

SeaJS

前端模块化开发探索与网站性能优化实践

玉伯 - 淘宝网 - Velocity

2011.12

关于我

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- * Fortran, C, .NET, Java, JavaScript, NodeJS
- * 用开放的心态，打造专业的人生。



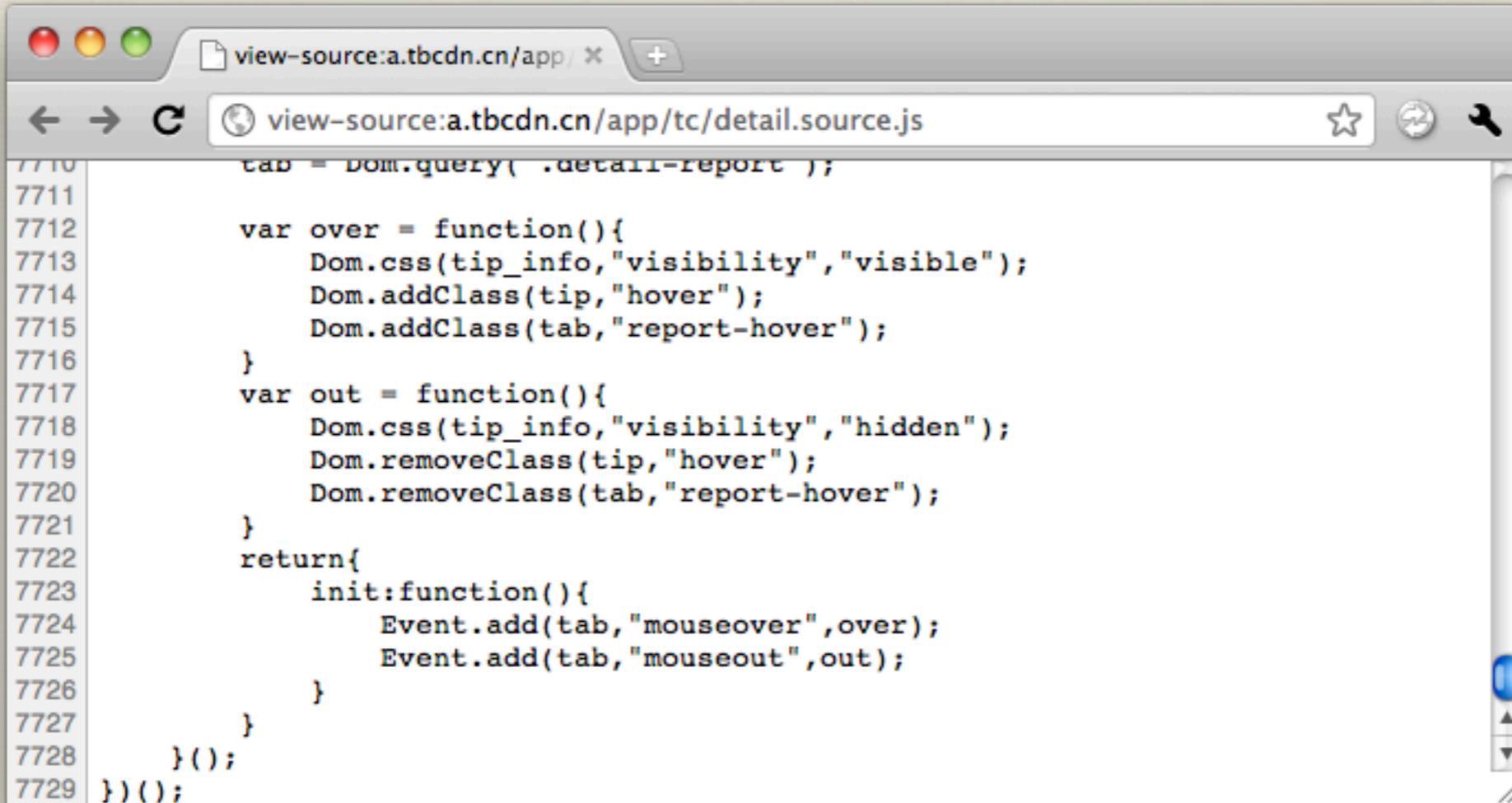
大纲

- * 遇到的问题
- * 设计目标
- * 用法与示例
- * 内部设计
- * 网站性能优化实践
- * 总结

遇到的问题

The Problems

2010年9月淘宝商品详情页



The screenshot shows a web browser window with the URL `view-source:a.tbcdn.cn/app/tc/detail.source.js`. The page content is a single JavaScript file containing approximately 8000 lines of code. The code is organized into several functions, primarily dealing with DOM manipulation and event handling for a 'report' feature.

```
7710     tab = Dom.query( ".detail-report" );
7711
7712     var over = function(){
7713         Dom.css(tip_info,"visibility","visible");
7714         Dom.addClass(tip,"hover");
7715         Dom.addClass(tab,"report-hover");
7716     }
7717     var out = function(){
7718         Dom.css(tip_info,"visibility","hidden");
7719         Dom.removeClass(tip,"hover");
7720         Dom.removeClass(tab,"report-hover");
7721     }
7722     return{
7723         init:function(){
7724             Event.add(tab,"mouseover",over);
7725             Event.add(tab,"mouseout",out);
7726         }
7727     }
7728 })(());
7729 })();
```

近8000行的单文件

2011年12月搜狐首页

view-source:<http://www.sohu.com/>

```
<script type="text/javascript" src="http://r.suc.itc.cn/
combo.action?v.11112401&r=
/itoolbar/plugins/jquery-1.6.2.js|
/itoolbar/core/passport.js|
/itoolbar/core/base64.js|
/itoolbar/core/jquery.cookie.js|
/itoolbar/jquery.toolbar.index.js
&t=js&c=utf-8" charset="utf-8"></script>
```

Size Content	Time Latency	Timeline	1.45s	2.18s	2.91s
56.00KB	1.97s				
151.36KB	286ms				

2011年12月淘宝首页



A screenshot of a web browser window displaying the source code of Taobao's homepage. The browser title bar shows "view-source:www.taobao.com". The main content area of the browser displays the following JavaScript code:

```
70 FP.add({
71     'direct-promo': {
72         fullpath: 'http://a.tbcdn.cn/p/fp/2010c/js/fp-direct-promo-min.js?
73 t=20111115.js'
74     },
75     'fp-mods': {
76         fullpath: 'http://a.tbcdn.cn/??s/kissy/1.1.6/switchable/switchable-pkg-
77 min.js,s/kissy/1.1.6/suggest/suggest-pkg-min.js,s/kissy/1.1.6/datalazyload/datalazyload-
pkg-min.js,s/kissy/1.1.3/flash/flash-pkg-min.js,p/search/searchsuggest-
min.js,p/fp/2011a/expressway/profile-min.js,p/fp/2011a/header/header-
min.js,p/fp/2011a/attraction/attraction-min.js,p/fp/2011a/attraction/ald-
min.js,p/fp/2011a/expressway/expressway-min.js,p/fp/2011a/category/category-
min.js,p/fp/2011a/category/sub-promotion-min.js,p/fp/2011a/guide/alimama-ecpm-
min.js,p/fp/2010c/js/fp-hubble-monitor-min.js,p/fp/2011a/hotsale/p4p-
min.js,p/fp/2011a/local-life/local-life-min.js,p/fp/2011a/footer/footer-min.js?
t=20111128.js'
78     }
79 });
80 
```

繁重的配置

```
YUI().use("io-base", "mod-a", "mod-b", function(Y) {  
  
    // Y.on 是 mod-a 添加的、还是 mod-b 添加的?  
    // 如果都往 Y 上添加 on 方法，会出现什么问题?  
    Y.on(...);  
  
    // io-base 在 Y 上添加了 io 方法。  
    // 是怎么知道的呢？查文档？为什么不是 "Y.IO" ?  
    var request = Y.io(...);  
  
});
```

YUI3 的命名空间困局

2011年12月淘宝CMS系统

YUI 2.7.0

```
<script  
src="http://a.tbcdn.cn/tbra/1.0/tbra-widgets.js"></script>  
<script  
src="http://a.tbcdn.cn/yui/2.7.0/build/container/container-min.js"></script>  
<script  
src="http://a.tbcdn.cn/kissy/1.0.8/ks-core-min.js"></script>
```

KISSY 1.0.8

旧有代码多
升级代价大

+

版本冲突
资源不够
时间紧张
...

=

决定在旧版本
上继续开发

↑
依赖旧版本的代码更多

版本“锁定”的苦恼

```
#/etc/hosts
```

```
127.0.0.1      a.tbcdn.cn
```



Willow

JSlide

ucool config page

INFO

用户 IP 标识: 10.1.25.35

请选择一个绑定目录: 无绑定目录

映射前缀: ?

SWITCH

DEBUG 模式:

绑定预发环境:

手动combo:

使用服务器 Assets 目录:

本地目录映射: lab

“在线”开发与调试

querystring.js

```
QueryString.parse('a=b&b=c');  
//=> { a: 'b', b: 'c' }  
  
QueryString.stringify({ 'foo': 'bar' });  
//=> 'foo=bar'
```



如何跨环境共享通用模块？

遇到的问题小结

- * 单文件过大，维护成本高，有损性能
- * 同步阻塞式加载，影响网站打开速度
- * 异步无阻加载的配置过重，维护不便
- * 命名空间的记忆负担与潜在冲突
- * 类库升级成本等因素导致版本“锁定”
- * 开发、部署与上线后的 bug fix 不够便捷
- * 跨环境开发的通用模块共享问题

设计目标

Design Goals

JavaScript development
needs to be done differently.

