Samurai-Native架构设计与项目构建

Geek Zoo Studio @ GMTC 2016, Beijing

@老郭为人民服务 | https://github.com/gavinkwoe

来自 Geek-Zoo Studio， BeeFramework & Samurai-Native 作者.

A coder, a geek, a ghost of samurai in human shell.

议程

- 历史回顾
- Demo
- 架构设计
- 实现细节
- QA

历史回顾

1994

Web 出现

- 21年前
  - Netscape navigator 浏览器发布
  - 使用 HTML+CSS 编写网页

2008

Native App 出现

- 8年前
  - Apple iOS 发布
  - 使用 OC 开发原生App

2011

Hybrid App 出现

- 5年前
  - Adobe **PhoneGap** 发布
  - 使用 **HTML+CSS** 开发App

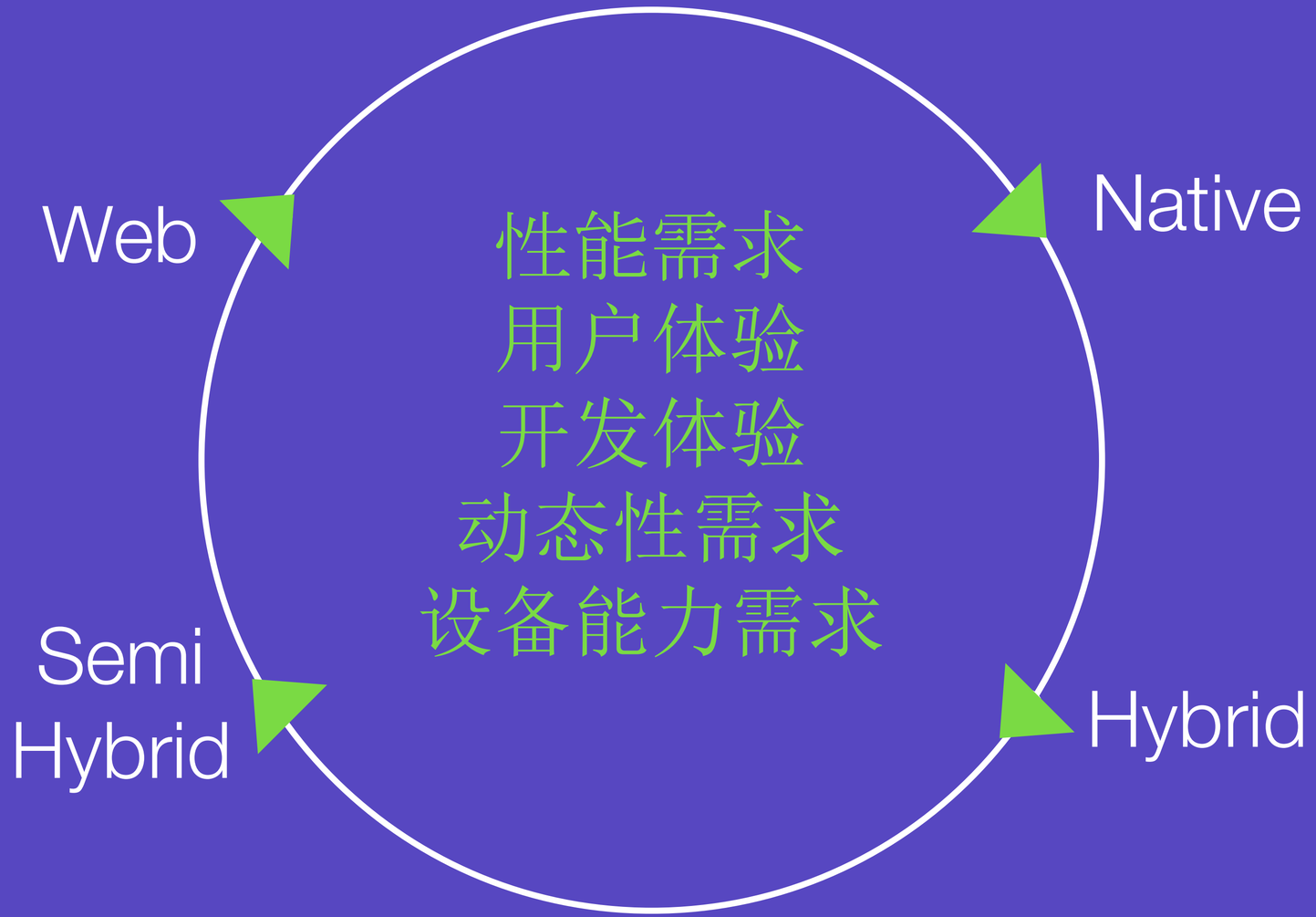
2015

- 1年前
  - Facebook **React-Native** 发布
  - 使用 **Reactjs** 开发原生App

2015-2016

- 最近几个月
  - WEEX 发布
  - JSPatch 发布

技术在不断新陈代谢，Hybrid模式更适合移动场景



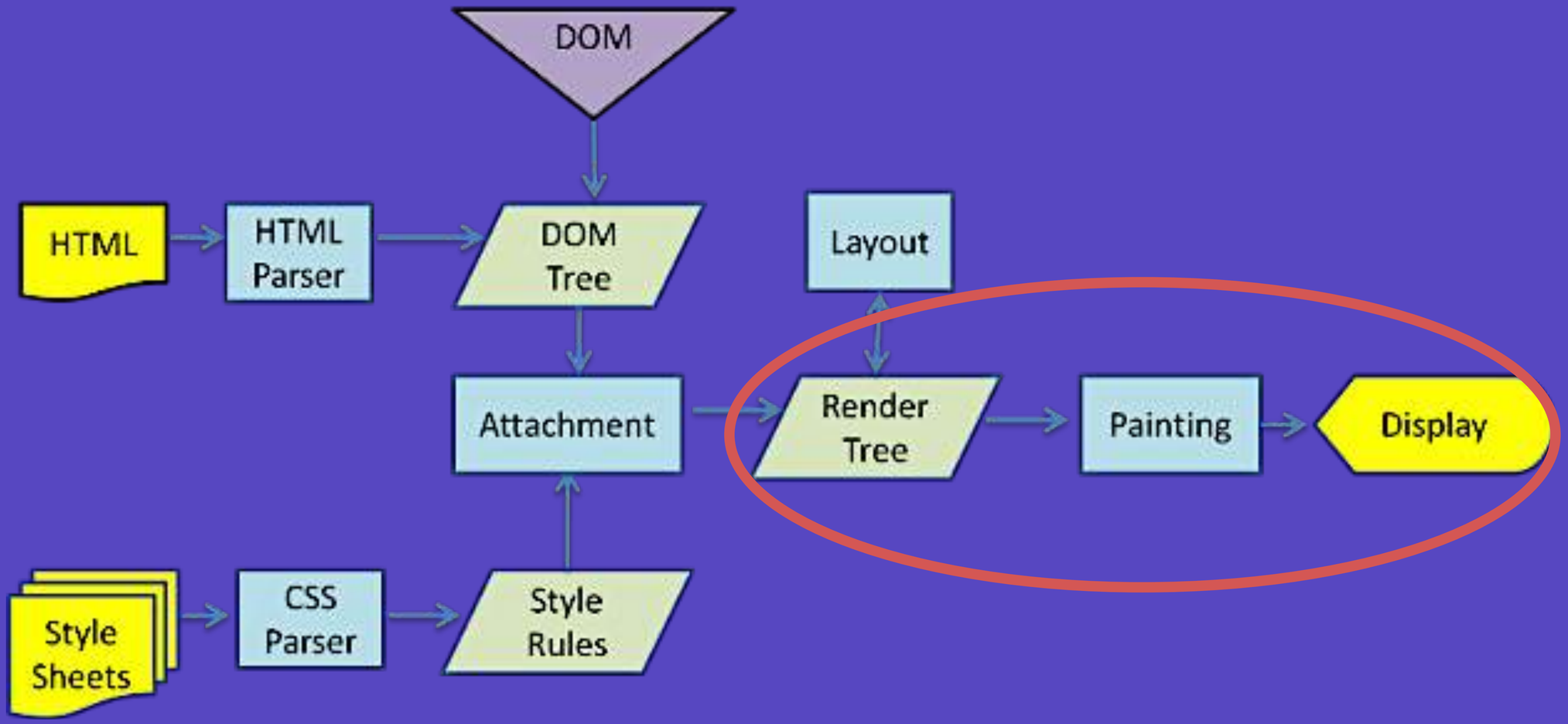
最近一年技术栈也已经发生变化，新的技术涌现

动态视图	Lua		WEEX	WEEX	
动态逻辑					
动态补丁	JSPatch	JSPatch		JSPatch	JSPatch

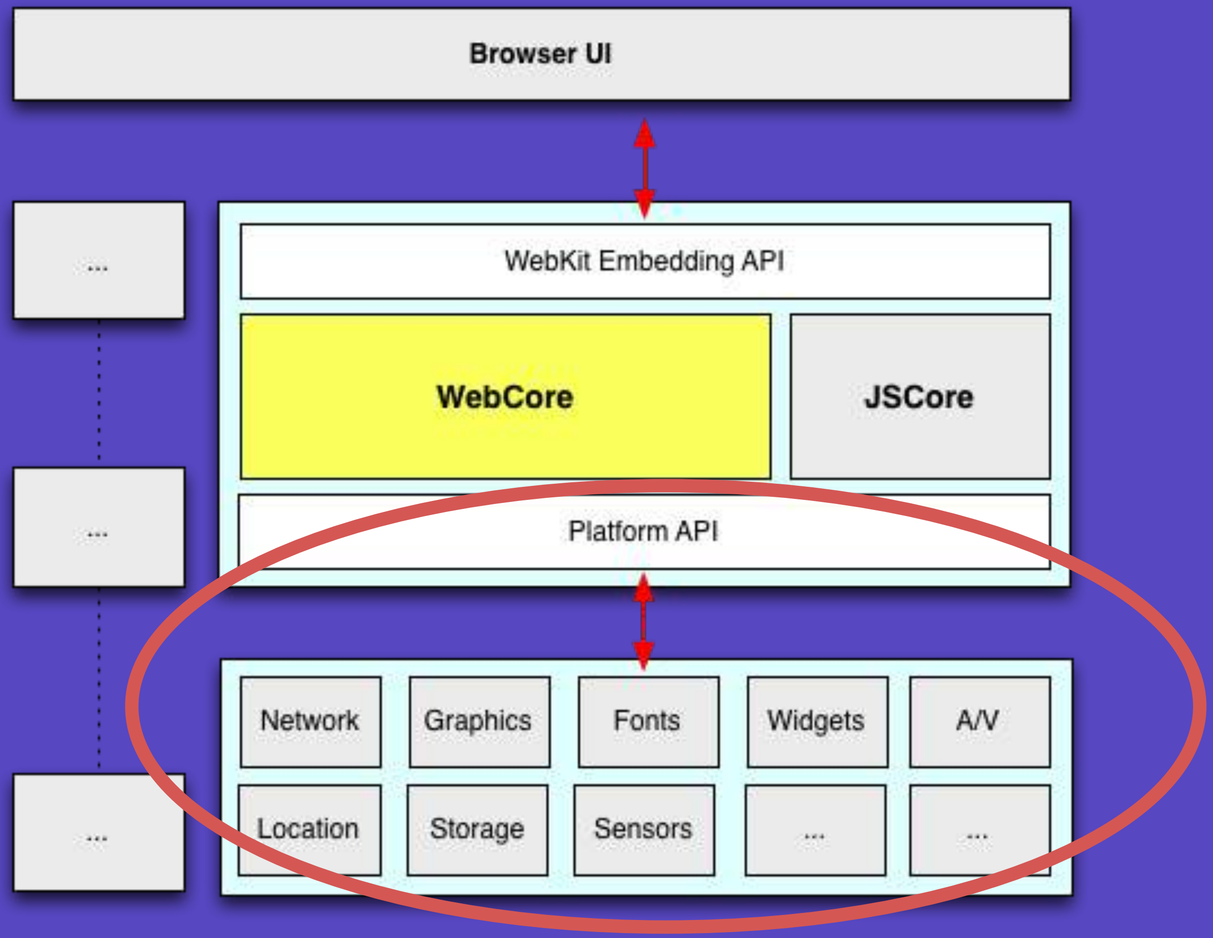
通过分析软件包资源

为什么 WebKit 不好满足这些技术需求？

Painter做为渲染后端，无法直接还原用户体验

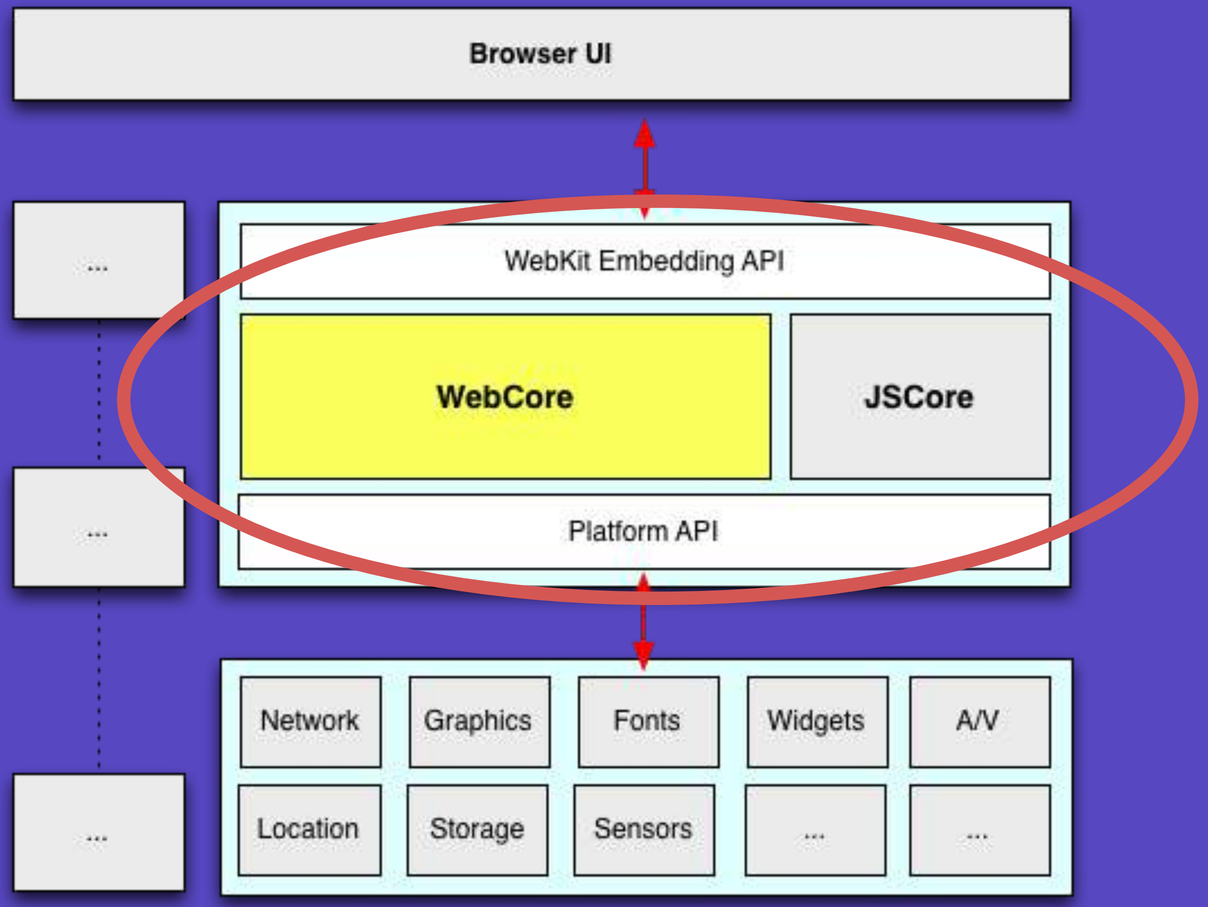


对开发者完全黑盒，缺失设备/运行时调用能力



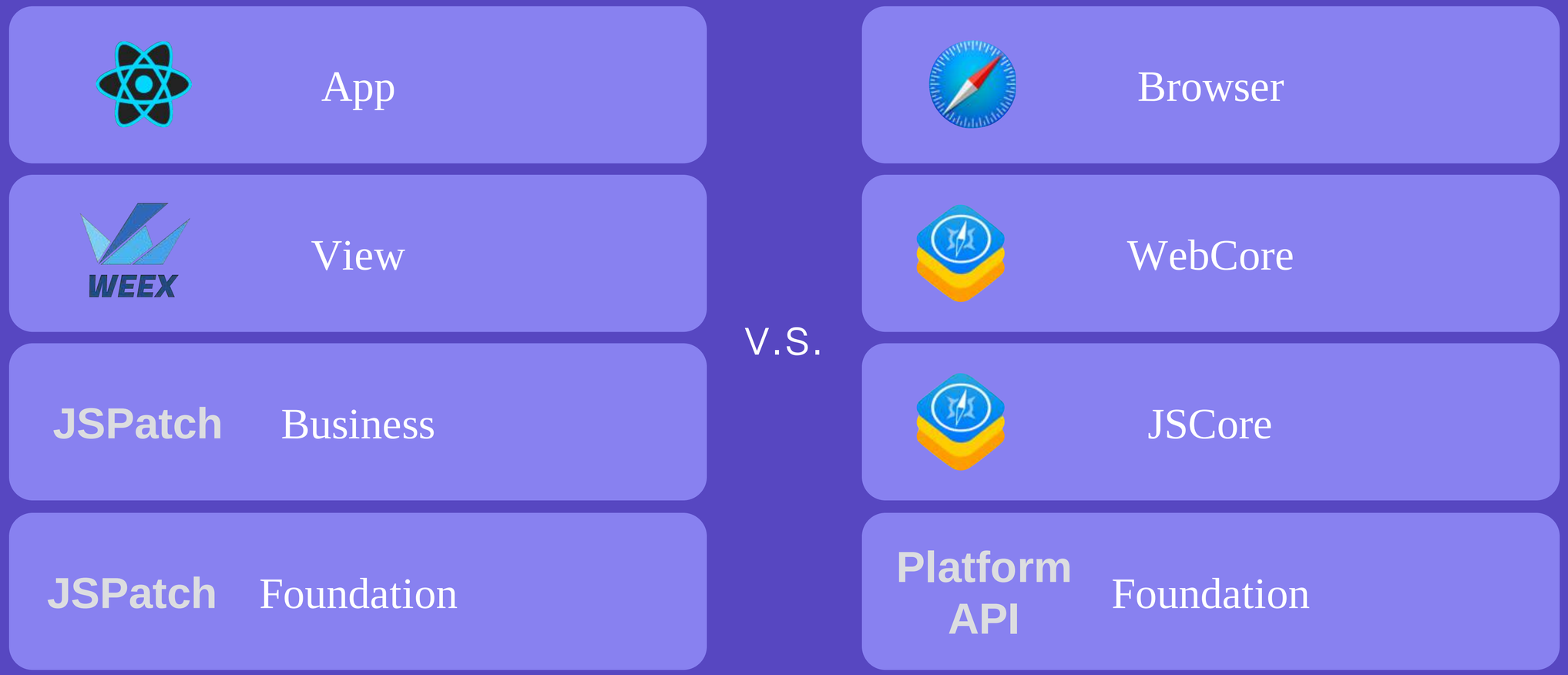
历史包袱过多，W3C规范定制过慢，落后于实际需求

CSS 1.0
CSS 2.0
