

Zoom on mobile devices

1. The existing zoom in firefox

- A. Full zoom: It changes the layout as necessary to look better. It means that firefox has to change style data and perform reflow according to new zoom factor. This needs a lot of operations to change the layout. Maybe it looks fine on desktop, but in consideration of mobile devices, it has serious performance issue. That's why I suggest another zoom on mobile devices.

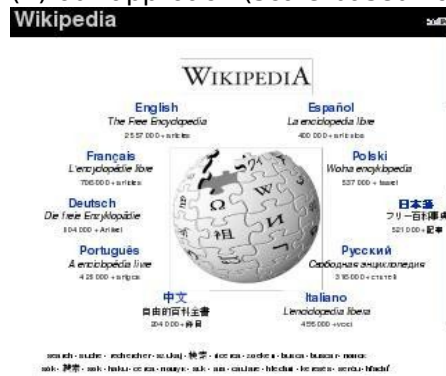
2. Problems

- A. Performance - Actually, I've tried to measure the performance of full zoom on the Samsung mobile device, which has Monahans-LV (Xscale 600Mhz) and doesn't have FPU.

		RebuildAllStyleData		DoReflow		SetFullZoom Overall time	
		DFB(ms)	tinyX(ms)	DFB(ms)	tinyX(ms)	DFB(ms)	tinyX(ms)
www.mozilla.org	zoom-in	156	142	461	535	621	696
	zoom-out	144	148	444	445	593	596
www.cnn.com	zoom-in	1219	1440	3044	3405	4525	4990
	zoom-out	1228	1378	2865	3055	4349	4573
	zoom-in	1203	1453	3061	3355	4522	4945
	zoom-out	1174	1396	2878	3058	4299	4584
Average (cnn)		1206	1417	2962	3218	4424	4773

- B. Layout - All mobile devices has much smaller display than desktop. But I am not sure if web standards like HTML, CSS care about it and most web designers in the world do. Let's see two images below.

(1) our approach (scale-based zoom)



(2) full zoom



In order to obey CSS rules, full zoom has to display in this way on small screens (the layout looks destroyed). What is the right way to be presented to end-users? I would like to hear your opinions.

3. Our approach

- A. Cairo-Scaling: Just scale everything by the zoom factor when drawing (without changing style data and doing reflow), and leave the page layout unchanged. As you know, it can be done using cairo-transformation functions. So I would call it "cairo-scaling" temporarily.

4. Performance of cairo-scaling on the same target.

		RebuildAllStyleData		DoReflow		SetFullZoom Overall time	
		DFB(ms)	tinyX(ms)	DFB(ms)	tinyX(ms)	DFB(ms)	tinyX(ms)
www.mozilla.org	zoom-in	0	0	0	0	58	Not tested
	zoom-out	0	0	0	0	67	Not tested
www.cnn.com	zoom-in	0	0	0	0	156	Not tested
	zoom-out	0	0	0	0	162	Not tested
	zoom-in	0	0	0	0	147	Not tested
	zoom-out	0	0	0	0	159	Not tested

5. Cairo-scaling's issues:

- How to handle events
- How to handle native widgets
- How to handle plug-ins
- How to distinguish between chrome and contents.
- When drawing, cairo has to do a lot of floating point computations and this could be the problem on mobile devices which don't have FPU. It causes painting performance to be slow.
- There could be other problems that I missed.

6. Question.

Actually I've hacked and fixed above issues except for handling plug-ins and floating point computation issue. But one important thing to take note is that, my fixes ONLY cover those scenarios that I've tested and it may have missed out untested events and native widgets. I am also not sure whether this is a good approach to be able to cover all issues easily.

Will there be any better and simpler approach that could easily cover all of those potential issues for scale-based zoom?

Will there be any other issues that are not listed above?