设计目标

- * 一个模块一个文件

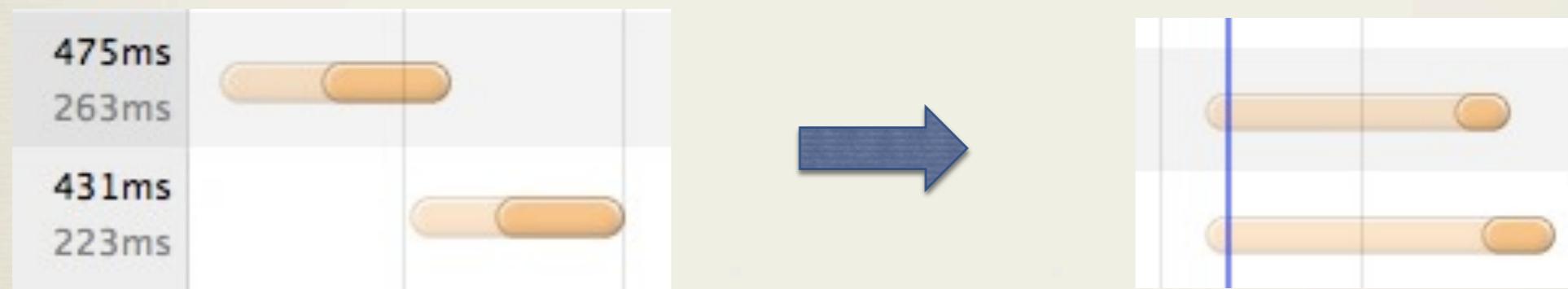
a_very_big_file.js



module_a.js
module_b.js
module_c.js
module_d.js
...

设计目标

* 高性能：异步 + 并行



设计目标

- * 使用简单：自动管理依赖 + 约定优于配置

```
FP.add({  
  'fp-mods': {  
    fullpath: 'http://  
a.tbcdn.cn/??s/kissy/1.1.6/  
switchable/switchable-pkg-  
min.js,s/kissy/1.1.6/suggest/  
suggest-pkg-min.js,s/kissy/  
1.1.6/datalazyload/  
datalazyload-pkg-min.js,s/  
kissy/1.1.3/flash/flash-pkg-  
min.js,p/search/searchsuggest-  
min.js,p/fp/2011a/expressway/  
profile-min.js,p/fp/2011a/  
header/header-min.js,p/fp/  
2011a/attraction/attraction-  
min.js,...'  
  }  
});
```



```
// in module_a.js:  
require('path/to/module_x');  
  
// in html page:  
seajs.use('path/to/main');  
  
// in deployment:  
$ spm build main.js --combine
```

设计目标

* 可维护性：无命名空间冲突 + 多版本共存

```
var E = YAHOO.util.Event;  
var Desc = TB.Detail.Desc;
```



```
<script src="jquery-1.2.6.js">  
<script src="jquery-1.7.1.js">  
<script>  
    var jq17 = $.noConflict(true);  
</script>
```



```
// in module_x.js:  
var E = require('./event');  
var Desc = require('./desc');
```

```
// in module_x.js:  
var jq12 = require('jquery/1.2.6/jquery');  
var jq17 = require('jquery/1.7.1/jquery');
```

设计目标

* 弱依赖：浏览器即服务器



```
sudo vi /etc/hosts
```

UCool...

设计目标

- * 跨环境：通用模块只需编写一次

```
// in html page:  
<script src="sea.js"  
data-main="./init"></script>  
  
// in init.js:  
var QS = require('querystring');
```

```
// in node environment:  
$ node init.js  
  
// in init.js:  
require('seajs');  
var QS = require('querystring');
```

设计目标

- * 稳定可靠：失败率和传统方式在一个量级
- * 可扩展性：通过插件可满足自定义需求

SeaJS is
a Module Loader for the Web.

<https://github.com/seajs>

<http://seajs.com>

Download

[git repo](#)

[Development Version \(1.1.0\)](#)

32KB, Uncompressed with Comments

[Production Version \(1.1.0\)](#)

4KB, Minified and Gzipped

Compatible

IE 5.5+	✓
Chrome 3+	✓
Firefox 2+	✓
Safari 3.2+	✓
Opera 10+	✓

用法与示例

Usage and Examples

(using seajs 1.1.0)

安装

1. 安装 node:

<http://nodejs.org/dist/v0.6.4/node-v0.6.4.msi>

2. 安装 spm:

`$ npm install spm -g`

3. 下载 seajs:

`$ spm install seajs`

示例：基本用法

init.js:

```
define(function() {  
    alert('Hello, world!');  
});
```

test.html:

```
<script src="libs/seajs/1.1.0/sea.js"></script>  
<script>  
    seajs.use('./init');  
</script>
```

- * 一个模块一个文件
- * 使用 define 定义模块
- * 使用 use 异步加载模块

示例：基本用法

init.js:

```
define(function(require, exports) {
  exports.message = 'Hello, world!';
});
```

test.html:

```
<script src="libs/seajs/1.1.0/sea.js"></script>
<script>
  seajs.use('./init', function(init) {
    alert(init.message);
  });
</script>
```

- * 使用 exports 对外提供接口
- * 使用 use 的回调函数获取加载的模块对象

示例：基本用法

init.js:

```
define(function(require, exports) {
  var weather = require('./weather');
  var temperature = weather.getTemperature('Beijing');

  exports.message = 'The temperature of Beijing is ' +
    temperature;
});
```

weather.js:

```
define(function(require, exports) {
  var io = require('./io');
  ...

  exports.getTemperature = function(city) { ... };
});
```

- * 使用 require 获取其他模块对象
- * 自动处理依赖
- * 关注点分离：直接依赖的模块 + 向外提供的接口

示例：基本用法

```
define(function(require, exports, module) {  
    var a = require('./a');  
  
    require.async('./b', function(b) {  
        ...  
    });  
  
    exports.x = ...;  
});
```

<http://seajs.com/docs/zh-cn/module-definition.html>

示例：transport

abc.js:

```
(function() {
  if (typeof ABC === 'undefined') {
    ABC = {};
  }

  ABC.doSth = function() { ... };
  ABC.someMember = ...;
})();
```



```
define(function(require, exports) {
  var ABC = exports;

  ABC.doSth = function() { ... };
  ABC.someMember = ...;
});
```

示例：transport

underscore/transport.js:

```
/**  
 * @package https://raw.github.com/documentcloud/underscore/master/package.json  
 * @src http://documentcloud.github.com/underscore/underscore.js  
 * @min http://documentcloud.github.com/underscore/underscore-min.js  
 */  
(function(factory) {  
  if (typeof define === 'function') {  
    define('#{{id}}', [], factory);  
  }  
  else if (typeof exports !== 'undefined') {  
    factory(require, exports, module);  
  }  
  else {  
    factory();  
  }  
})(function(require, exports, module) {  
  /*{{code}}*/  
});
```

```
~/Sites/spm/modules/underscore$ spm transport transport.js -f  
Start transporting  
... Fetching https://raw.github.com/documentcloud/underscore/master/package.json  
... Fetching http://documentcloud.github.com/underscore/underscore.js  
.....  
... Fetching http://documentcloud.github.com/underscore/underscore-min.js  
.....  
Transported to /Users/lifesinger/Sites/spm/modules/underscore/1.2.2
```

示例：transport

<http://modules.seajs.com/>

modules in the sea

backbone v0.5.3

Give your JS App some Backbone with Models, Views, Collections, and Events.

[backbone.js](#) (5KB, Minified and Gzipped)
[backbone-debug.js](#) (42KB, Uncompressed Code)

es5-safe v0.9.2

Provides compatibility shims so that legacy JavaScript engines behave as closely as possible to ES5.

[es5-safe.js](#) (1KB, Minified and Gzipped)
[es5-safe-debug.js](#) (10KB, Uncompressed Code)

jquery v1.7.1

A new kind of JavaScript Library.

