

Firefox Layout

jmi@mozilla.com

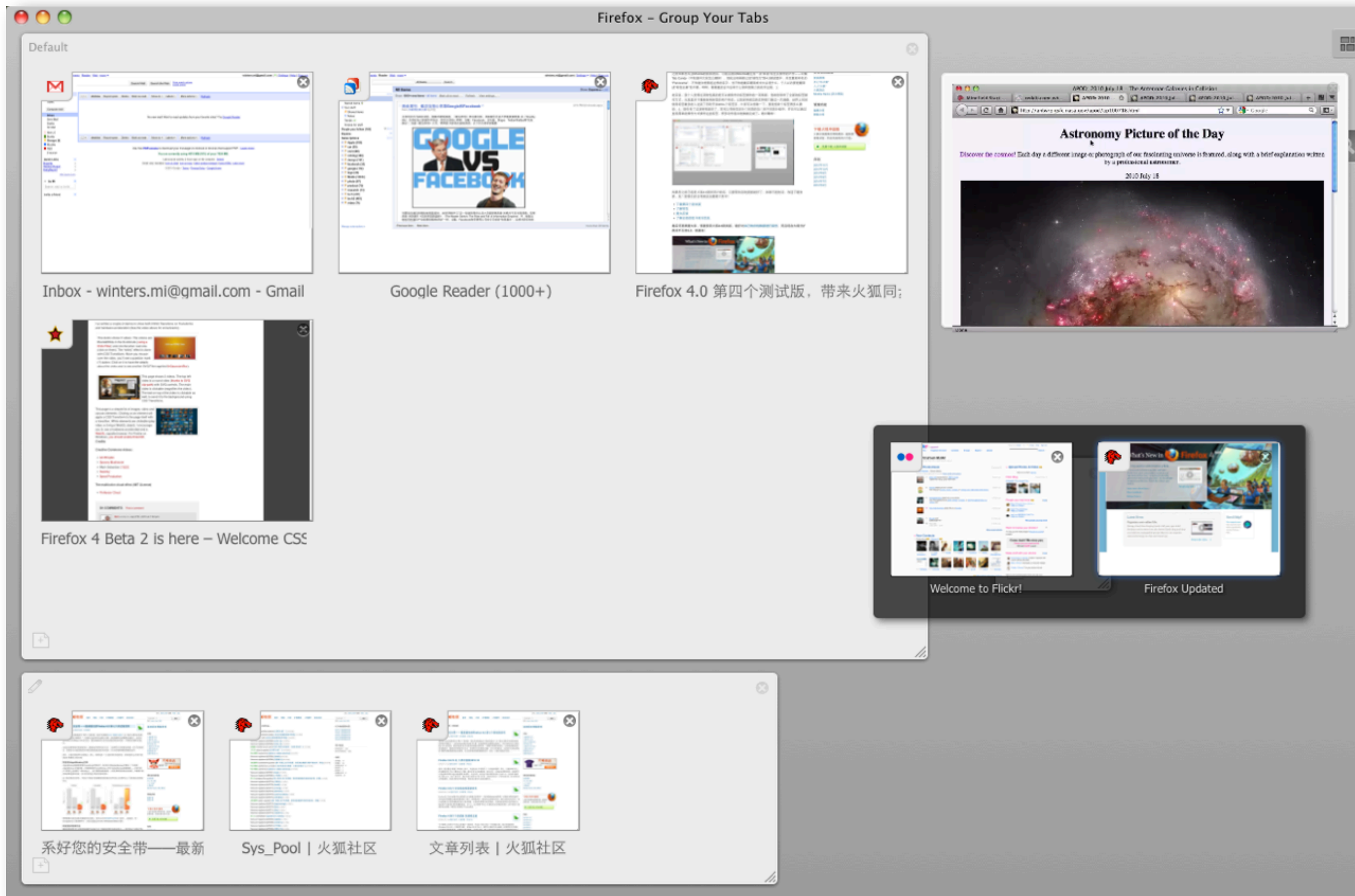






- Firefox 4, which is right around the corner, is an incredibly terrific product!
- New UI (Firefox Button, Tab Groups, Tab on Top ...)
- Firefox Sync
- Hardware Acceleration, WebGL, CSS 3
- JaegerMonkey (Mozilla Monkey Family)
-



