On Monday: go to EMPAC for a presentation by Eric Ameres.

Compression SW: Handbrake.fr  Open source multiplatform.

for recording, fraps is pretty good, demo is free.

Chapter 7

INTERPOLATION

\[ V_2 = \alpha V_1 + \beta V_z \]

\[ 0 \leq \alpha \leq 1 \]

\[ P = \alpha A + \beta B + \gamma C \]

\[ \alpha + \beta + \gamma = 1 \]
\[ N_p = \alpha N_A + \beta N_B \]

Renormalize \( N_p \).

Use \( N_p \) to calculate photons shadow at \( P \).

Another > Interpolation

Interpolate along edges, then along scanlines. R/T HW.
graphics pipeline

process vertices → [ rasterize ] → [ process ]

rotate etc.

find pixels in each △ → interpolation

depth buffer front/stable

tessellate (or split) complicated polygons into triangles

long thin triangles may not shade well.
WILL SHADE DIFFERENTLY.

THIS IS A PROBLEM IN A VIDEO IF DIAGONAL CHANGES FROM FRAME TO FRAME.

CONVEX POLYGON

TILING/TESSELATION IS HARDER

CHAPTER 9
ORIENTATION

BACK SIDE
PENCIL LETS YOU COLOR THEM DIFFERENTLY

FOR A CLOSED POLYHEDRON

THE BACK FACE ARE ALL HIDDEN. CULL THEM.
THAT DELETED $\frac{1}{2}$ FACES

NOT FOR KLEIN BOTTLES
REX "ORIENTABILITY"
Using this requires that you designed object so faces' vertices are listed in proper direction.

CT ID Curves

World is curved

Q1: How should designer spec it?
Q2: WHAT TYPE OF MATH SHOULD BE USED?

- $y = x^2$ (Explicit)
- $x^2 + y^2 = 1$ (Implicit)
- $x = \sin \theta$ and $y = \cos \theta$ (Parametric)
Q3. What elementary functions?

Q4. Polynomials, rationals not sin, cos etc.

Circle: \( x = \frac{z^2}{1+z}, \quad y = \frac{z^2}{1+z} \)

Q4. How to handle complicated curves?

A1. High degree polynomial
\[ x = \sum_{n=0}^{\infty} a_n z^n \]

A2. Connect low degree polynomials
Problems with high degree polynomials
1. loss of precision during computation
2. sensitivity of curve to small changes in coefficients
3. no local control - changing any coefficient changes whole curve
4. not intuitive

Problems with joining many low-degree curves
1. You must make the curves meet so smoothly at a joint that the customer can't see the joint.

Join low degree curves

1. ENDPOINTS MEET
2. TANGENTS MATCH
3. CURVATURES MATCH
(I'm being a little sloppy, ignoring difference CR vs G²)

PIECES HAVE TO BE AT LEAST CUBICS
High degree polynomials have issues with interpolation. For splines, don't go higher. Use cubic splines.
How to specify coefficients

Cubic Par

User input gives 4 control points

System computes curve
For surface
Give a mesh of
16 control points.

Next time: Details
Example program
OpenCL.

Bezier (Curve+Patch)
De Casteljau