

浏览器渲染与WEB前端开发

nwind

Outline

- 百度Web前端研发部
- HTML布局无处不在
- 渲染引擎
- 浏览器



Web 前端 研发 部

FrontEnd

Web前端研发部

- 负责百度各产品线前端的开发、优化
- html、css、javascript、flash、php



内部平台

The screenshot shows the official documentation for the Tangram JS framework. At the top, there's a navigation bar with tabs for 'Tangram', 'Component', 'More', and 'Tools'. Below the navigation is a search bar and a 'Documentation' tab. The main content area features a large image of snow-capped mountains and a banner for 'Tangram JS framework 1.3.1发布: 更新日志 开始使用'. To the right of the banner is a sidebar with a 'Documentation Structure (HTML)' section containing links to 'Tangram', 'Why Use', 'How to Use', and 'FAQ'.

The screenshot displays the 'Baidu FLASH展示平台' (Baidu Flash Team Display Cube) interface. The header includes a logo, the title '百度FLASH展示平台 BAIDU FLASH TEAM DISPLAY CUBE', and a navigation menu with links to '首页', '百度应用', '业内应用', '技术洞见', '基础库', and '团队成员'. The main content area shows several thumbnail images of different applications, with a specific application titled '百度闪客' highlighted. On the right side, there are sections for '业内搜索' (Search), '友情链接' (Friendship Links) listing 'Tangram', 'UI', 'Jdk(BeLibrary)', 'CSS(arcs)', 'WebSafe', and 'weblab', and a 'Top users' table.

The screenshot of the Smart FlashBase platform features a blue header with the text 'Smart FlashBase Accelerate your flash develop!'. Below the header are three main sections: 'UI 用户界面组件库' (UI Component Library), 'DV 数据可视化基础库' (Data Visualization Foundation Library), and 'LIB 工具类库' (Tool Class Library). Each section has a brief description and a preview image. A '开始使用' (Get Started) button is located at the top right of the main content area.

The screenshot shows a community-based platform for front-end development. The header includes a logo, navigation links for 'ADoc', 'NT', 'Share', 'Smart', 'Tangram', and 'Weblab', and a search bar. The main content is a 'Share' section displaying posts from users like 'shafeng'. One post discusses '松散耦合、颗粒度' (Loose Coupling, Granularity) and another discusses 'overflow:hidden带来的问题' (Problems caused by overflow:hidden). To the right is a 'Top users' table listing active members. The footer features the Baidu logo and the text 'BaiDu Fe Web前端研发部'.

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当CSS和HTML越来越丰富时...

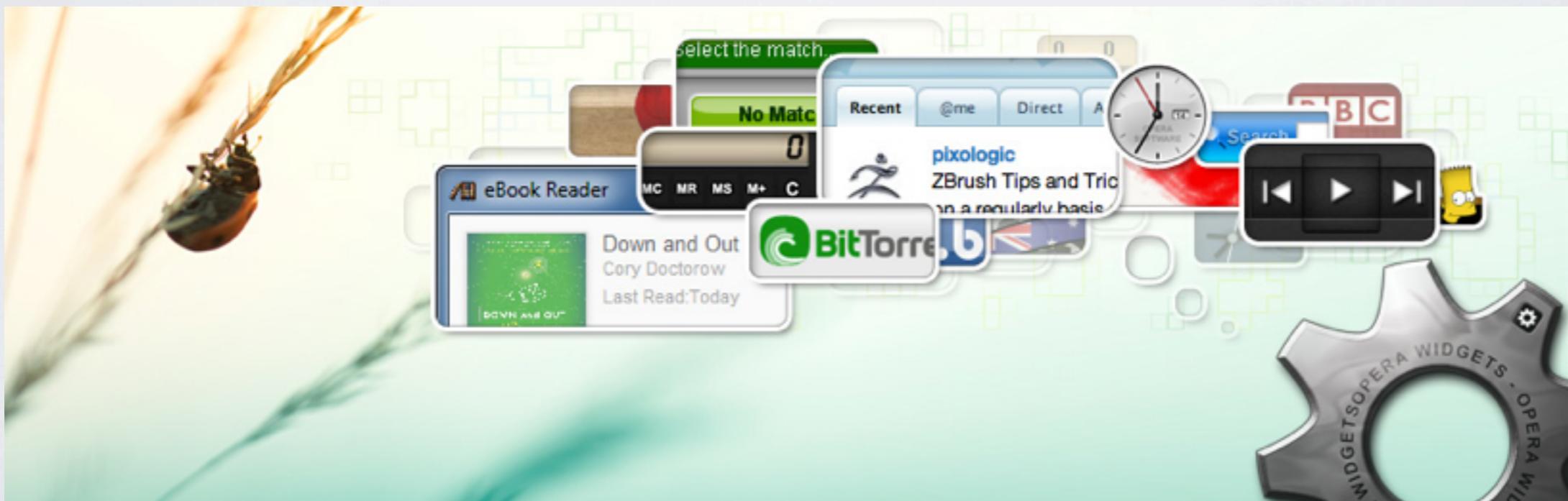
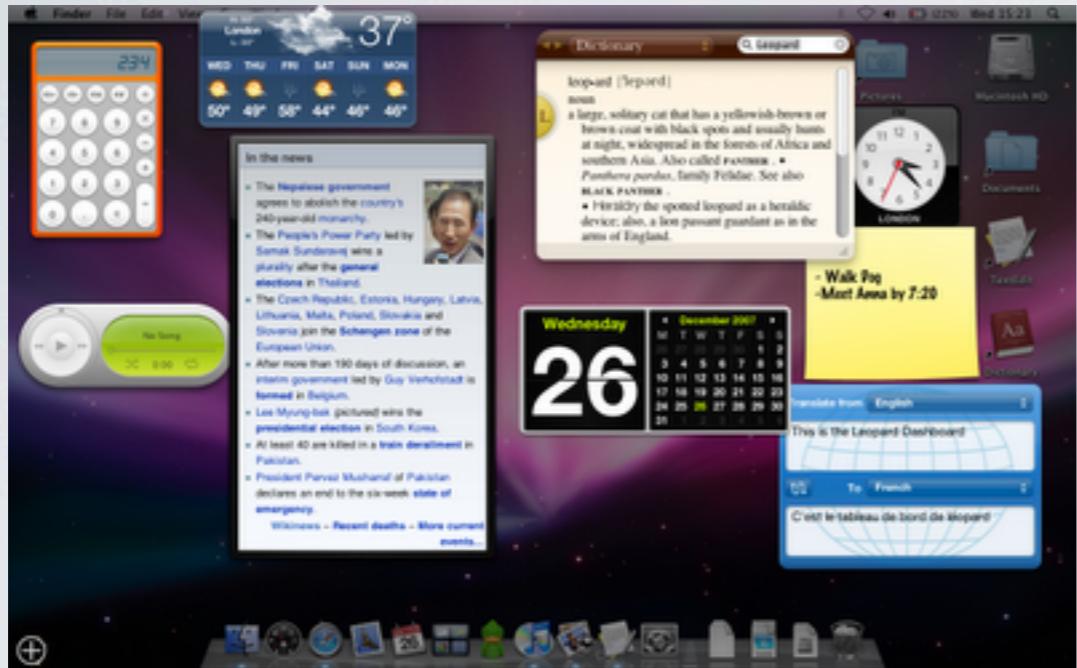
HTML布局将无处不在

- 悄悄融入到各种桌面应用中
- 成为程序的插件
- 本地应用
- 各种其它设备...

嵌入到桌面应用



Widget





Smartphone Apps using the
Web Standards you already know



User Interface **Everywhere** using the
Web Standards you already know

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Webkit engine

WebKit渲染引擎

- is an engine, not a browser
- forked from KHTML
- 10% market share

WebKit begins where the **chrome** ends



<http://webkit.org/blog/101/back-to-basics/>

What uses WebKit



WebKit engine features

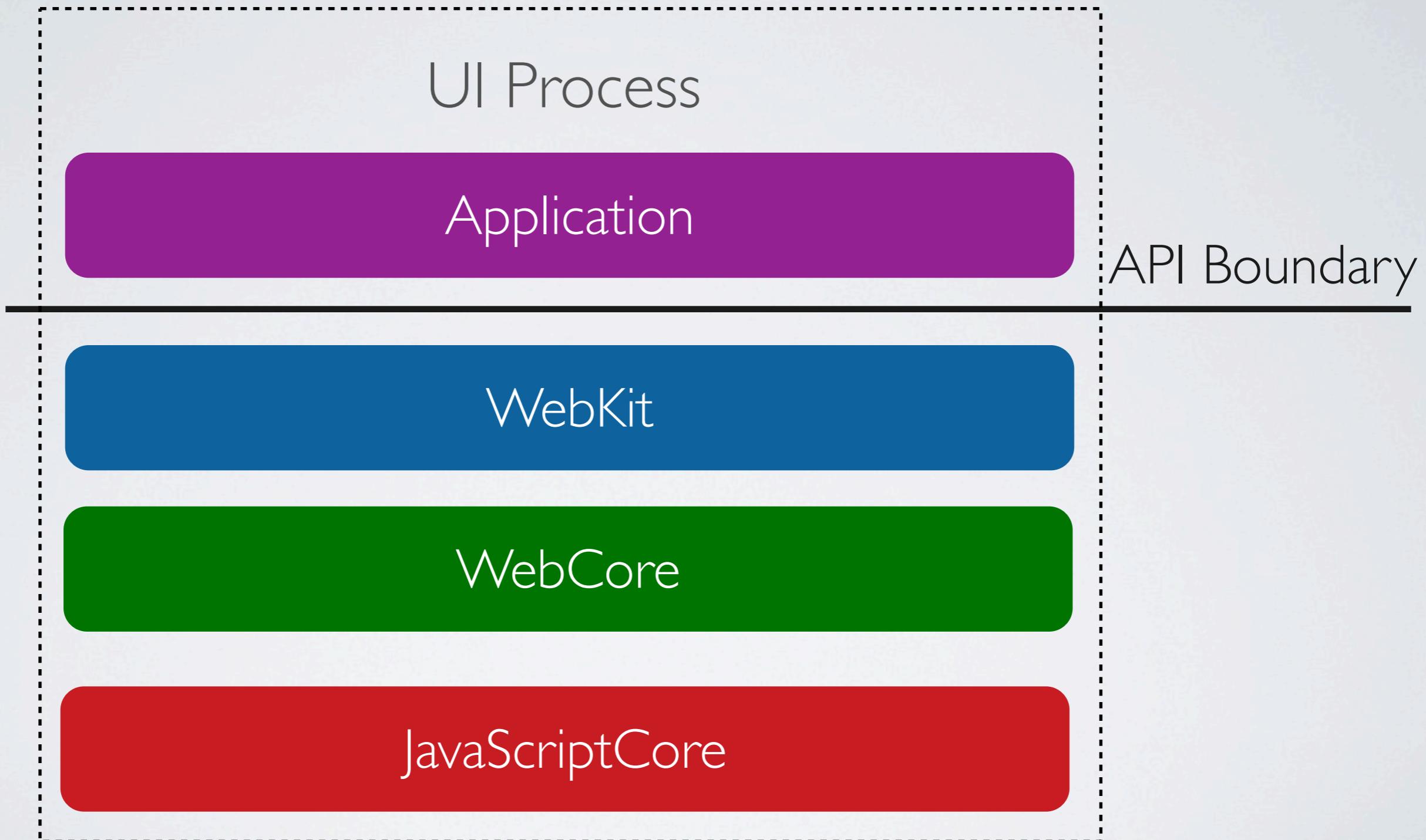
- **standards compliance (css3, html5)**
- **performance**
- **clear, maintainable code**