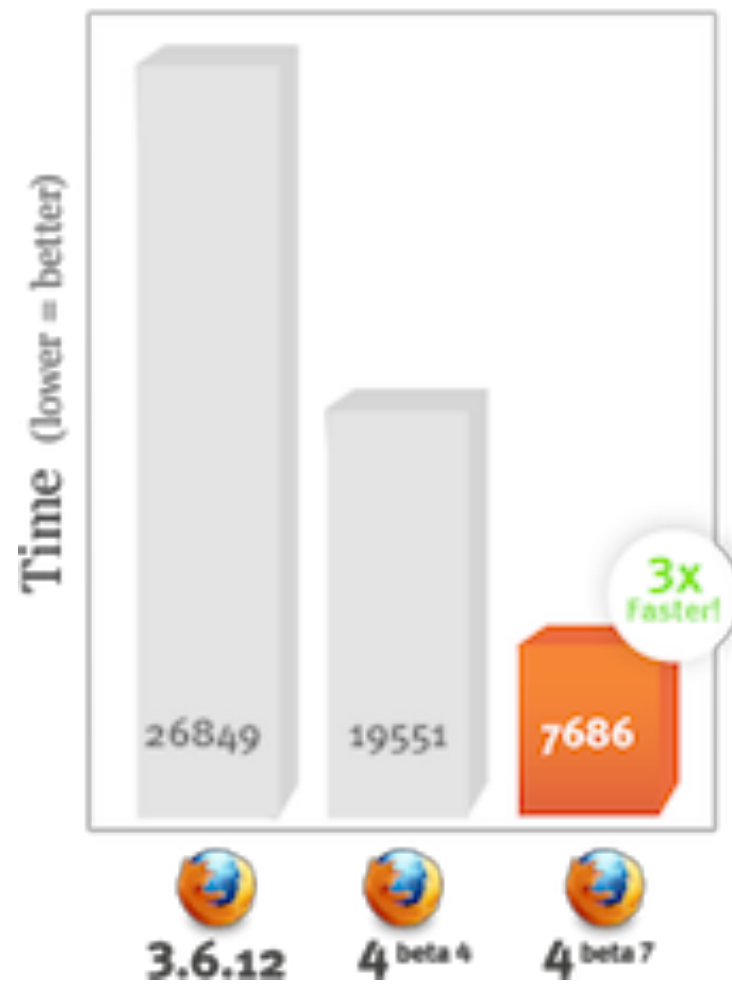


Firefox
Panorama

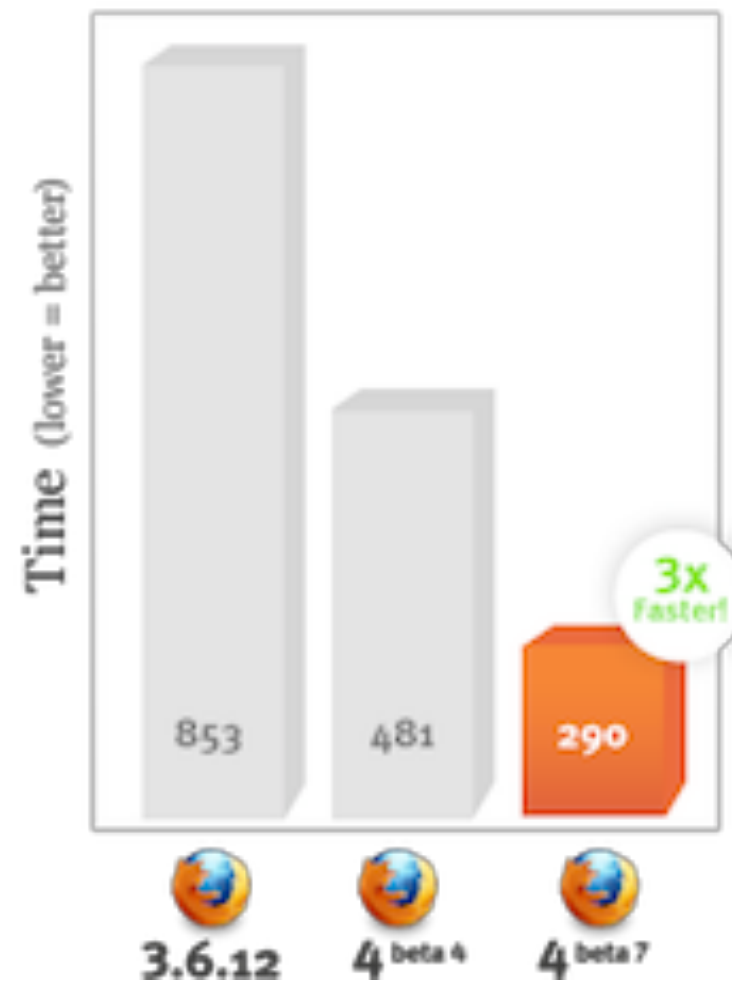


JaegerMonkey

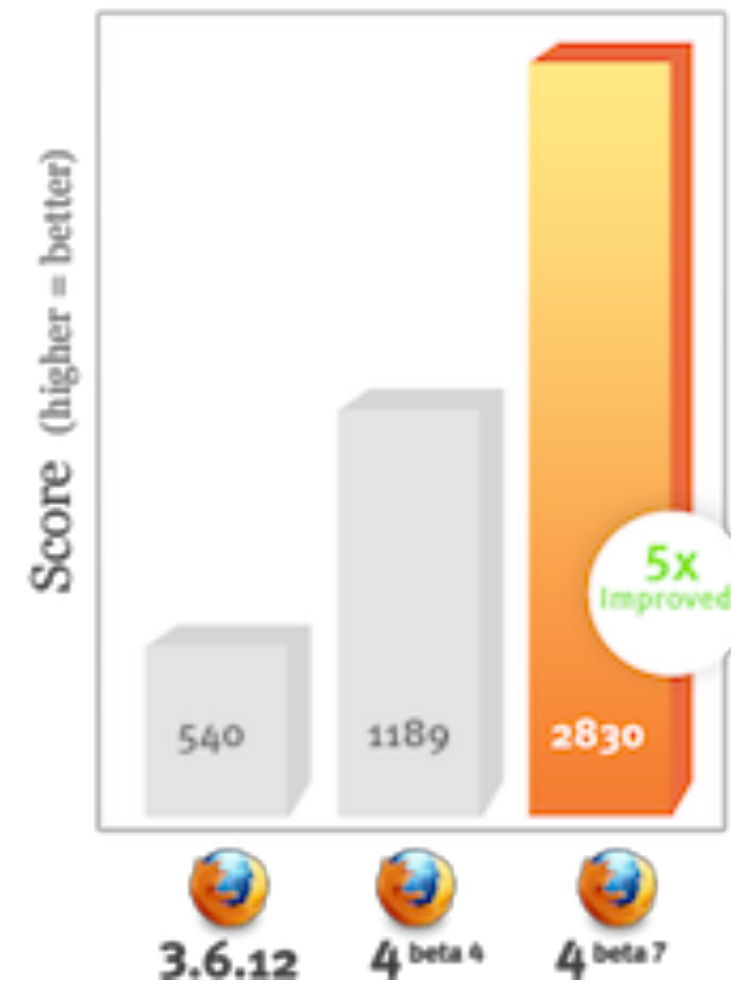
Kraken



Sunspider

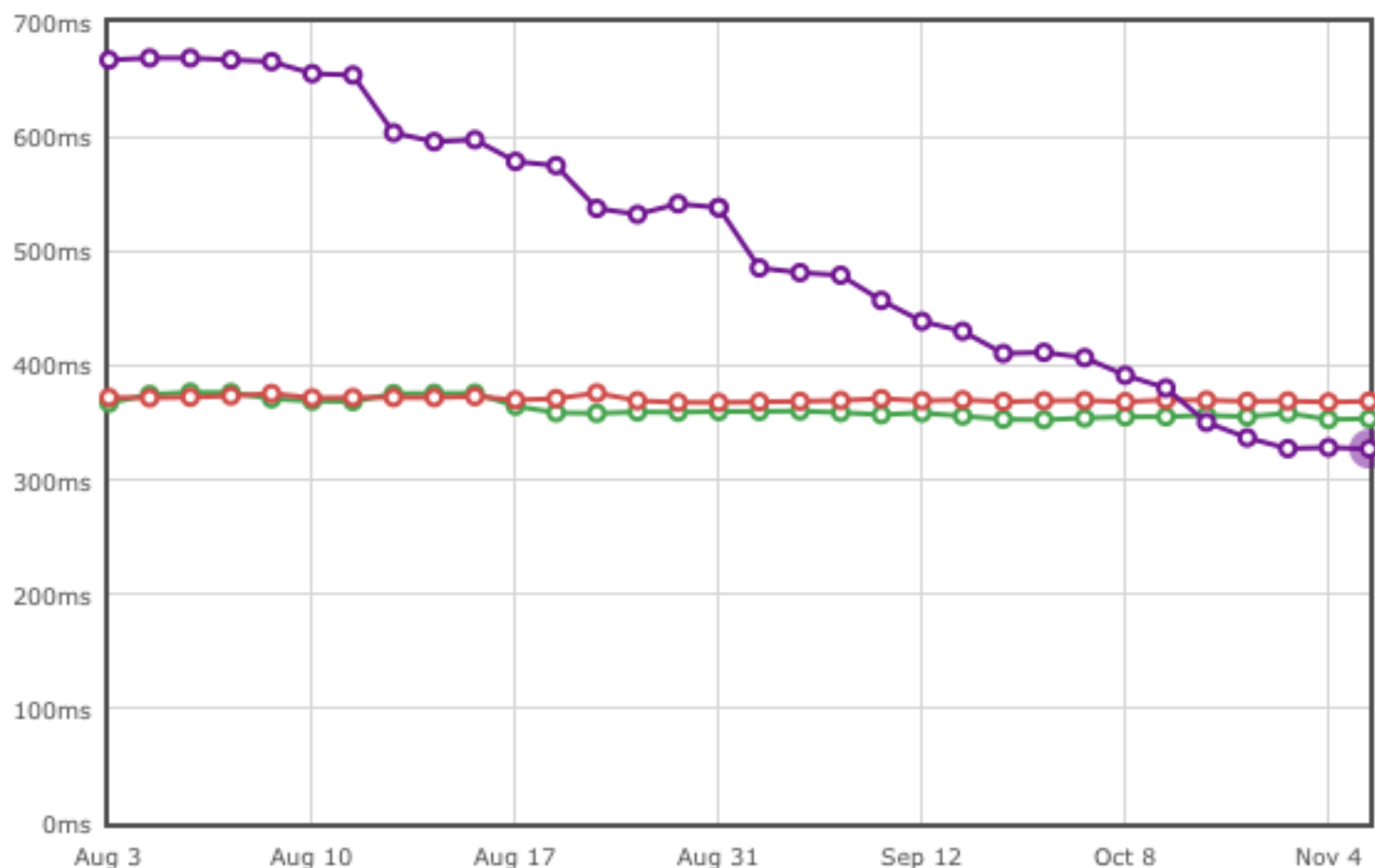


V8 Benchmark, version 6

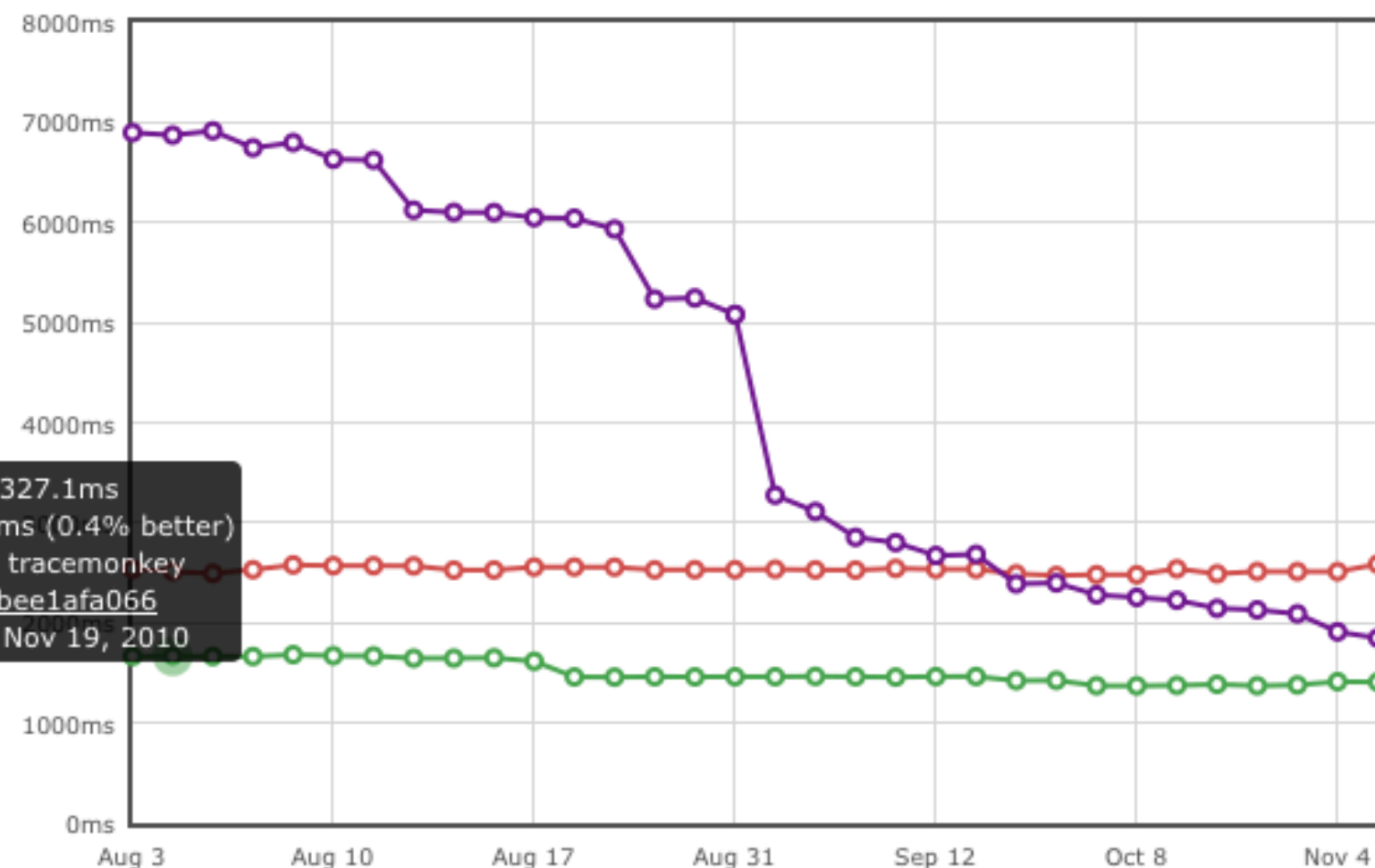


AreWeFastYet.com

sunspider



v8bench



speed: 327.1ms
Δ: -1.2ms (0.4% better)
source: tracemonkey
rev: [3abee1afa066](#)
tested: Nov 19, 2010

