Draw and animate graphics: the<canvas> element

INTRODUCTION

The <canvas> tag is one of the "Flash killer" features of HTML5. This course will focus on the fundamental drawing capabilities of the HTML5 canvas.

The W3C HTML5 specification about the <canvas>element states that "*The canvas element provides scripts with a**resolution-dependent bitmap canvas**, which can be used for rendering graphs, game graphics, or other visual images on the fly.*"

> **The canvas has been designed for pixel-based graphics**, while SVG (Scalable Vector Graphics, another W3C standard) is for vector-based graphics.

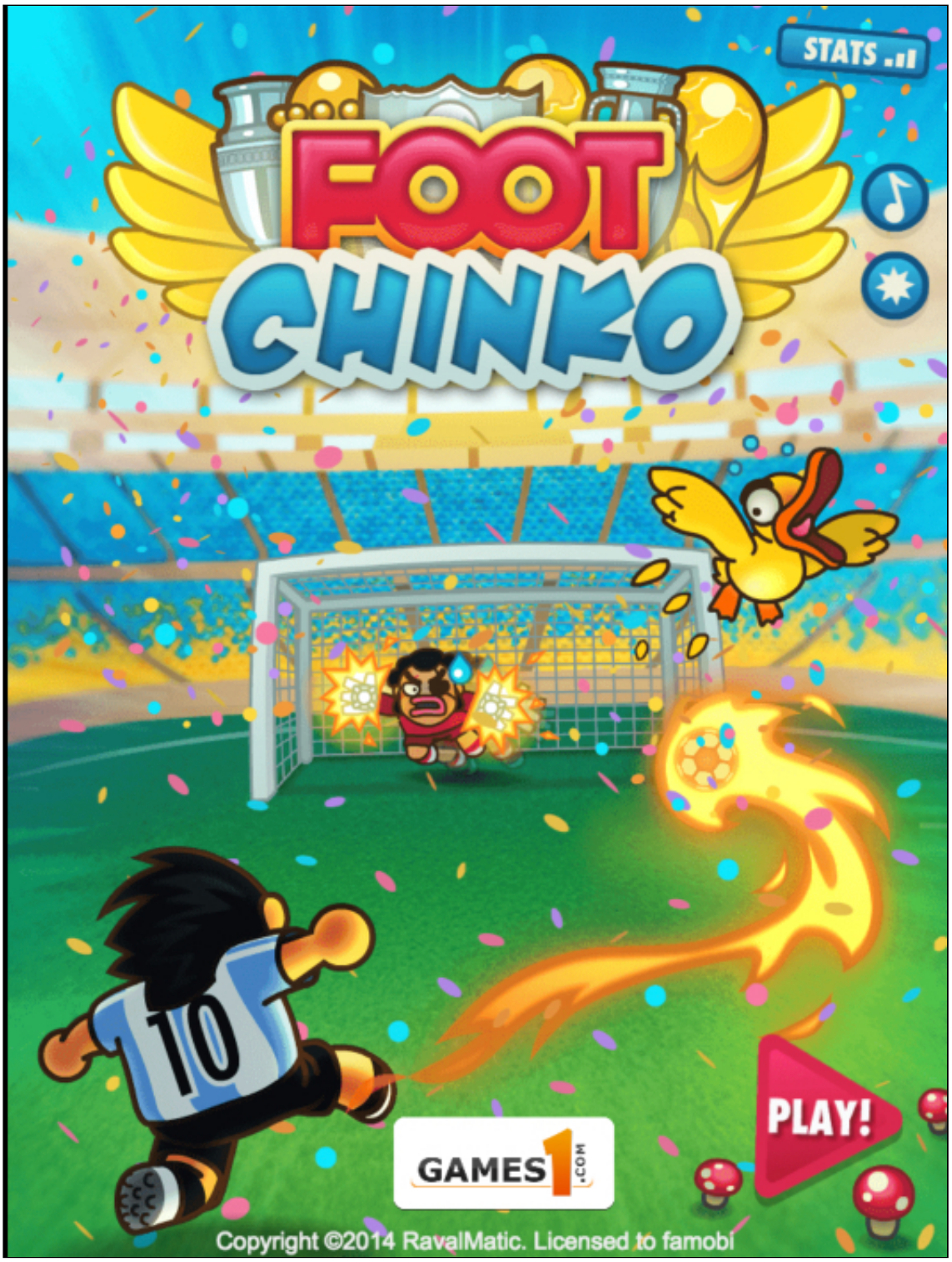
Indeed, the canvas JavaScript drawing API supports different kind of shapes: lines, rectangles, ellipses, arcs, curves, text, images. Some drawing styles need to be specified that will affect the way shapes are drawn (color, drawing width, shadows, etc.). An alpha channel for drawing in transparent mode is also supported, as well as many advanced drawing modes and global filters (blur, etc.).