WebKit Components

- **WebKit**
 - front-end layer, gtk/mac/qt/win/wx
- **WebCore**
 - rendering, layout, painting...
- **JavaScriptCore**
 - JavaScript engine (interpreter)

WebKit API

WebKit



WebKit API

- 封装对**webcore**的调用
- 为**webcore**提供平台相关的操作
 - 网络调用
 - 绘图
 - 监听用户交互

WebKit API

- **mac**
- **qt**
- **gtk**
- **win**
- **wx**
- **chromium**
- **...**

WebKit mac

```
#include <WebKit/WebKit.h>
```

WebKit development

- **WebView WebFrame WebPreferences...**
- **Delegate**
- **DOM API**
- **using javascript**

WebView API

- **loadRequest()**
- **reload()**
- **goBack() / goForward()**
- **makeTextLarger() / makeTextSmaller()**

Delegate

- **WebFrameLoad**
 - didFailLoadWithError:forFrame
- **WebPolicy**
 - decidePolicyForNewWindowAction
- **WebResourceLoad**
 - didFinishLoading
- **WebUI**

DOM API

- W3C DOM Specification
- [[doc.documentElement] innerHTML]

Call Javascript

- **id win = [webView windowScriptObject];**
- **[win evaluateWebScript:@"location.href"];**

WebKit demo



WebKit Components

- **WebKit**
 - front-end layer, gtk/mac/qt/win/wx
- **WebCore**
 - rendering, layout, painting...
- **JavaScriptCore**
 - JavaScript engine (interpreter)