mozilla firefox 4 (TM+JM) google chrome (v8)

apple safari (nitro)

[x86](#) | [x64](#) | [regress-x86](#) | [regress-x64](#) | [FAQ](#) | [suggestions](#)

speed: 368.8ms
Δ: 0.8ms (0.2% worse)
source: WebKit
rev: [72370](#)
tested: Nov 19, 2010

speed: 353.5ms
Δ: 0.7ms (0.2% worse)
source: v8
rev: [5860](#)
tested: Nov 19, 2010



Firefox[®] 4 beta

Demo



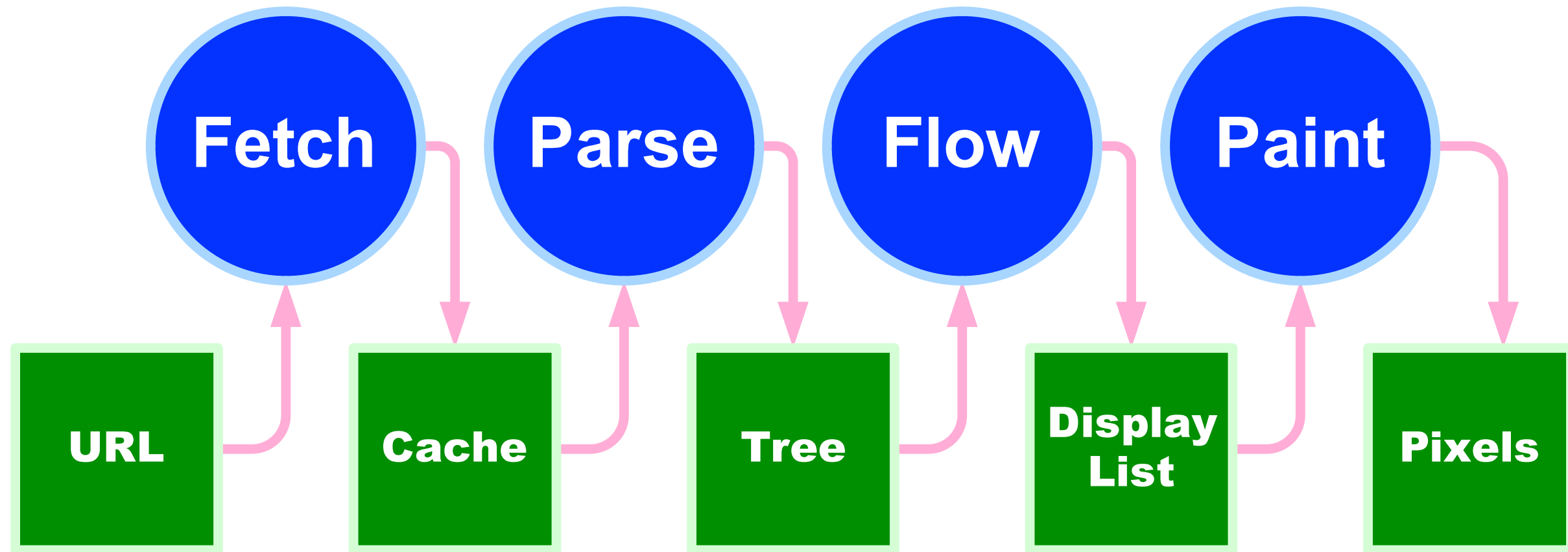


Firefox 4 - Beta 3

Web Tech Preview

<http://hacks.mozilla.org>
by @paulrouget

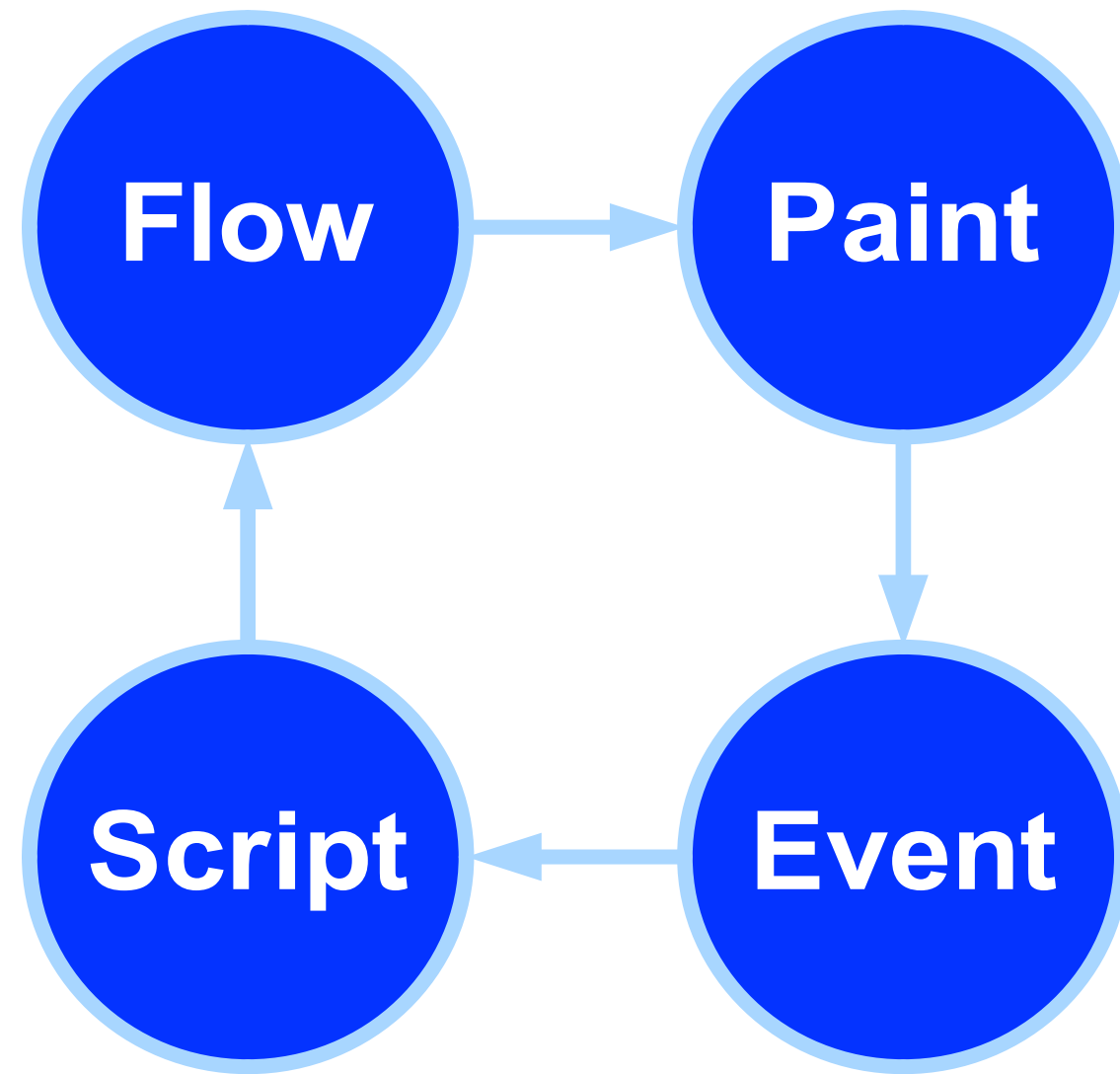
Browser Basics



* Borrowed from Douglas Crockford's Lecture on "Theory of DOM"



