix`/`glPopMatrix` to save/restore original values.

## 2.3 `pong.c`

My first video game. Wow.

1. What are the elements in the game?
2. What animations are there? What functions do they map to?
3. What are the boundary conditions?

   (a) Velocity.

   (b) Bounces.

   (c) Acceleration.

   (d) Randomization.

   (e) Misses.

   (f) Points, time?

Details:

1. Creating/rendering the ball.
2. Moving the ball: `glTranslate`.
3. Accessing cursor control keys: `glutSpecialFunc`.