The canvas is also used to do animations at 60 frames per second (useful for games), to display videos with special effects, to display a webcam stream, and so on.

EXAMPLES

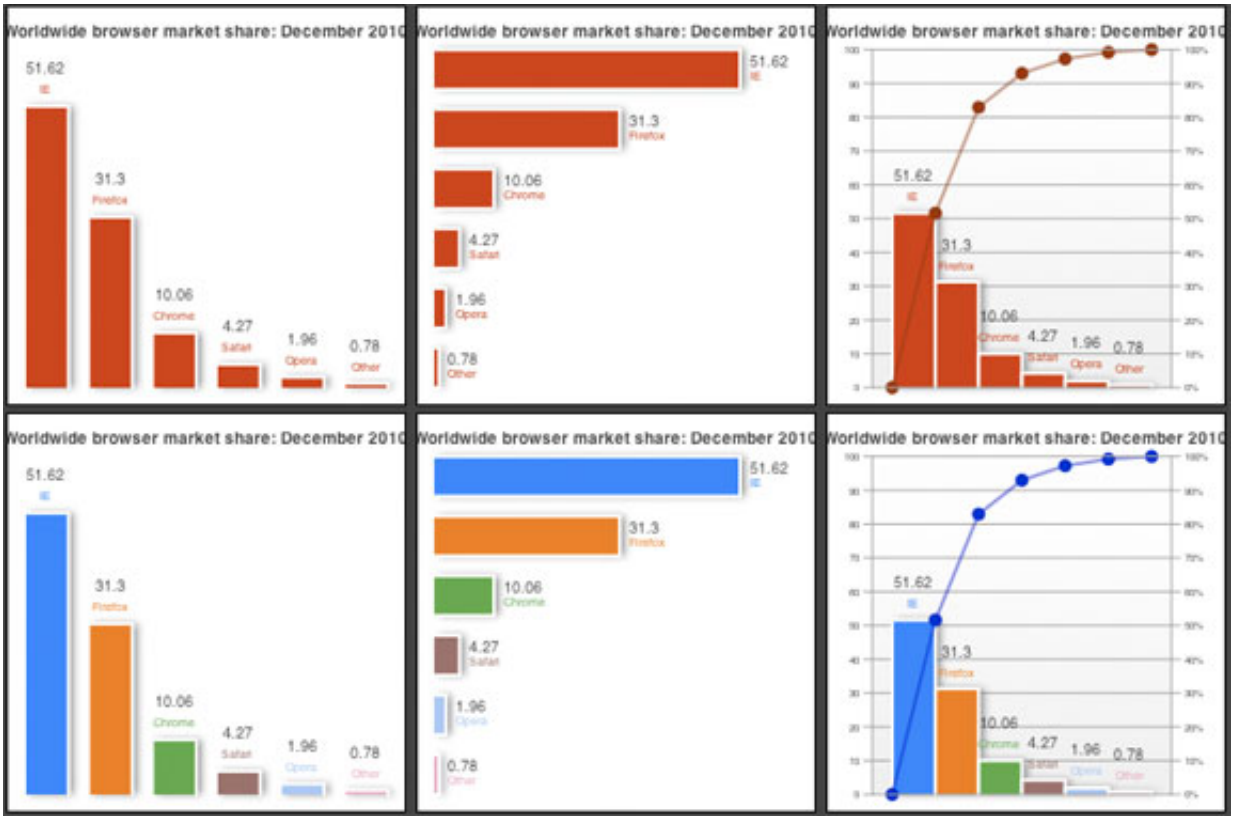
Example 1

Foot Chinko, one of the most popular free HTML5 games (released in 2015):



Example 2

Data visualization with the HTML5 <canvas>:



