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Real-Time Drawing in the Browser with HTML5 Canvas

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Agenda

- Motivation
- Canvas Basics
- Performance Matters
- Short Exercise
- What’s Next?

Motivation

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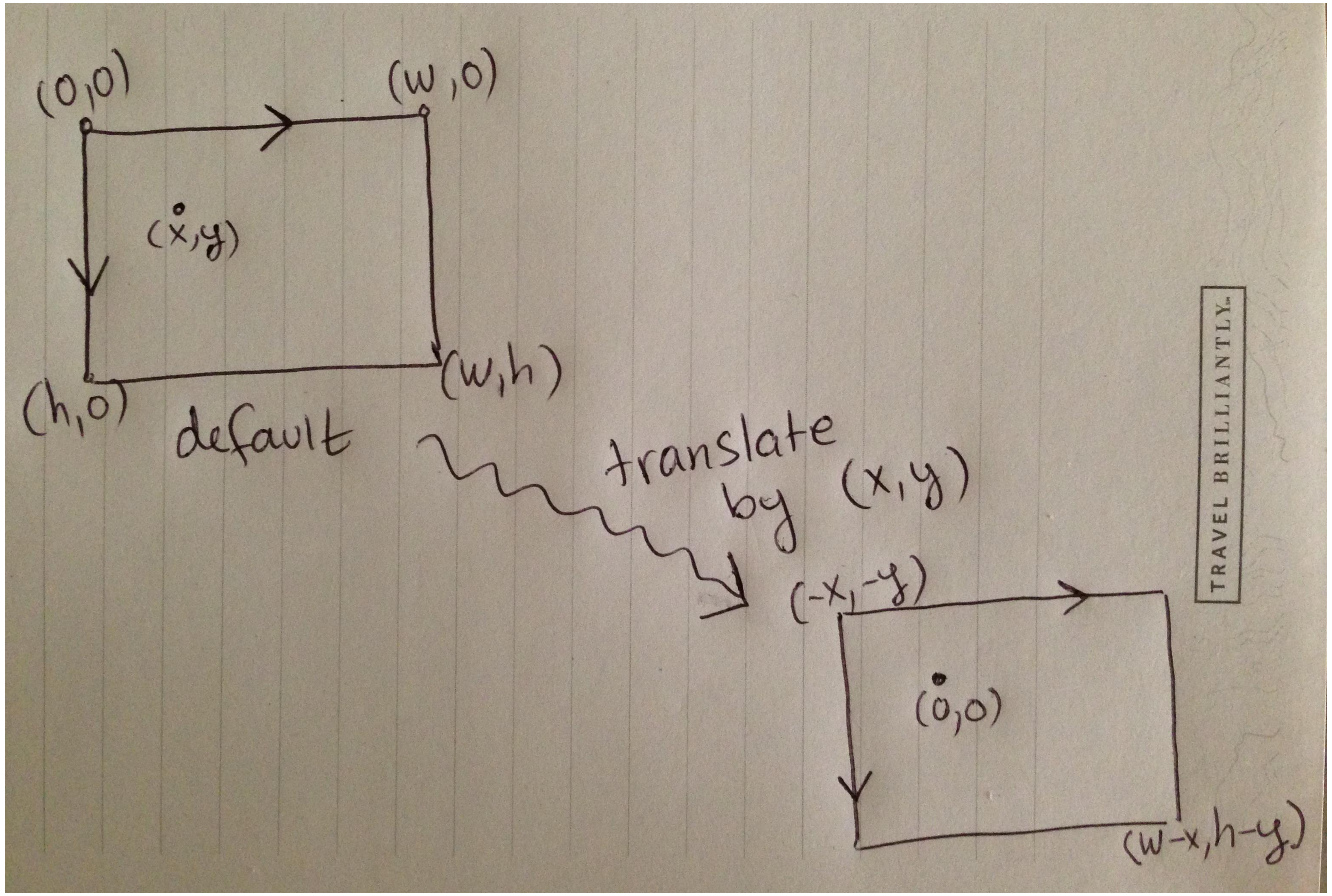
(BIG) DEMO

Animated Real-Time Clock

Recap – Basic Canvas Recipe

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



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Rendering to off-screen canvas