WebCore

Loading

Painting

Parsing

Rendering

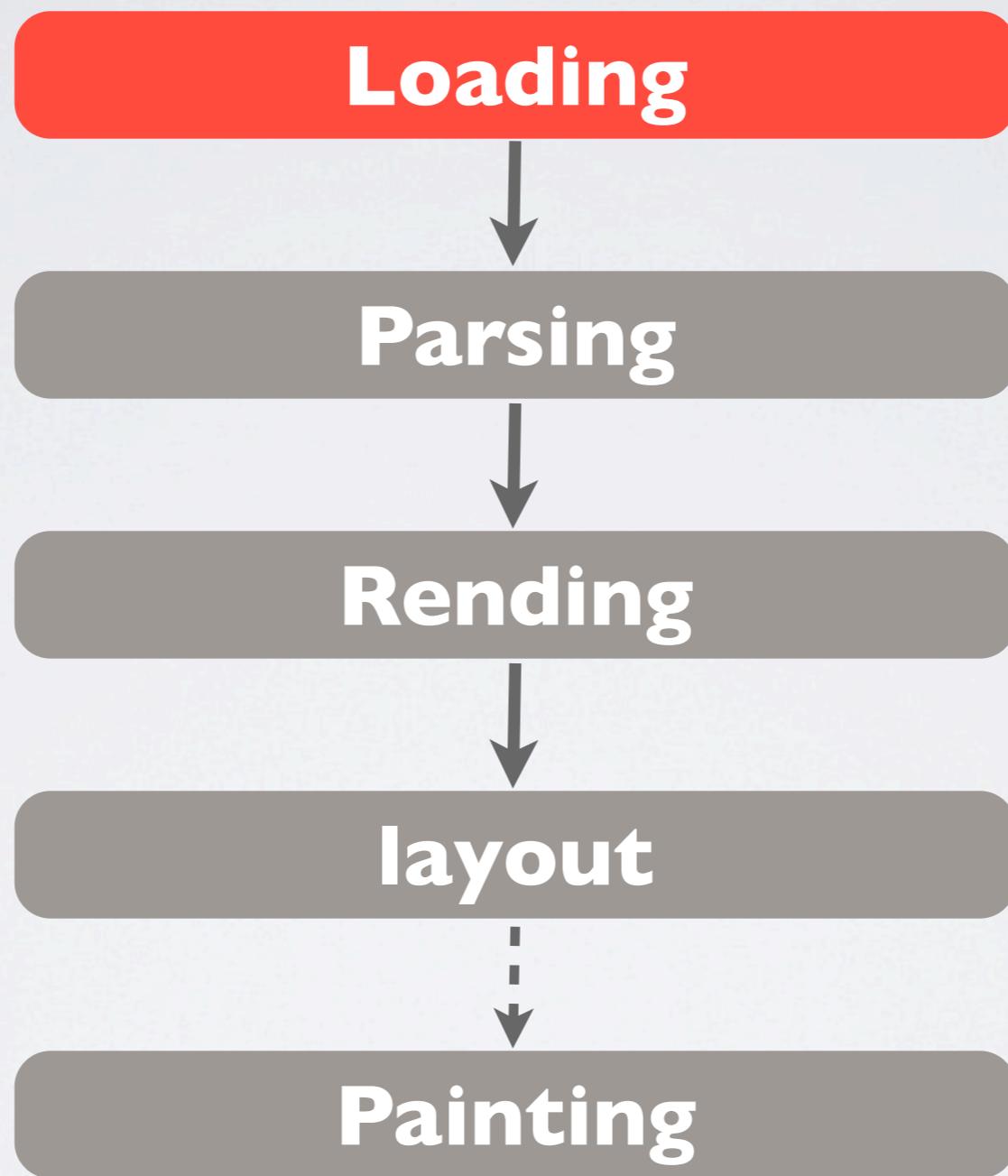
Layout

Script Execution

Event Handling

Style Resolution

Process

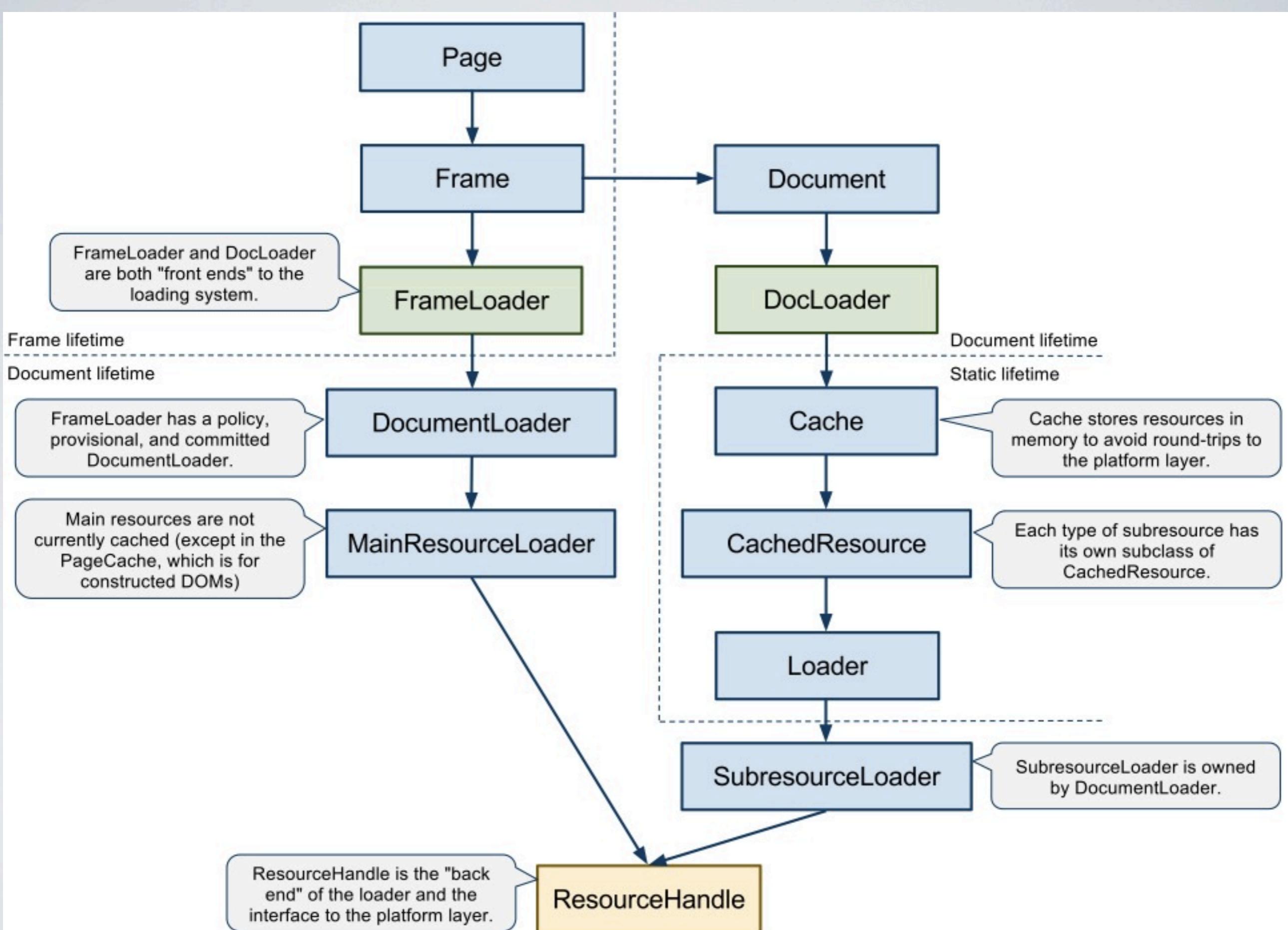


Loading

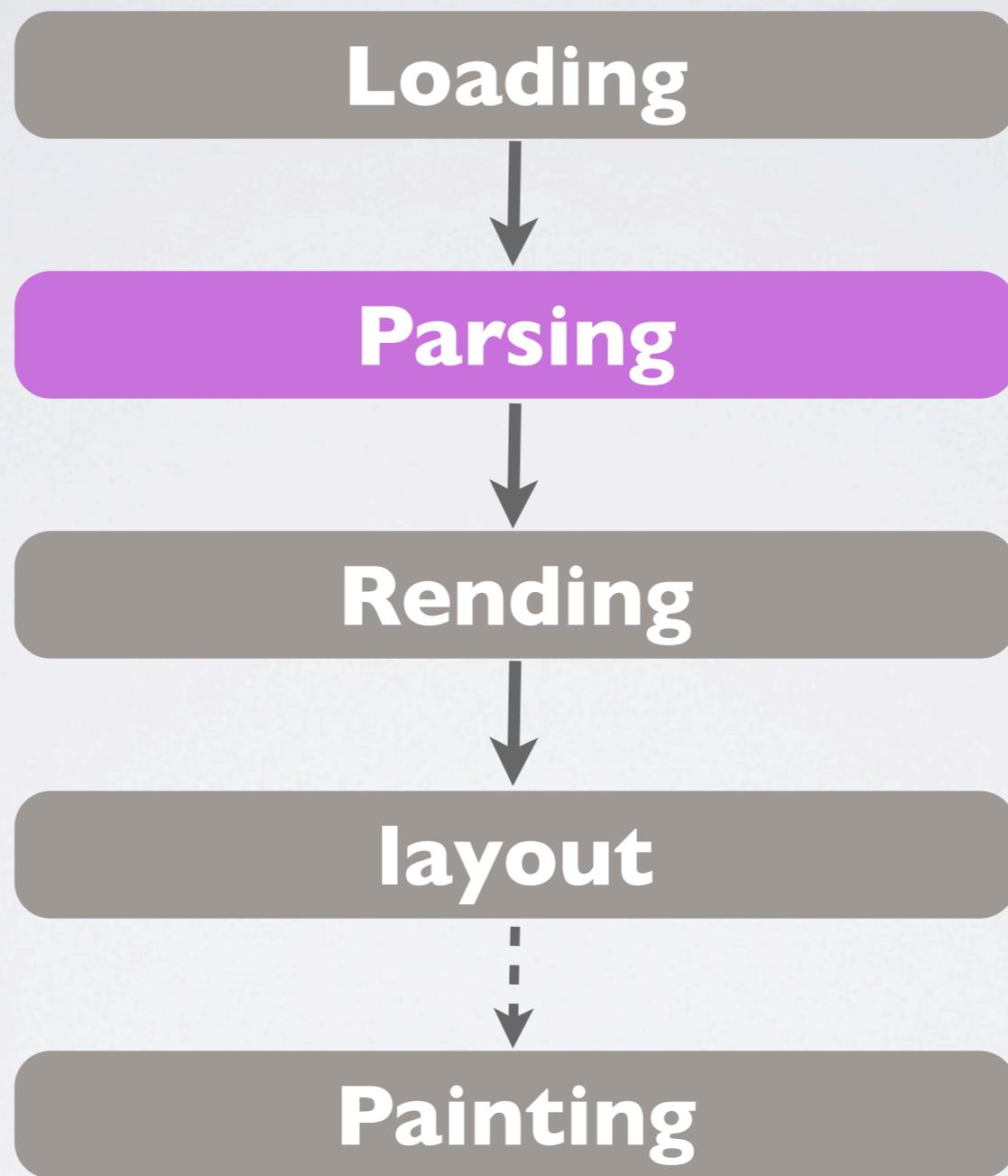
- 网络, 本地
- 分为两种类型
 - Frames 网页
 - Resources 其它