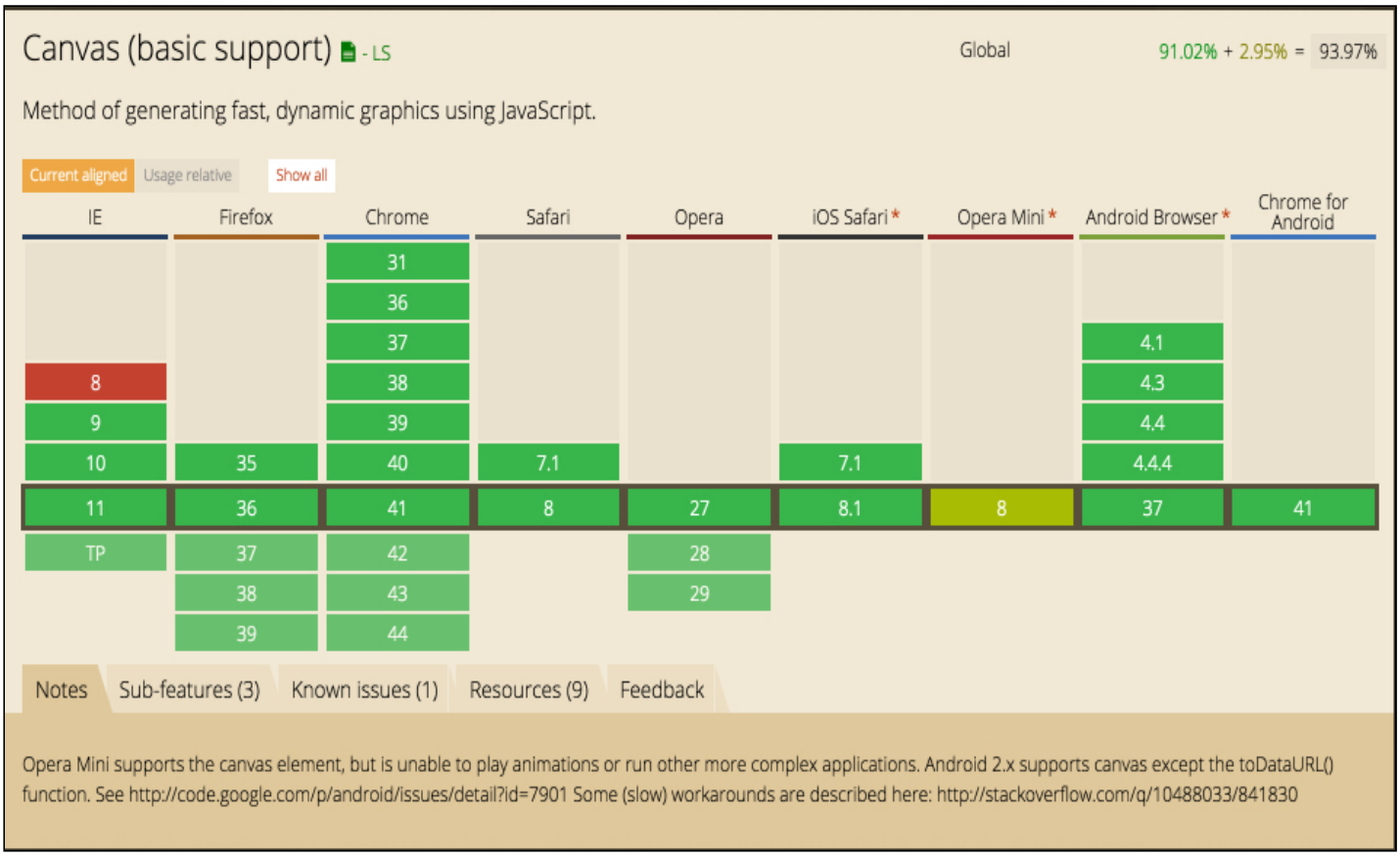
Example 3

Love HTML5, a nice demo that shows 60 frames/s animation in a canvas, (written in 2009)!

Performance is generally good *today*, since most Web browsers support hardware acceleration or will add support soon. Back in 2009, this demo ran at only a few images per second on some low-end computers (smartphones that could run HTML5 demos, such as this one, did not exist at that time) due to the lack of hardware acceleration support in the browser's implementations of the canvas API.

Note: 3D drawing using the WebGL API is also possible in a `<canvas>`, but will not be covered in this course. For the most curious among, please have a look at the two popular libraries for doing 3D drawing/animation in a `<canvas>`: BabylonJS andThreeJS.

CURRENT SUPPORT BY BROWSERS (AS OF 2015)



An up-to-date version of this table is at: http://caniuse.com/#feat=canvas

GOOD EXTERNAL RESOURCES

- http://www.html5canvastutorials.com/
- http://tutorials.jenkov.com/html5-canvas/index.html
- http://joshondesign.com/p/books/canvasdeepdive/title.html
- http://briangrinstead.com/canvasslides

KNOWLEDGE CHECK 3.2.2 (NOT GRADED)

The HTML5 canvas is for:

- Pixel-based graphics (bitmaps)
- Vector-based graphics