CSS 3.0
HTML 2.0
HTML 3.2
HTML 4.0
HTML 5.0
XHTML

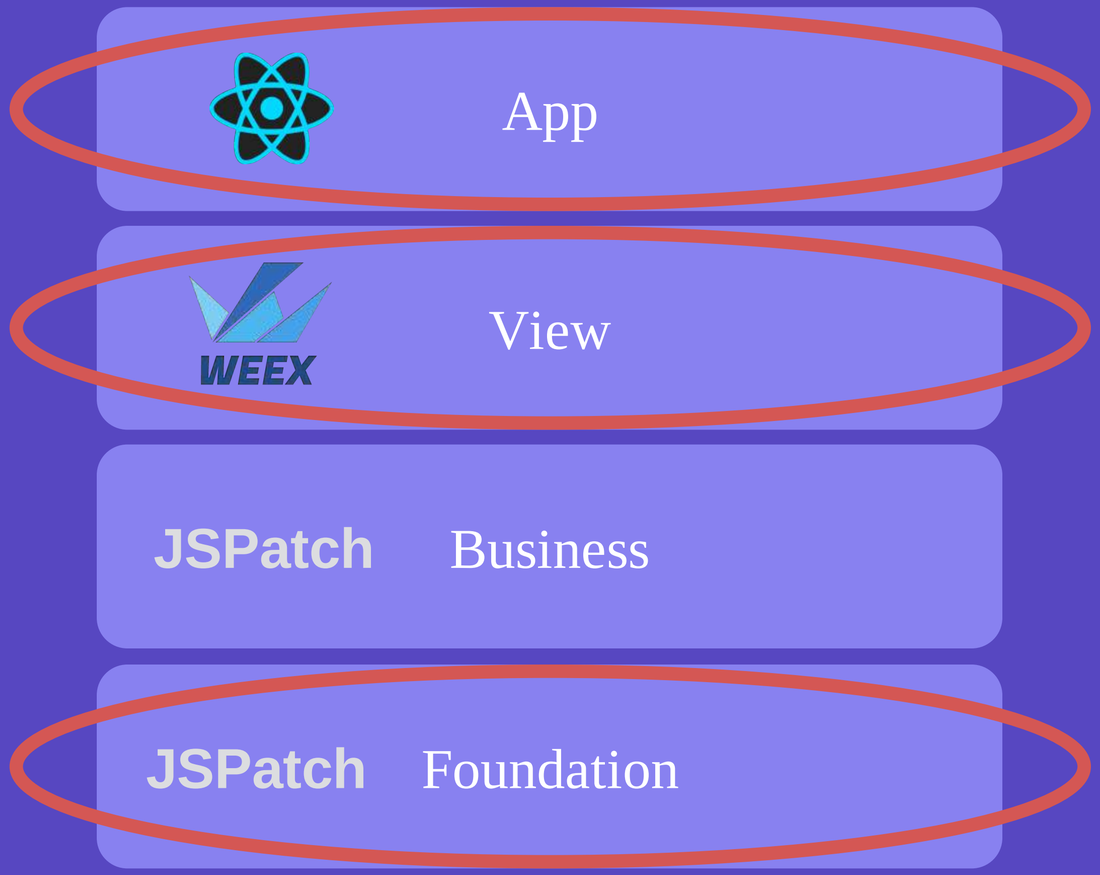


URL / URI
Protocols
Networks
Graphics
Audio / Video
Math
Mobile Web

从近年技术发展看，WebKit 正在被重新发明



通过不同垂直场景的解决方案，解决不同角度问题



全站动态化

界面动态化

运行时补丁

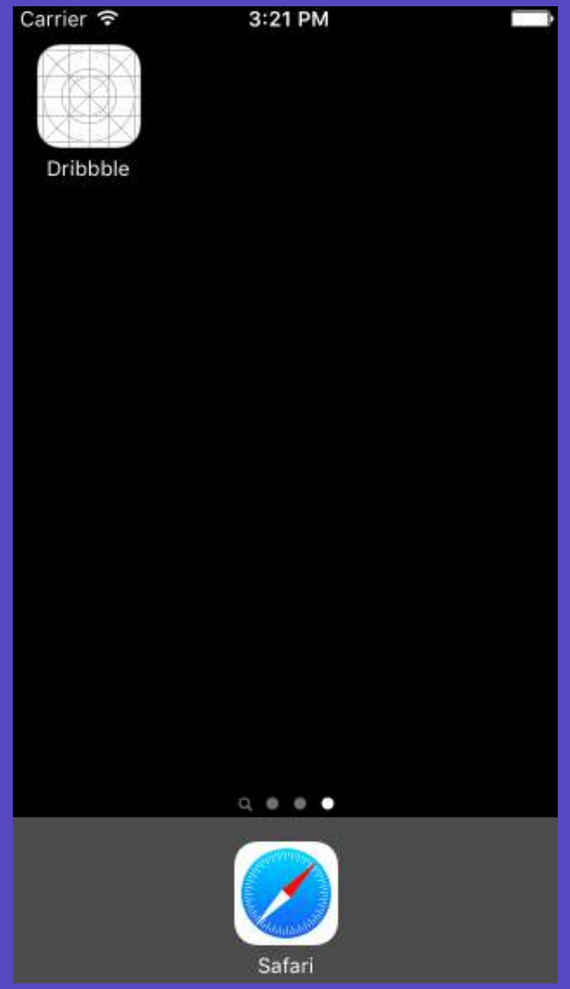
运行时补丁

第三方软件正在解决实际需求

Bring web standards to native platform

Demo

- 通过 JS/HTML/CSS 编写iOS App
- 生成纯原生 UI 界面
- 可通过第三方扩展
  - SDWebImage
  - MBProgressHUD
  - AFNetworking



```
<body>
    <RefreshCollectionView class="list">
        <UICollectionViewCell class="cell">
            <SDWebImageView class="image"></SDWebImage
        </UICollectionViewCell>
    </RefreshCollectionView>
</body>

<style>
    .list {
        display: block;
        width: 100%;
        height: 100%;
        margin: 0 3px;
    }

    .cell {
        width: 100%;
        height: auto;
    }

    .image {
        width: 100%;
        height: 140px;
        background-color: #aaa;
        -uikit-contentMode: UIViewContentModeScaleAspe
        -uikit-layer-masksToBounds: YES;
    }
</style>
```

