

**Test:**

Bubbles

Bubble Count: 1000

Test Duration: 30s

**Device:**

Safari Technology Preview Release 98

MacBook Pro (15-inch, 2016)

macOS 10.14.6

2.7 GHz Intel Core i7

16 GB 2133 MHz LPDDR3

Radeon Pro 455 2GB and Intel HD Graphics 530 1536 MB

**Backend/Engine:**

Ionic: Web Animations

Anime.js: requestAnimationFrame loop + inline CSS styles

GSAP: requestAnimationFrameLoop + inline CSS styles

**Notes:**

1. Web Animations in Safari has yet to be shipped, but it is stable enough state that I felt comfortable using this as the engine for Ionic Animations.

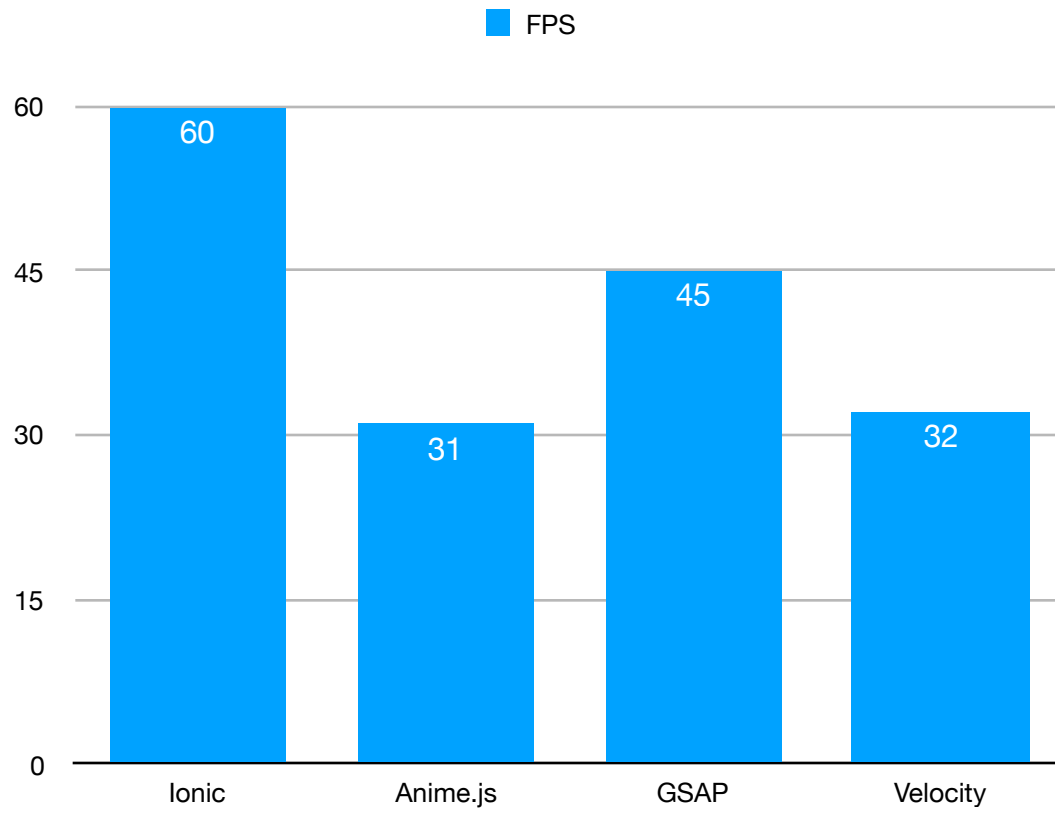


Table 1

	Ionic	Anime.js	GSAP	Velocity
FPS	60	31	45	32

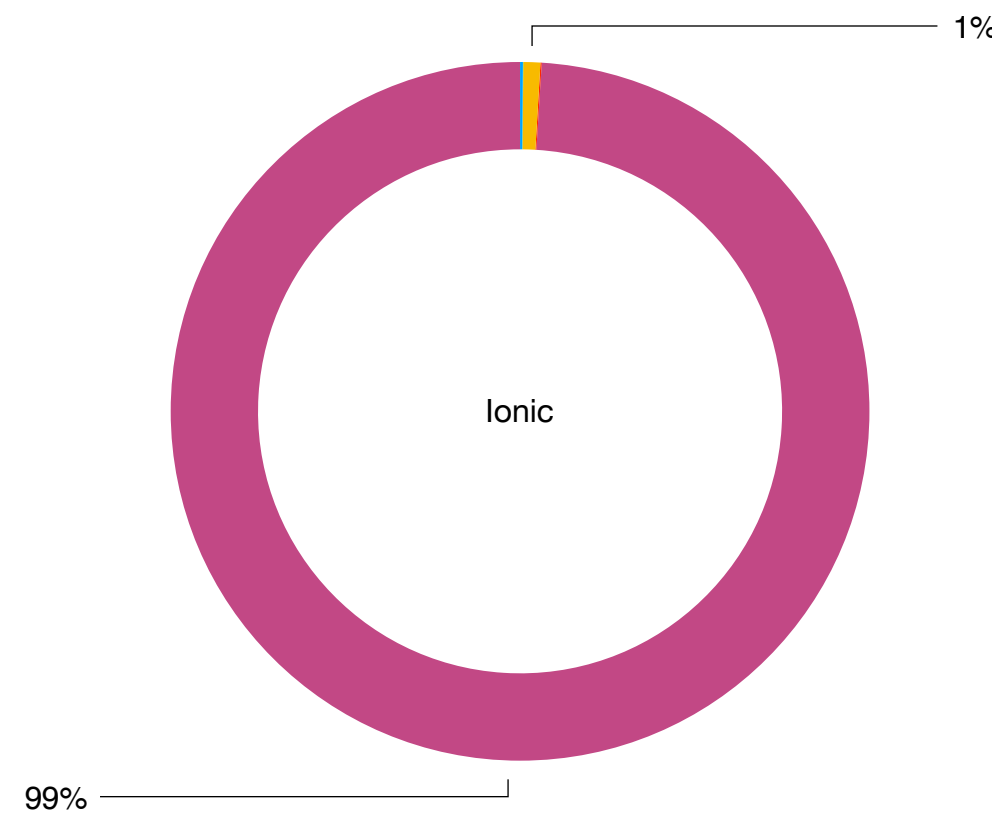
Main Thread Processing Time

	Ionic	Anime.js	GSAP	Velocity
<b>JavaScript</b>	38ms	7580ms	2788ms	6812ms
<b>Layout</b>	7ms	5958ms	13146ms	8146ms
<b>Paint</b>	234ms	6593ms	3743ms	5176ms
<b>Style</b>	19ms	6178ms	8030ms	6012ms
<b>Idle</b>	29702ms	3691ms	2293ms	3854ms
<b>Total</b>	30000ms	30000ms	30000ms	30000ms

