Review: Projective Rendering Pipeline
• object O2W world W2V viewing V2C
  modeling transform
  OCS - object/model coordinate system
  WCS - world coordinate system
  VCS - viewing/camera/eye coordinate system
  CCS - clipping coordinate system
  NDCS - normalized device coordinate system
  DCS - device/display/screen coordinate system

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Review: View Volumes
• perspective view volume
• orthographic view volume

perspective view volume
orthographic view volume

Review: Separate Warp From Homogenization
• warp requires only standard matrix multiply
  • distort such that orthographic projection of distorted objects is desired persp projection
  • w is changed
  • clip after warp, before divide
  • division by w: homogenization

NDC to Device Transformation
• map from NDC to pixel coordinates on display
  • NDC range is x = -1...1, y = -1...1, z = -1...1
  • typical display range: x = 0...500, y = 0...300
  • maximum is size of actual screen
  • z range max and default is (0, 1), use later for visibility

Device vs. Screen Coordinates
• viewport/window location wrt actual display not available within OpenGL
  • usually don’t care
    • use relative information when handling mouse events, not absolute coordinates
    • could get actual display width/height, window offsets from OS
  • loose use of terms: device, display, window, screen...

Reading for Viewing
• FCG Chapter 7 Viewing
• FCG Section 6.3.1 Windowing Transforms
• RB rest of Chap Viewing
• RB rest of App Homogeneous Coords

N2D Transformation
• general formulation
  • reflect in y for upper vs. lower left origin
  • scale by width/2, height/2, depth/2
  • FCG includes additional translation for pixel centers at (.5, .5) instead of (0,0)

Device Coordinate System (DCS)
Normalized Device Coordinate System (NDCS)
Clipping Coordinate System (CCS)
World Coordinate System (WCS)
Object Coordinate System (OCS)

Perspective View Volume
Orthographic View Volume

Extra TA office hours in lab next week to answer questions
- Mon 1-3
- Tue 2-4
- Wed 1-3
- reminder
  - Wed 2/6: Homework 1 due 1pm sharp
  - Wed 2/6: Project 1 due 6pm.

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Review: Understanding Z
• z axis flip changes coord system handedness
  • RHS before projection (eye/view coords)
  • LHS after projection (clip, norm device coords)

Reading for Next Time
• RB Chap Color
  • FCG Sections 3.2-3.3
  • FCG Chap 20 Color
  • FCG Chap 21.2.2 Visual Perception (Color)