HTML + Native Component

CSS + Property Mapping

```
include( '/js/api/DribbbleAPI.js' );
include( '/js/model/DribbbleModel.js' );

require( 'MBProgressHUD' );

defineClass( 'DribbbleIndexPage', 'SamuraiActivity', ['MBProgressHUDDelegate'],
{
    model: null,
    list: null,
    hud: null
},
{
    'onCreate' : function()
    {
        var activity = self;
        var model = new Dribbble.Model.ShotList( 'popular' );

        model.onLoading = function( reset ){
            if ( reset )
            {
                [activity showLoading];
            }
        };
        model.onLoaded = function(){
            [activity.props.list stopLoading];
            [activity reloadData];
            [activity hideLoading];
        };
        model.onError = function(){
            [activity.props.list stopLoading];
            [activity reloadData];
            [activity hideLoading];
        };

        self.props.model = model;

        [self setNavigationBarTitle:'Dribbble'];
        [self loadTemplateFile:'/html/DribbbleIndexPage.html'];
    },
```

Include file & Require class

Define Native Class

OC > JS Callback

Using Obj-C Syntax

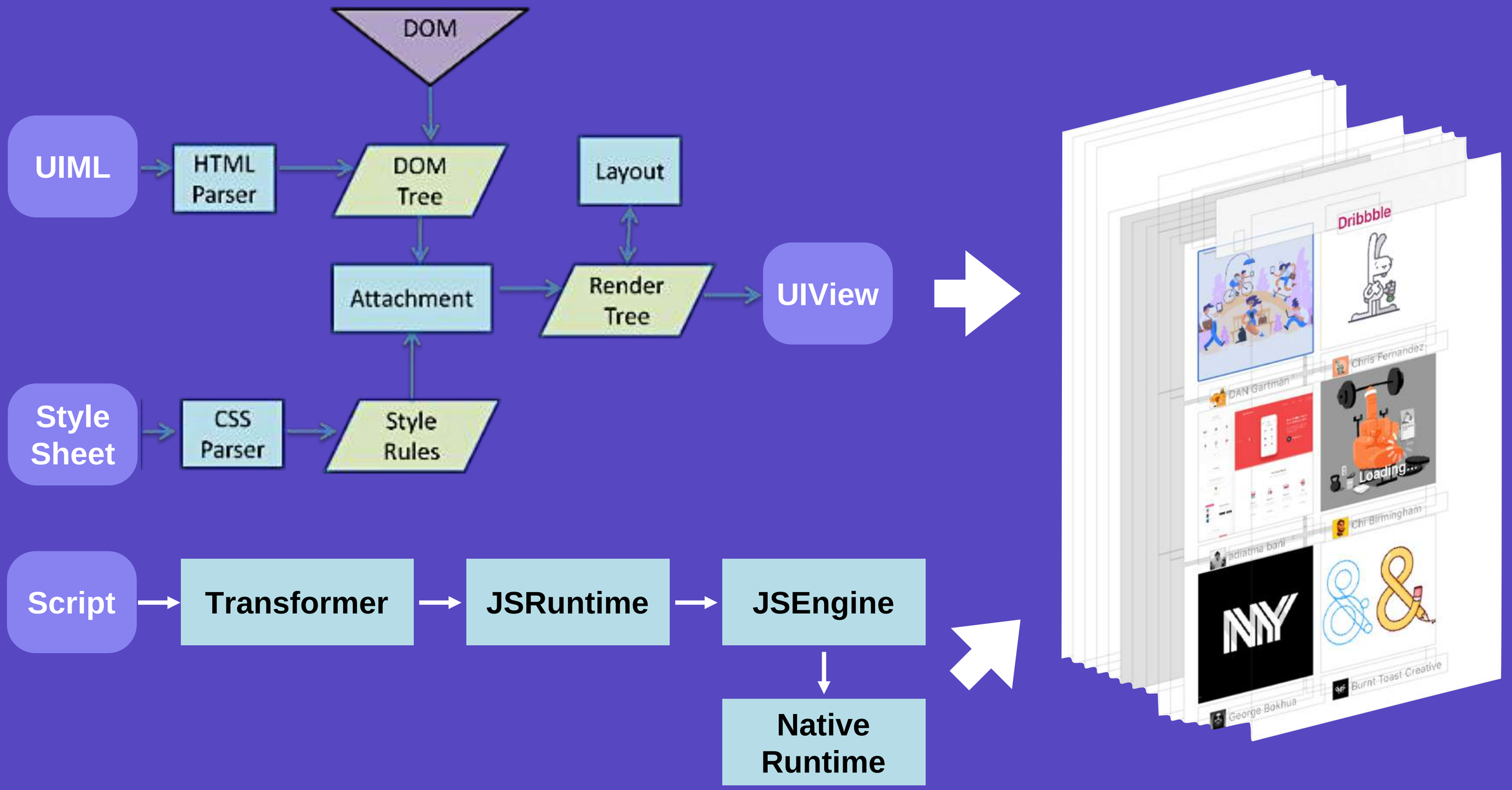
JS > OC Invocation

HTML
Layout

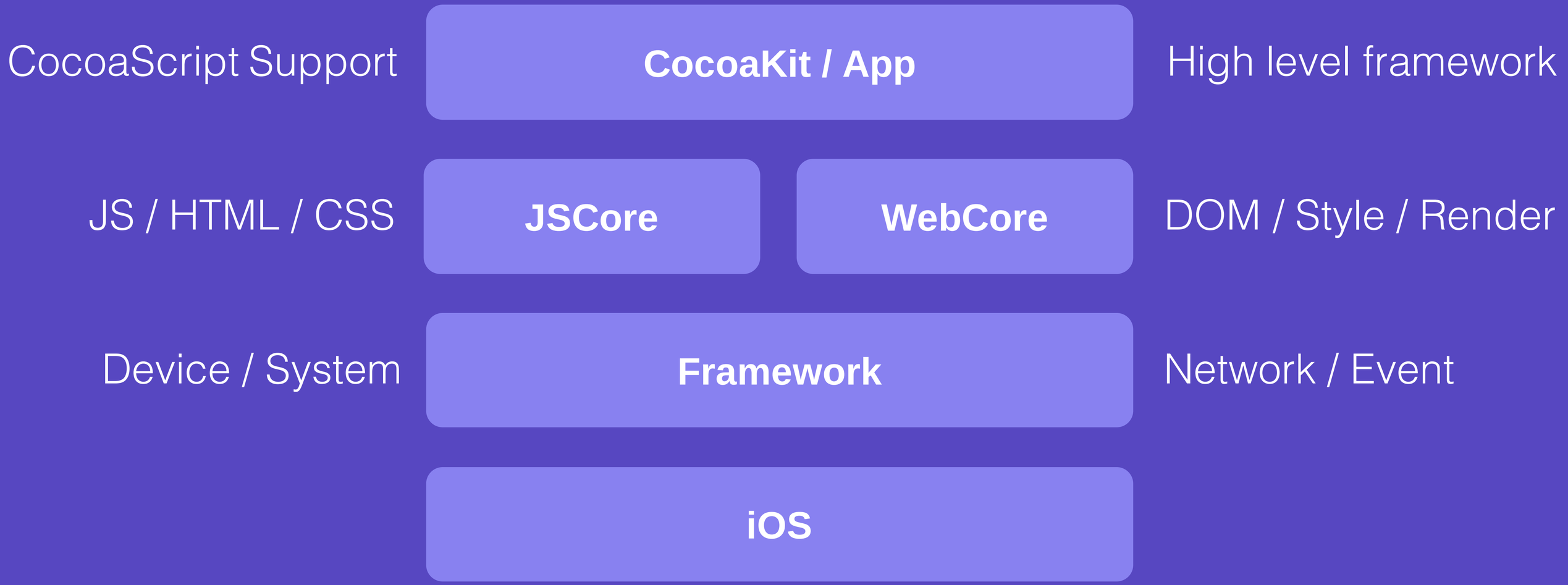
JS
Logic

CSS
Style

Native
Ability


DOM
UIML
HTML Parser
DOM Tree
Layout
Attachment
Render Tree
UIView
Style Sheet
CSS Parser
Style Rules
Script
Transformer
JSRuntime
JSEngine
Native Runtime
Dribbble
Chris Fernandez
DAN Gartman
Loading...
Chi Birmingham
sdiatma bani
George Bokhua
Burnt Toast Creative

架构概览


CocoaScript Support
CocoaKit / App
High level framework
JS / HTML / CSS
JSCore
WebCore
DOM / Style / Render
Device / System
Framework
Network / Event
iOS