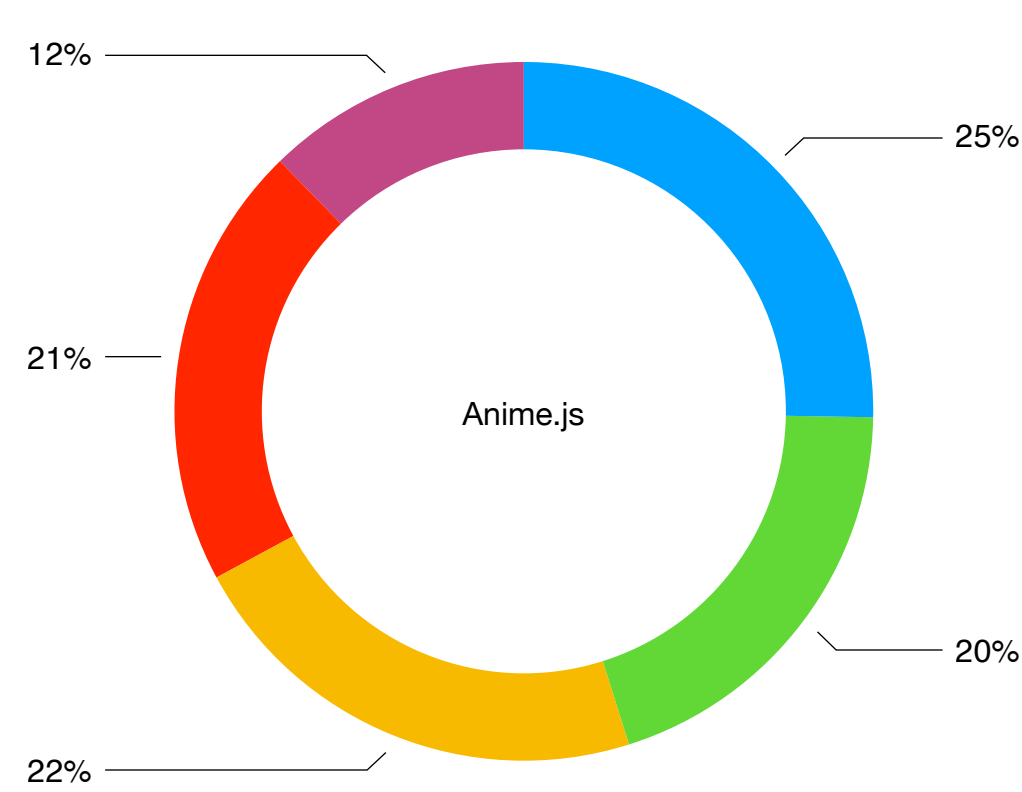
Main Thread Processing Percentage

	Ionic	Anime.js	GSAP	Velocity
<b>JavaScript</b>	0.13%	25.27%	9.29%	22.71%
<b>Layout</b>	0.02%	19.86%	43.82%	27.15%
<b>Paint</b>	0.78%	21.98%	12.48%	17.25%
<b>Style</b>	0.06%	20.59%	26.77%	20.04%
<b>Idle</b>	99.01%	12.30%	7.64%	12.85%
<b>Total</b>	100%	100%	100%	100%