Browser Basics



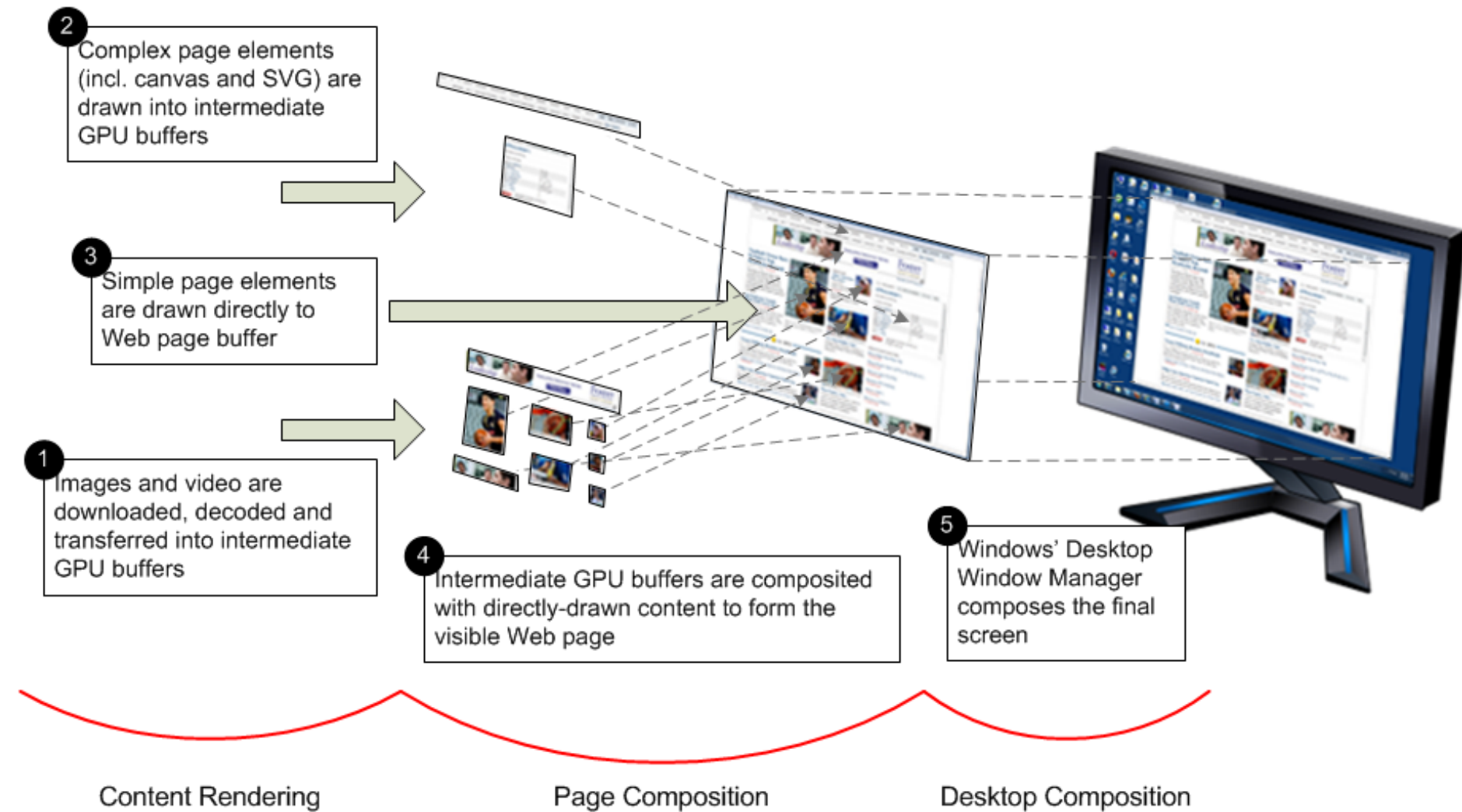
- The Browser has an event-driven, single-threaded, asynchronous programming model.

* Borrowed from Douglas Crockford's Lecture on "Theory of DOM"



Browser Tasks

- Loading
- Parsing
- Script Execution
- **Layout**
- Style Resolution
- **Paint**
- Event Handling