WebCore 实现

WebCore 作用

```
<UIImageView/>

UIImageView {
  width: 100%;
  color: red;
}
```

DSL Code

UIView Tree

Native UI

WebCore 架构

Render workflow

Template

HTML UserAgent

HTML Render

HTML Layout

HTML Doc

HTML DOM

HTML Element

Document workflow

Layout algorithm

CSS Resolver

CSS Value

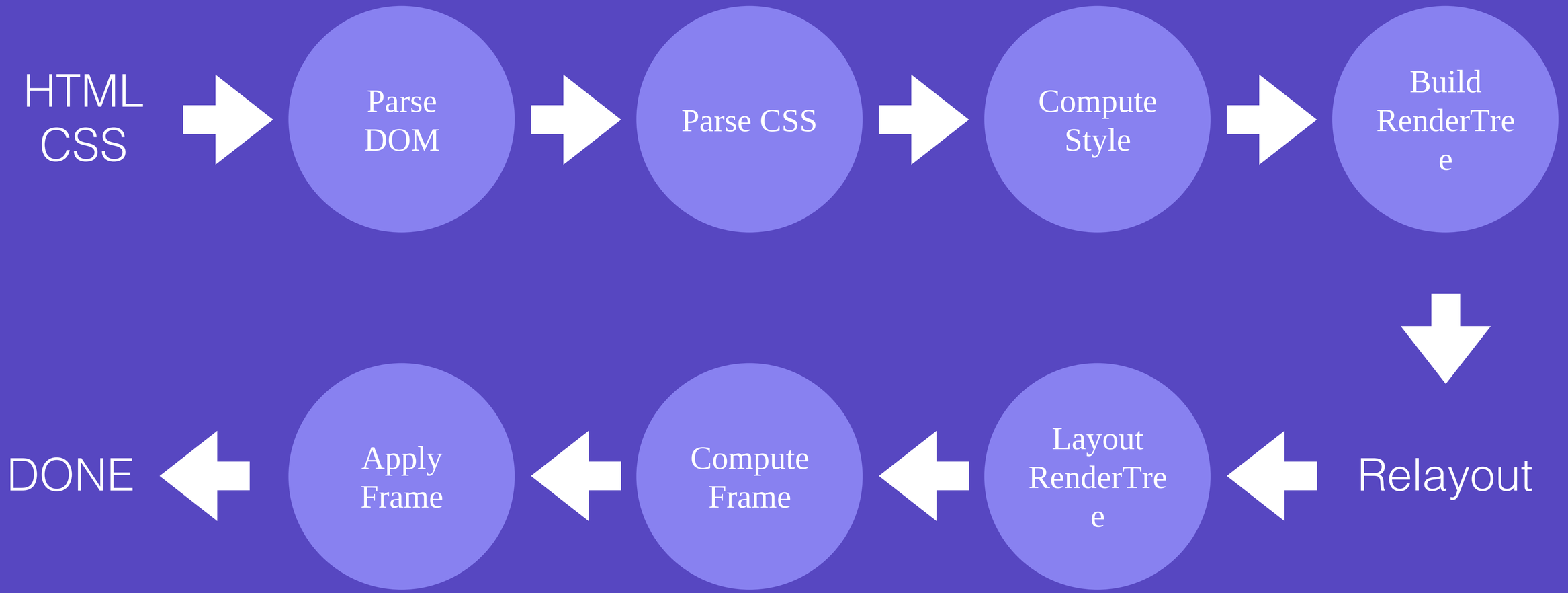
CSS StyleSheet

gumbo parser

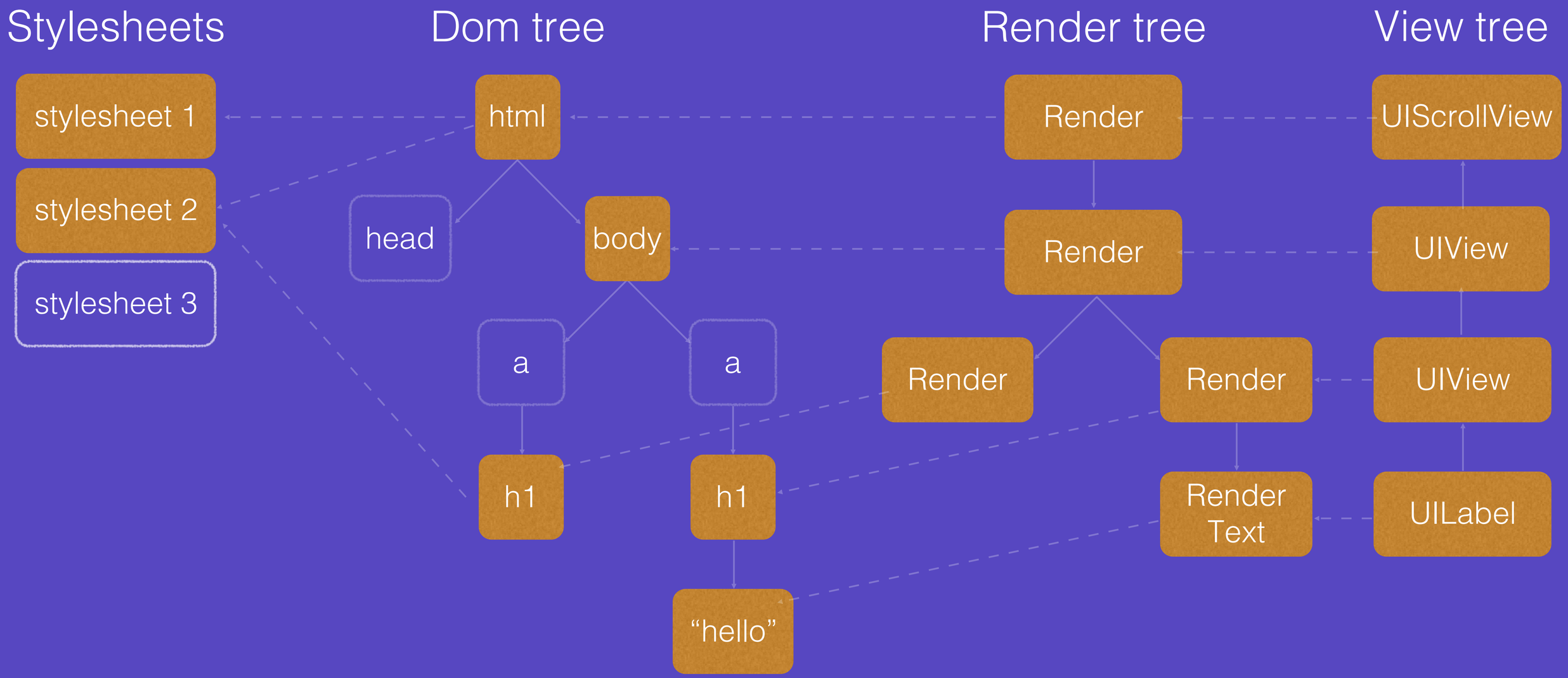
katana parser

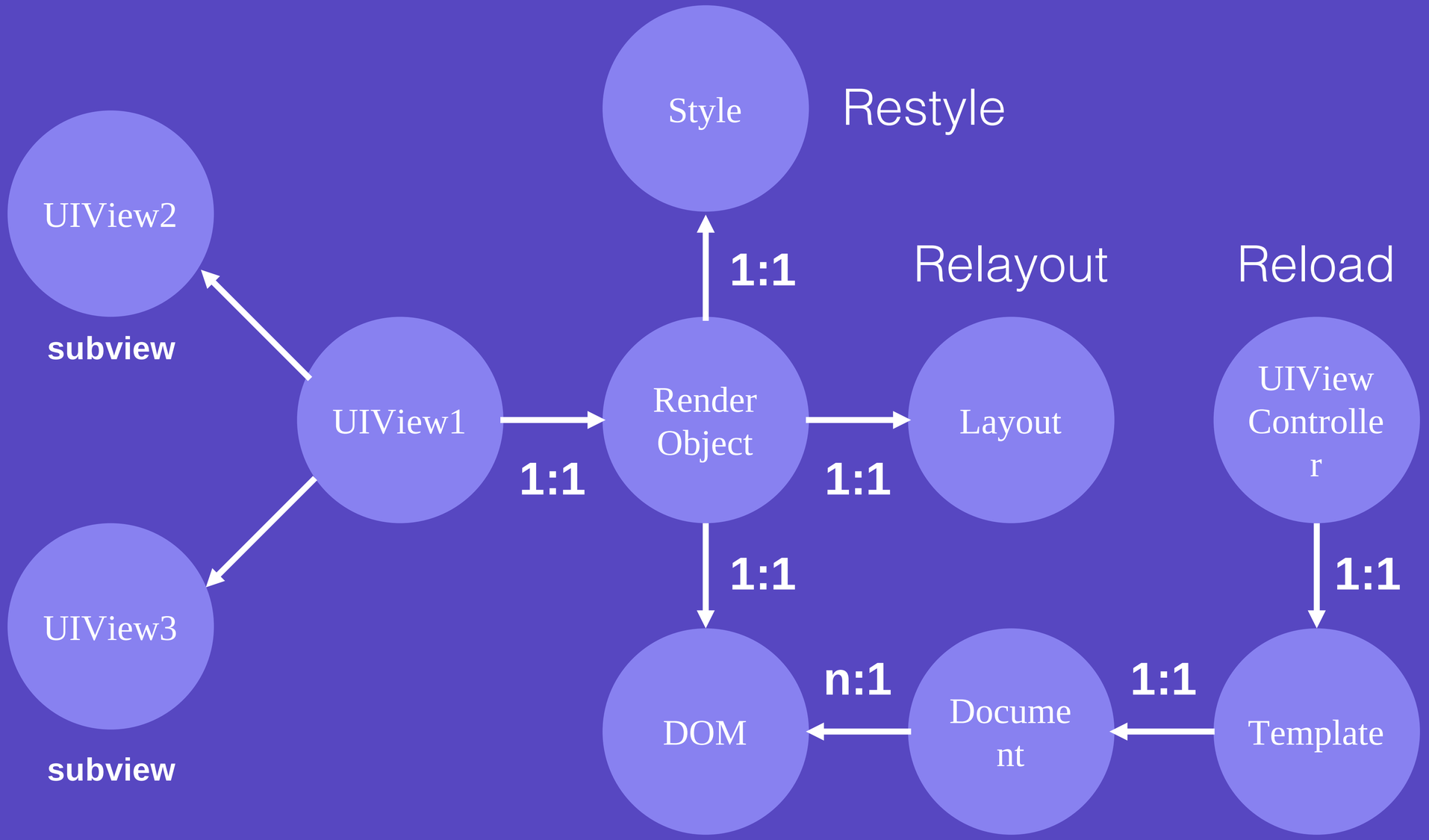
UserAgent Config

WebCore 工作流


HTML
CSS
Parse
DOM
Parse CSS
Compute
Style
Build
RenderTre
e
Relayout
Layout
RenderTre
e
Compute
Frame
Apply
Frame
DONE

WebCore 树结构

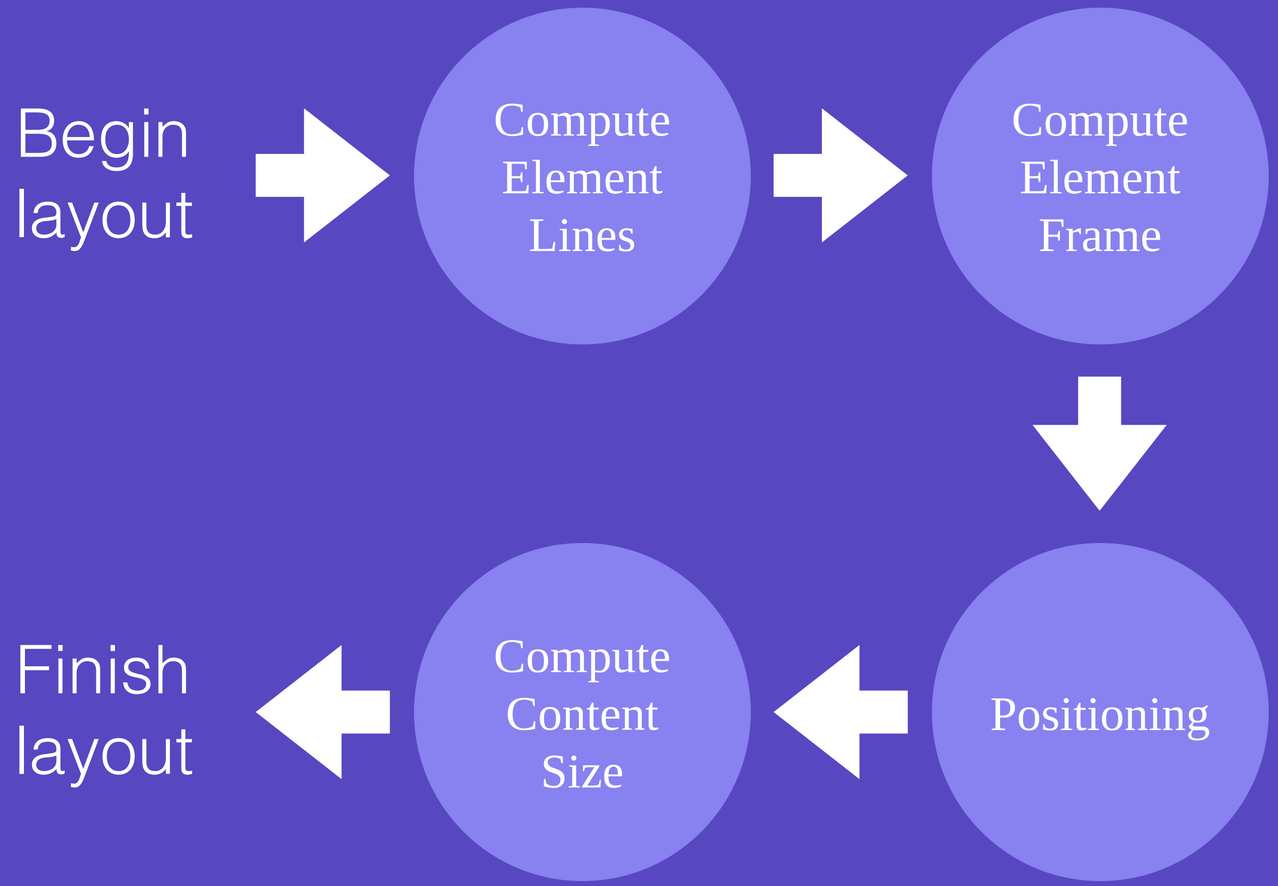

Stylesheets
Dom tree
Render tree
View tree
stylesheet 1
stylesheet 2
stylesheet 3
html
head
body
a
a
h1
h1
“hello”
Render
Render
Render
Render
Render
Text
UIScrollView
UIView
UIView
UILabel