Loading is complexity

- 调用网络接口
- 加载 解析 执行, 错综复杂的关系
- 各种**Cache**机制
 - HTTP
 - 前进后退



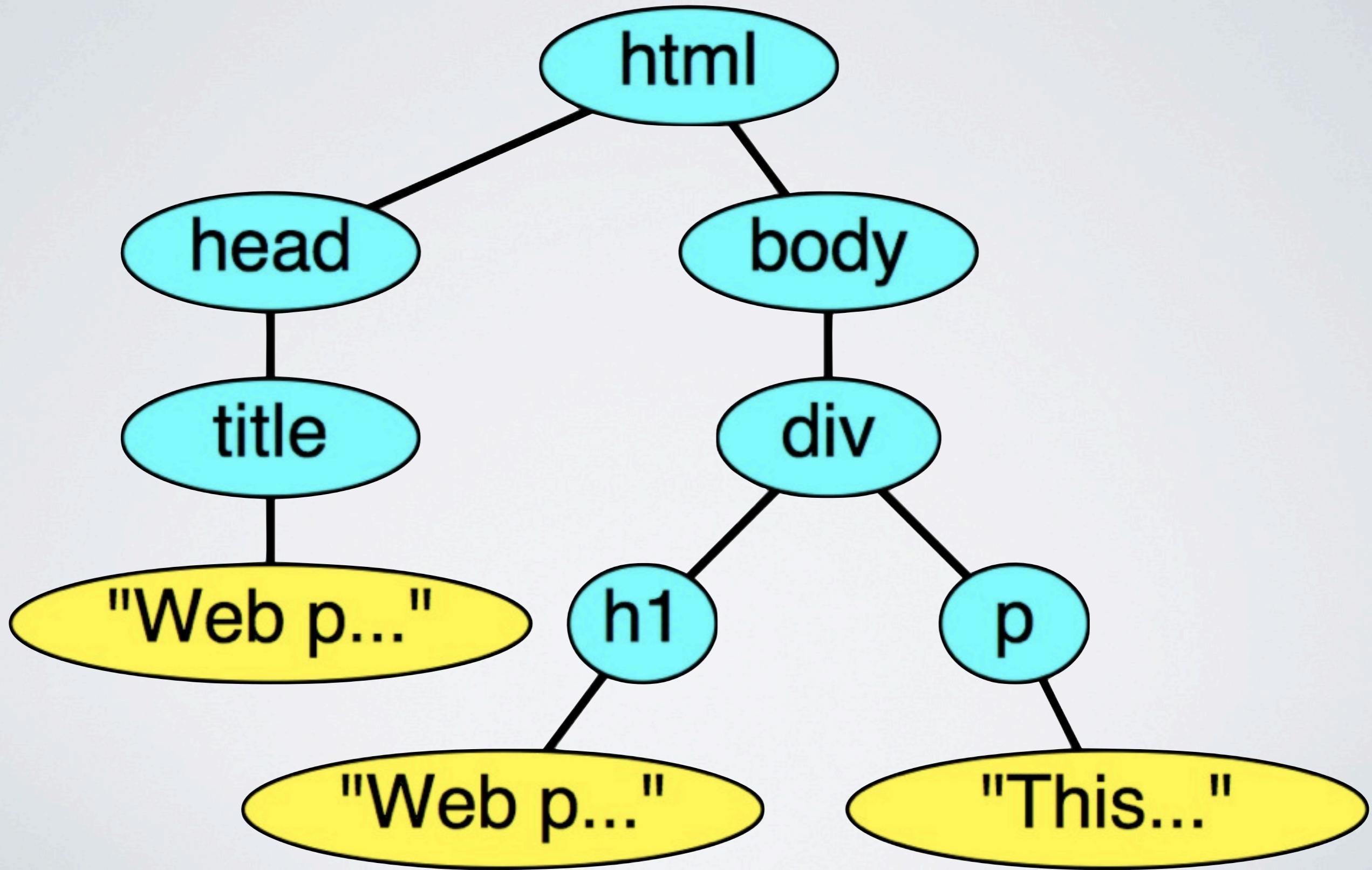
Process



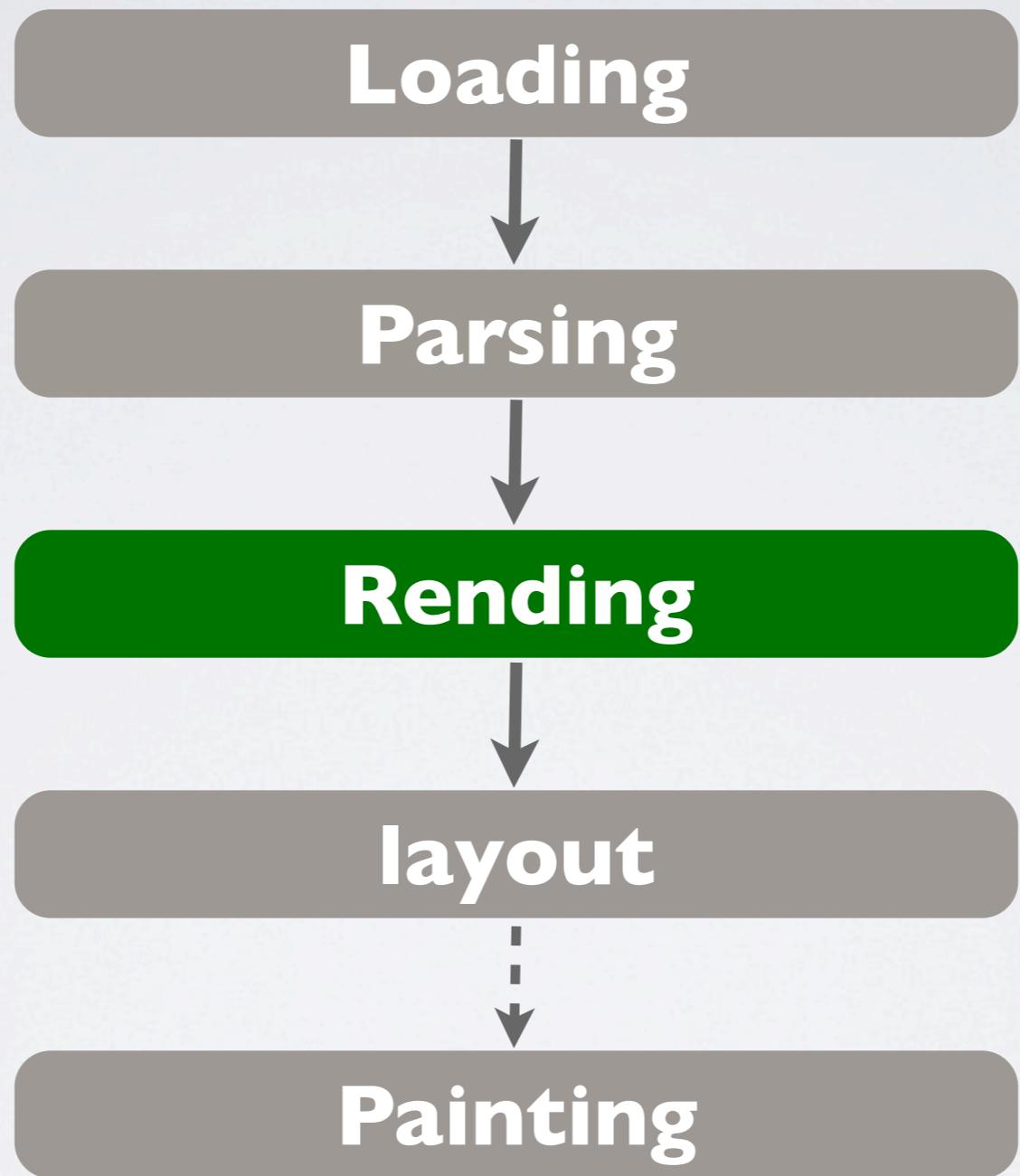
Parsing

- 状态机
- 构建DOM树
- 建立节点的对象
- 各种出错情况处理

DOM Tree



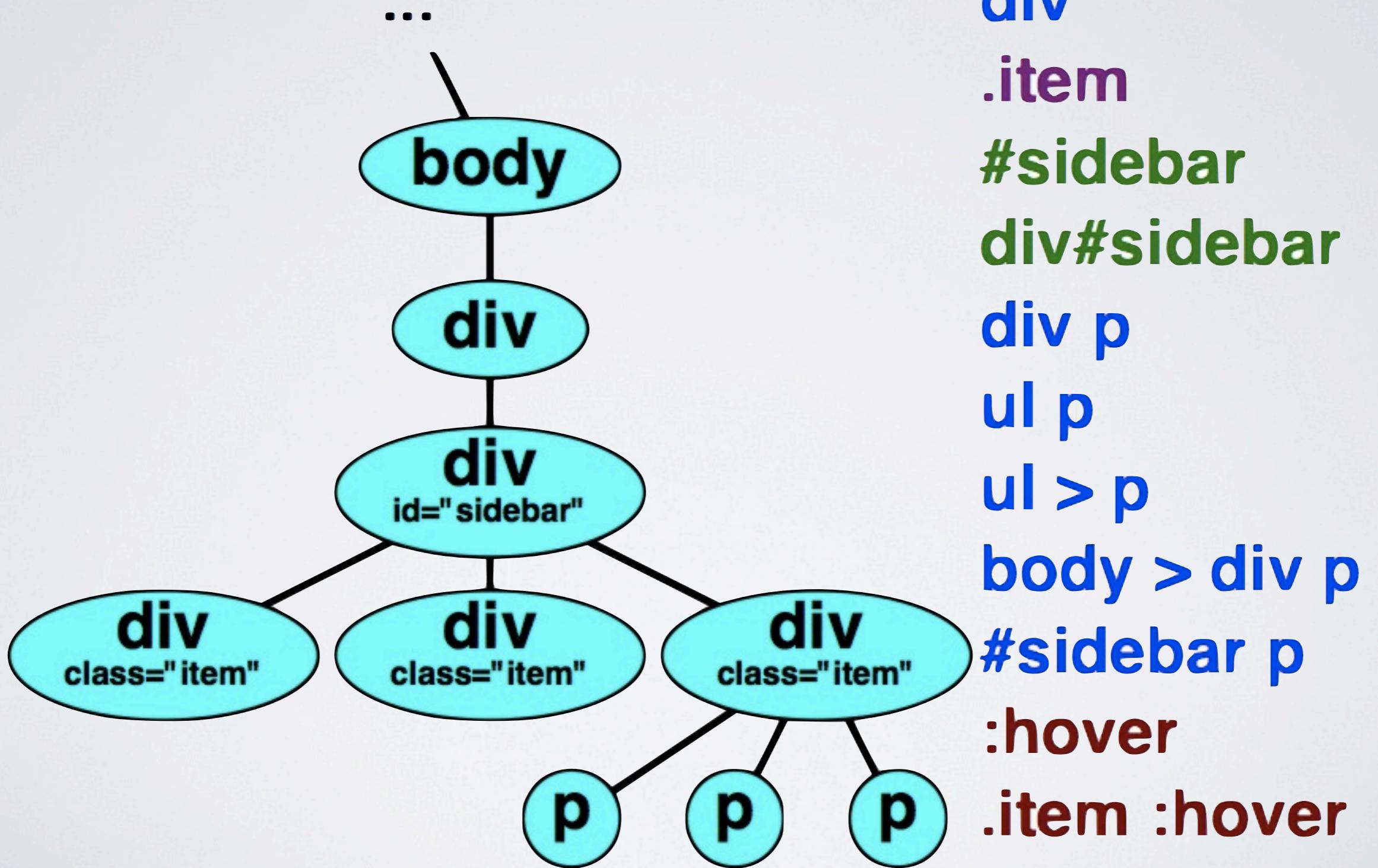
Process



Rending

- 依据**Selector**计算出节点的样式
- 生成**Render Tree**
- 需等待**CSS**加载
- **RenderObject.h**

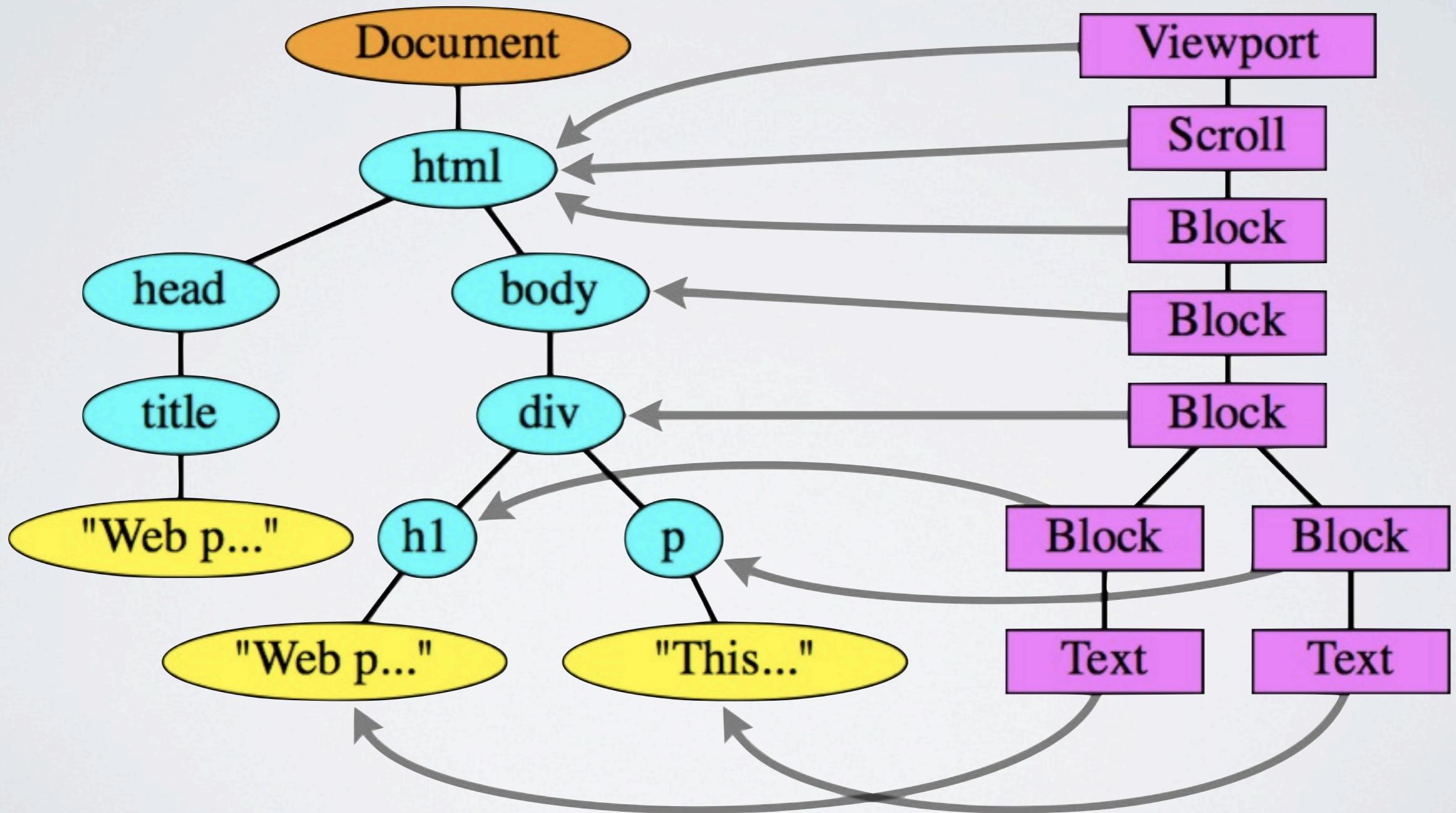