* Picture comes from the IE blog introducing hardware acc



Layout

Input

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://  
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en-us" lang="en-  
<head>  
  <script type="text/javascript">var _starttime = new Date().getTime  
  <meta http-equiv="Content-Type" content="text/html; charset=utf-8"  
  <meta name="robots" content="index,follow" />  
  <link rel="shortcut icon" href="/skins/mozilla/Fox3/favicon.ico" />  
  <link rel="alternate" type="application/rss+xml" title="What's new fee  
  <link rel="alternate" type="application/rss+xml" title="Page and subps  
  <link rel="alternate" type="application/rss+xml" title="Page changes f  
  <meta name="generator" content="MindTouch 9.12.3" />  
  <link rel="search" type="application/opensearchdescription+xml" title=
```

<html>	HTMLDocument
<head>	HTMLHTMLElement
<title>	HTMLHeadElement
foo	HTMLTitleElement
</title>	Text("foo")
</head>	

?

Output



Layout

Input

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Layout

Output



Layout

Input

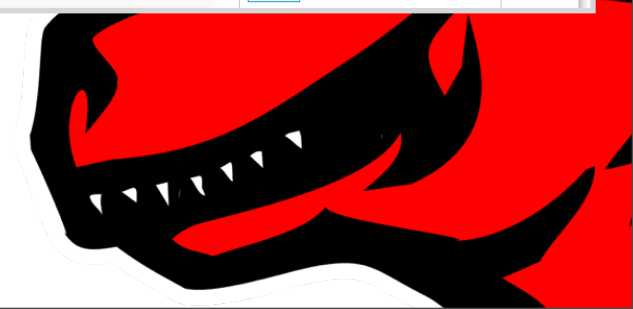
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Layout

where things go on
