Real-Time Drawing in the Browser with HTML5 Canvas

Dina Goldshtein
#dinagozil
https://blogs.microsoft.co.il/dinazil
Agenda

- Motivation
- Canvas Basics
- Performance Matters
- Short Exercise
- What’s Next?
(BIG) DEMO

Animated Real-Time Clock

fluentconf.com
#fluentconf
Recap – Basic Canvas Recipe

- Get canvas element from DOM
- Get the 2D drawing context
- Pick a coordinate system
- Draw your stuff
- Loop to animate
DEMO

Rendering to off-screen canvas
DEMO

Cost of transformations
DEMO

Cost of coloring
Lots More That Can Be Done

- Avoid state changes as much as possible (like with transformations and colors)
- Batch calls as much as possible (we already saw the effect in the last demo)
- Use `window.requestAnimationFrame()` rather than `window.setInterval()`

- Keep tabs on changed area and repaint only differences
- Cache anything you can (any calculation done inside the animation affects performance)
- Avoid text rendering
- Avoid image resizing
- Avoid floating-point coordinates (smoothing is expensive)
- Use multiple canvases to simplify scene rendering by defining layers

- World is changing – keep testing your performance ([JSPerf](https://jsperf.com/))
Exercise

- Build your own online Paint app

- Download starter code from https://github.com/dinazil/fluent-2016-canvas/tree/master/assignment

#fluentconf
How Do We Proceed?

- [https://developer.mozilla.org/en-US/docs/Web/API/Canvas_API](https://developer.mozilla.org/en-US/docs/Web/API/Canvas_API) - A good place to start

- No need to rewrite history
  - Fabric.js
  - Paper.js
  - EaselJS
  - oCanvas

- Specialized libraries
  - Data visualization: d3.js
  - Charts: Chart.js

- WebGL – essentially unlimited performance (compared to 3D context)
Summary

- Motivation
- Canvas Basics
- Performance Matters
- Short Exercise
- What’s Next?
Thanks for listening!

Dina Goldshtein
#dinagozil
https://blogs.microsoft.co.il/dinazil