[jquery.js](#) (33KB, Minified and Gzipped)
[jquery-debug.js](#) (243KB, Uncompressed Code)

<https://github.com/seajs/modules>

示例：preload



```
Function.prototype.bind
Object.keys
Array.isArray
Array.prototype.forEach
Array.prototype.map
Array.prototype.filter
Array.prototype.every
Array.prototype.some
Array.prototype.reduce
Array.prototype.reduceRight
Array.prototype.indexOf
Array.prototype.lastIndexOf
String.prototype.trim
Date.now
```

示例: preload

```
seajs.config({
  alias: {
    'es5-safe': 'es5-safe/0.9.2/es5-safe',
    'json': 'json/1.0.1/json'
  },
  preload: [
    Function.prototype.bind ? '' : 'es5-safe',
    this.JSON ? '' : 'json'
  ]
}) ;

seajs.use('./init', function() {
  console.log([2, 4, 8].reduce(function(a, b) {
    return a * b;
  )));
}) ;
```

示例：JSONM

JSONP --> JSONM

data.js:

```
define( {  
    "name": "Frank Wang",  
    "age": 31  
} );
```

x.js:

```
define(function(require, exports) {  
    var data = require('path/to/data.js');  
    ...  
});
```

示例：多版本共存

SeaJS 的模块，理想情况下，不再有全局变量。

old_module.js:

```
define(function(require, exports) {
  var $ = require('jquery/1.2.6/jquery');
  ...
});
```

new_module.js:

```
define(function(require, exports) {
  var $ = require('jquery/1.7.1/jquery');
  ...
});
```

示例：多版本共存

jquery-fancybox.js:

```
define(function(require) { return function($) {
    if ($.fancybox) return;

    require('./jquery.easing.1.3.js')($);
    require('./jquery.mousewheel.js')($);
    require('./jquery.fancybox-1.3.4.css');

    $.fancybox = function(obj) { ... }
    ...
}});
```

jQuery 穿肠过，插件身上留。

module_x.js:

```
define(function(require, exports) {
    var $ = require('jquery/1.7.1/jquery');
    require('./jquery-fancybox.js')($);

    $.fancybox(...);
});
```

示例：less



```
// LESS                                /* Compiled CSS */  
  
#header {  
    h1 {  
        font-size: 26px;  
        font-weight: bold;  
    }  
    p { font-size: 12px;  
        a { text-decoration: none;  
            &:hover { border-width: 1px }  
        }  
    }  
}  
  
#header h1 {  
    font-size: 26px;  
    font-weight: bold;  
}  
#header p {  
    font-size: 12px;  
}  
#header p a {  
    text-decoration: none;  
}  
#header p a:hover {  
    border-width: 1px;  
}
```

示例：less

```
seajs.config({
  alias: {
    'less': 'less/1.1.5/less'
  },
  preload: ['plugin-less']
});
```

```
define(function(require, exports) {
  require('./style.less');
  ...
});
```

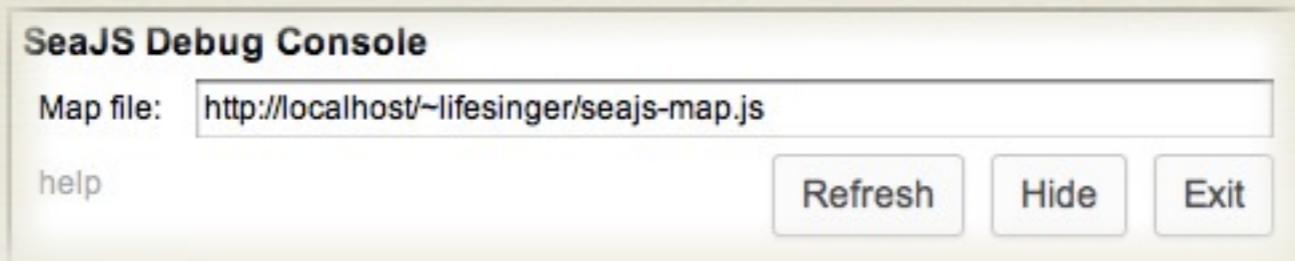
示例：less

- * plugin-text: 加载模板等文本文件
- * plugin-json: 加载 JSON 数据
- * plugin-coffee: 加载 coffee 脚本
- * plugin-less: 加载 less 样式
- * ...

示例：markzhi.com



<http://markzhi.com/>



seajs-map.js:

```
define(function() {
  var rules = [];

  rules.push([
    'http://markzhi.com/assets/',
    'http://localhost/markzhi/assets/'
  ]);

  seajs.config({ 'map': rules });
});
```

URL	Status	Domain
▶ GET sea.js	200 OK	markzhi.com
▶ GET plugin-map.js	200 OK	markzhi.com
▶ GET seajs-map.js	200 OK	localhost
▶ GET router.js	200 OK	localhost
▶ GET head.js	200 OK	localhost
▶ GET ga.js	200 OK	localhost
▶ GET mark_list.js	200 OK	localhost
▶ GET jquery.js	200 OK	localhost
▶ GET mustache.js	200 OK	localhost
▶ GET dialog.js	200 OK	localhost
▶ GET underscore.js	200 OK	localhost
▶ GET canvas.js	200 OK	localhost
▶ GET jquery.ui.core.js	200 OK	localhost
▶ GET jquery.ui.widget.js	200 OK	localhost
▶ GET jquery.ui.tabs.js	200 OK	localhost
15 requests		

在线本地调试大观

示例：nodejs

a.js:

```
define(function(require, exports, module) {  
    exports.basename = module.id.split('/[\/\\\]/').pop();  
});
```

program.js:

```
require('seajs');  
  
console.log(require('./a').basename);
```

```
$ node program.js
```

使用 SeaJS 的网站



<https://github.com/seajs/seajs/wiki/SeaJS-Users>

内部设计

Internal Design

模块规范

- * CommonJS/Modules 1.1.1



<http://wiki.commonjs.org/wiki/Modules/1.1.1>

模块规范

math.js

```
exports.add = function() {
  var sum = 0, i = 0, args = arguments, l = args.length;
  while (i < l) {
    sum += args[i++];
  }
  return sum;
};
```

increment.js

```
var add = require('math').add;
exports.increment = function(val) {
  return add(val, 1);
};
```

program.js

```
var inc = require('increment').increment;
var a = 1;
inc(a); // 2

module.id == "program";
```

模块规范

CommonJS 很理想

- * 强沙箱：除非显式给 global 添加成员，否则都是局部变量。
- * require 可同步读取文件，速度很快。
- * 可根据 paths 查找本地文件来“寻找”模块。
- *

模块规范

浏览器之“痛”

- * 同源策略限制。
- * 浏览器与服务器之间的“遥远”距离。
- * HTTP 并发链接数限制。
- * 浏览器的兼容性，顽固的 IE6-8.
- *

模块规范

Wrappings

```
(function() {  
    ...  
})();
```



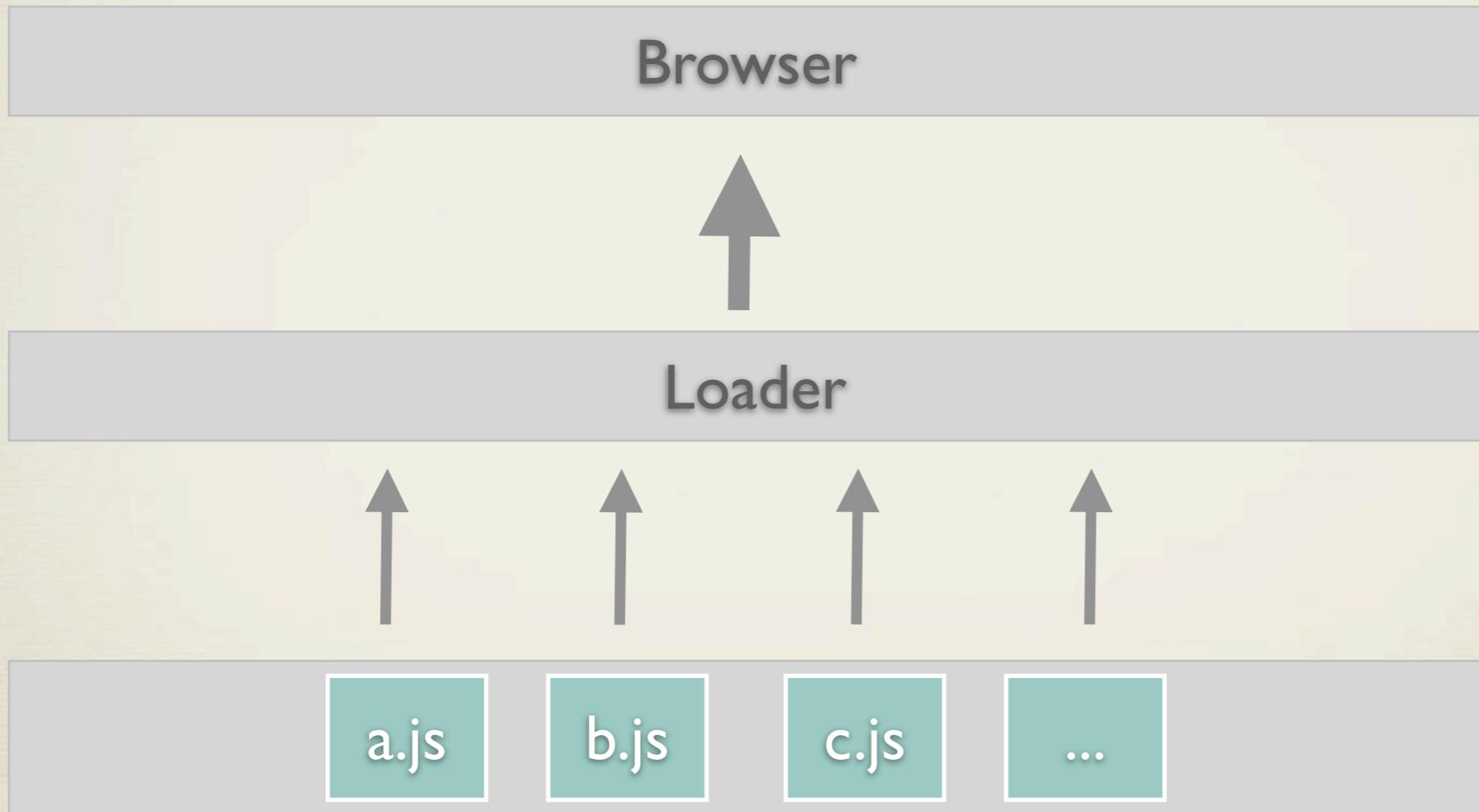
```
define(function(require, exports) {  
    ...  
});
```

Web 开发中，本身就充满包裹层。
SeaJS 里把包裹层标准化为 define.