Selector matching



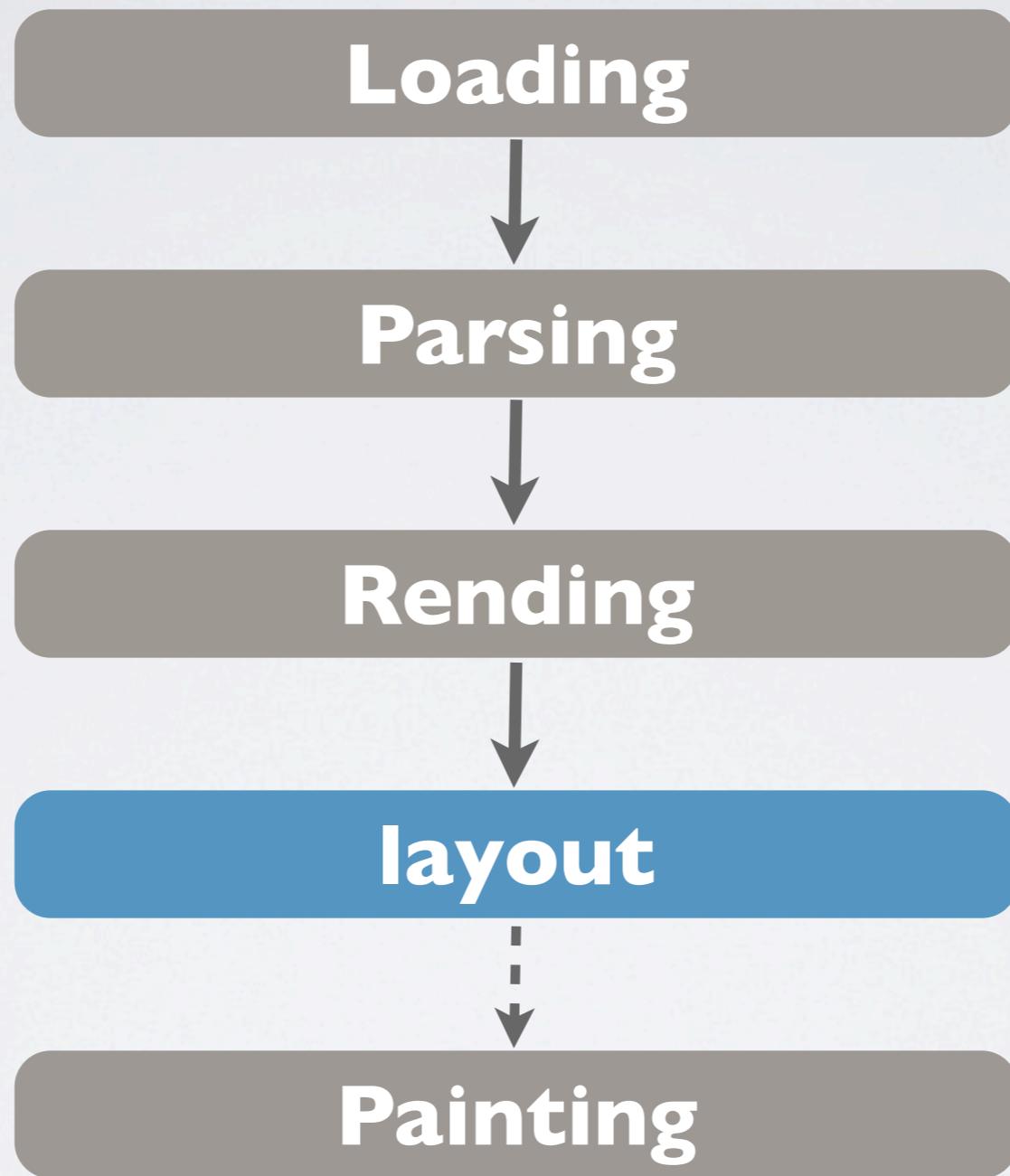
Render Tree

- 只和展现相关
 - 不关心display:none的DOM节点
- 将节点和样式关联起来
- 生成一些匿名节点
 - 文字折行

Render Tree



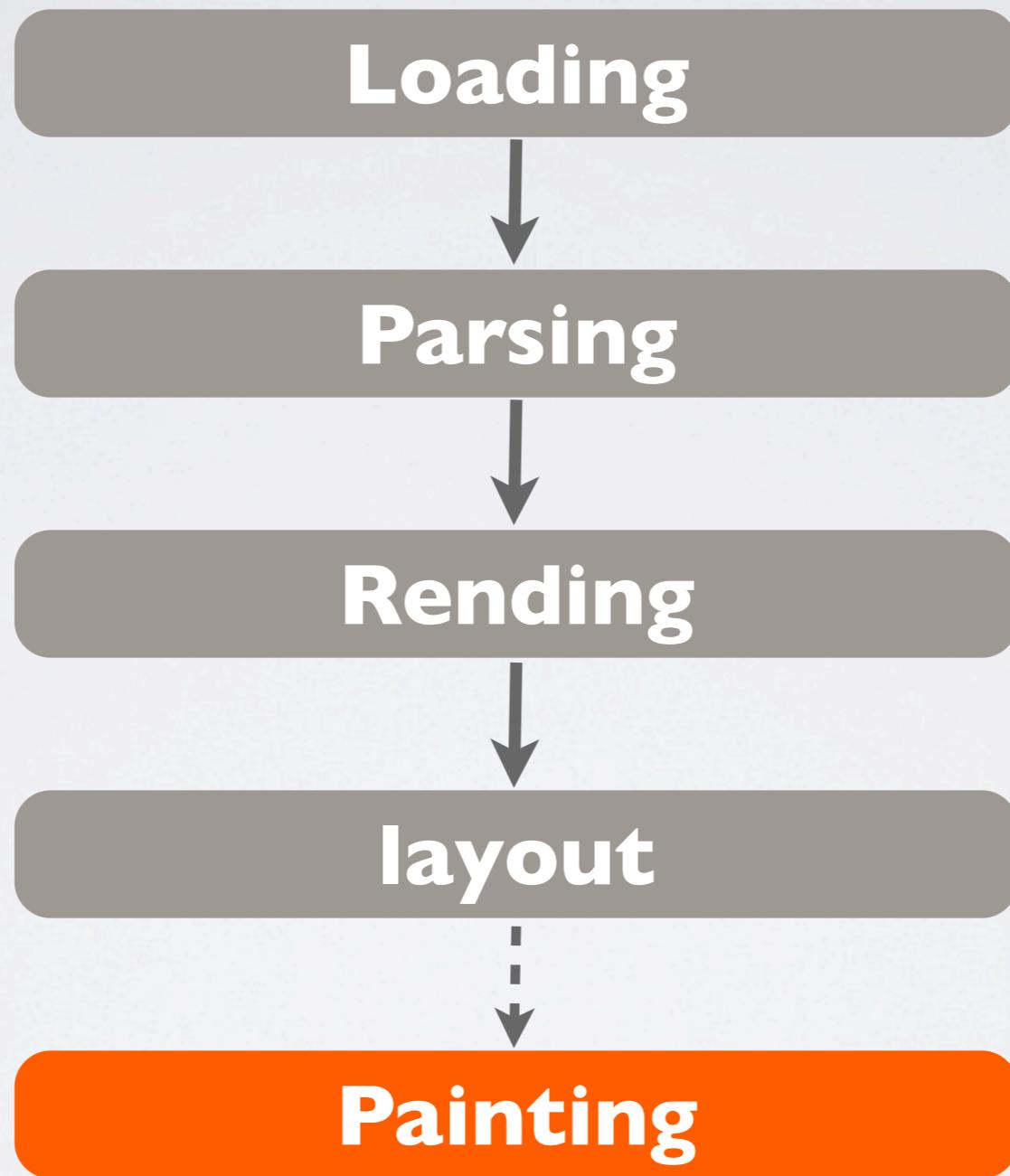
Process



Layout

- 从根节点递归调用**render**对象的**layout**方法
 - 只有**input**框从子结点开始渲染
 - 计算元素的大小及位置等信息

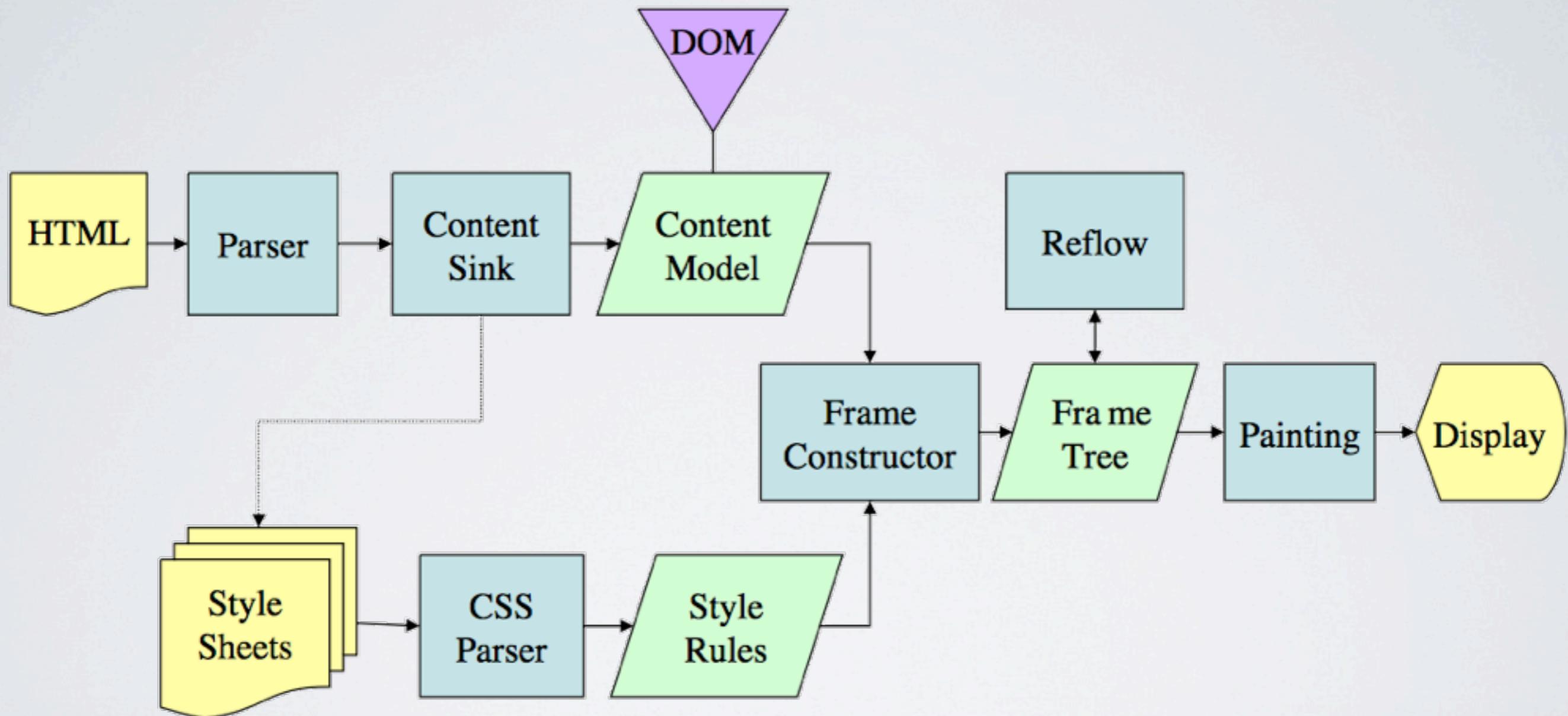
Process



Painting

- 从root元素开始
- 从底至顶一层层绘图
- 调用2D图形API

overview (Gecko)