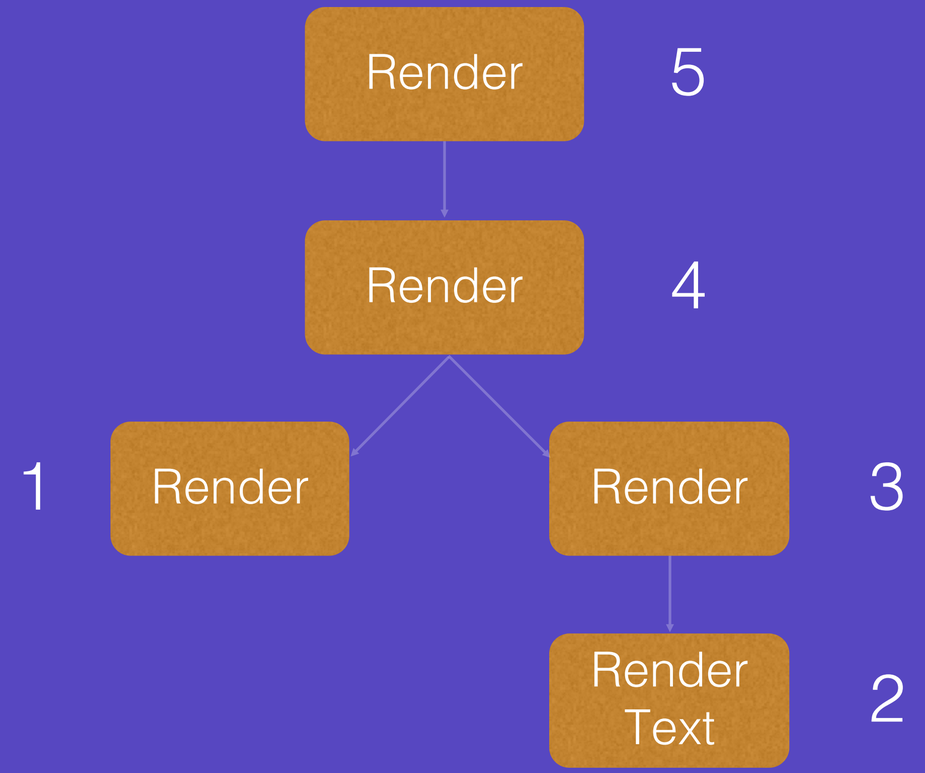

Style
Restyle
UIView2
1:1
Relayout
Reload
subview
UIView1
Render Object
Layout
UIView Controller
1:1
1:1
1:1
UIView3
1:1
n:1
1:1
DOM
Document
Template
subview

布局算法 (1)

- display: inline/block/flex/table
  - Inline layout
  - Block layout
  - Flex layout
  - Table layout

布局算法 (2)


Begin layout
Compute Element Lines
Compute Element Frame
Positioning
Compute Content Size
Finish layout


Render
5
Render
4
1
Render
Render
3
Render Text
2

用户代理

- UserAgent Setting
  - 默认 font / color / metrics
- UserAgent StyleSheet
  - 默认样式及元素与组件关系
  - samurai-html-hierarchy.css
  - samurai-html-useragent.css

```
body {
    -samurai-view-hierarchy: 'tree';
    -samurai-view-class: 'SamuraiHtmlElementBody';
}

article {
    -samurai-view-hierarchy: 'tree';
    -samurai-view-class: 'SamuraiHtmlElementArticle';
}

aside {
    -samurai-view-hierarchy: 'tree';
    -samurai-view-class: 'SamuraiHtmlElementAside';
}

div {
    -samurai-view-hierarchy: 'tree';
    -samurai-view-class: 'SamuraiHtmlElementDiv';
}
```

对原生组件支持

<UIActivityIndicatorView/>	<UITextField/>	<UIScrollView/>	<UITableView/>
<UIButton/>	<UITextView/>	<UIProgressView/>	<UITableViewCell/>
<UIImageView/>	<UISlider/>	<UISlider/>	<UICollectionView/>
<UIPageControl/>	<UISwitch/>	<UIStepper/>	<UICollectionViewCell/>
<UILabel/>	<UIView/>	<UIWebView/>	...

Support all of UIKit components

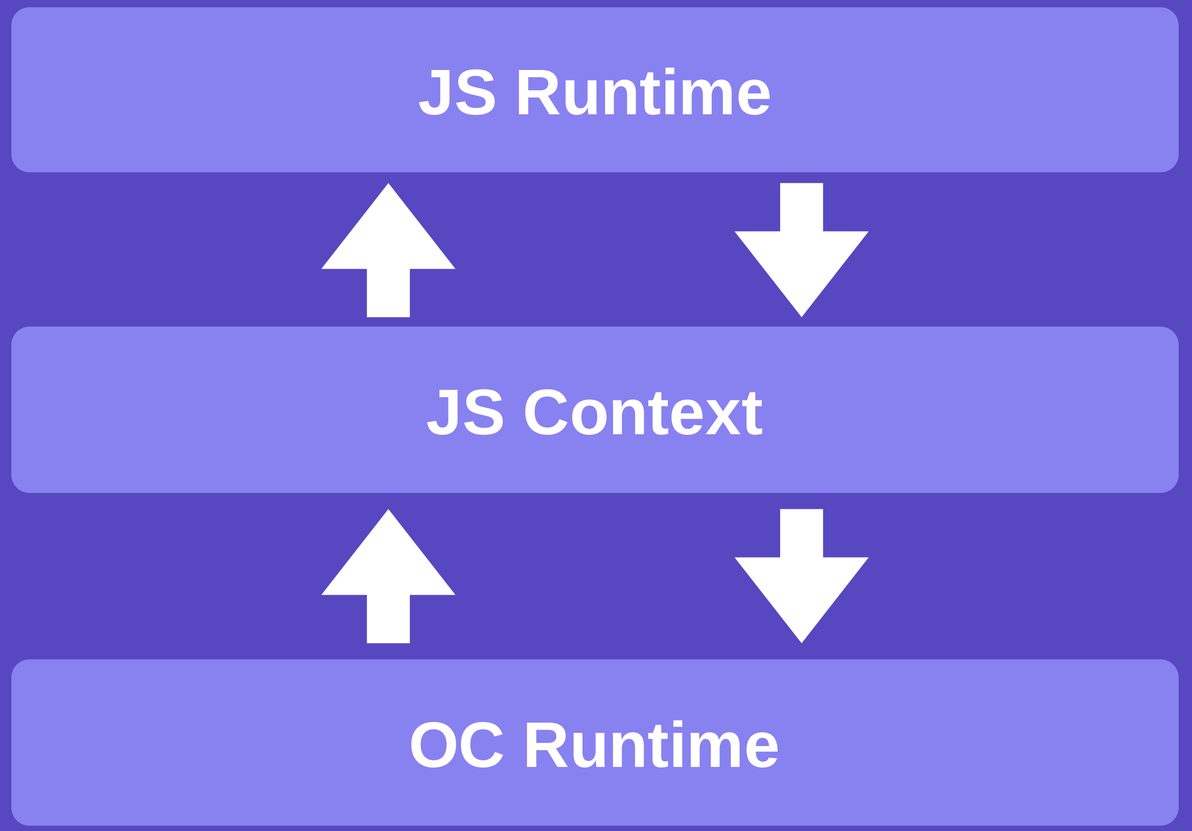
对原生组件扩展

- <UIButton/>
- 两步搞定
  - html_applyDom:
    - 解析DOM数据
  - html_applyRender:
    - 应用计算好的样式

```
@implementation UIButton(Html)

- (void)html_applyDom:(SamuraiHtmlDomNode *)dom
{
    [super html_applyDom:dom];

    self.titleLabel.text = [[dom computeInnerText] normalize];
    self.titleLabel.hidden = NO;

    [self setTitle:self.titleLabel.text forState:UIControlStateNormal];
}

- (void)html_applyRender:(SamuraiHtmlRenderObject *)render
{
    [super html_applyRender:render];

    self.titleLabel.hidden = NO;
    self.titleLabel.frame = CGRectMake( 0.0f, 0.0f, render.computedFrame.size.width, rende
    self.titleLabel.font = render.computedFont;

    switch ( render.computedTextAlign ) {
        case CSSTextAlign_Left:         self.titleLabel.textAlignment = NSTextAlignmentLef
        case CSSTextAlign_Right:        self.titleLabel.textAlignment = NSTextAlignmentRig
        case CSSTextAlign_Center:       self.titleLabel.textAlignment = NSTextAlignmentCen
        case CSSTextAlign_Justify:      self.titleLabel.textAlignment = NSTextAlignmentJus
        default:                        self.titleLabel.textAlignment = NSTextAlignmentLef
    }

    switch ( render.computedWordWrap ) {
        case CSSWordWrap_BreakWord:     self.titleLabel.lineBreakMode = NSLineBreakByWordW
        case CSSWordWrap_Normal:
        default:
        {
            switch ( render.computedTextOverflow ) {
                case CSSTextOverflow_Clip:      self.titleLabel.lineBreakMode = NSLineBrea
                case CSSTextOverflow_Ellipsis:  self.titleLabel.lineBreakMode = NSLineBrea
                default:                        self.titleLabel.lineBreakMode = NSLineBrea
            }
```

JSCore 实现

JSCore 作用



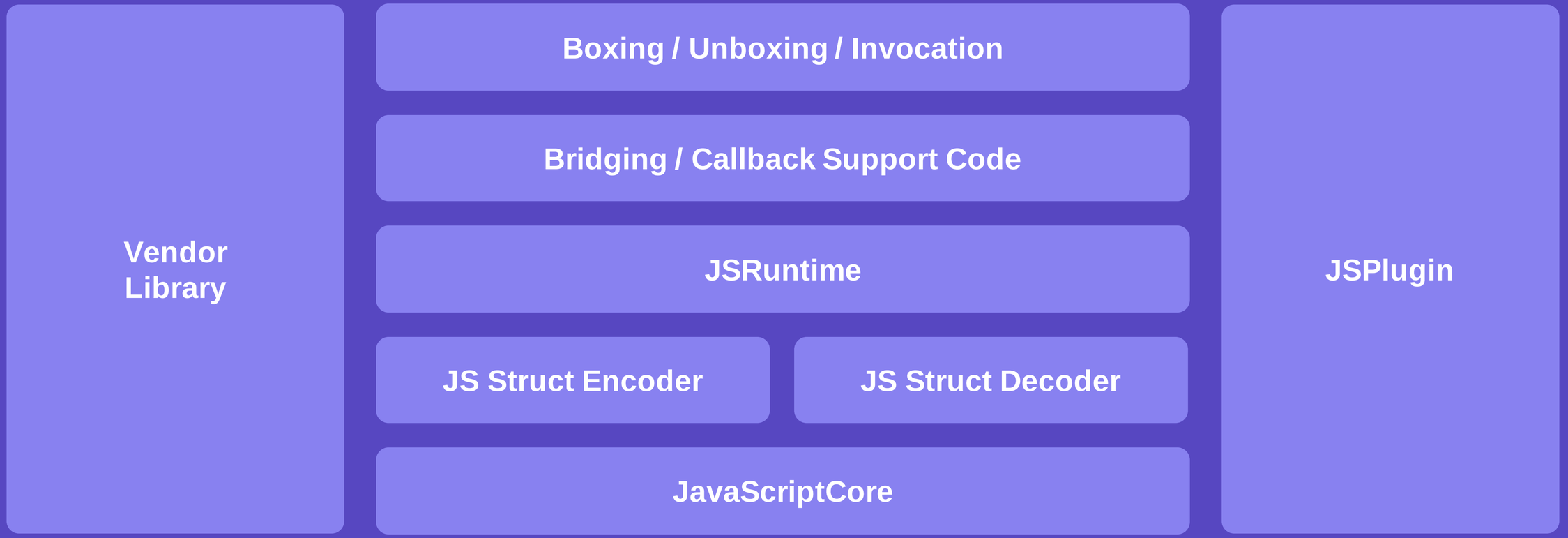
Call OC from JS

Bridging

Call JS from OC

将底层Runtime所有能力导出给JS Context

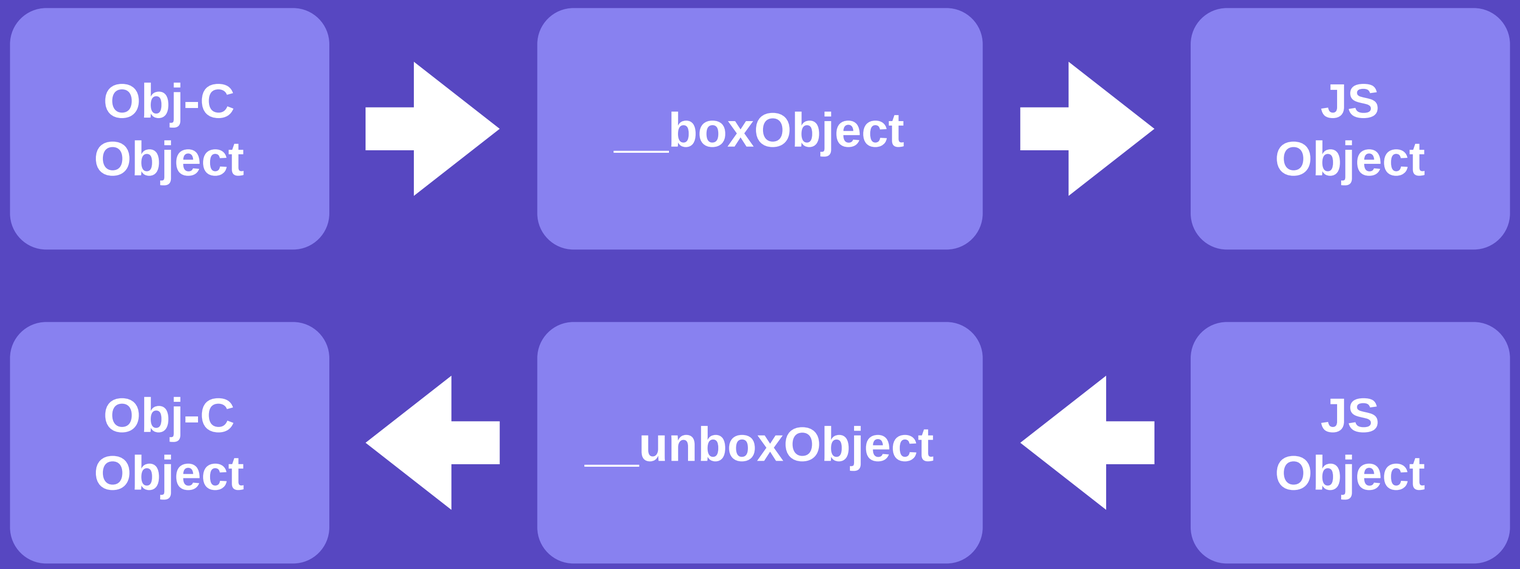
JSCore 架构


Vendor Library
Boxing / Unboxing / Invocation
Bridging / Callback Support Code
JSRuntime
JS Struct Encoder
JS Struct Decoder
JavaScriptCore
JSPlugin