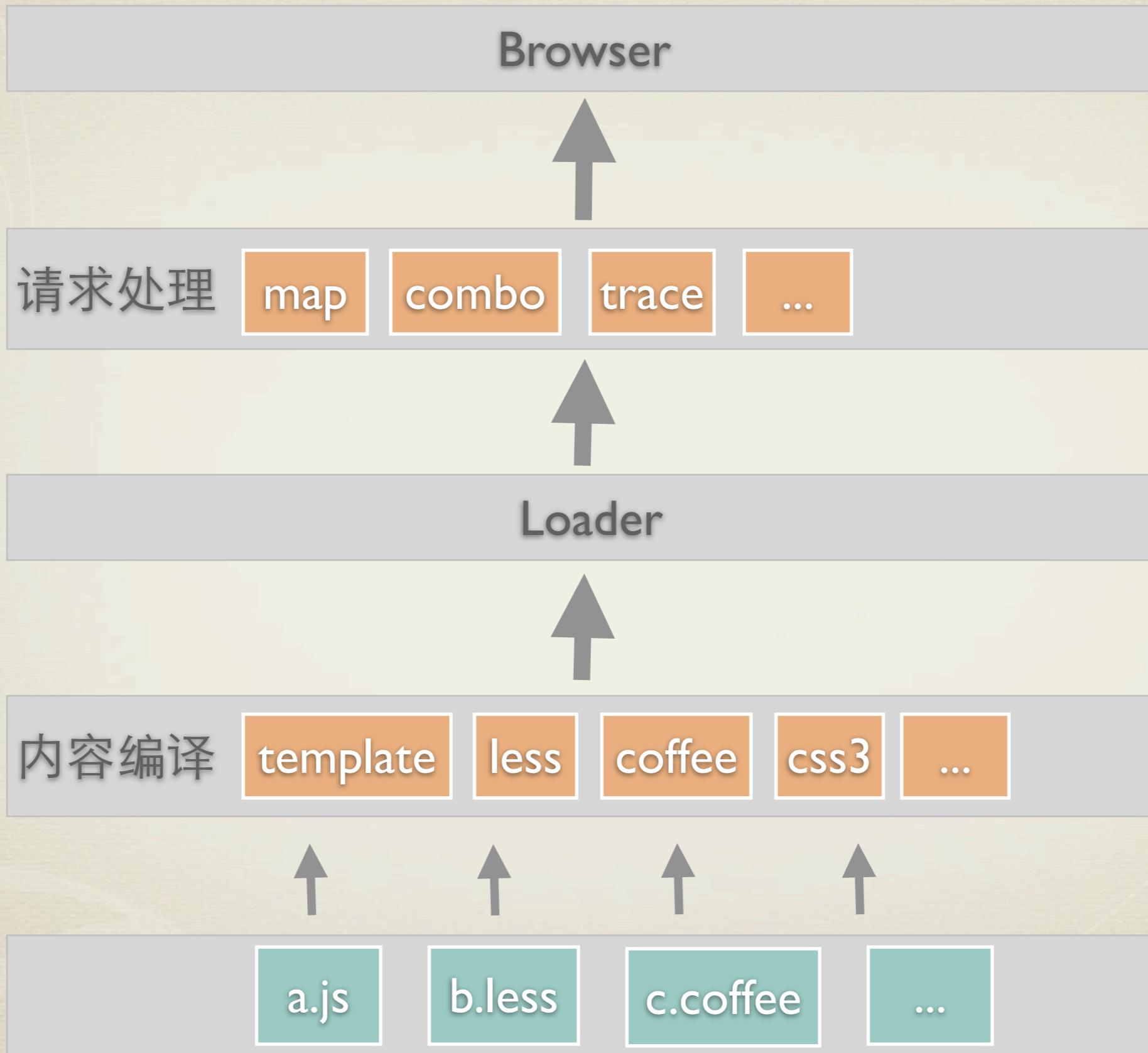
模块规范小结

- * CommonJS/Modules 1.1.1
- * NodeJS Modules
- * Define Wrappings
- * UnCommonJS Specifications