the screen / paper

Output



Layout

Input

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Layout

where things go on
the screen / paper

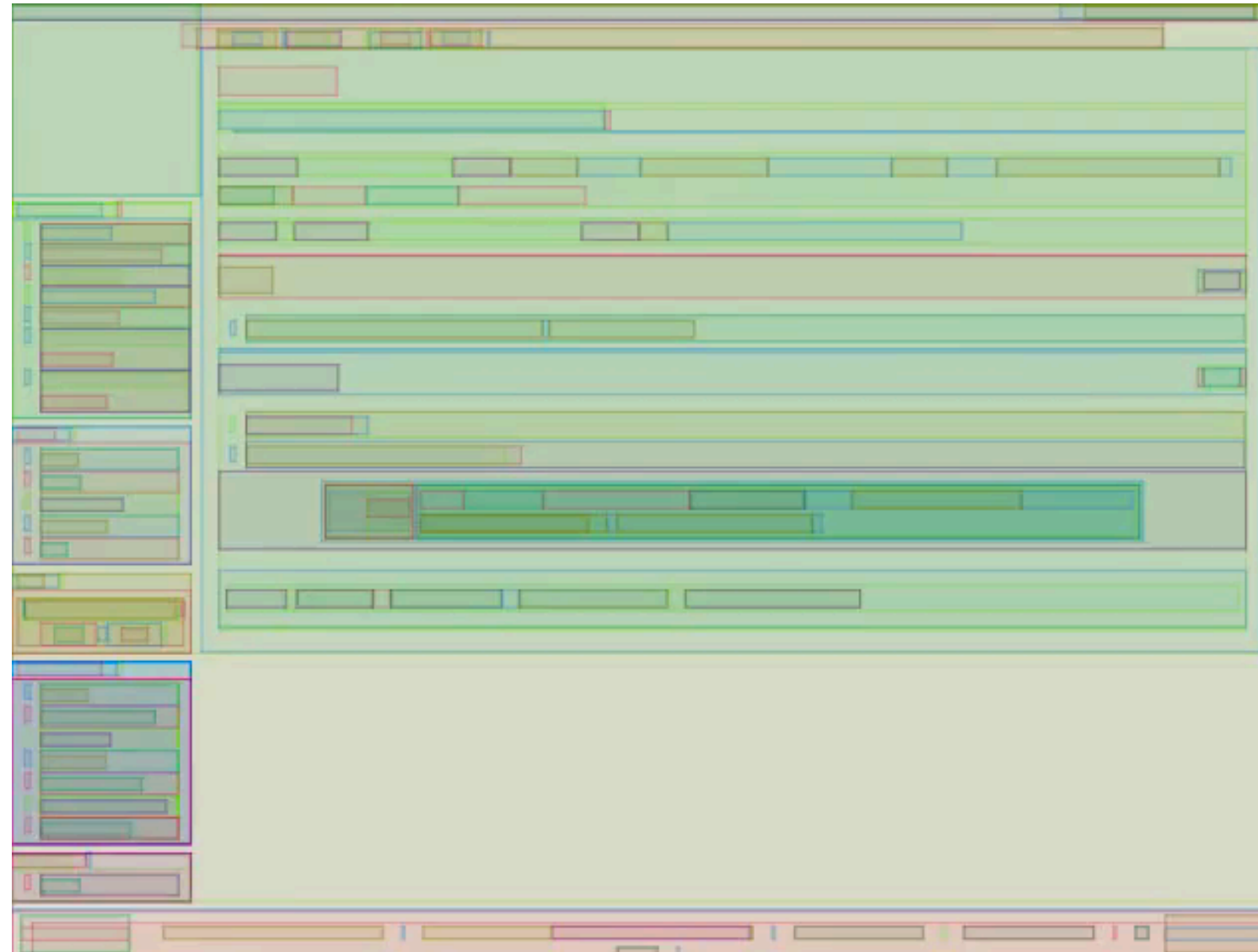


Output

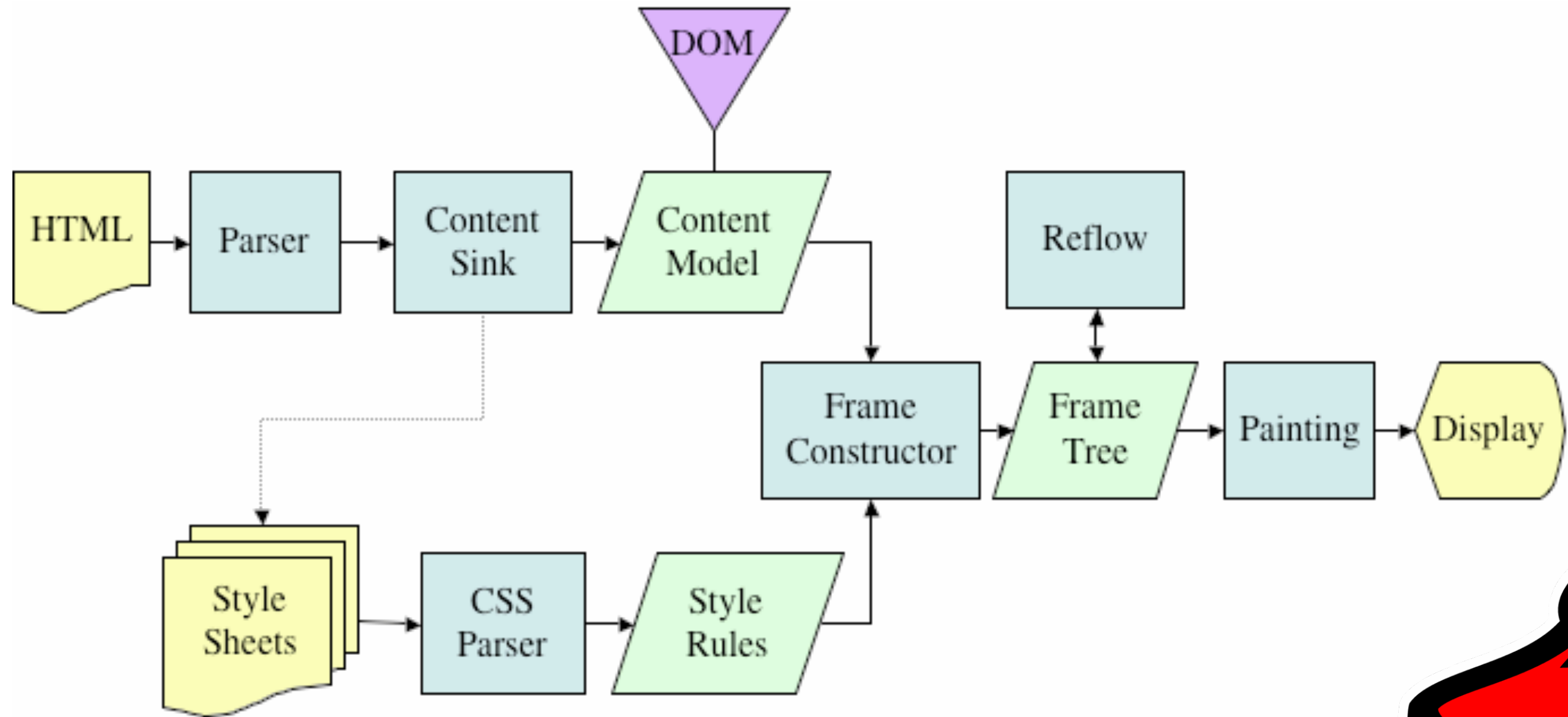


Terms

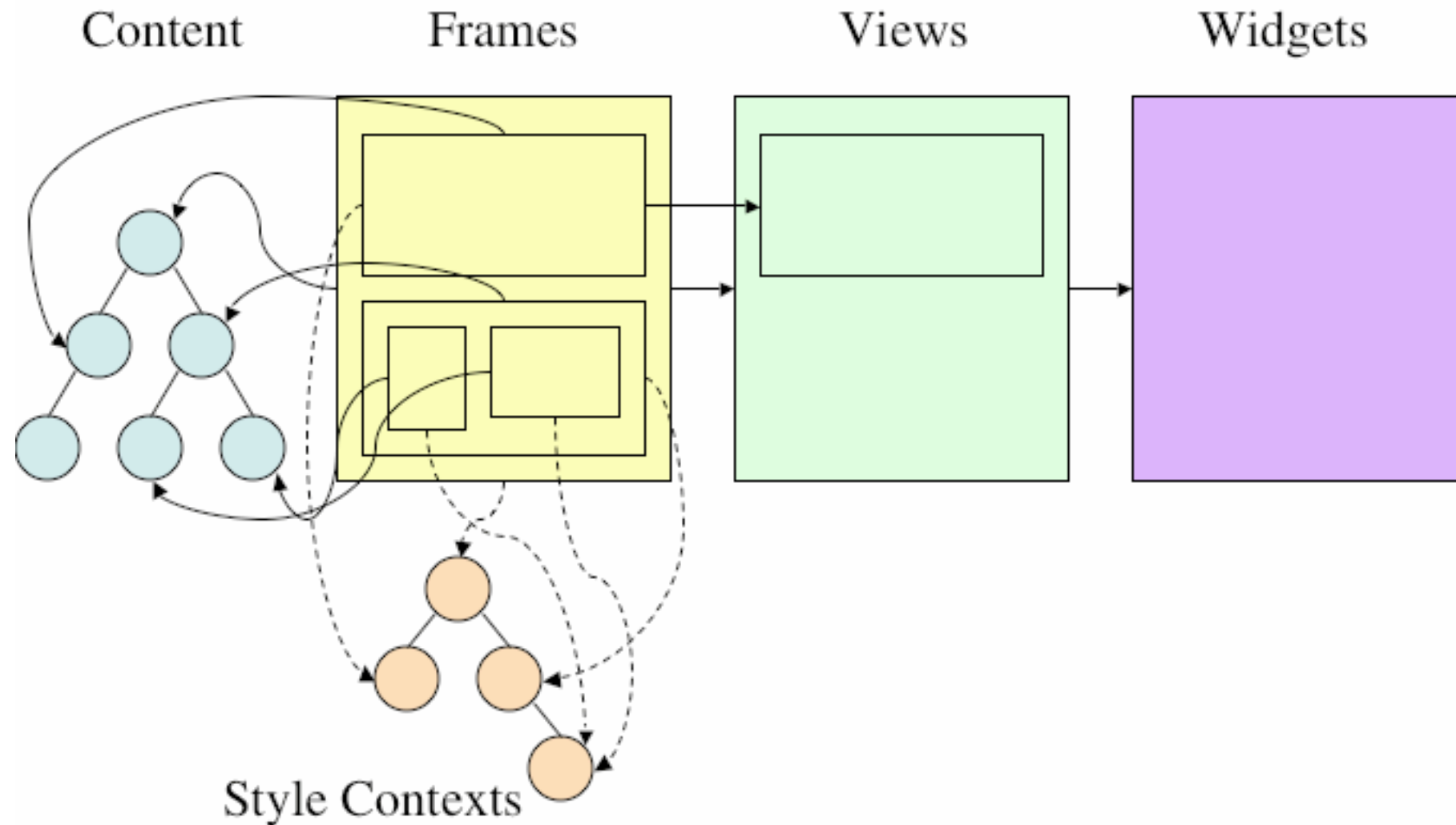
- DOM Tree
- Style System
- Layout jobs:
 - Frames
 - Reflow



Basic Flows



Frames



- An encapsulation of a region on the screen;
- A region that contains geometry, e.g. size, location, stacking order;
- 1..* correspondence between content elements and frames;
- Got style contexts from Style System;



Frames

- Frames are RECTANGLES.
- Block vs Line (inline)
 - BLOCK is composed of 1..* LINES.
 - LINE is a single row of text or other presentational elements.
 - Width of BLOCK changed, contents of LINES must be reformatted.

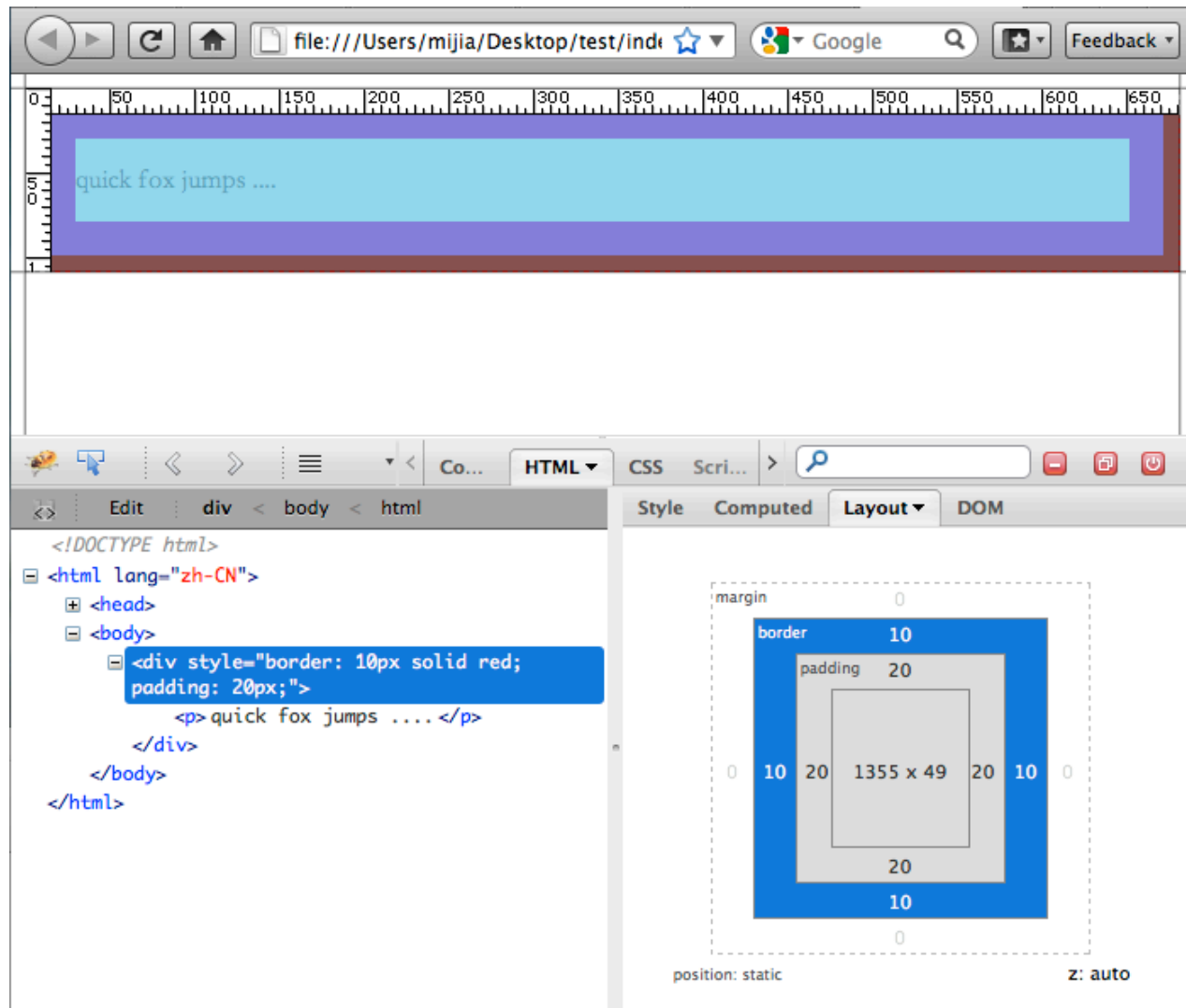
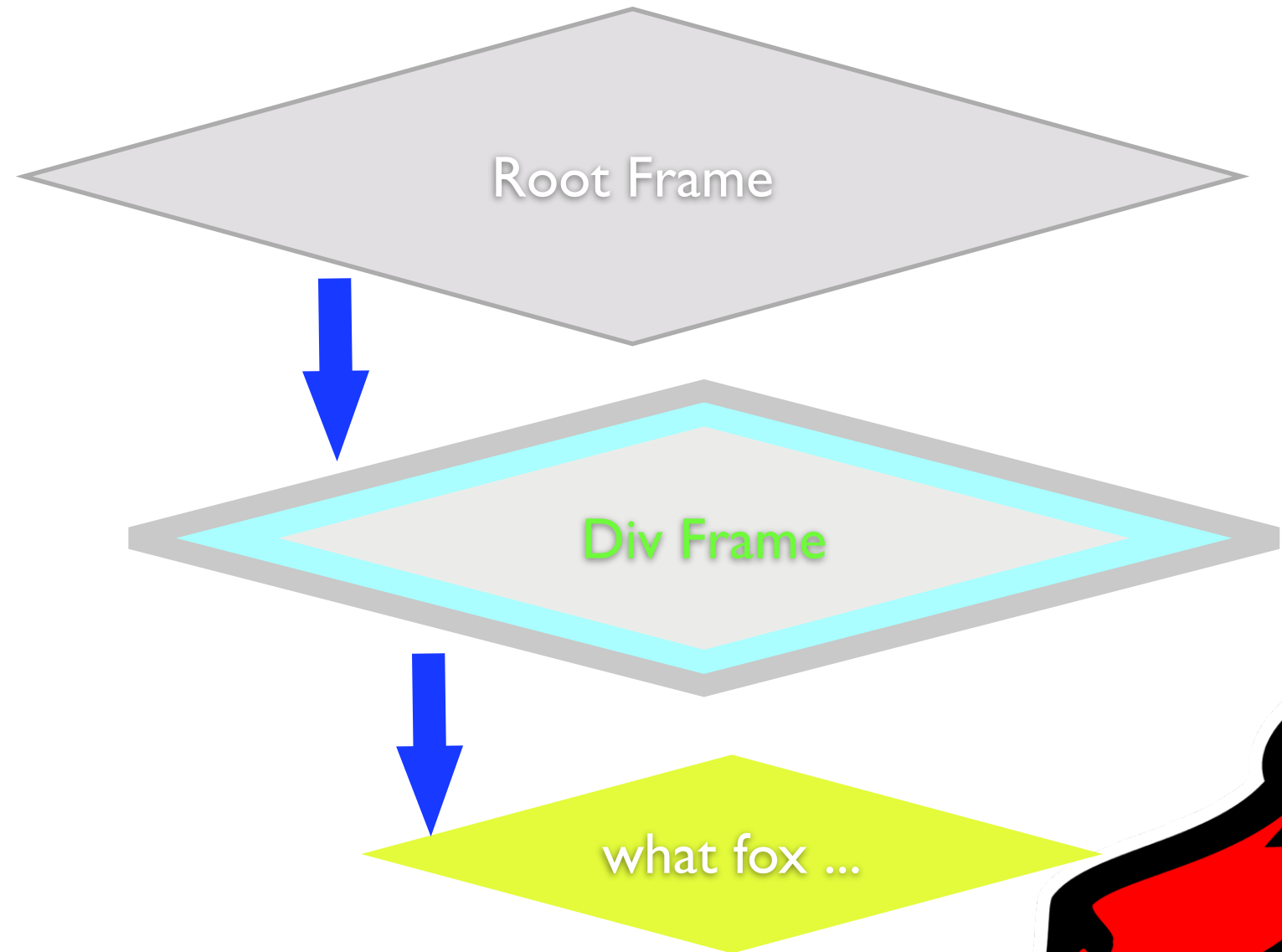
```
<p>  
We need documentation for users, web developers, and  
developers working on Mozilla. Much of the existing  
code <b>isn't very well documented</b>. In the process  
of figuring things out, try and document your discoveries.  
</p>
```



Frame Tree

- Root Frame (<html>)
- nsIFrame, nsFrame ...