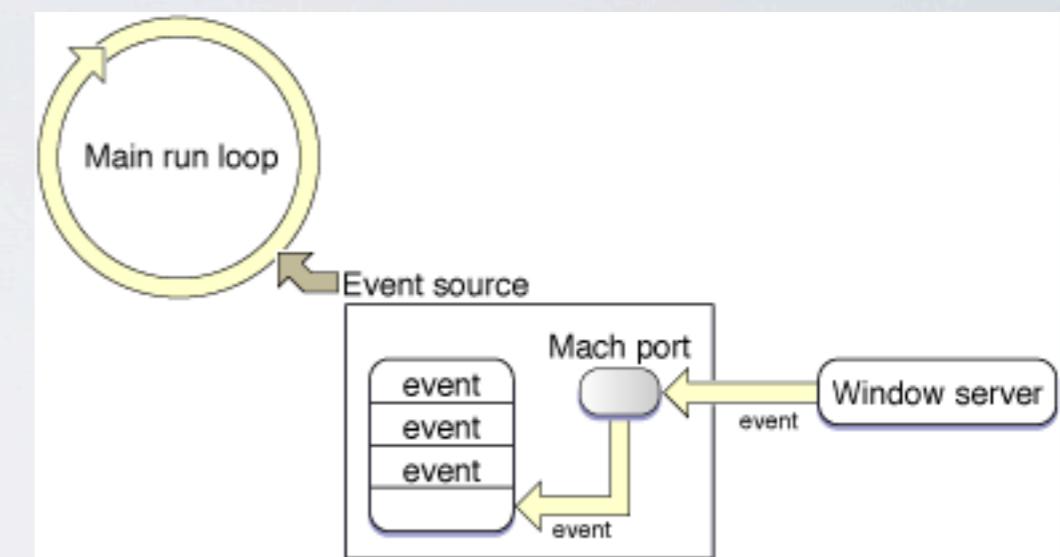
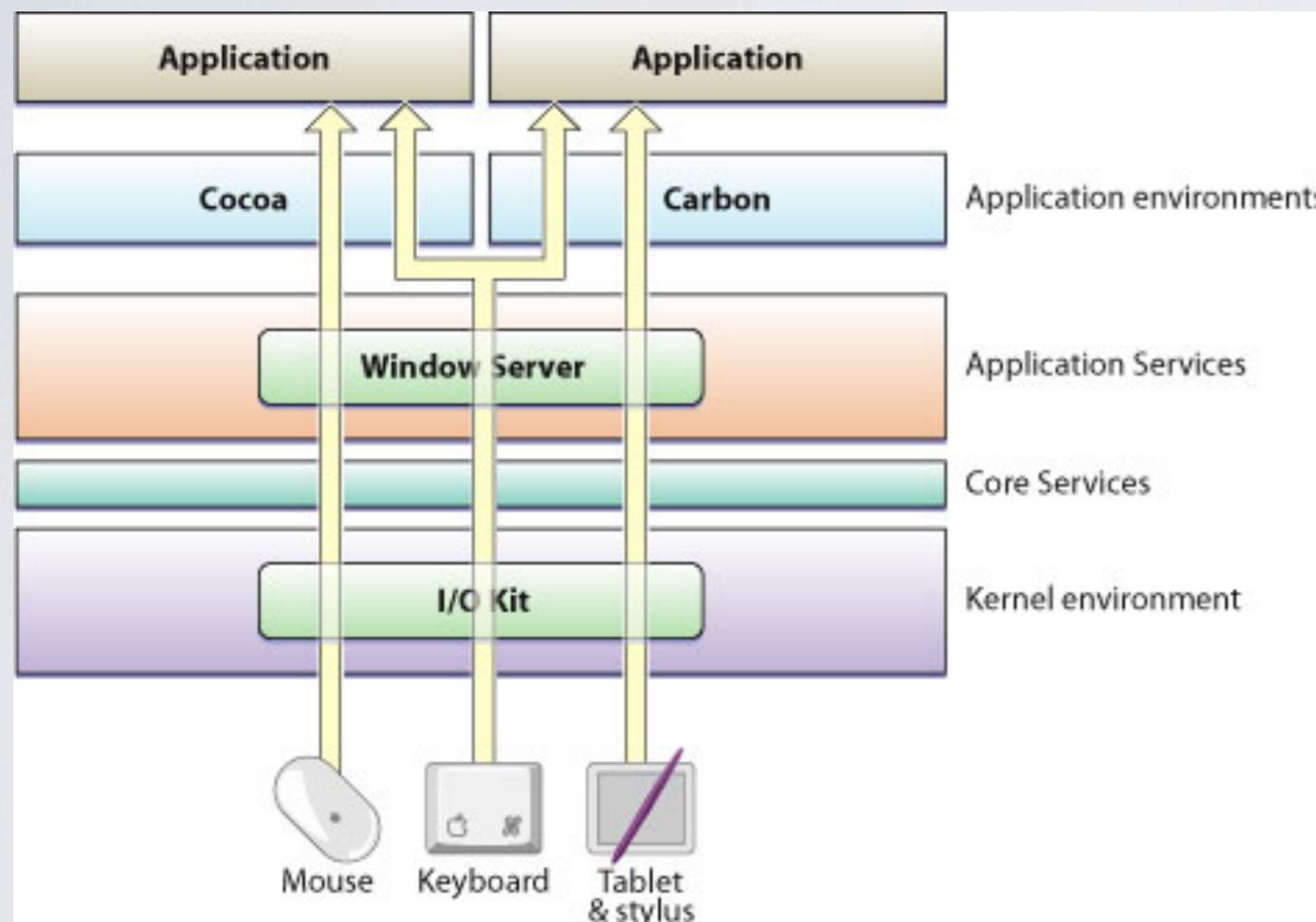
Event Handling

- 监听鼠标键盘事件
 - 找到对应的元素(hitTest)
- 设置需要**layout**的标志位
- **layout** (队列, 异步执行)
- **painting**

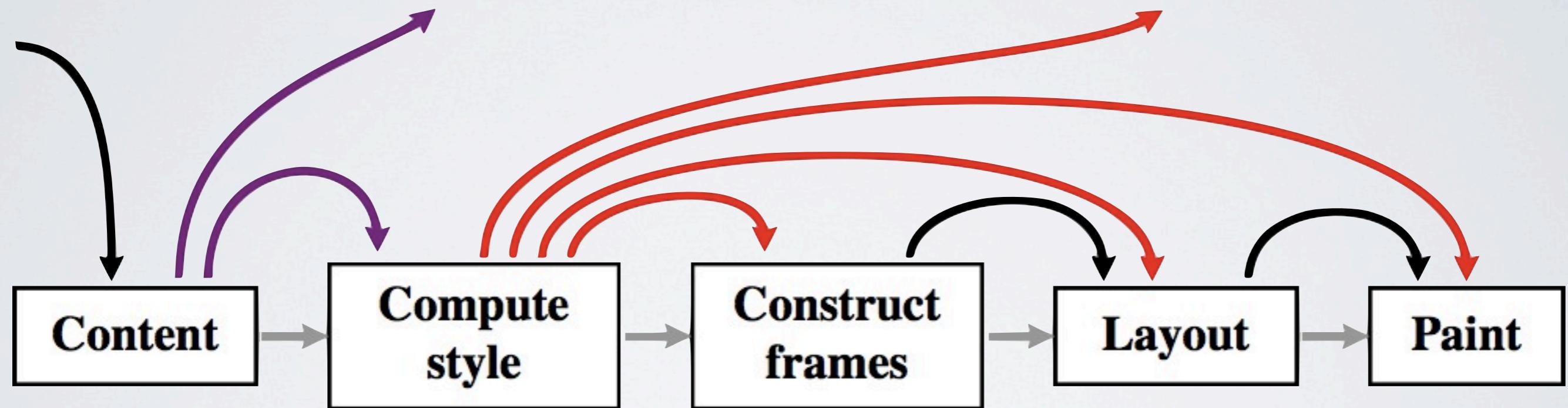
Event Example

- -[WebHTMLView mouseUp:]
- WebCore::EventHandler::mouseUp
- WebCore::EventHandler::handleMouseReleaseEvent
- WebCore::EventHandler::prepareMouseEvent
- WebCore::Document::properMouseEvent
- WebCore::RenderLayer::hitTest
- WebCore::RenderLayer::hitTestLayer

Event System (Mac)



Dynamic changes



```
el.style.left = "2px";
```

```
el.style.left = el.offsetLeft + "px";
```

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- HTML布局无处不在
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Browsers