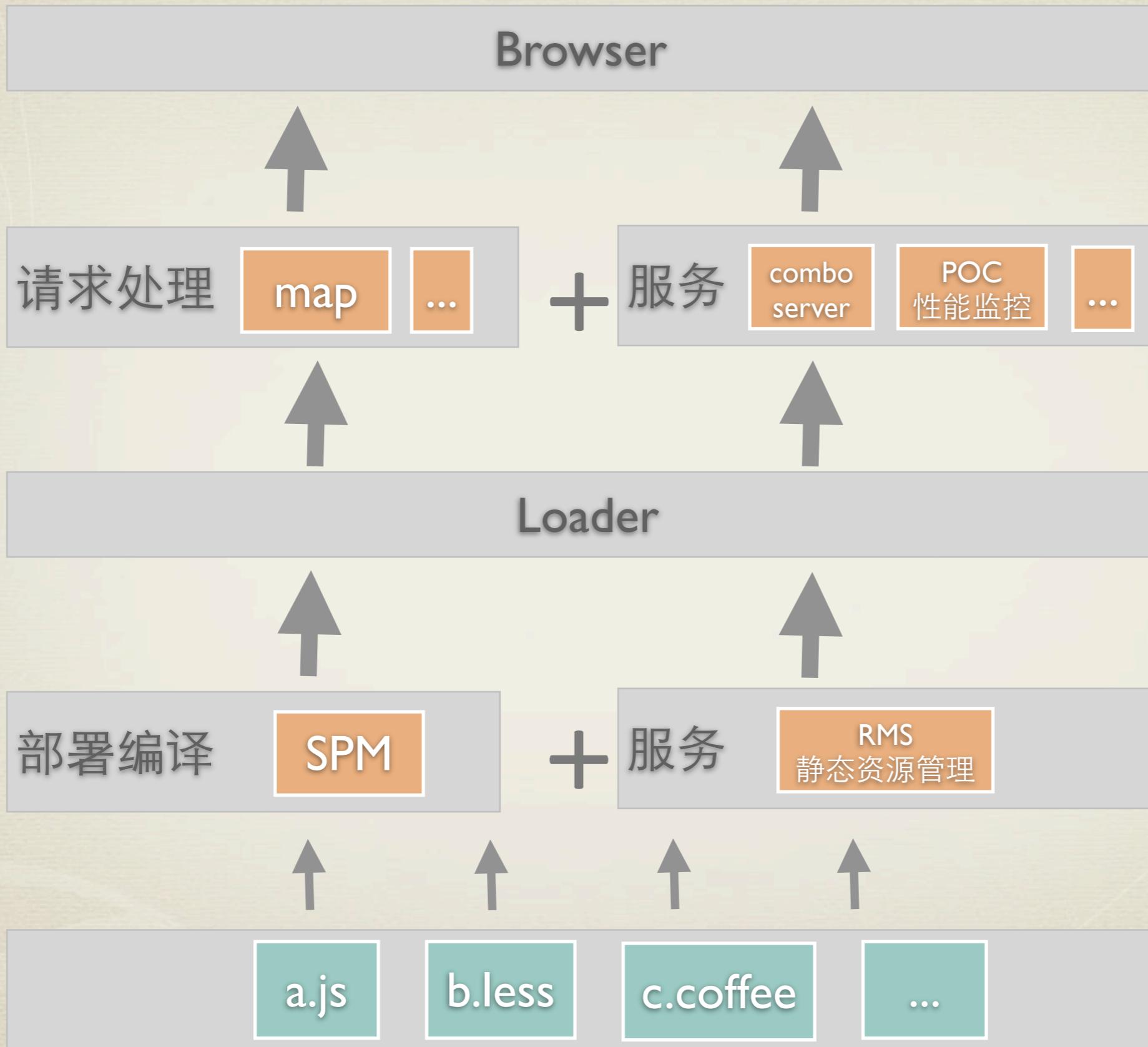
加载设计



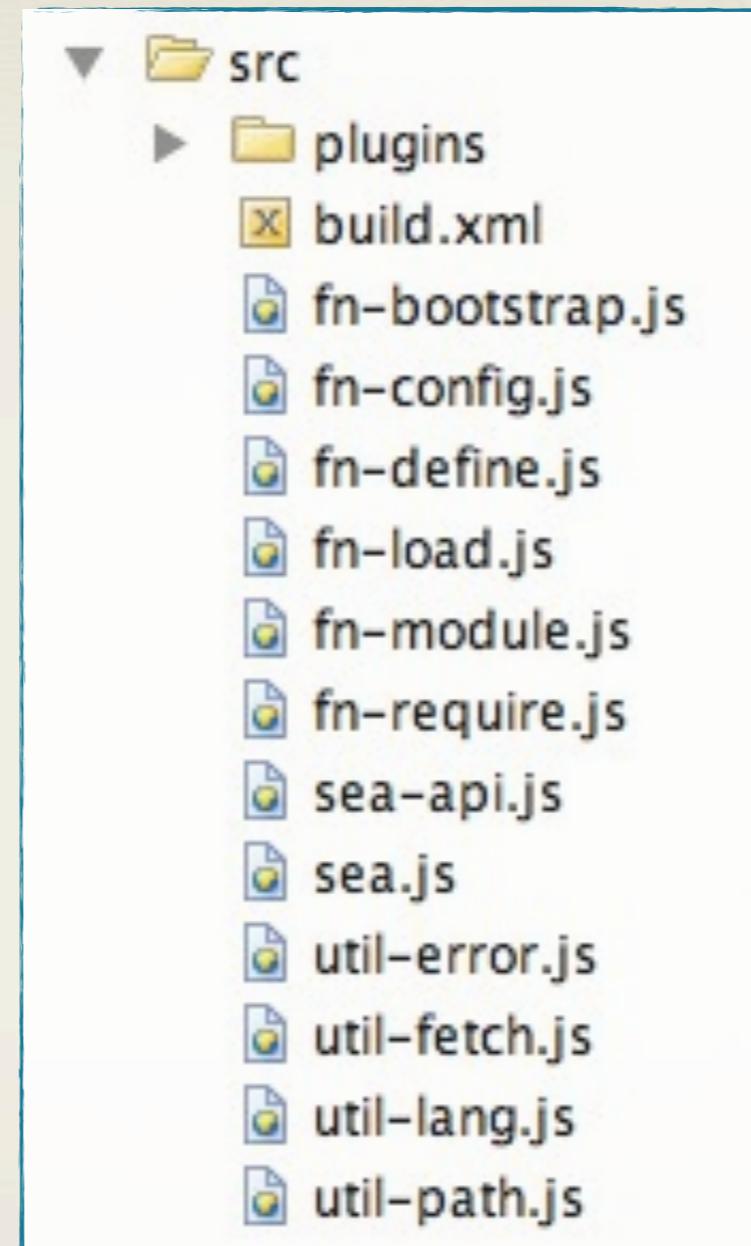
加载设计



加载设计



源码



<https://github.com/seajs/seajs/tree/master/src>

网站性能优化实践 WPO Practice

一个典型的淘宝商品详情页

The screenshot shows a typical Taobao product detail page for a Laneige product. At the top, there's a navigation bar with links to the homepage, my purchases, my Taobao, shopping cart,收藏夹 (Favorites), 搜索 (Search), and website navigation. The main header features the store name "Happy Designer" and its slogan "乐享创意家 since2003". On the right side, there's a sidebar with various service links and contact information.

The central part of the page displays the product information for "H00962【柠檬杀】Laneige/兰芝 锁水滋养睡眠面膜补水80ml 代购". It includes a large image of the product, its price (原价¥129, 促销价¥109.), and a brief description: "Snow crystal clear & hydrated skin with Snow water science". Below the product image, there are buttons for "立刻购买" (Buy Now) and "加入购物车" (Add to Cart). To the left of the product image, there's a sidebar with a "收藏店铺" (Collect Store) section featuring a woman's face and some text, and a "掌柜说" (Shopkeeper Says) section with a quote from a customer.

商品详情页最重要的要素

苹果平板电脑 Apple iPad现货 苹果 wifi版ipad(16G)非3G版 [举报此商品 \(无货举报 | 其他举报 \)](#)



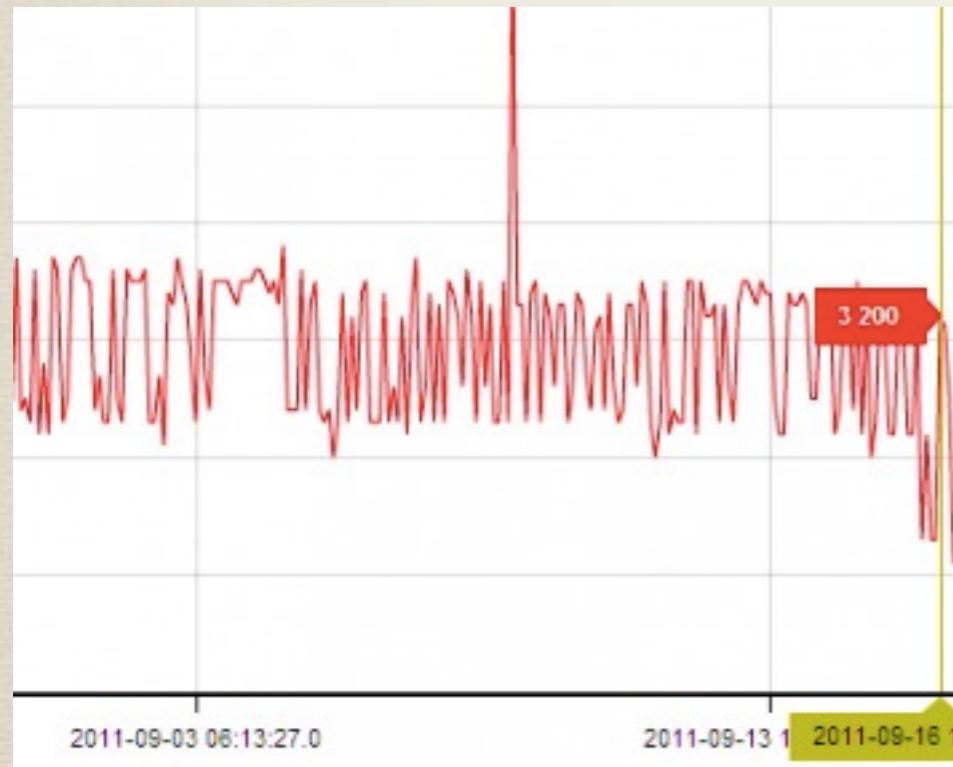
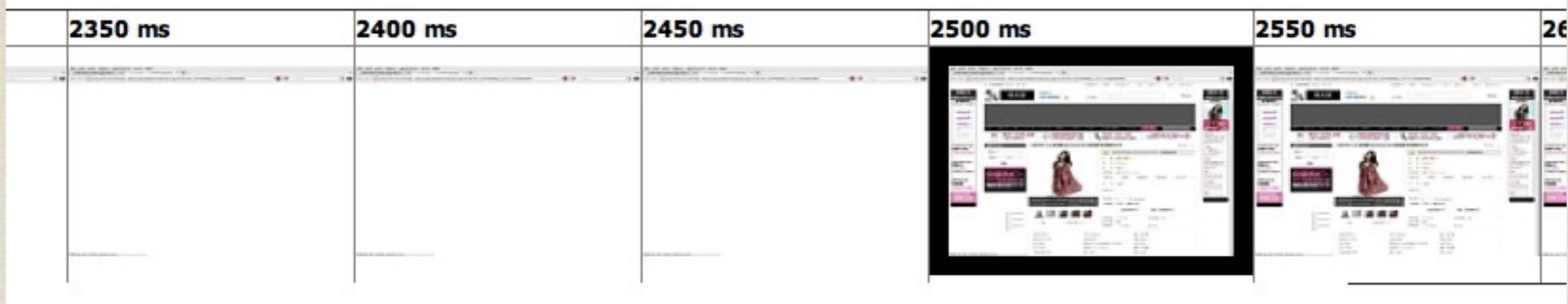
价 格: **¥4798.00**
促 销: **店铺VIP**
运 费: 卖家承担运费
已 售 出: **381件**
评 价: **★★★★★ 4.8分 (已有138人评论)**
送 积 分: 单件送 **2399分**
付款方式: 支持信用卡付款 [更多信息](#)

颜色分类: **银色**
套餐类型: **套餐一** **套餐二** **套餐三** **官方标配**
数 量: 件 (库存945件)

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- * 商品图片、价格等信息
- * 立刻购买、加入购物车按钮
- * 商品描述信息

遇到的问题



img04.taobaocdn.co	6.3 KB	36ms
dsc.taobaocdn.com	1.6 KB	9ms
a.tbcdn.cn	35.3 KB	11ms
a.tbcdn.cn	3.6 KB	4ms
a.tbcdn.cn	29.7 KB	11ms
a.tbcdn.cn	760 B	1ms
atpanel.com	49 B	1ms
acookie.taobao.com	49 B	2ms
cart.daily.taobao.net	47 B	11ms
a.tbcdn.cn	10.4 KB	4ms
img03.taobaocdn.co	4.9 KB	5ms
img03.taobaocdn.co	91.6 KB	63ms

首屏平均时间高达 3 秒

影响页面速度的因素

* 服务器端处理时间

quantiles	RT(ms)	mean(ms)
5.0%	0.3	0.2
10.0%	22.5	8.0
20.0%	27.0	16.5
30.0%	29.7	20.5
40.0%	32.3	23.1
50.0%	35.1	25.2
60.0%	38.2	27.1
70.0%	42.3	29.0
80.0%	48.6	31.0
90.0%	62.9	33.6
95.0%	83.6	35.6
99.0%	219.9	38.9
99.9%	2704.1	44.8
99.99%	12425.4	49.1
99.999%	45002.2	51.5
100%	72455.2	52.0