```
<div border="10" padding="20">  
  <p>what fox has jumped ...? </p>  
</div>
```



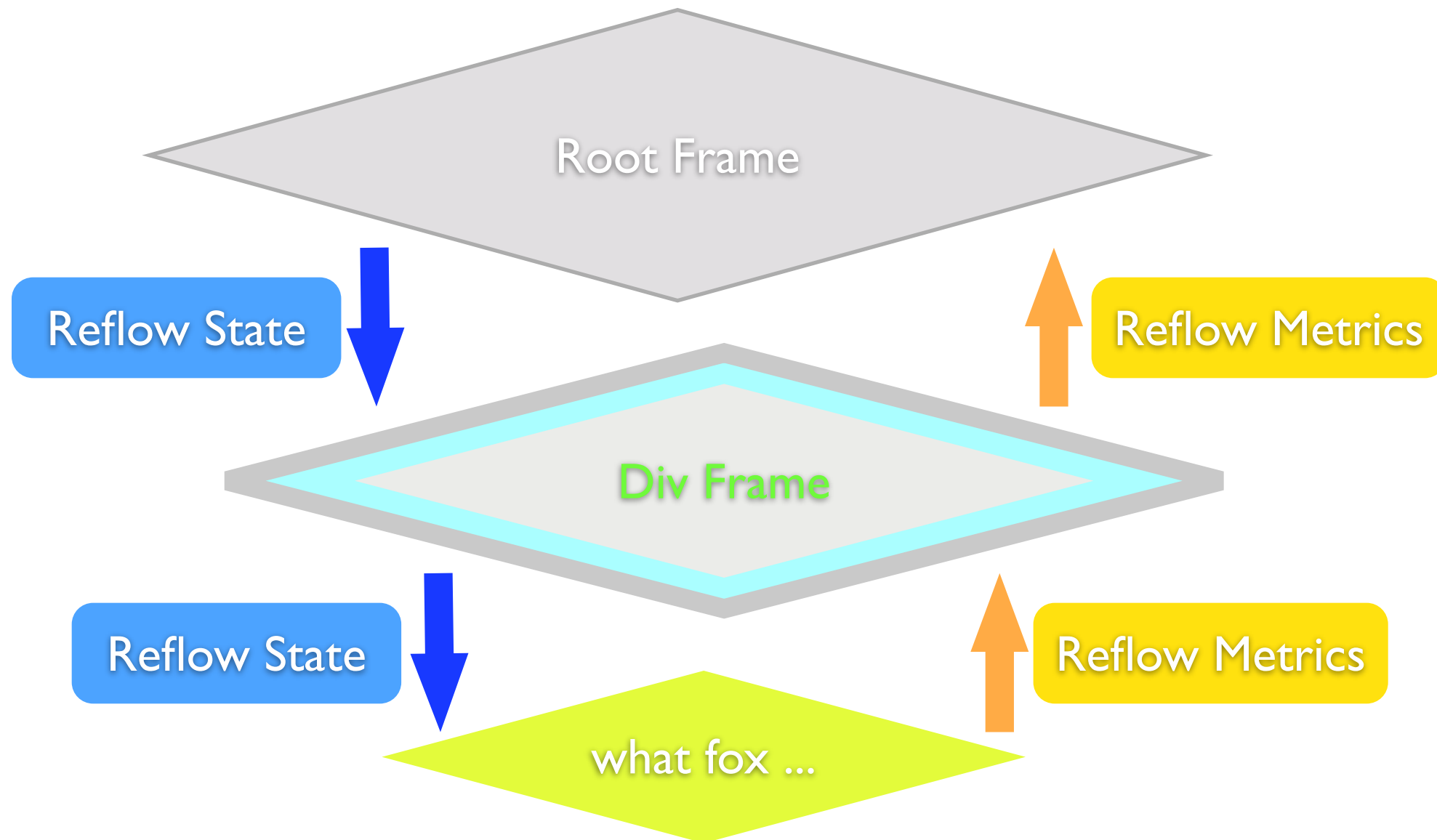
Reflow

- After Frames are created, “REFLOW” them to format!
- REFLOW is the process by which the GEOMETRY of the layout engine’s formatting objects are COMPUTED.
 - Geometry: x, y, w, h
 - Computed hierarchically.
- HTML uses a flow based layout model,
 - left-right, top-bottom, 1 pass
 - out-of-flow: floats, absolute positioned, ...
 - Table: more than 1 pass



Reflow, How?