Browser features

起始页

tab管理

崩溃恢复

地址栏增强

广告拦截

超级拖拽

快速查找

下载管理

自动升级

防假死

智能填表

代理切换

屏幕截图

收藏管理

鼠标手势

安全检测

进程管理

皮肤

缩放

错误页

安全检测

在线升级

插件机制

账号绑定

快捷键

隐私浏览

清除纪录

基本实现方法

- 监听渲染引擎提供的事件/hook
- 使用渲染引擎提供的DOM API
 - 如鼠标手势
- 有些功能可以直接用html
 - 如起始页



Chrome {OS}

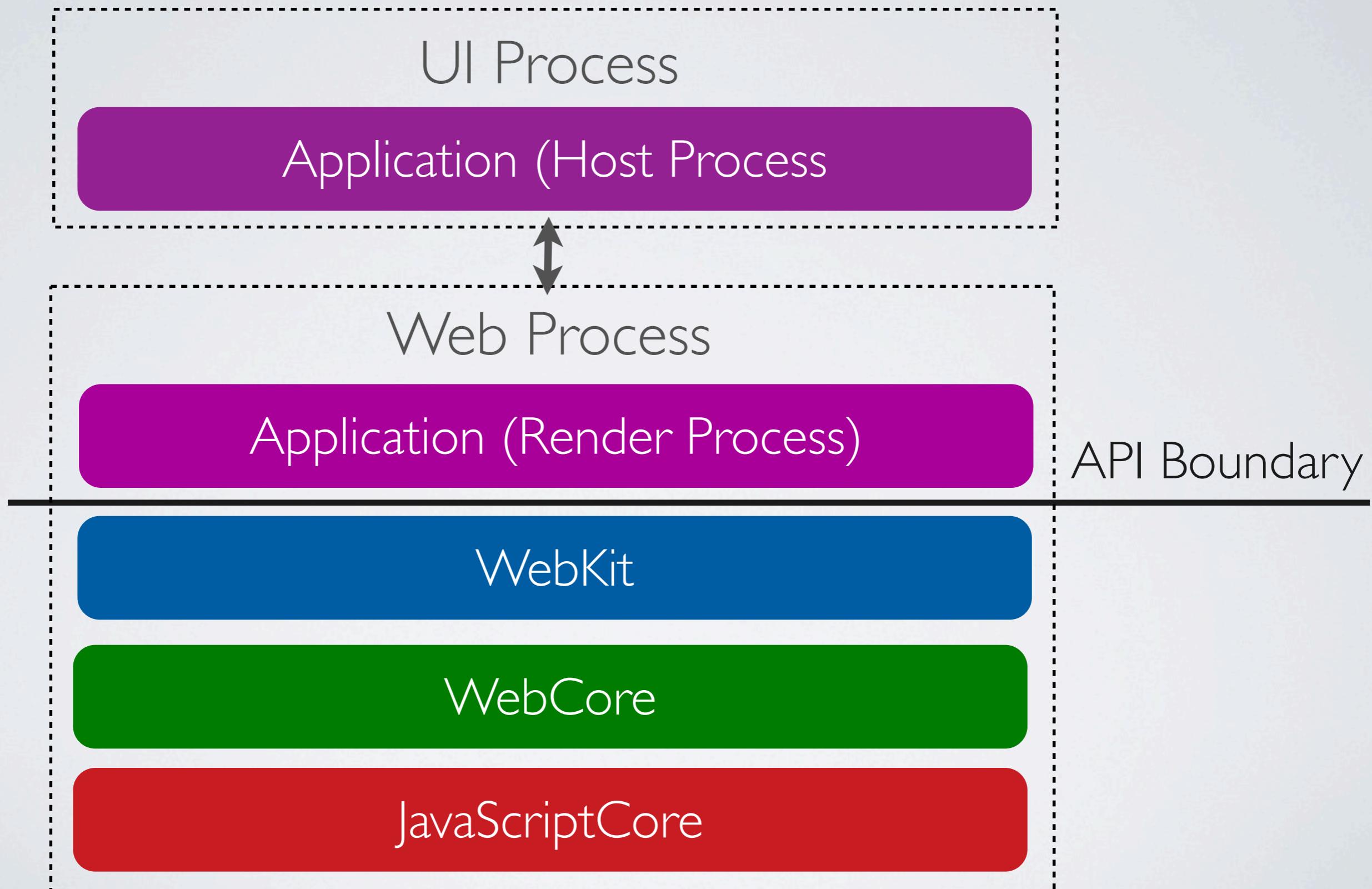
Chrome

- Multi-process
- WebKit glue
- Skia
- Network
- Extension
- Update

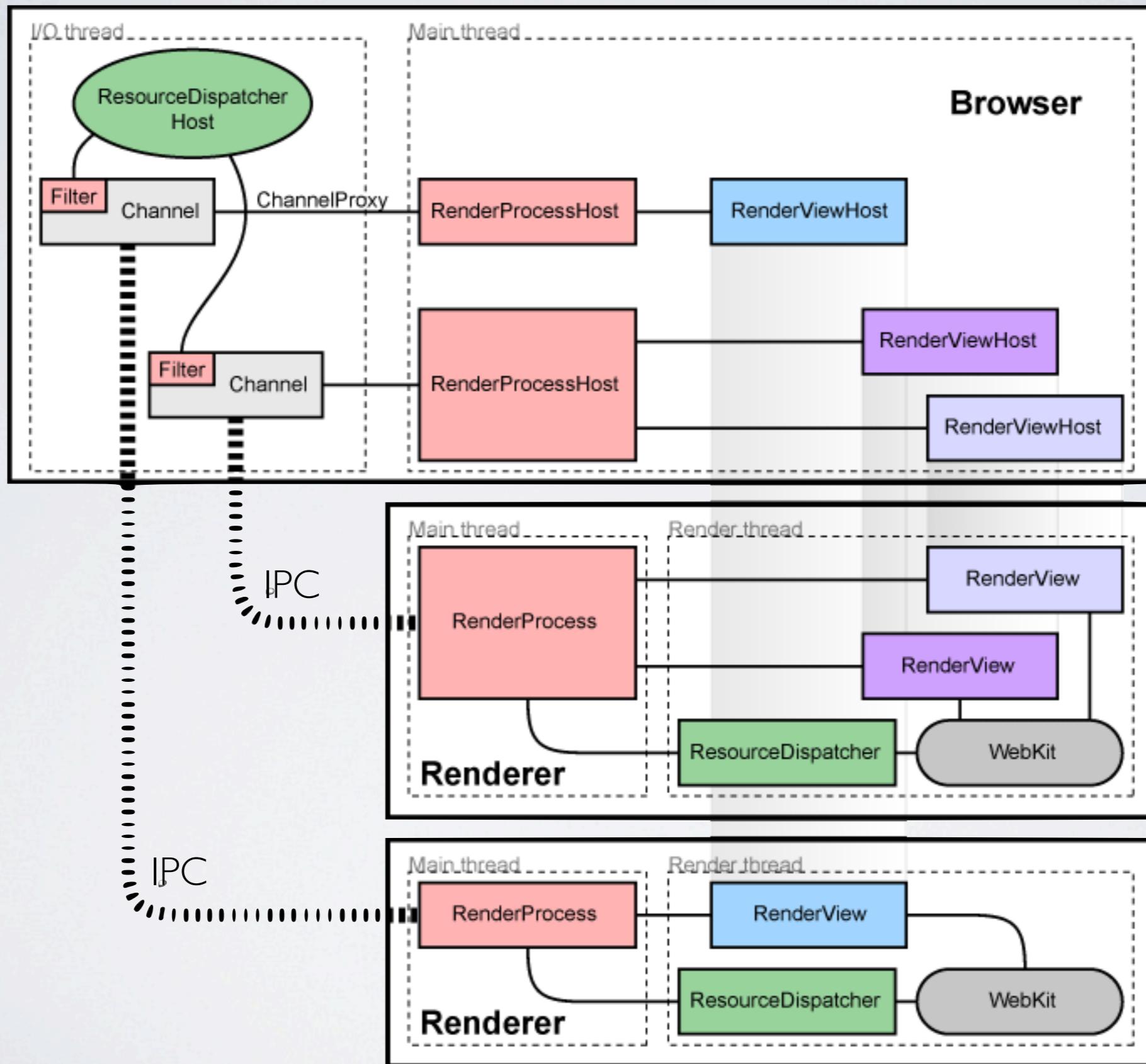
Multi-process Architecture

- **browser as an operating system**
- **asynchronous**
 - backing store
- **sandbox**

Multi-process Architecture



Chrome multi-process architecture



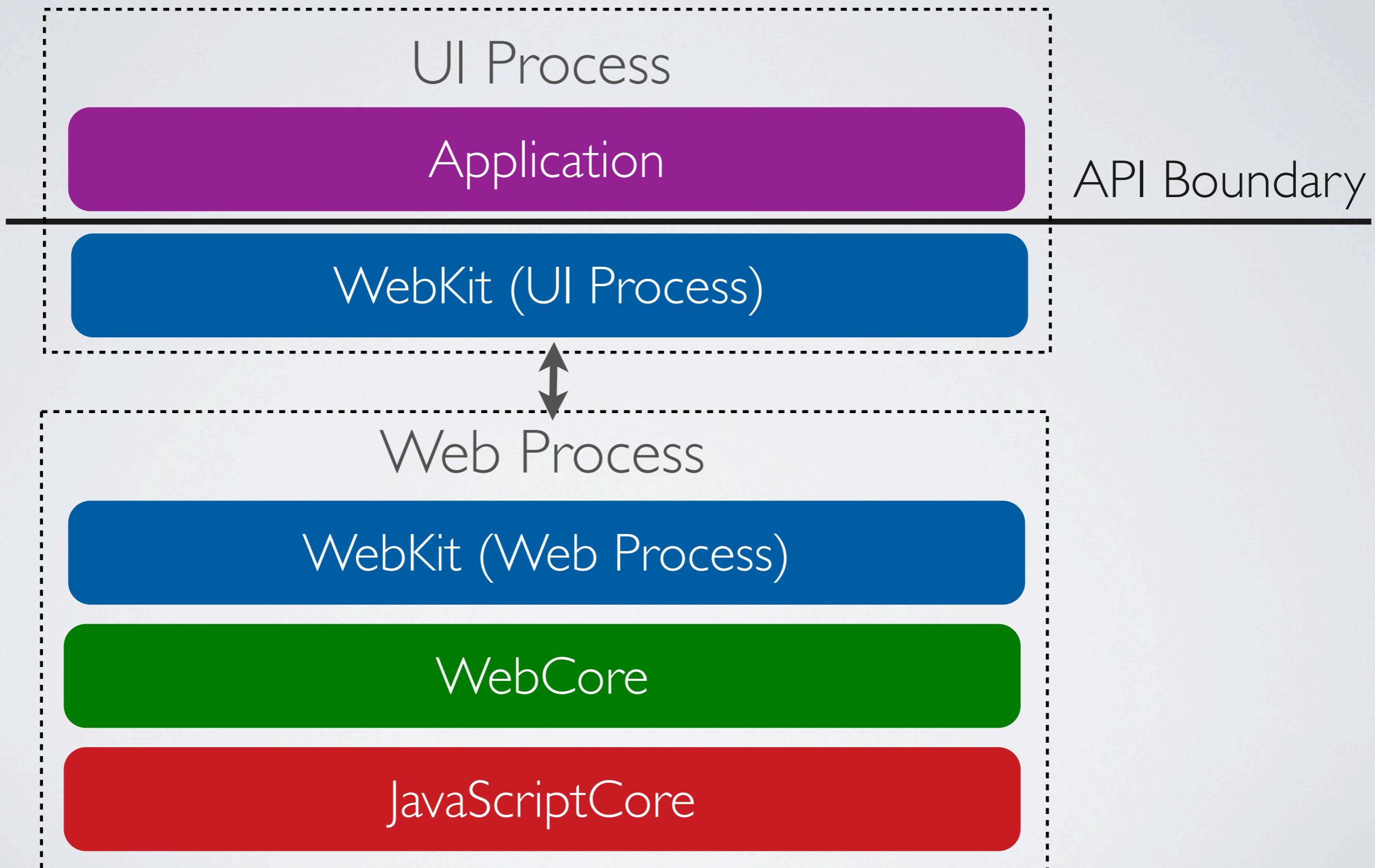
Other Process Model

- **WebKit2**
- **IE8 “Loosely-Coupled IE”, “Gazelle”**
- **Firefox “Electrolysis”**

WebKit2

- build in separate process
- no-blocking API

WebKit2



WebKit

UI Process

Application

WebKit

WebCore

JavaScriptCore

WebKit2

UI Process

Application

WebKit

Web Process

WebKit

WebCore

JavaScriptCore

Chrome

UI Process

Application

Web Process

Application

WebKit

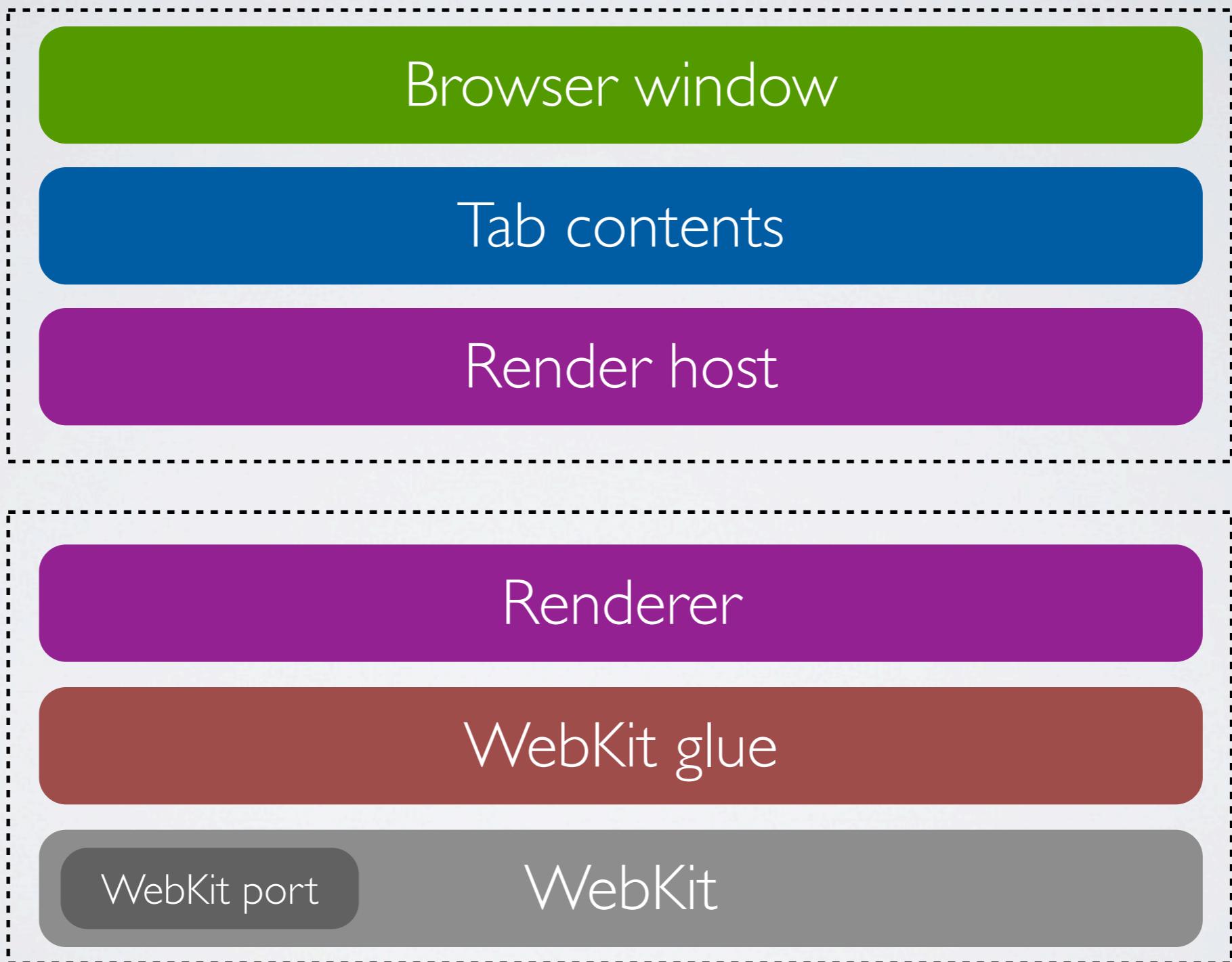
WebCore

JavaScriptCore

WebKit glue

- "WebKit embedding layer"
- 避免依赖各种GUI框架
- Chrome与WebKit的桥梁

Chrome layers



Skia

- GDI is not enough
- GDI+ is no longer support and is slow
- in-house solution
- use GDI for text