JSCore 实现

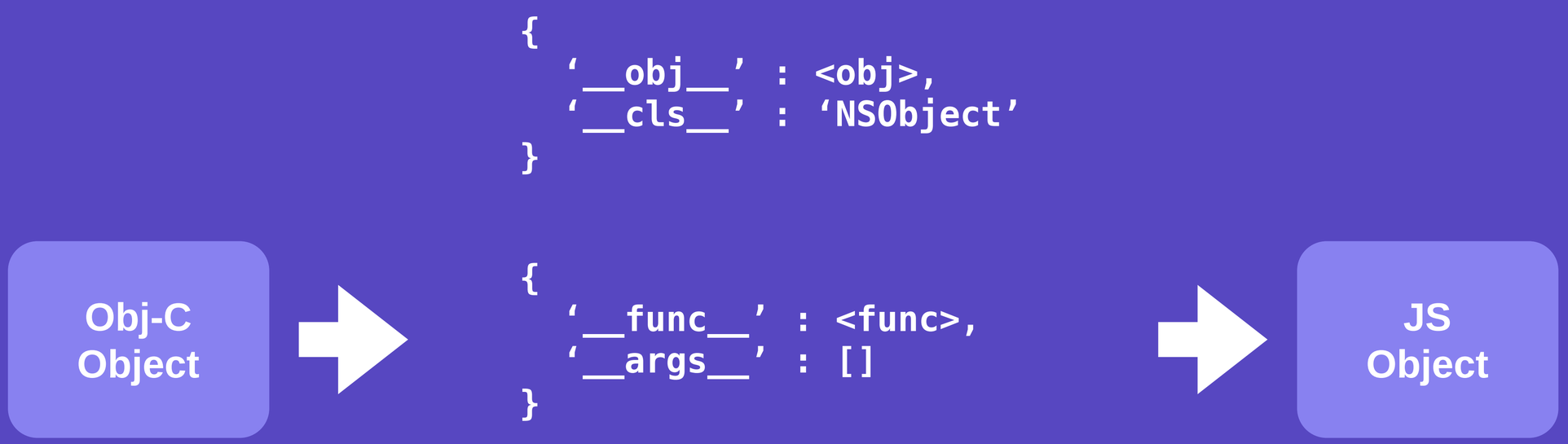
- Native 部分
  - 获取类
  - 创建类
  - 调用方法
  - 读写属性
  - 读写变量
  - 加载文件
- Runtime 部分
  - 方法Hook
  - 方法重定向
  - 对象类型转换
  - 返回值处理
  - Block支持
  - Context
- JS 部分
  - BoxedObject
  - BoxedClass
  - 打包/解包对象
  - 分发/处理回调
  - 引用原生类
  - 引用文件

对象传递 Boxing/Unboxing



Different from JSPatch, boxing/unboxing in JS side

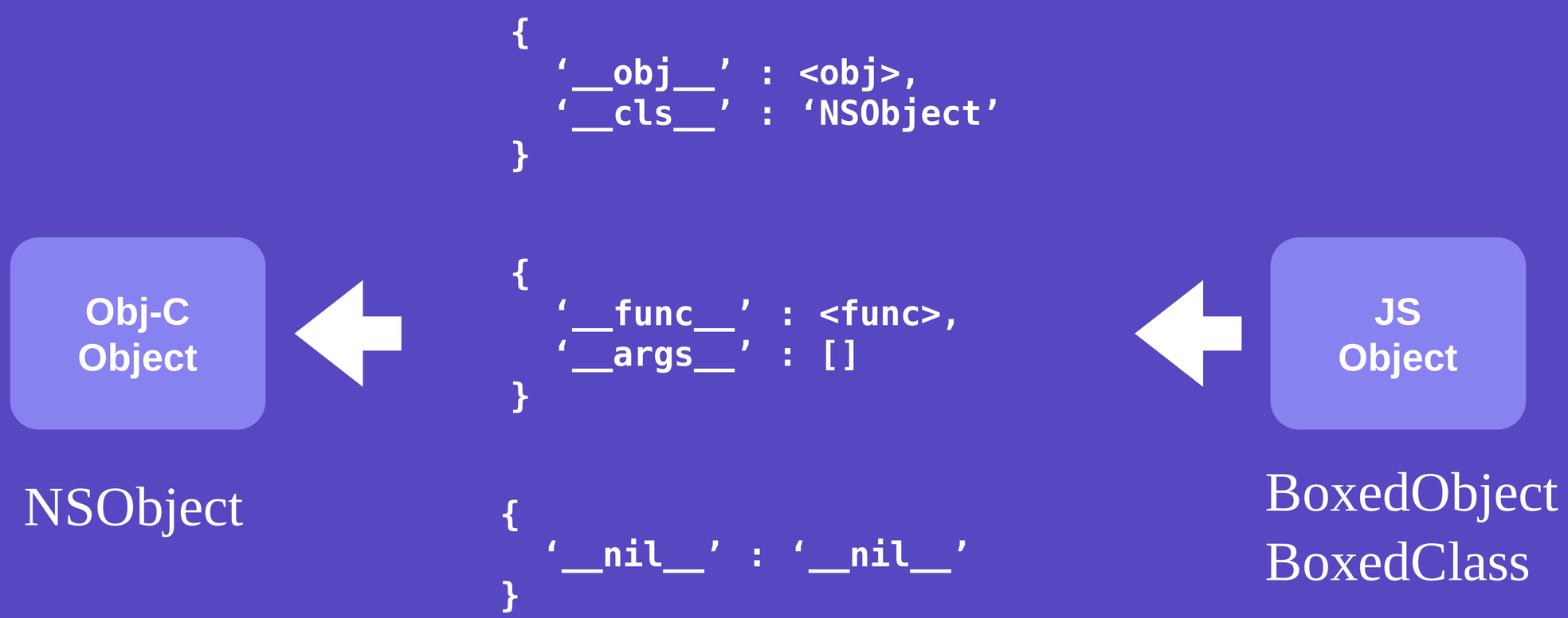
对象打包 Boxing



NSObject

BoxedObject
BoxedClass

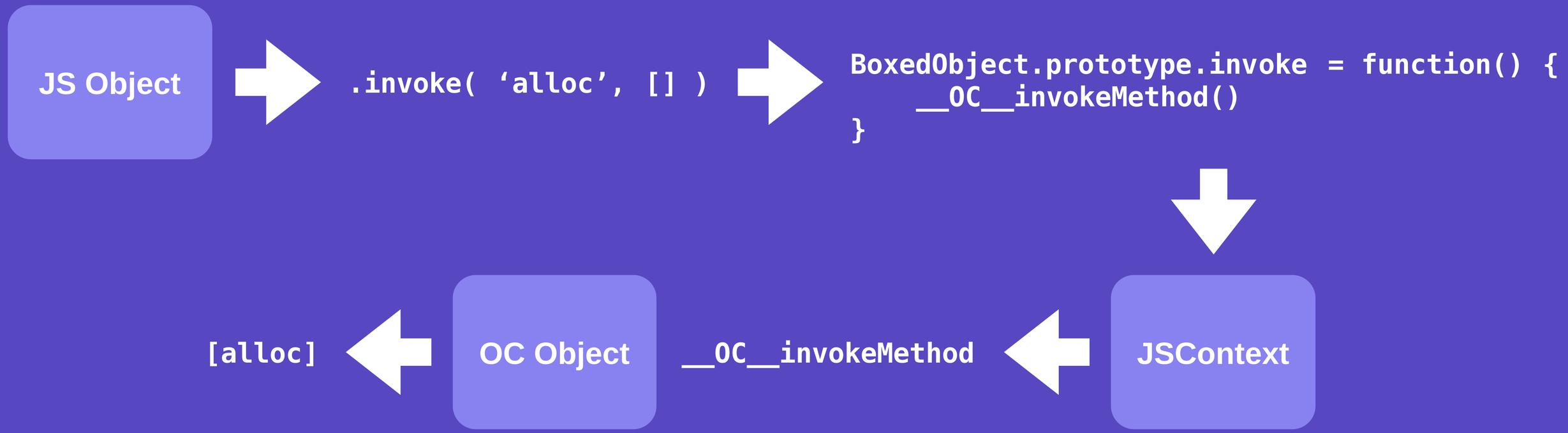
对象解包 Unboxing



从 JS 到 OC 调用 (1)