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Cost of transformations

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Cost of coloring

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Lots More That Can Be Done

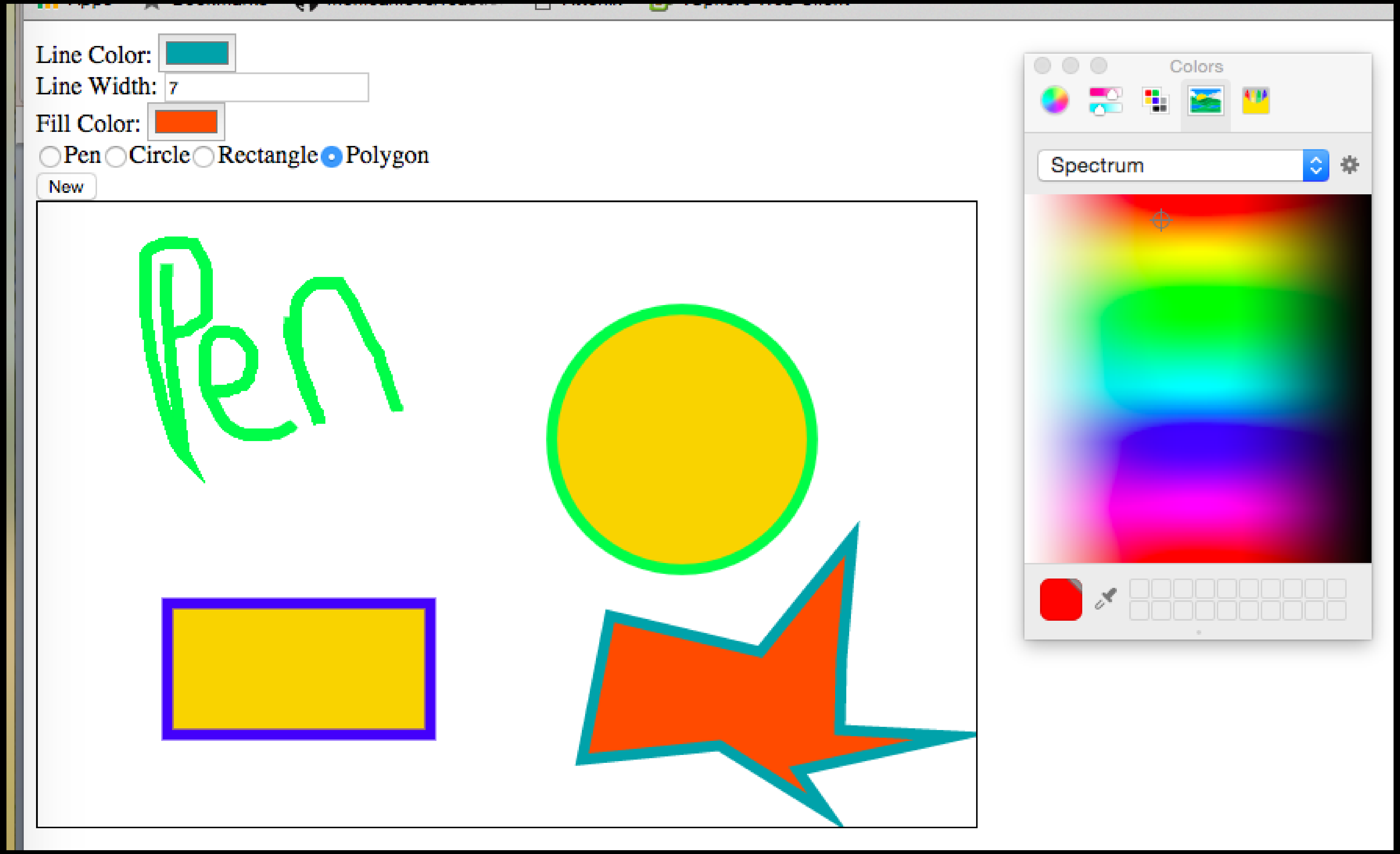
- Avoid state changes as much as possible (like with transformations and colors)
- Batch calls as much as possible (we already saw the effect in the last demo)
- Use `windows.requestAnimationFrame()` rather than `window.setInterval()`

- 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)

Exercise

- Build your own online Paint app


Line Color:
Line Width: 7
Fill Color:
Pen Circle Rectangle [✓ Polygon]
New

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

How Do We Proceed?

- 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

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Thanks for listening!

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