详情页服务器处理时间平均值为 52 ms

影响页面速度的因素

* 网络耗时

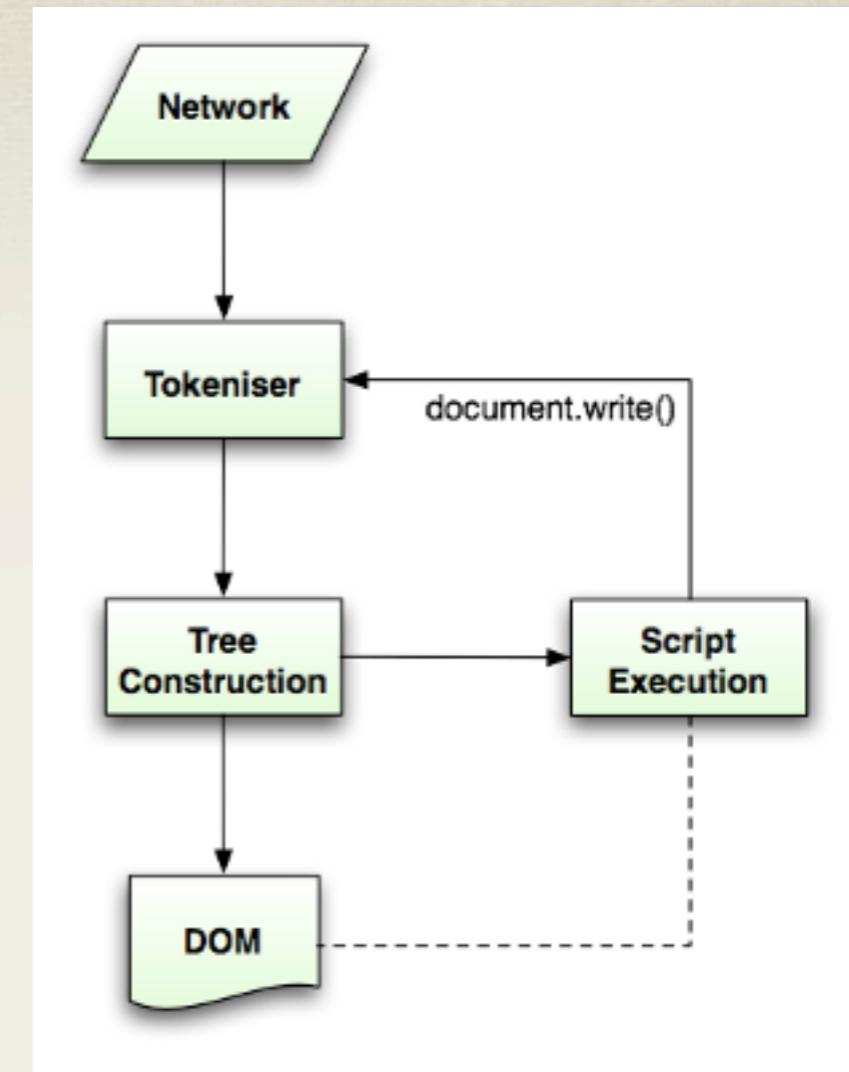
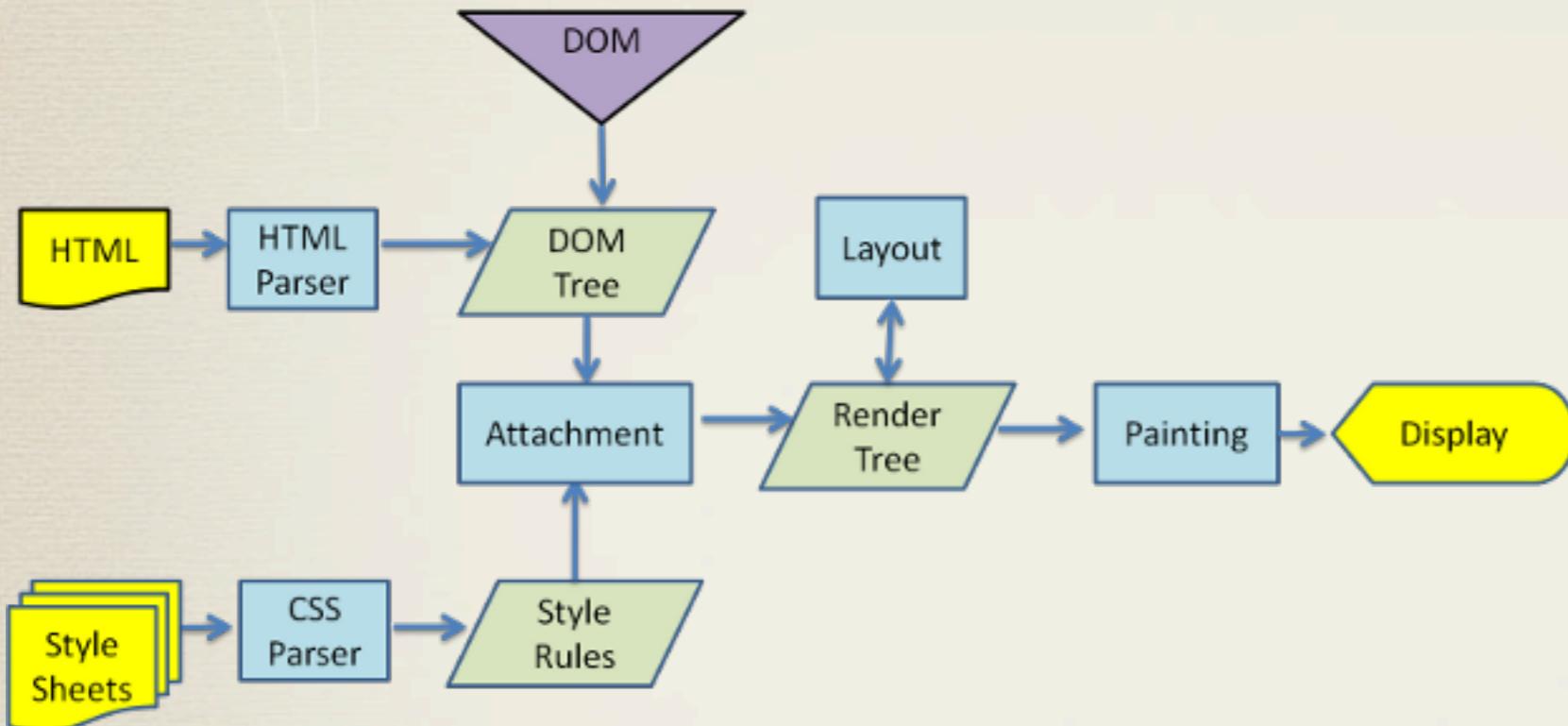
```
$ cat 2011-02-14-taobao-access_log_tcp_cnp__win\=3__win\=7_ngw@24120.cn3
Compare Files:/tmp/b,/tmp/a
quantiles(x)    original(ns)    optimized(ns)    diff(ns)    diff(x)    org_mean(ns)    opt_mean(ns)    dif_mean(ns)    dif_mean(x)
  5.0            406.0          348.0          -56.0        -16.3      384.5          248.8          -55.7         -18.3
 10.0           516.0          422.0          -94.0        -18.2      385.0          316.6          -68.4         -17.8
 20.0           687.0          573.0         -114.0        -16.6      493.5          408.1          -85.4         -17.3
 30.0           859.0          719.0         -140.0        -16.3      585.7          487.0          -98.7         -16.9
 40.0          1062.0          906.0         -156.0        -14.7      679.0          568.1          -110.9         -16.3
 50.0          1359.0          1148.0         -219.0        -16.1      783.2          657.8          -125.4         -16.8
 60.0          1781.0          1485.0         -296.0        -16.6      912.1          765.4          -146.7         -16.1
 70.0          2422.0          2031.0         -391.0        -16.1     1078.8          984.5          -174.3         -16.2
 80.0          3531.0          3047.0         -484.0        -13.7     1318.3          1188.8          -209.5         -16.8
 90.0          5570.0          4904.0         -666.0        -12.0     1650.1          1483.4          -246.7         -15.8
 95.0          8688.0          7828.0         -860.0        -9.9      1922.7          1649.0          -273.7         -14.2
 99.0          20703.0          20750.0         47.0          0.2      2341.0          2048.8          -292.2         -12.5
 99.9          64953.0          72832.0         7879.0        10.9      2683.2          2328.3          -282.9         -10.9
 99.99         192987.0         215894.0         22187.0       11.5      2687.5          2417.7          -269.8         -10.8
 99.999        284375.0         402469.0         118894.0      41.5      2787.9          2442.3          -265.6         -9.8
 100          587223.0          632593.0         45370.0       7.7      2712.5          2448.5          -264.0         -9.7

Administrator@t-xiaofan /cygdrive/d/work/initcwnd/results/rtcnpdata
$ cat 2011-02-14-taobao-access_log_tcp_cnp__win\=3__win\=9_ngw@24120.cn3
Compare Files:/tmp/b,/tmp/a
quantiles(x)    original(ns)    optimized(ns)    diff(ns)    diff(x)    org_mean(ns)    opt_mean(ns)    dif_mean(ns)    dif_mean(x)
  5.0            406.0          328.0          -78.0        -19.2      384.5          242.7          -61.8         -20.3
 10.0           516.0          415.0          -101.0        -19.6      385.0          308.1          -76.9         -20.8
 20.0           687.0          559.0          -128.0        -18.6      493.5          396.6          -96.9         -19.6
 30.0           859.0          783.0          -156.0        -18.2      585.7          474.1          -111.6         -19.1
 40.0          1062.0          891.0          -171.0        -16.1      679.0          554.3          -124.7         -18.4
 50.0          1359.0          1123.0         -236.0        -17.4      783.2          643.0          -140.2         -17.9
 60.0          1781.0          1454.0         -327.0        -18.4      912.1          748.6          -163.5         -17.9
 70.0          2422.0          2000.0         -422.0        -17.4     1078.8          885.8          -193.0         -17.9
 80.0          3531.0          3016.0         -515.0        -14.6     1318.3          1088.5          -229.8         -17.5
 90.0          5570.0          4986.0         -664.0        -11.9     1650.1          1384.0          -266.1         -16.1
 95.0          8688.0          7893.0         -795.0        -9.2      1922.7          1632.3          -290.4         -15.1
 99.0          20703.0          20172.0         -531.0        -2.6      2341.0          2033.3          -307.7         -13.1
 99.9          64953.0          64389.0         -564.0        -0.9      2683.2          2299.0          -304.2         -11.7
 99.99         192987.0         193953.0         1846.0       0.5      2687.5          2384.2          -303.3         -11.3
 99.999        284375.0         310998.0         26623.0      9.4      2787.9          2483.7          -304.2         -11.2
 100          587223.0          765484.0         178261.0      38.4      2712.5          2410.1          -302.4         -11.1
```