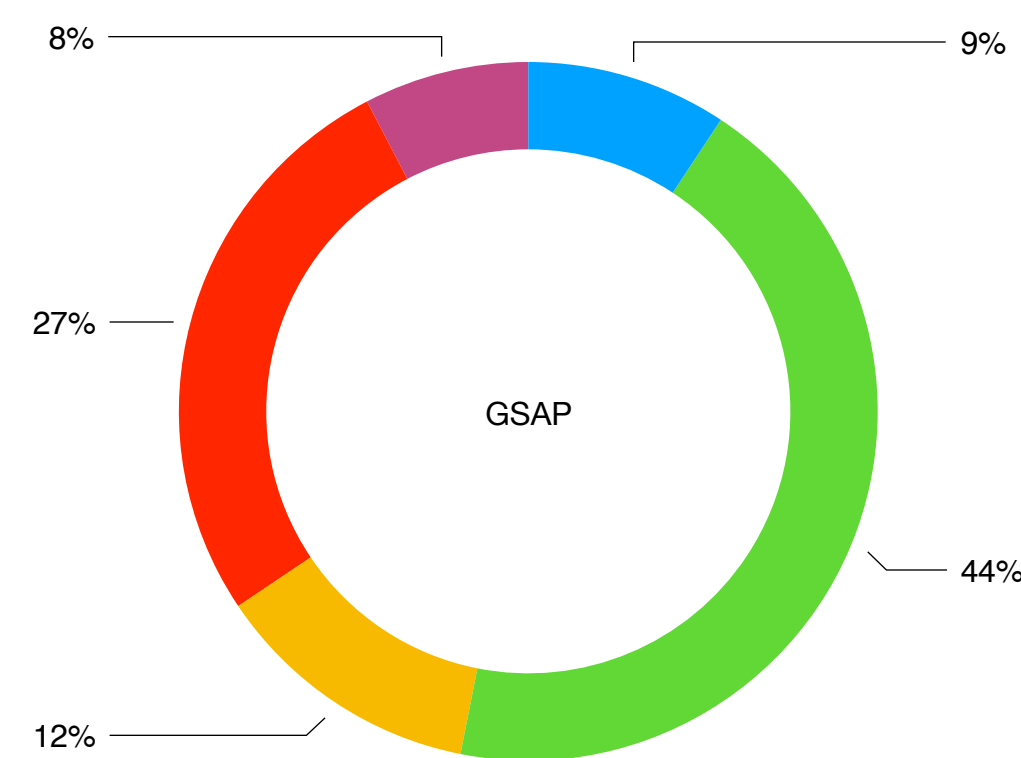
JavaScript Layout Paint Style Idle



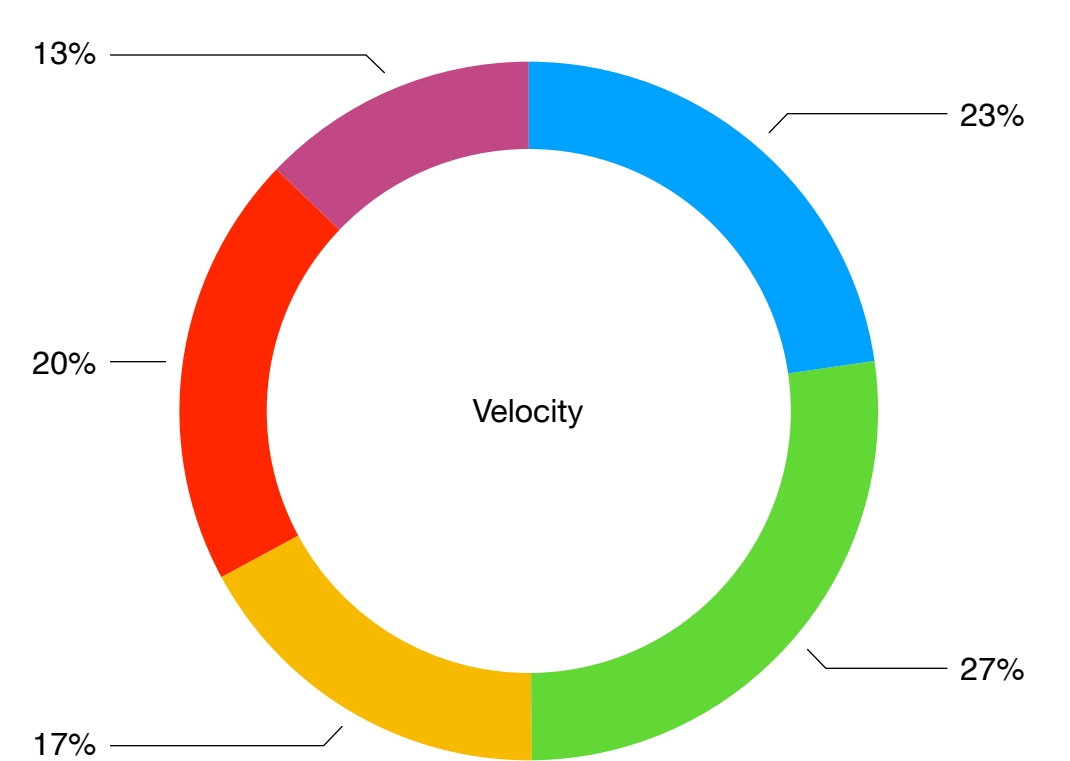
JavaScript Layout Paint Style Idle



JavaScript Layout Paint Style Idle

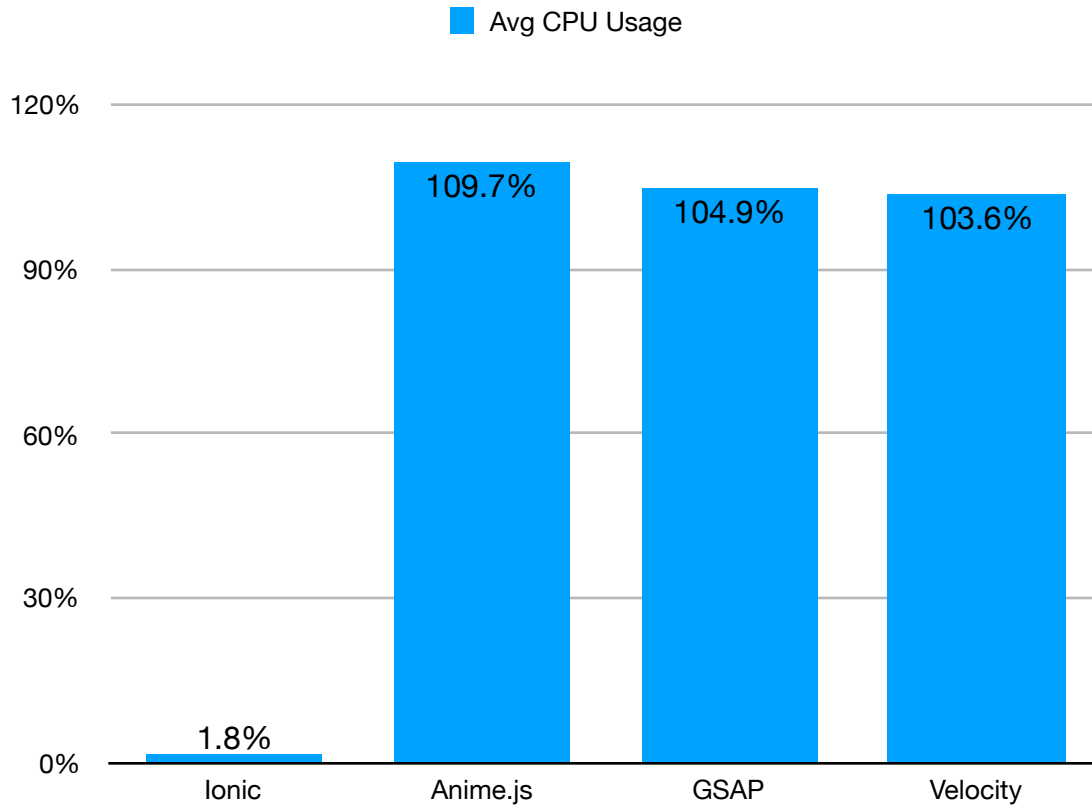


JavaScript Layout Paint Style Idle