BoxedObject

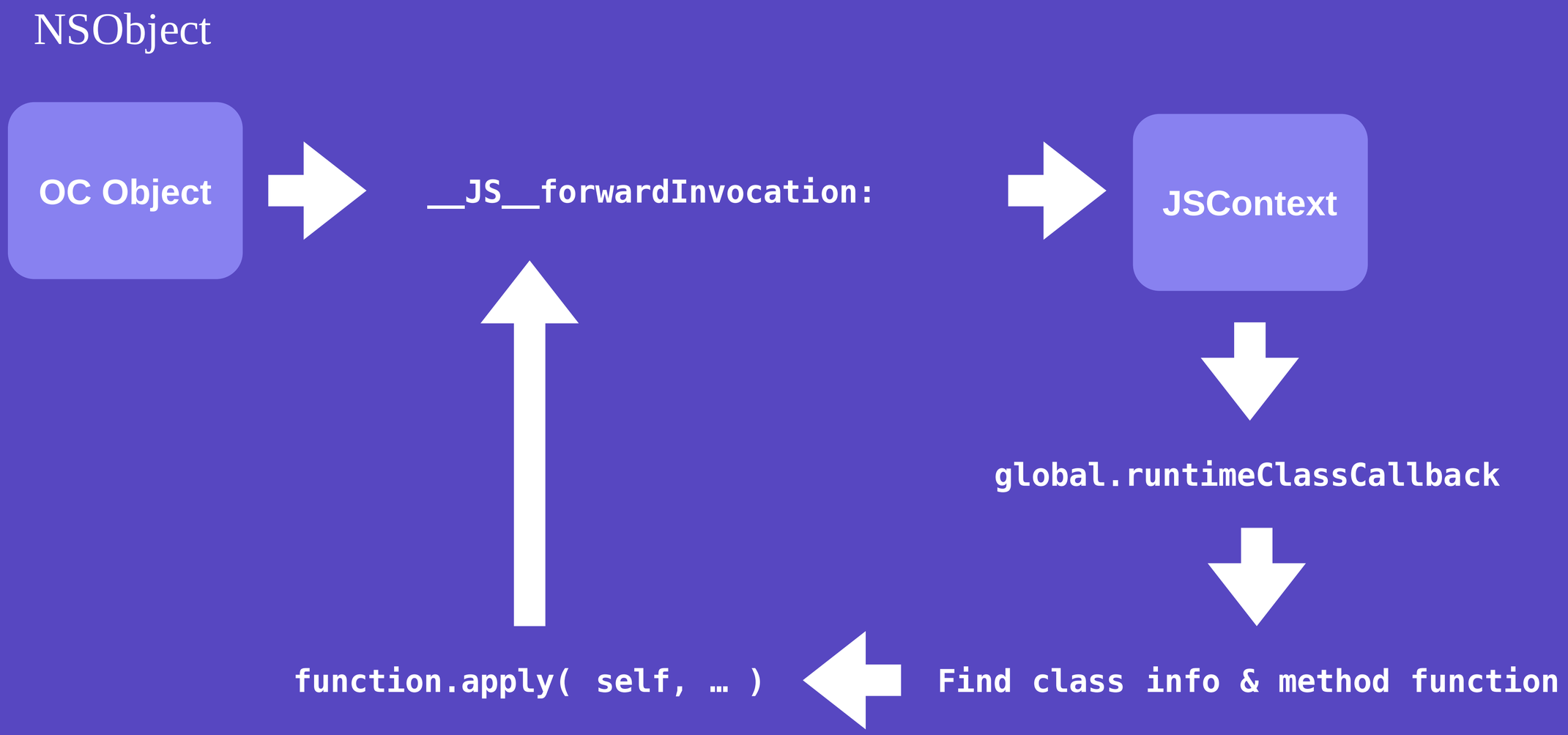
BoxedClass



从 JS 到 OC 调用 (2)

```
BoxedObject.prototype.invoke = function( methodName, methodArgs )
{
    var classInfo = global.importedClasses[this._className];
    if ( false == __isNone( classInfo ) )
    {
        var methodFunction = classInfo.instanceMethods[methodName];
        if ( false == __isNone( methodFunction ) )
        {
            var _self = global.self;

            global.self = this;

            var returnValue = methodFunction.apply( this, methodArgs );

            global.self = _self;

            return returnValue;
        }
    }

    var unboxedArgs = __isNone( methodArgs ) ? [] : __unboxObject( methodArgs );
    var returnValue = __OC__invokeMethod( this._object, methodName, unboxedArgs );
    if ( __isNone( returnValue ) )
        return null;

    return __boxObject( returnValue );
};
```

从 OC 到 JS 调用 (1)


NSObject
OC Object
__JS__forwardInvocation:
JSContext
global.runtimeClassCallback
Find class info & method function
function.apply(self, …)

从 OC 到 JS 调用 (2)

```
global.runtimeClassCallback = function( className, method, object, args )
{
    var classInfo = global.importedClasses[className];
    if ( __isNone( classInfo ) )
    {
        console.log( "Class '" + className + "' not found" );
        return null;
    }

    var methodForward = classInfo.methodForwards[method];
    if ( methodForward )
    {
        method = methodForward;
    }

    var methodFunction = classInfo.instanceMethods[method];
    if ( __isNone( methodFunction ) )
    {
        console.log( "Method '" + method + "' not found" );
        return null;
    }

    var boxedThis = __boxObject( object );
    var boxedArgs = __boxObject( args );

    var _self = global.self;

    global.self = boxedThis;

    var returnValue = methodFunction.apply( boxedThis, boxedArgs );

    global.self = _self;

    if ( __isNone( returnValue ) )
        return null;

    return __unboxObject( returnValue );
};
```

JSContext 实现

- Get/Create Class
- Invoke Method
- Get/Set Property
- Get/Set Variable
- (在OC中， Class也是Object）

```
self.context[@"__OC__getClass"] = ^( JSValue * className ) {};
self.context[@"__OC__createClass"] = ^( JSValue * className, JSValue
self.context[@"__OC__invokeMethod"] = ^( JSValue * jsObject, JSValue
self.context[@"__OC__getProperty"] = ^( JSValue * object, JSValue *
self.context[@"__OC__setProperty"] = ^( JSValue * object, JSValue *
self.context[@"__OC__getVariable"] = ^( JSValue * object, JSValue *
self.context[@"__OC__setVariable"] = ^( JSValue * object, JSValue *
self.context[@"__OC__retain"] = ^( JSValue * object ) {};
self.context[@"__OC__release"] = ^( JSValue * object ) {};
self.context[@"__OC__include"] = ^( JSValue * jsPath ) {};
self.context[@"__OC__assert"] = ^( JSValue * value, JSValue * desc )
self.context[@"__OC__log"] = ^( JSValue * text ) {};
```

JSRuntime 实现

- BoxedObject
- BoxedClass
- __boxObject(any)
- __unboxObject(any)
- global.runtimeClassCallback
- global.runtimeFunctionCallback

```
function BoxedObject( object, className ) {};

BoxedObject.prototype.invoke = function( methodName, methodArgs ) {};
BoxedObject.prototype.retain = function() {}
BoxedObject.prototype.release = function() {}

function BoxedClass( object, className )

BoxedClass.prototype.invoke = function( methodName, methodArgs ) {};
```

从JS中创建OC类

- OC
  - __OC__createClass
- JS
  - BoxedClass

```
require( 'MBProgressHUD' );

defineClass( 'MyClass', 'SuperClass', ['Protocol'],
{
    hello : null
},
{
    'method' : function()
    {
        self.props.hello = 'world';
        self.invoke( 'method2:', ["abc"] );
    },

    'method2' : function()
    {
    },

});
```

CocoaKit

CocoaKit 作用

App Bundle (/www)

CocoaScript

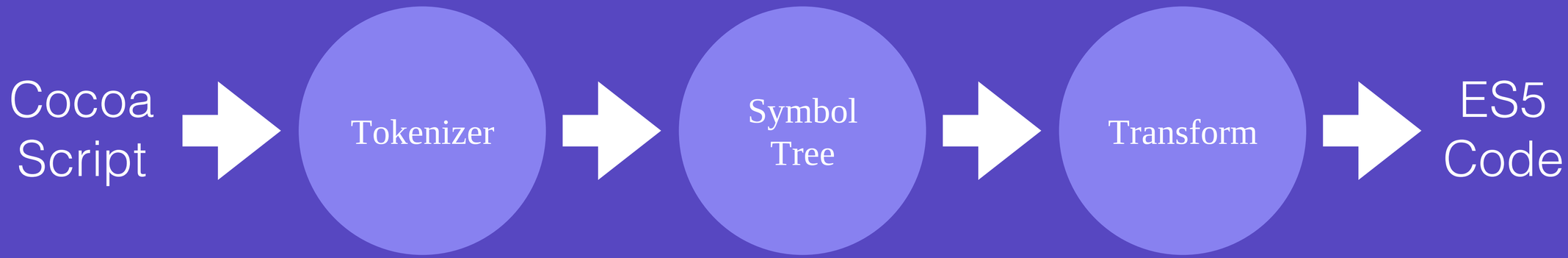
UIComponents

提供高阶的App Bundle支持，及CocoaScript编程语言支持

CocoaKit

- CocoaScript Transformer
  - 运行时将 Obj-C 代码转换为 可运行的JS 代码
  - Sketch插件官方御用语言
  - 原作者是 ccgus（FMDB），对原版进行升级改造
- 支持数据绑定
- 支持更多UIKit组件

CocoaScript Transformer (1)



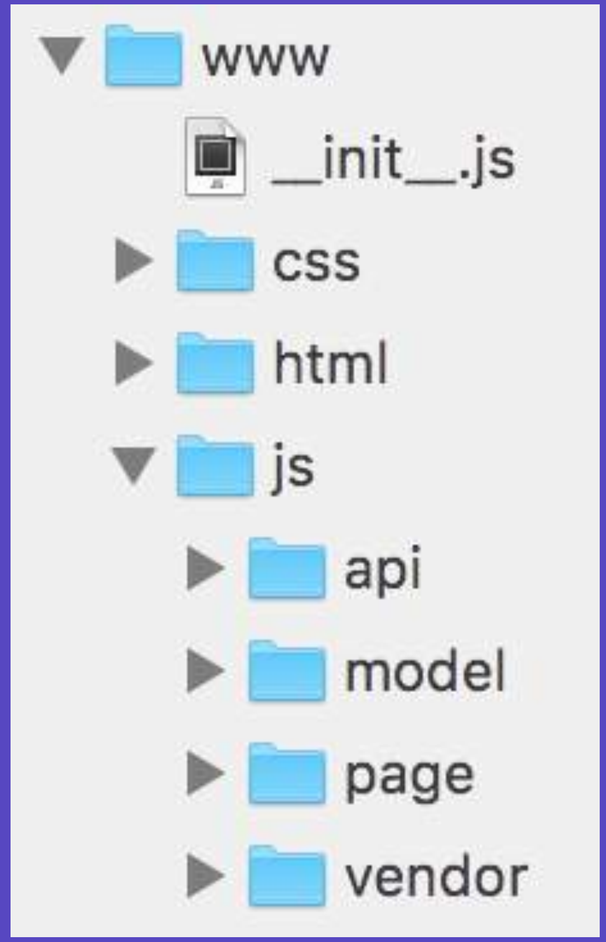

```
[obj doSth:arg]  obj.invoke('doSth', [arg])
```

CocoaScript Transformer (2)

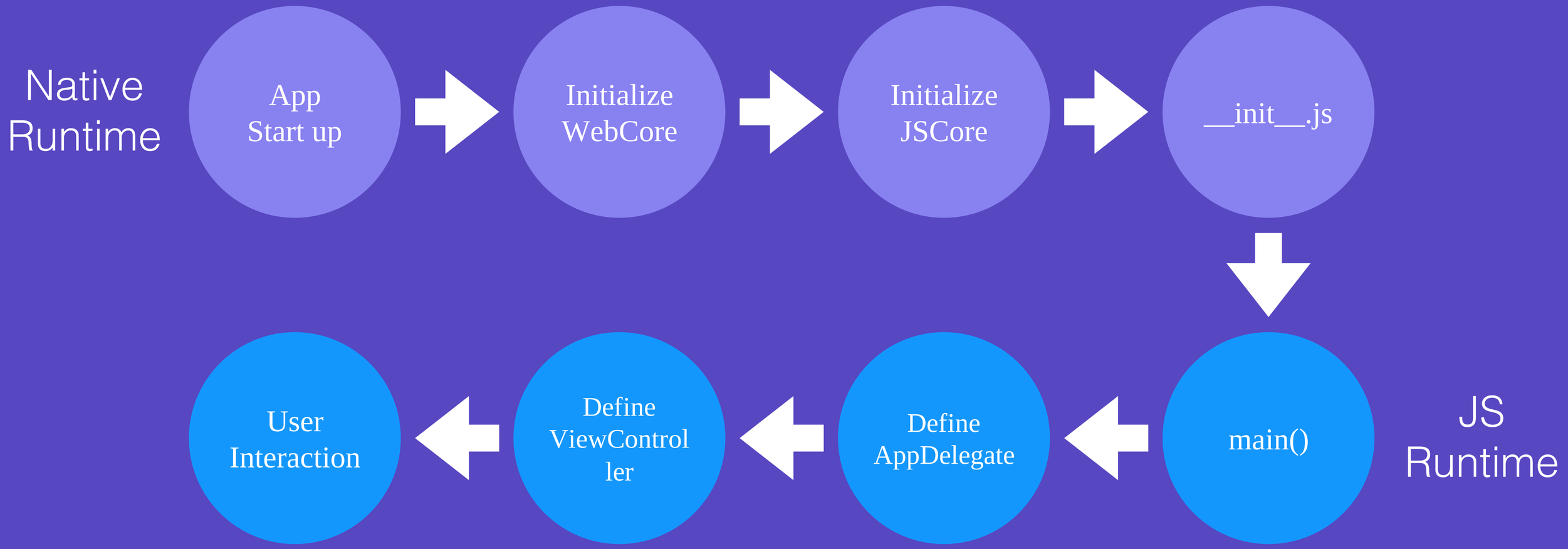
- Transform 规则
  - [a b] -> a.invoke(‘b’)
  - [a b:c] -> a.invoke(‘b:’, c)
  - a[i] -> a[i]
  - [[a.b.c() d:[e f] g:h i:j.k().l([m.n().o p])] q:([r.s]) t:u[1] v:w(1+2)]
- TODParseKit

App Bundle (1)

- \www
  - __init__.js main entry
  - \css style files here
  - \html template files here
  - \js javascript files here



App Bundle (2)


Native Runtime
App Start up
Initialize WebCore
Initialize JSCore
__init__.js
main()
Define AppDelegate
Define ViewControl ler
User Interaction
JS Runtime