30KB的页面，有50%的用户下载时间超过1秒

影响页面速度的因素

* 浏览器渲染



对于详情页：

1. 一个页面约 2000 个节点。渲染一个 DOM 节点，平均需 0.5ms
2. JS 执行与 UI Update 共享一个线程。无 JS 时，可直接提速 1s
3. 简化页面布局，对首屏时间无明显影响。

影响页面速度的因素

* 浏览器的渐进式渲染

Show Page Timeline | Show Statistics | Clear

[-] H05875 【柠檬杀】Skin79 三重功效修颜防晒BB霜 SPF25 红桶40g-淘宝网

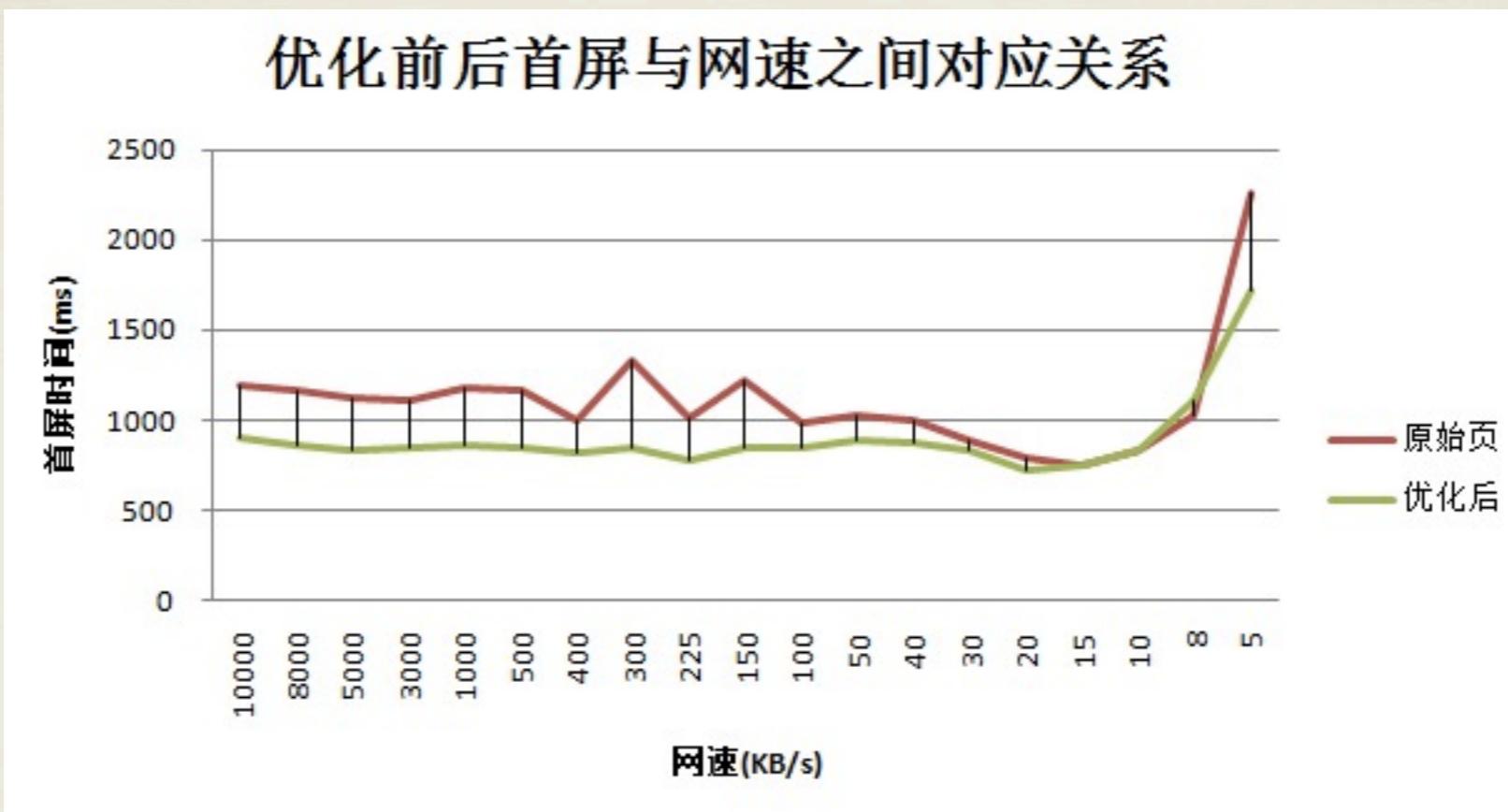
[+]	GET sleep.htm?t=2500&b=1&s_tid	200 OK	speed.taobao.com	207.5 KB	2.52s
[+]	GET a.tbcdn.cn	200 OK	a.tbcdn.cn	24.4 KB	11ms
[+]	GET gray.css?1.1.css	200 OK	a.tbcdn.cn	417 B	2ms
[+]	GET a.tbcdn.cn	200 OK	a.tbcdn.cn	10.2 KB	5ms
[+]	GET T1174_XgRjXXb1upjX.jpg	200 OK	logo.taobaocdn.com	18.3 KB	19ms
[+]	GET s_crown_3.gif	200 OK	pics.taobaocdn.com	3.4 KB	7ms
[+]	GET T1U1BVXjtDXXXXXXX-16-19.p	200 OK	img04.taobaocdn.cc	1.1 KB	9ms
[+]	GET T1NddsXfFoXXXXXXXX-24-20.p	200 OK	img01.taobaocdn.cc	960 B	8ms
[+]	GET T1_cRsXhXxXXXXXXXX-22-16.g	200 OK	img08.taobaocdn.cc	286 B	9ms

对于详情页：

1. 页面渲染默认是渐进式的，从网络层取到 8K 内容时，就会开始渲染。
2. 页面是边下载边执行的。

影响页面速度的因素

* 浏览器的贪婪渲染



对于详情页：

1. 当网速太快时，浏览器会进入贪婪渲染，首屏时间不一定快。
2. 当网速大于 50KB/s 时，chunked 优化才有价值。
3. 网速太快的用户，也需要优化。

与首屏相关的一些有意思结论

- * 并非服务器越快，首屏就越快
- * 并非 HTML 越大，首屏就越慢
- * 网速越快，首屏有可能越慢
- * BigPipe 等 Flushed 输出，不一定让首屏变快

本次优化目标

- * 大幅度减少首屏渲染时间
- * 尽量不改变原有开发习惯
- * 用尽量少的代码做尽可能多的优化

不适合本次优化的方案

* HTML 重构



存在大量用户自定义代码

不适合本次优化的方案

* BigPipe 流水线



BigPipe 的核心优化是让服务器运算、网络下载和浏览器渲染三者能尽量并行处理。但对于淘宝商品详情页来说，服务器端已经够快，在服务器端做类 Facebook 的 BigPipe 会显著增加服务器端的复杂度，得不偿失。