### Average CPU Usage

	Ionic	Anime.js	GSAP	Velocity
Avg CPU Usage	1.8%	109.7%	104.9%	103.6%



**Test:**

Bubbles

Bubble Count: 500

Test Duration: 45s

**Device:**

Safari 13

iPhone 7

iOS 13.1

**Backend/Engine:**

Ionic: CSS Animations

Anime.js: requestAnimationFrame loop + inline CSS styles

GSAP: requestAnimationFrameLoop + inline CSS styles

**Notes:**

1. I originally was going to do 1000 bubbles but GSAP's startup overhead ended up hanging the phone too much.

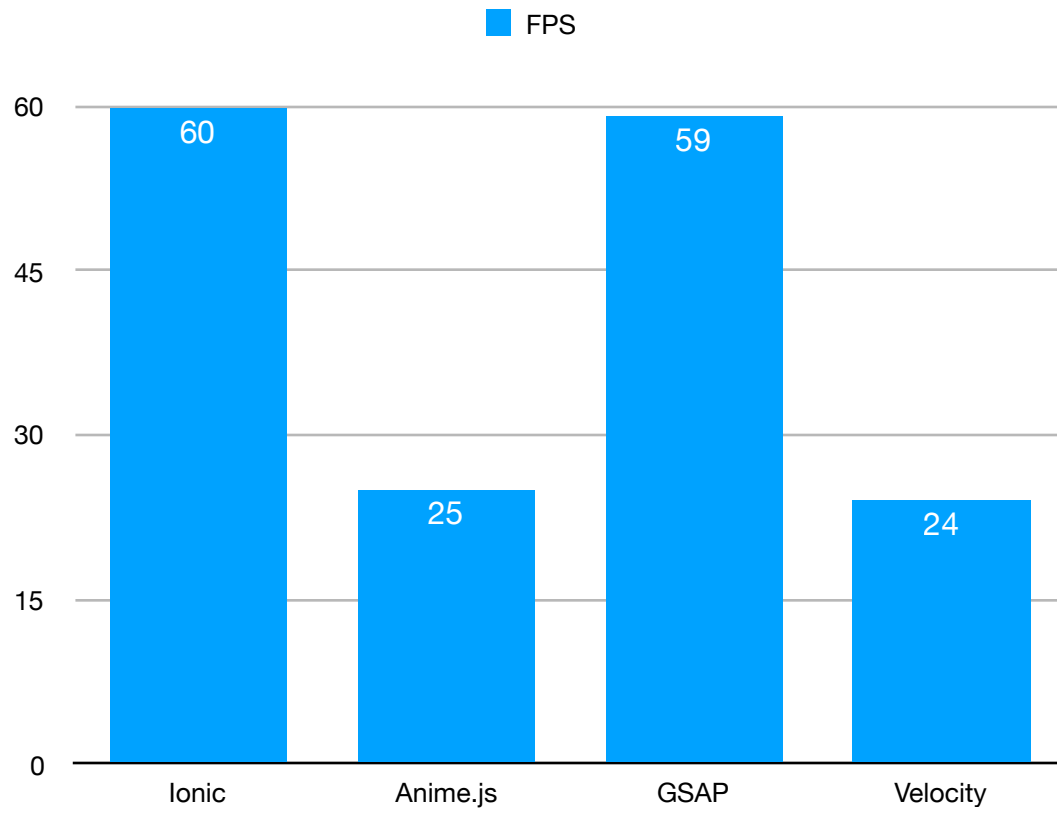


Table 1

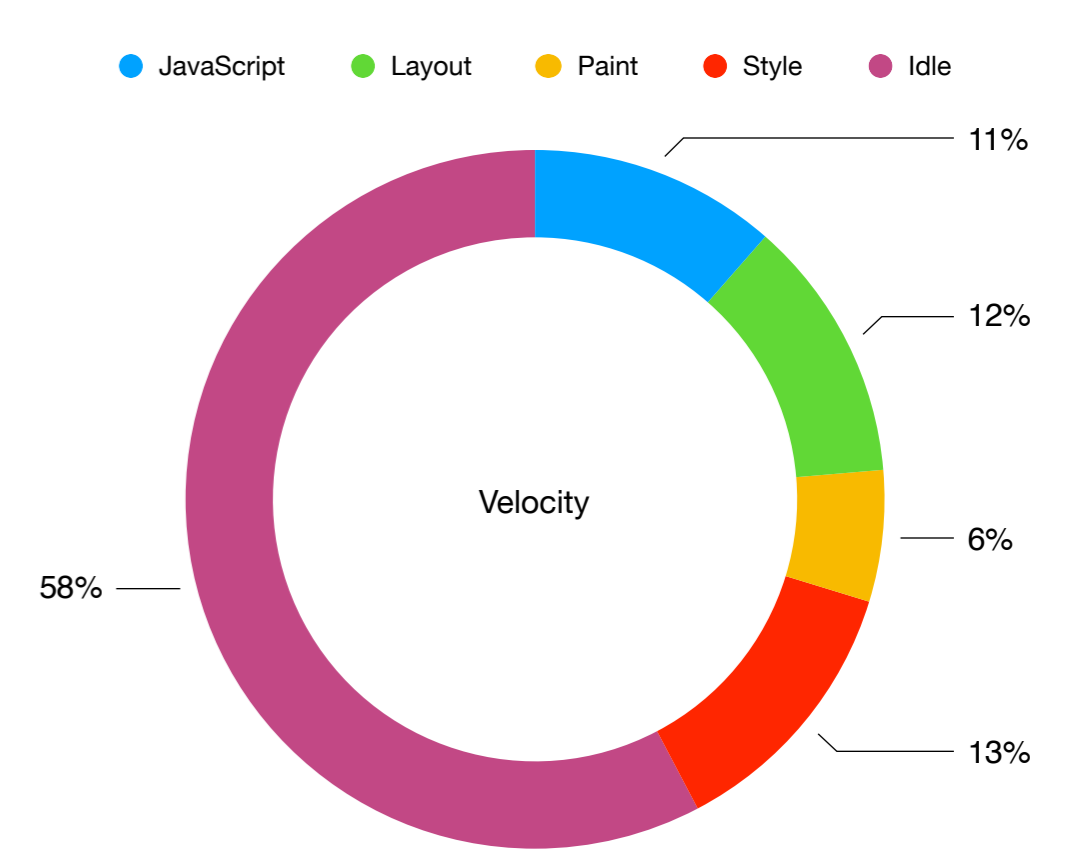