App Bundle (2)

```
int main( int argc, char * argv[] )
{
    SAMURAI_SET_BUNDLE_PATH( "/www" );

    [[SamuraiCocoaKit sharedInstance] startup];

    @autoreleasepool
    {
        return UIApplicationMain( argc, argv, nil, @"DribbbleApp" );
    }
}
```

数据绑定

```
'reloadData' : function()
{
    var model = self.props.model;
    var shots = [];

    for ( var i = 0; i < model.shots.length; ++i )
    {
        var shot = model.shots[i];

        shots.push({
            photo : shot.images.normal,
            avatar : shot.user.avatar_url,
            author : shot.user.name,
            attr : {
                views : shot.views_count,
                likes : shot.likes_count,
                comments : shot.comments_count
            },
        });
    }

    [self.props.list cocoa_setData:{ "shots" : shots }];
},
```

```
<UICollectionViewCell model="shots" onclick="@shotDidClic
    width: 100%;
    height: auto;
    ">
    <div style="
        width: 100%;
        height: auto;
        margin: 2px;
        padding: 2px;
        border: solid 1px #d0d0d0;
        background-color: #ffffff;
        ">
        <SDWebImageView model="photo" style="
            width: 100%;
            height: 140px;
            background-color: #aaa;
            -uikit-contentMode: UIViewContentModeScaleAsp
            -uikit-layer-masksToBounds: YES;
            ">
        </SDWebImageView>
```

```
[view cocoa_setData:{model: value}];
```

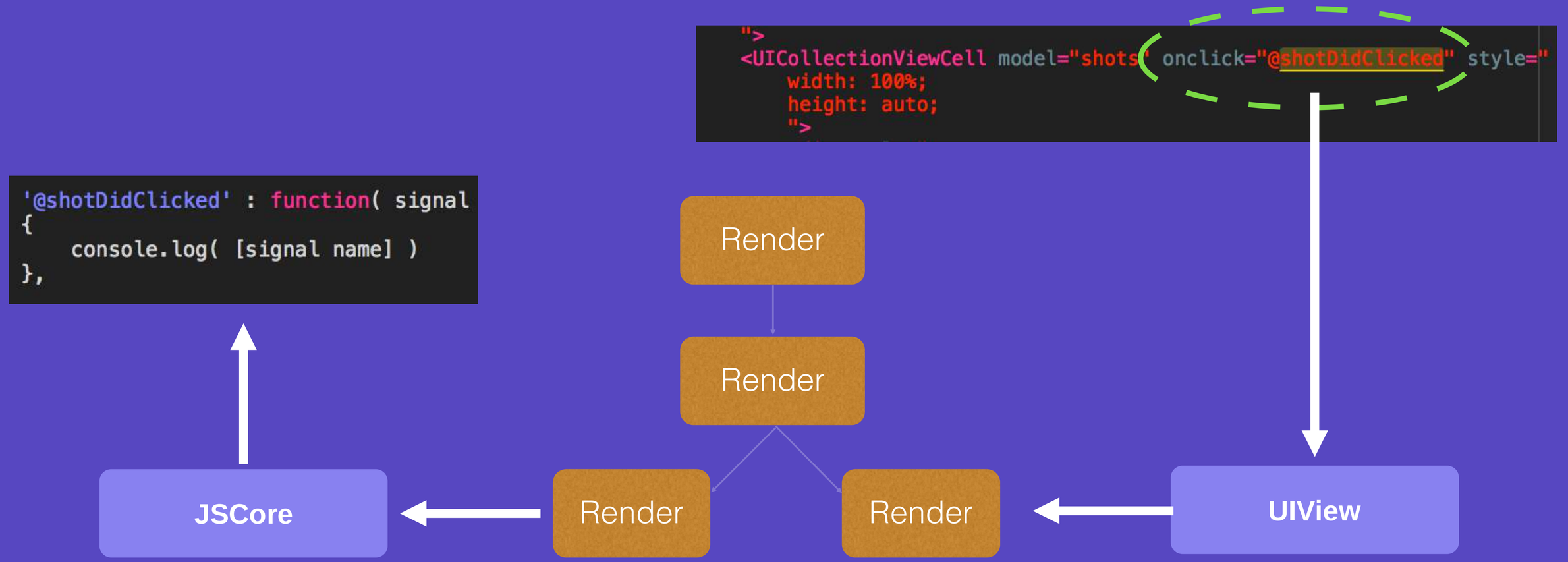
事件转发、处理

Signal handling (1)

```
'@shotDidClicked' : function( signal )
{
    console.log( [signal name] )
},

'@RefreshCollectionView.eventPullToRefresh' : function( signal )
{
    [self refresh];
},

'@RefreshCollectionView.eventLoadMore' : function( signal )
{
    [self loadMore];
}
```

@ {ClassName} . {EventName}

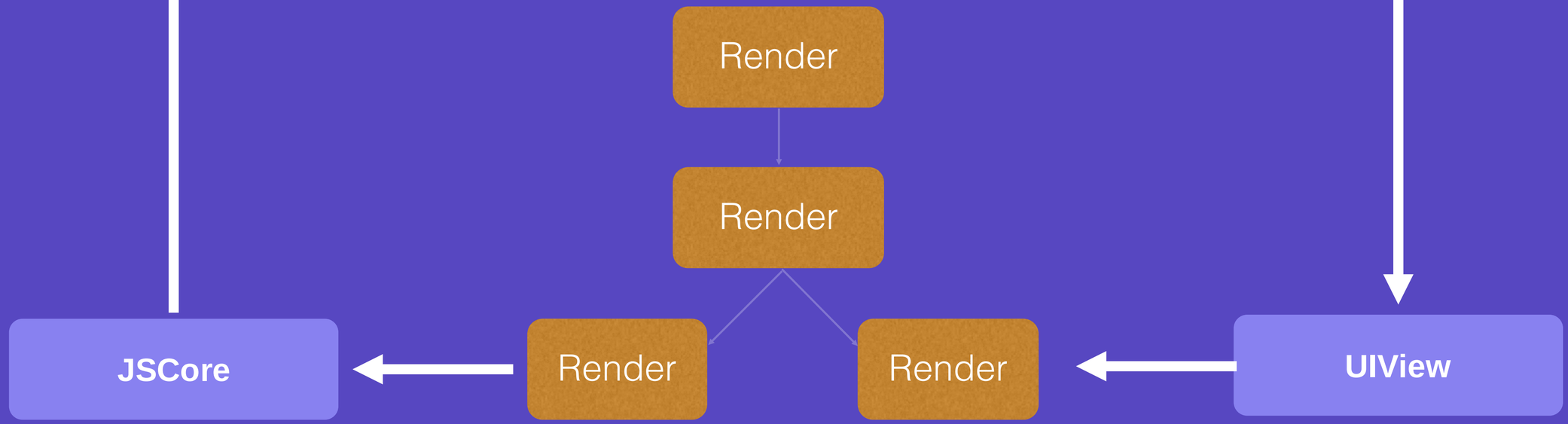
Signal handling (2)



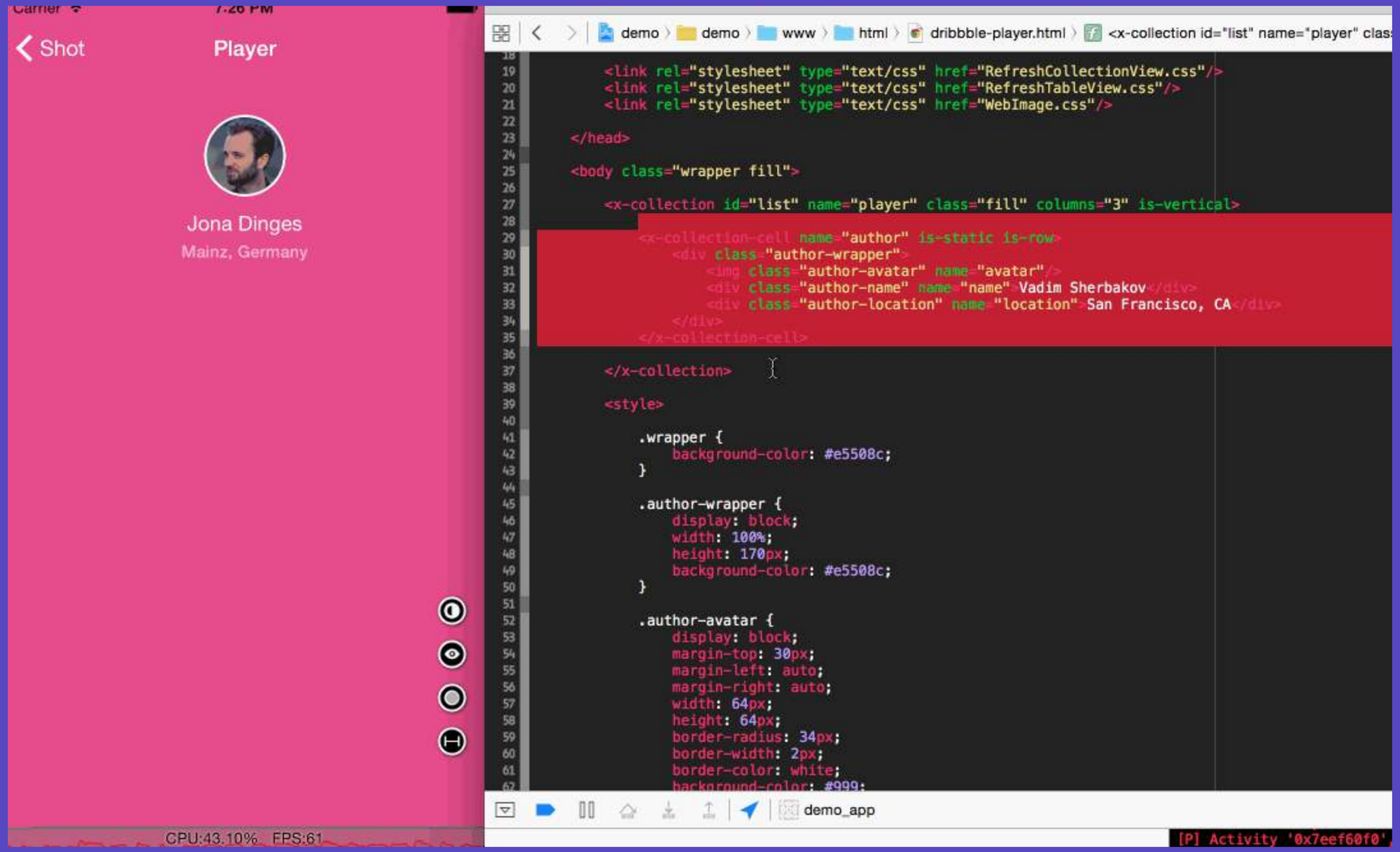
Signal handling (3)

```
@RefreshCollectionView.eventPullToRefresh' : function( signal )
{
    [self refresh];
},
```

```
[self ins_addPullToRefreshWithHeight:60.0 handler:^( UIScroll
    @strongify(self);
    [self sendSignal:self.eventPullToRefresh];
}];
```



Liveload


Shot
Player
Jona Dinges
Mainz, Germany
CPU:43.10% FPS:61
demo
demo
www
html
dribbble-player.html
<x-collection id="list" name="player" clas
<link rel="stylesheet" type="text/css" href="RefreshCollectionView.css"/>
<link rel="stylesheet" type="text/css" href="RefreshTableView.css"/>
<link rel="stylesheet" type="text/css" href="WebImage.css"/>
</head>
<body class="wrapper fill">
<x-collection id="list" name="player" class="fill" columns="3" is-vertical>
<x-collection-cell name="author" is-static is-row>

Vadim Sherbakov
San Francisco, CA

</x-collection-cell>
</x-collection>
<style>
.wrapper {
background-color: #e5508c;
}
.author-wrapper {
display: block;
width: 100%;
height: 170px;
background-color: #e5508c;
}
.author-avatar {
display: block;
margin-top: 30px;
margin-left: auto;
margin-right: auto;
width: 64px;
height: 64px;
border-radius: 34px;
border-width: 2px;
border-color: white;
demo_app
[P] Activity '0x7eef60f0'

Samurai-Native 0.2

Open source timeline

- 0.1） Apr, 2015
  - First commit, Open source on github.com
  - https://github.com/hackers-painters/samurai-native
- 0.1） Jul, 2015 (Internal)
  - ACID1 pass
  - ACID2 50%
- 0.2） Aug, 2016 (External)
  - Open Source

Thanks

Geek Zoo Studio @ GMTC 2016, Beijing

Be Hungry, Be Foolish

Geek Zoo Studio @ GMTC 2016, Beijing