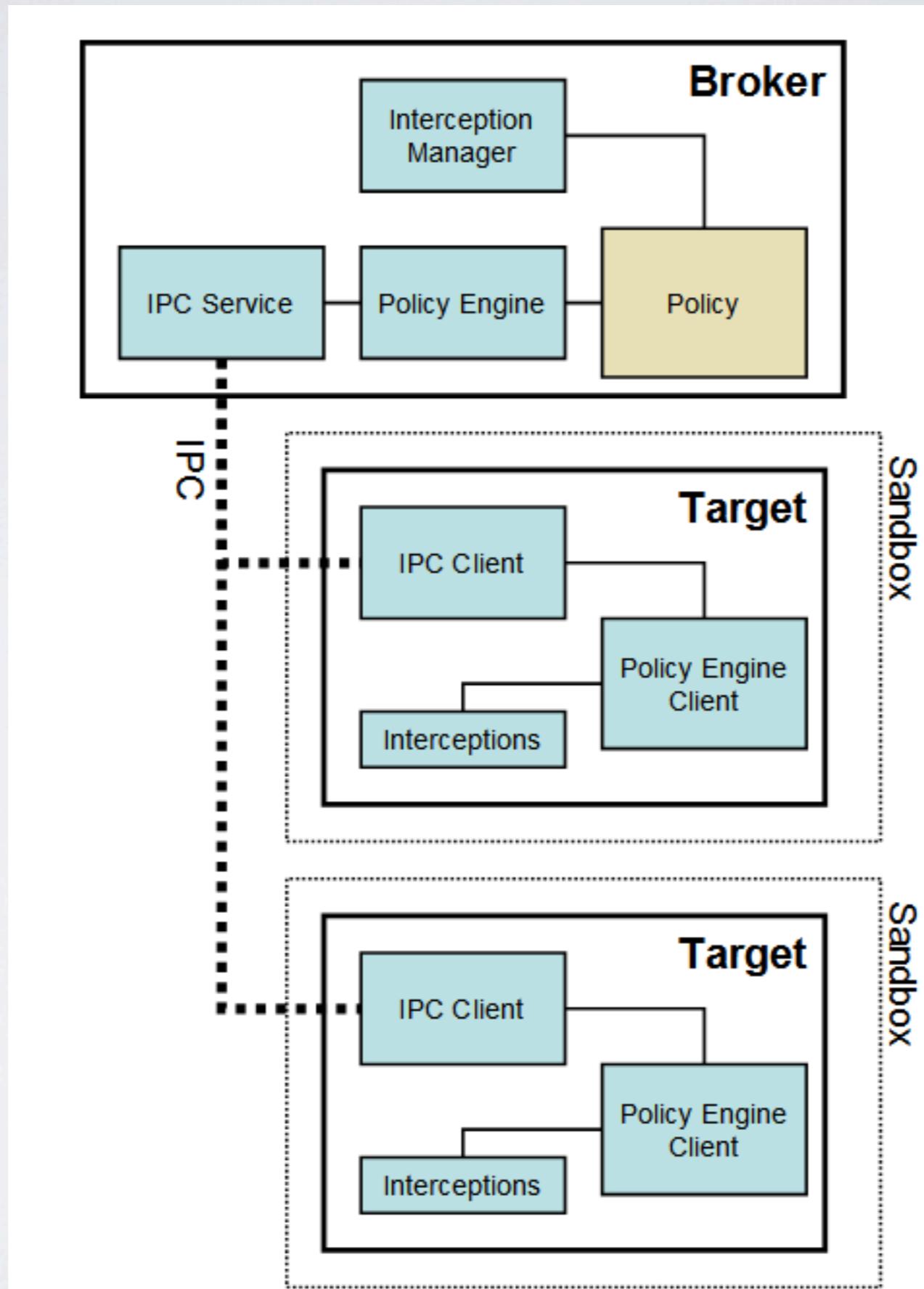
Network

- Rewrite Network Stack
- DNS Prefetching
- SPDY

Extensions

- **can use javascript**
 - html5, css3
 - don't need restart
- **NPAPI**
 - not sandbox
- **Native Client**

SandBox





Firefox (Gecko)

Firefox (Gecko)

- **not just a browser**
 - mail, newsgroup, web design tool...
- **complexity**
 - XPCOM, XUL
- **mozilla 2**

Komodo

The screenshot shows the Komodo IDE interface. The title bar indicates the file is 'each.js' located at '/Users/nwind/work/baidu/repos/projects/tangram/src/baidu/array'. The main window displays the following JavaScript code:

```
16 * @param {Array} source 需要遍历的数组
17 * @param {Function} iterator 对每个数组元素进行调用的函数
18 * @return {Array} 遍历的数组
19 */
20 baidu.array.each = function (source, iterator) {
21     var returnValue, item, i, len = source.length;
22
23     if ('function' == typeof iterator) {
24         for (i = 0; i < len; i++) {
25             item = source[i];
26             returnValue = iterator.call(source, item, i);
27
28             if (returnValue === false) {
29                 break;
30             }
31         }
32     }
33     return source;
34 };
35
36 // 声明快捷方法
37 baidu.each = baidu.array.each;
38
```

The code includes JSDoc-style comments for parameters and return values. The 'Samples (5.2.1)' section of the 'Toolbox' sidebar is expanded, showing categories for Abbreviations, General, and HTML. The 'com' category under HTML is selected. The status bar at the bottom shows 'Ready', 'UTF-8', 'Ln: 28 Col: 41', and a 'JavaScript' dropdown.

Thunderbird

Inbox – duoyi.wu@gmail.com

Get Mail Write Address Book Tag Search all messages

Inbox – duoyi.wu@gmail.com

Smart Folders

- Inbox (22)
 - wuduoyi@...com (22)
 - duoyi.wu@gmail.com
- Drafts
- Sent
 - wuduoyi@baidu.com
 - duoyi.wu@gmail.com
- Archives (7)
- Spam (3)
- Trash
- Outbox
- wuduoyi@baidu.com
 - other
 - space
 - weblab
- duoyi.wu@gmail.com
- Local Folders

Subject From Date

The Geek Stuff – Bas... The... 4:16 PM
Your receipt #MGVL6... iTu... 5:28 AM
MacUpdate Desktop ... des... 5/2/10 12:0...
[Bug 214476] Mozill... bug... 5/1/10 4:45...
webOS Developer Al... Pal... 5/1/10 3:07...
Mindjet's End of Mon... Gar... 5/1/10 12:4...
The Geek Stuff – Ho... The... 4/30/10 4:1...
"感恩母亲节，购花送... 955... 4/30/10 6:4...
【21早新闻】江苏泰兴... 21... 4/30/10 2:1...
第二届中国云计算大会... CSDN 4/29/10 9:3...
Confirm your Twitter... Twi... 4/29/10 3:2...
WWDC 2010. June 7... App... 4/29/10 9:3...
Your receipt #MGVL6... iTu... 4/29/10 4:0...
【21早新闻】北京楼市... 21... 4/29/10 2:1...
社交网络的未来前景 哈佛... 4/28/10 5:5...
The Geek Stuff – Ho... The... 4/28/10 4:1...
【21早新闻】最贵IPO... 21... 4/28/10 2:5...
在“阿凡达”做营销 哈佛... 4/27/10 3:3...
【21早新闻】政府拟提... 21... 4/27/10 2:3...
The Geek Stuff – The... The... 4/26/10 4:1...
【21早新闻】广电总局... 21... 4/26/10 2:0...
北京手机游戏行业 业... CSDN 4/23/10 8:1...
Full iPad support has... To... 4/23/10 6:3...
The Geek Stuff – 7zi... The... 4/23/10 4:1...
【21早新闻】审计署严... 21... 4/23/10 3:1...
新人不可不知的职场法则 哈佛... 4/22/10 7:0...
【21早新闻】三套房贷... 21... 4/22/10 3:2...

from Palm [reply forward archive junk delete]
subject **webOS Developer Alert: webOS Update Coming Soon** 5/1/10 3:07 AM
reply-to Palm Developer Relations <PalmInc-ctg0aeb7kaa>
to nwind ★ other actions ▾

palm Developer Alert

webOS™ Update Coming Soon - Preparation

The next version of webOS is coming soon.

You will receive an email alert in early May announcing the candidate. Please be prepared to begin testing your apps!

Because the scope of the changes in this update is limited, we will:

- You will have approximately one week to report show-stopper bugs in webOS before it is released to carriers.
- Once the build has been released to carriers, you will have another 2-3 weeks to address app-level bugs before the update lands on consumer devices.

Y Unread: 0 Total: 113



Internet Explorer (Trident)

IE shells (MSHTML)

- 360安全浏览器
 - 基于theworld, 基本上就是换了个肤
 - 支持多进程模式
- 遨游浏览器
 - 细节功能很多, UI不错
- 搜狗高速浏览器
 - 全网加速
 - webkit/IE双引擎



Windows® Internet Explorer 9

- HTML5 CSS3 ES5 SVG
- GPU
- Chakra inside

References

<http://trac.webkit.org/wiki/>

<http://www.chromium.org/developers/>

<http://dbaron.org/talks/>

<http://trac.webkit.org/wiki/WebKit2>

欢迎加入百度WEB前端研发部！

搜索研发部_Web前端研发工程师（2011校园招聘）

<http://hr.baidu.com/www/campusPro.action?l=7>

<http://www.baiduux.com>

Thank you