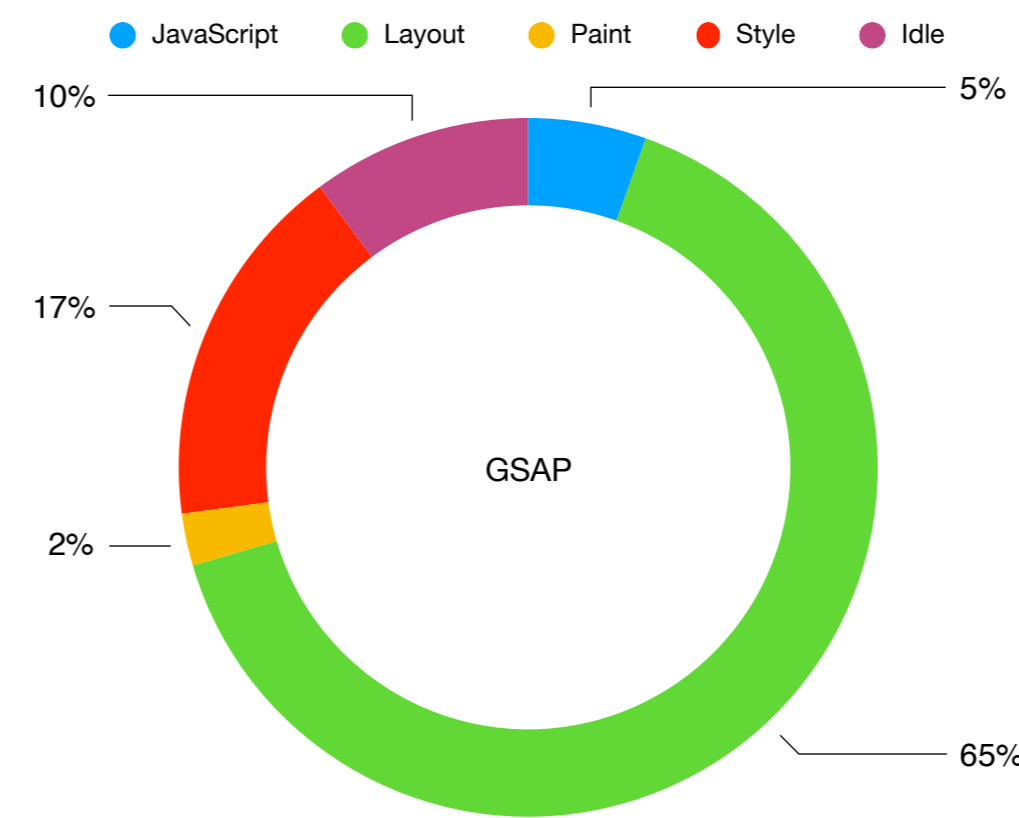
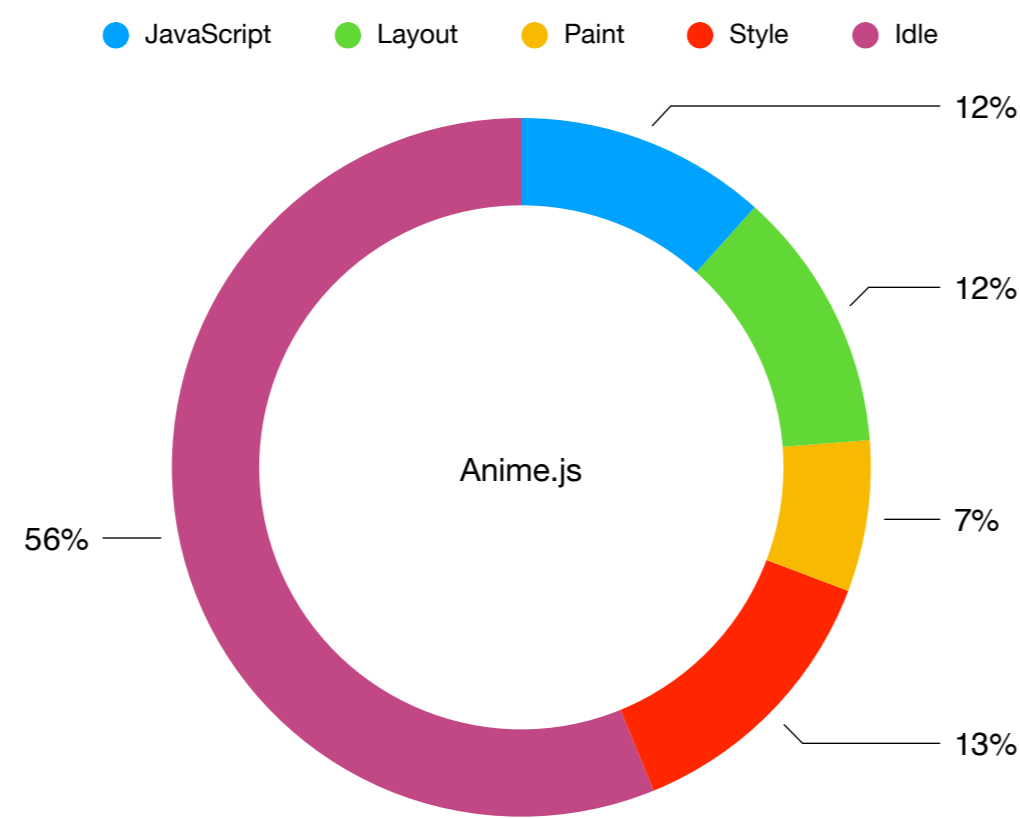
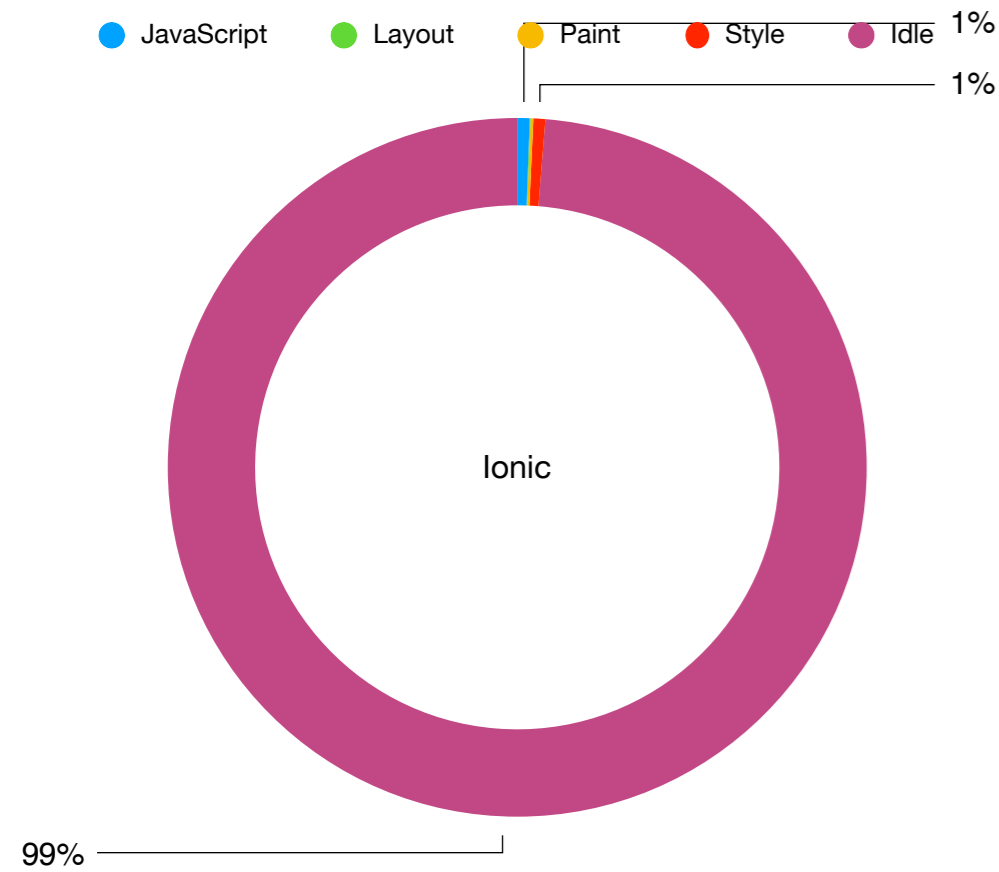
	Ionic	Anime.js	GSAP	Velocity
FPS	60	25	59	24

Main Thread Processing Time

	Ionic	Anime.js	GSAP	Velocity
<b>JavaScript</b>	258ms	5286ms	2458ms	5154ms
<b>Layout</b>	16ms	5060ms	29246ms	5490ms
<b>Paint</b>	60ms	3181ms	1089ms	2735ms
<b>Style</b>	247ms	5938ms	7629ms	5654ms
<b>Idle</b>	44419ms	25535ms	4578ms	25967ms
<b>Total</b>	45000ms	45000ms	45000ms	45000ms

Main Thread Processing Percentage

	Ionic	Anime.js	GSAP	Velocity
<b>JavaScript</b>	0.57%	11.75%	5.46%	11.45%
<b>Layout</b>	0.04%	12.24%	64.99%	12.20%
<b>Paint</b>	0.13%	7.07%	2.42%	6.08%
<b>Style</b>	0.55%	13.20%	16.95%	12.56%
<b>Idle</b>	98.71%	56.74%	10.17%	57.70%
<b>Total</b>	100%	100%	100%	100%



### Average CPU Usage

	Ionic	Anime.js	GSAP	Velocity
Avg CPU Usage	11.0%	48.8%	81.8%	43.4%