```
<div border="10" padding="20">  
  <p>what fox has jumped ...? </p>  
</div>
```

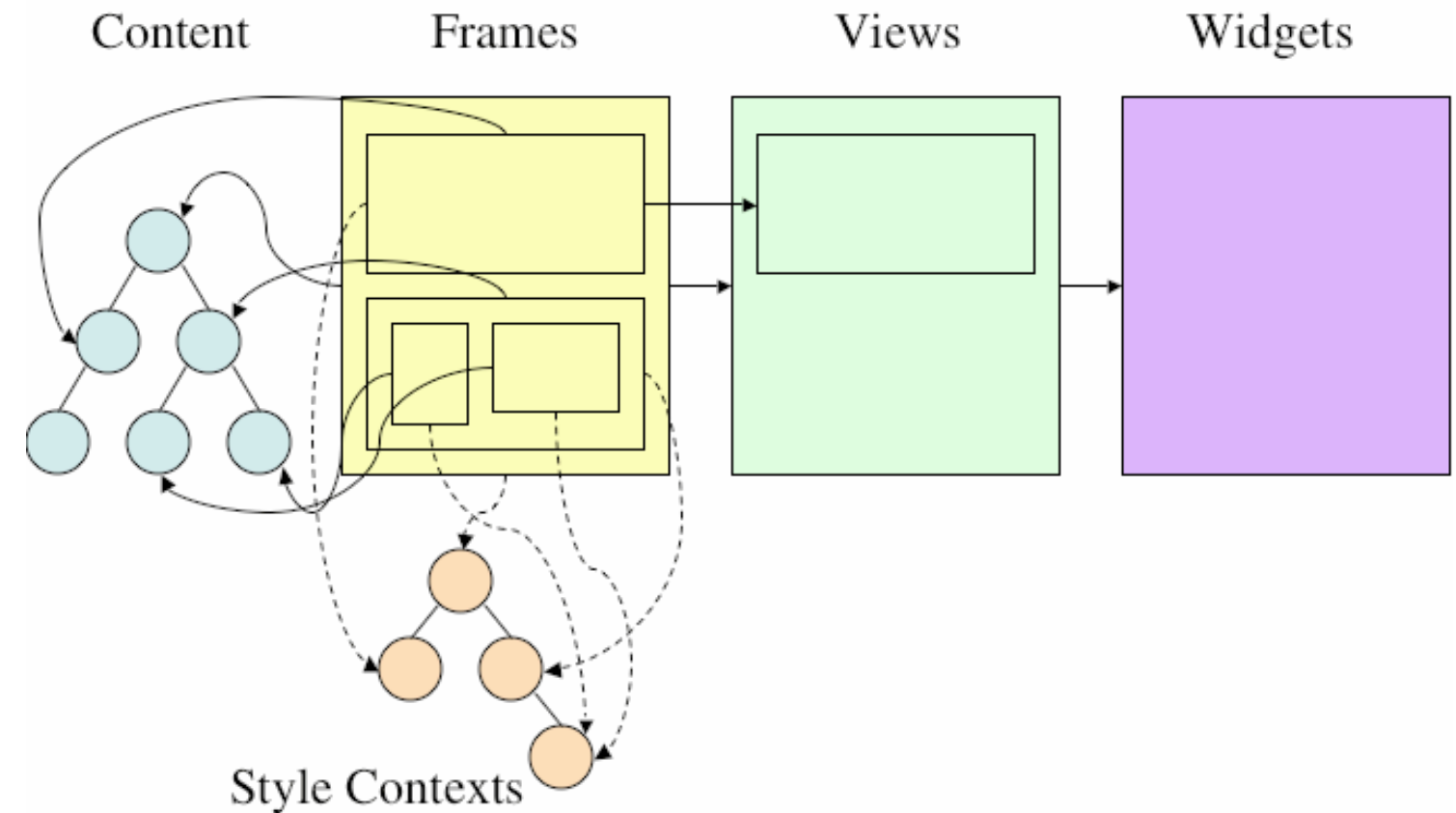


- **Reflow State:**
 - Constrained info about parent frames;
 - passed to child frames
- **Reflow Metrics:**
 - to send geo info back
 - dimension of child



Reflow, When?

- Initial page load
- Browser window resize
- DOM nodes added or removed
 - `div.appendChild(p) ...`
- Layout styles applied
 - `element.style.height = '100px';`
 - `element.style.display = 'block';`



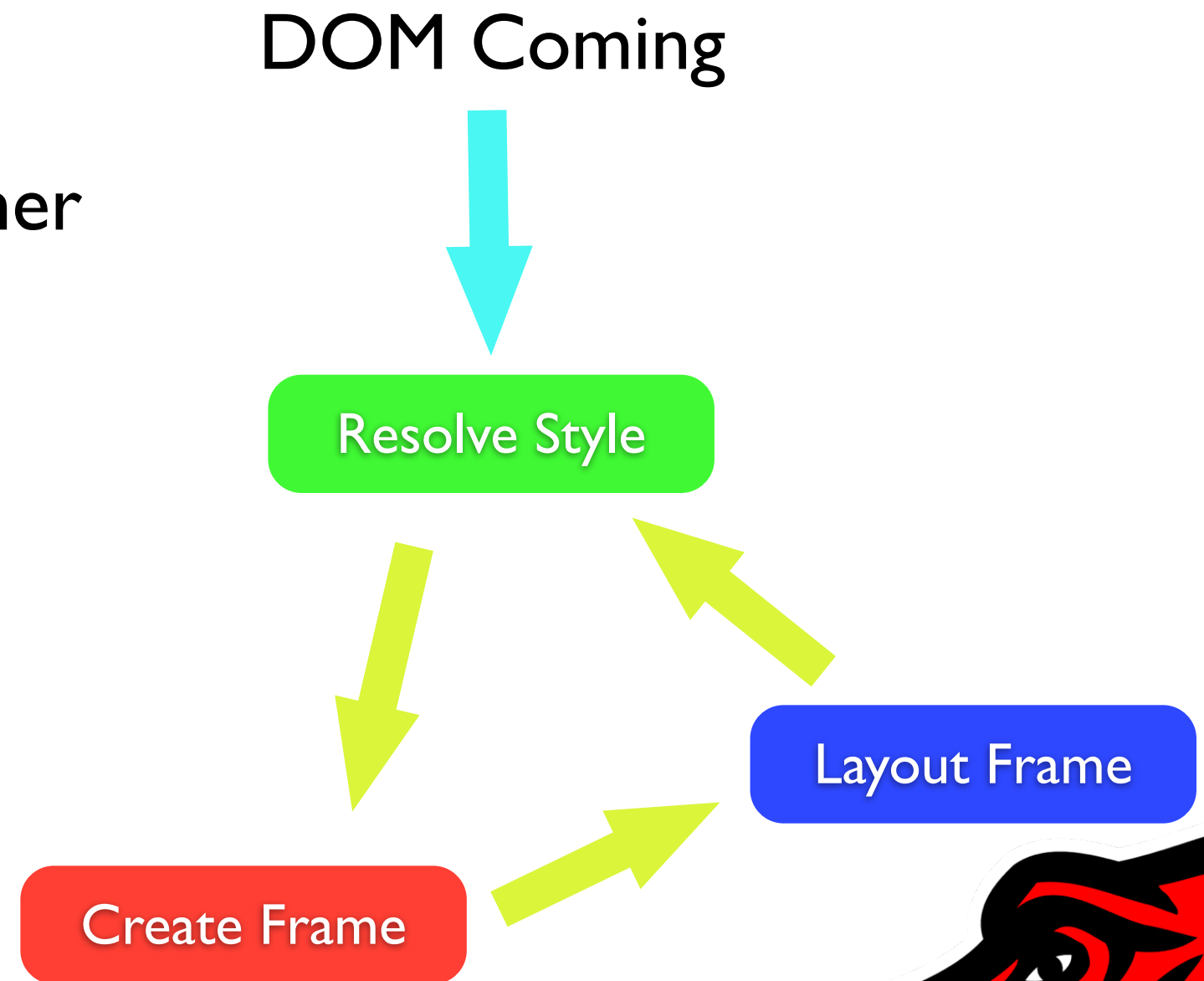
Reflow is simple, right?

Nope.



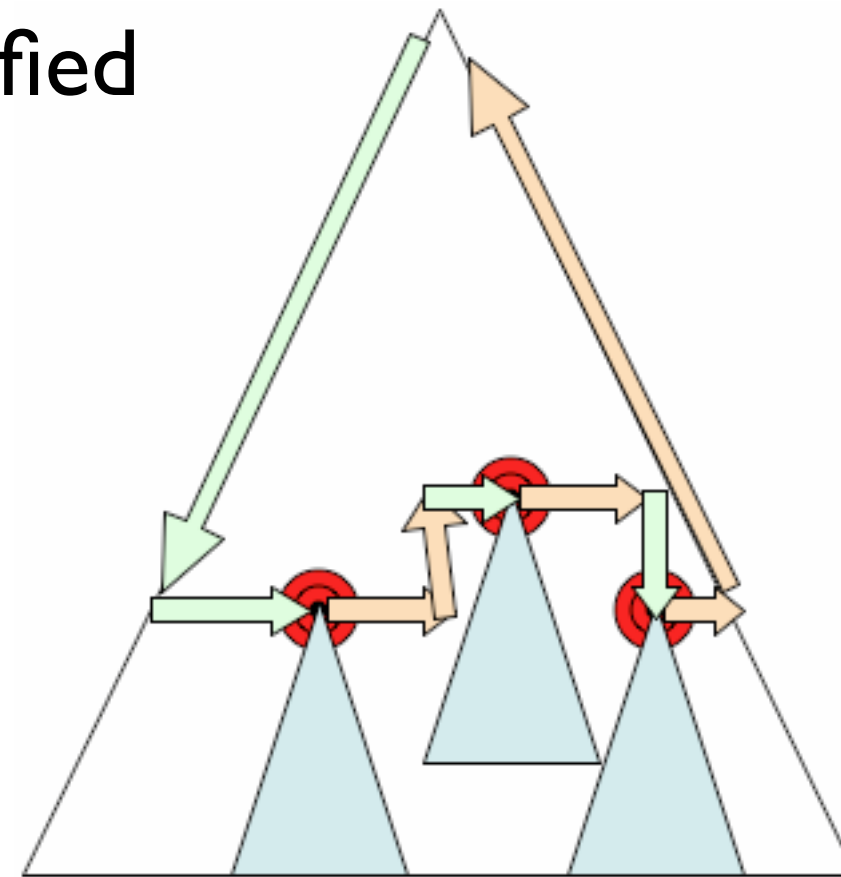
Incremental Reflow

- Goal: create parts of presentation, rather than waiting for entire doc
 - Resolve Style
 - Create Frame
 - Layout Frame
- In-flow vs. Out-of-flow

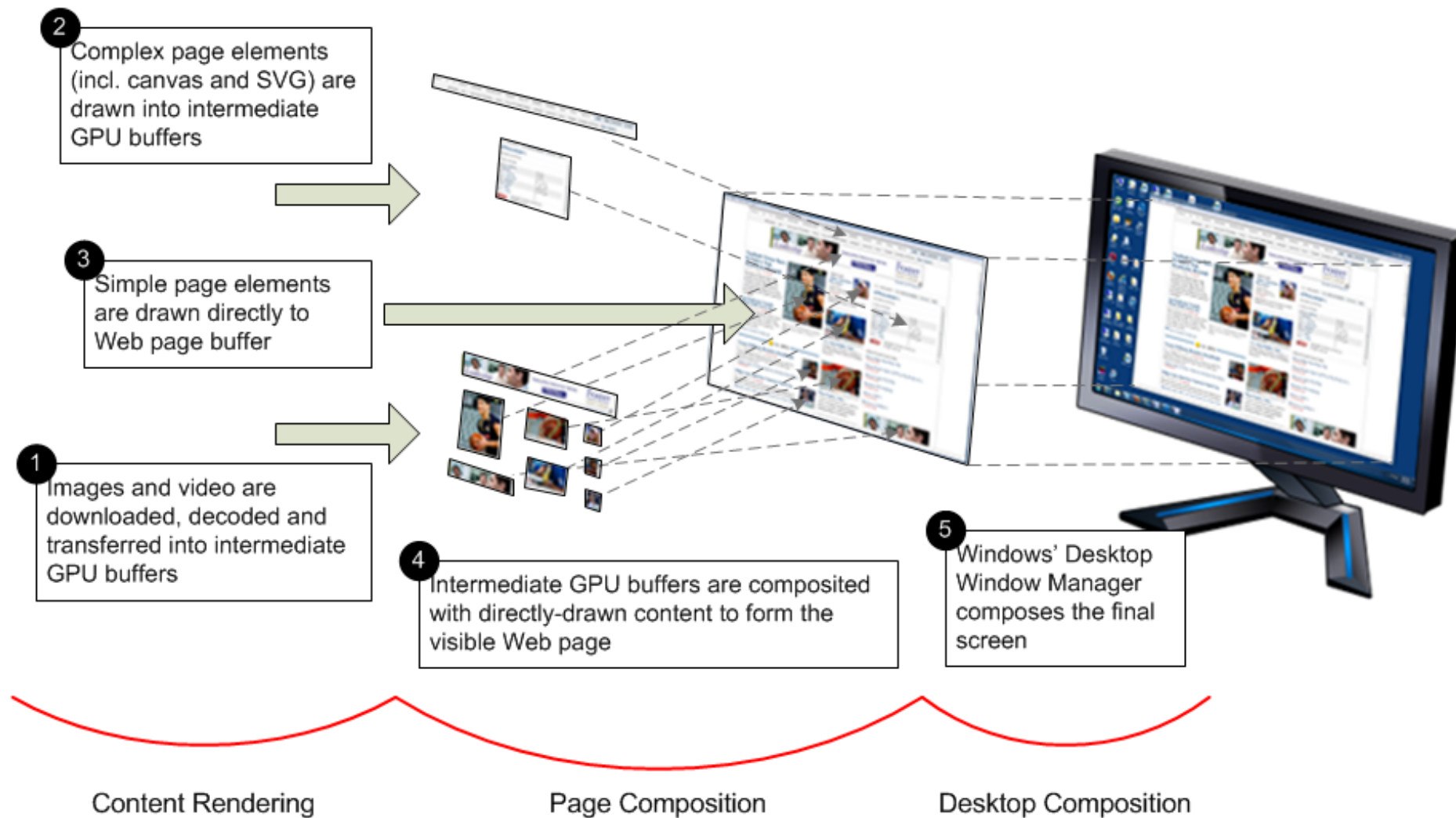


Dyn Changes to DOM

- to manage dynamic changes to the content model after doc is loaded and presented
 - content elements add, remove, modified
 - frames add, remove, modified
 - incremental reflow
 - queued and processed async



After reflow: PAINT



- Widgets
- Views manager paints views back-to-front
- walk from view to the frame, invoke `nsIFrame::Paint` per layer

* Picture comes from the IE blog introducing hardware acc



Summary

- Imagine them all as rectangles
- Think the web pages layout as the canvas, web devs are painting on it, we are controlling not controlled.
- Try to keep things neat and in-flow (Floats vs clear)
- Thinking in layout: all box model and geometry (rectangle again)
- Practice more, embrace the tools (Firebug) and community
- Fire bugs to browsers makers, :)



Summary of Summary



Summary of Summary

Rectangles



Thank you very much!

References:

`"gecko reflow layout site:developer.mozilla.org"`

