CS 349 - User Interfaces **Winter 2018**

Lecture 4: January 10, 2018

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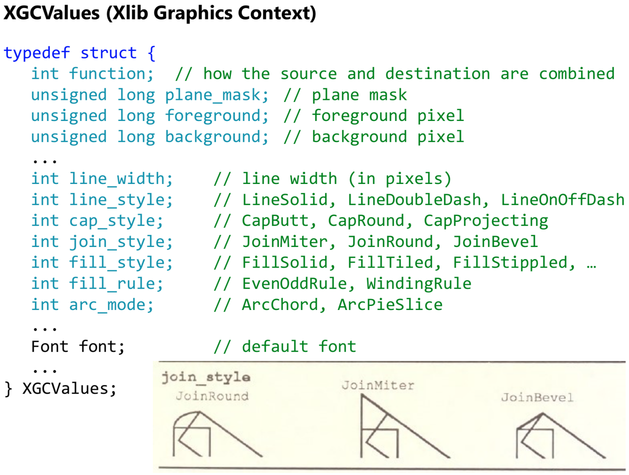
4.1 Drawing

4.1.1 Drawing Primitives

- Pixel
  `SetPixel(x,y. c)`
  `DrawImage(x,y,w,h,img)`
- Stoke
  `DrawLine(x1, y1, x2, y2, colour)`
  `DrawRect(x,y , w, h, colour)`
- Region
  `DrawText("A", x, y, colour)`
  `DrawRect(x, y, w, h, colour, thick, fill)`

4.1.2 Graphics Context

- Gather all options into a structure, pass it to teh draw routines
- In X, the graphics context is stored on hthe X server
- Modern systems like Java and Open GL have graphics context
  - Java : Graphics Object
  - OpenGL : Attribute State



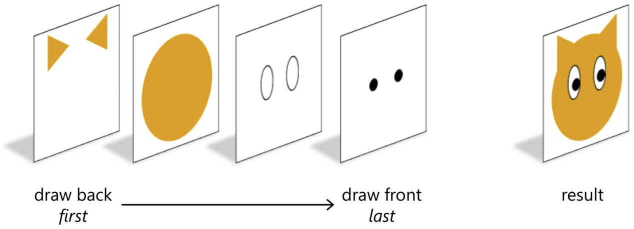
XGCValues (Xlib Graphics Context)

```
typedef struct {
   int function;  // how the source and destination are combined
   unsigned long plane_mask; // plane mask
   unsigned long foreground; // foreground pixel
   unsigned long background; // background pixel
   ...
   int line_width;    // line width (in pixels)
   int line_style;    // LineSolid, LineDoubleDash, LineOnOffDash
   int cap_style;     // CapButt, CapRound, CapProjecting
   int join_style;    // JoinMiter, JoinRound, JoinBevel
   int fill_style;    // FillSolid, FillTiled, FillStippled, …
   int fill_rule;     // EvenOddRule, WindingRule
   int arc_mode;      // ArcChord, ArcPieSlice
   ...
   Font font;         // default font
   ...
} XGCValues;
```

Taken From Class Slides

4.1.3 Painter Algorithm

- Basic graphics primitives are (really) primitive
- To draw more complex shapes :
  - Combine primitives
  - Draw back-to-front, layering the image



Taken From Class Slides

4.1.3.1 Implementing Painters Algorithm

- Think about things your program needs to paint
- Package drawing of each thing into a n object that can draw itself
  - Implement a Displayable base class with virtual "paint" method
  - Derive classes for the things you want to display
- Keep an ordered display list of displayable objects
- To repaint
  - Clear the screen
  - Repain everything in the display list.