最后选用的方案

BigRender - 在浏览器端对资源下载和页面渲染做合理调度。

1. 对服务端的修改非常小。
2. 在浏览器端通过 JS 来调度资源下载和页面渲染。

BigRender 要点

* 优化前



* 采用 BigRender

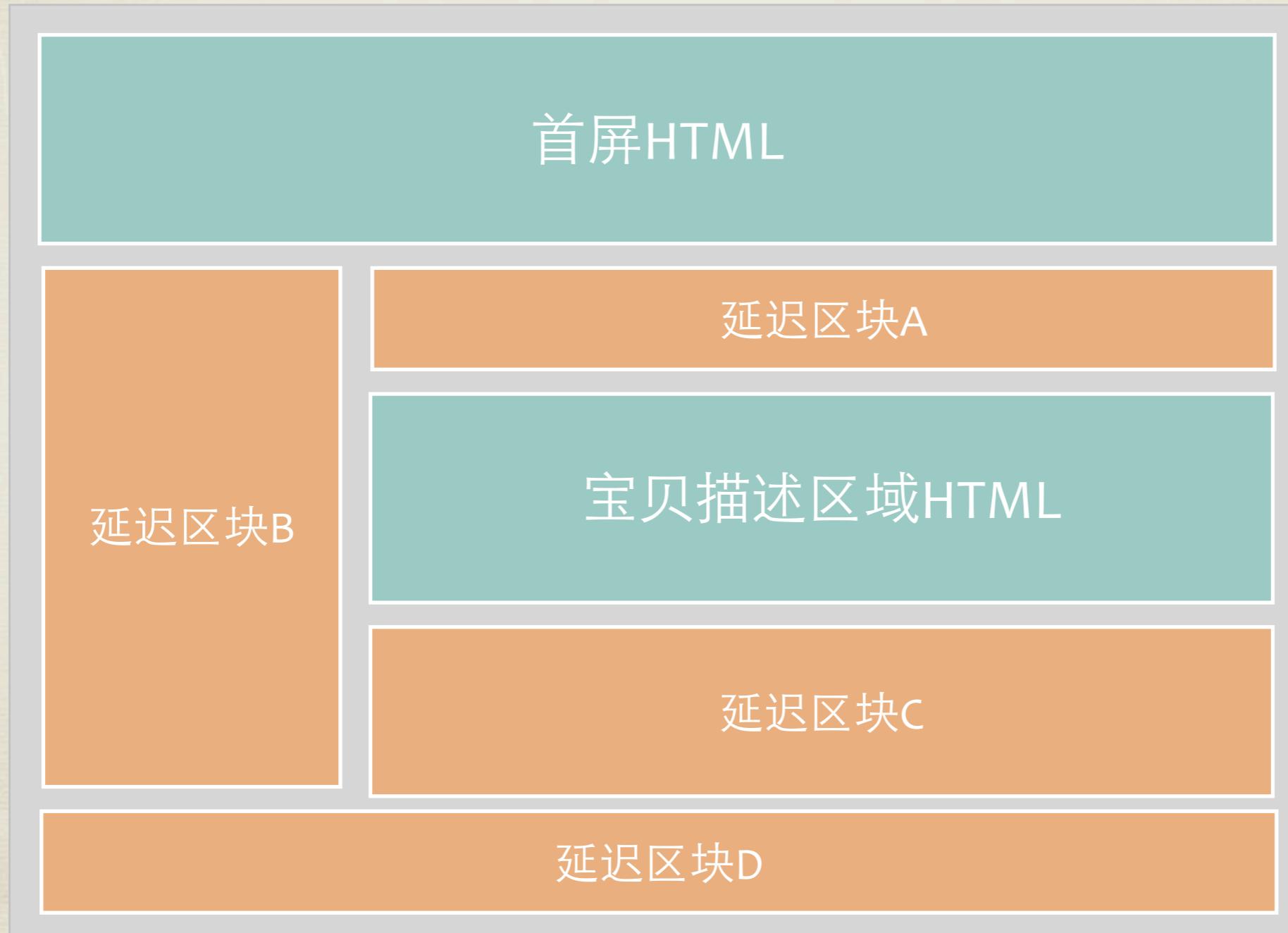


BigRender 要点

- * 减少首屏 DOM 节点数
- * 减少脚本阻塞
- * 合理调度资源下载和页面渲染

减少首屏 DOM 节点数

* 挖坑：



减少首屏 DOM 节点数

* 在页面中存放大块 HTML 代码的方式

1. js 字符串存储方式
2. 用注释来存放
3. 用 Raw text elements 元素（script 与 style）来存放
4. 用 RCDATA elements 元素（textarea 与 title）来存放

<http://lifesinger.wordpress.com/2011/09/23/bigrender-for-taobao-item/>

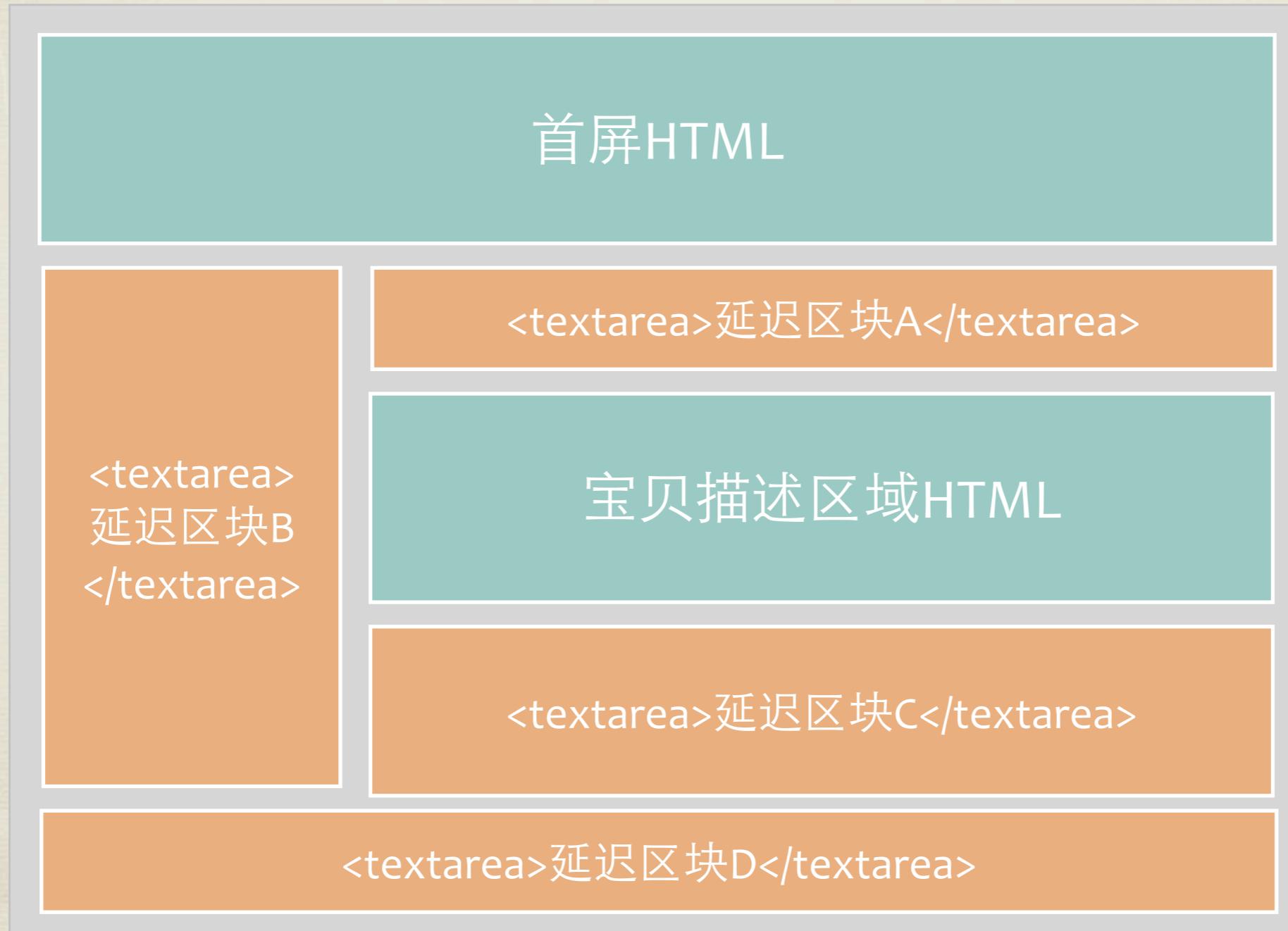
减少首屏 DOM 节点数

* 最后选择 textarea 来存储数据

1. 服务端，要将 HTML 中的 & 转义成 &
2. 服务端，要打破 ETAGO，将 </textarea 转义成 </textarea
3. 浏览器端，不需要任何转义，用 textarea.value 获取即可

减少首屏 DOM 节点数

* 挖坑：



减少脚本阻塞

1. 采用 SeaJS 来做加载器
2. sea.js 本身的无阻加载
3. 通过 SeaJS 异步并行加载其他文件

减少脚本阻塞

- * sea.js 本身的无阻加载 - 异步载入方式

```
// load sea.js asynchronously:  
;(function(m, o, d, u, l, a, r) {  
    if(m[d]) return;  
    function f(n, t) { return function() { r.push(n, arguments); return t; } }  
    m[d] = a = { args: (r = []), config: f(0, a), use: f(1, a) };  
    m.define = f(2);  
    u = o.createElement('script');  
    u.id = d + 'node';  
    u.src = 'http://example.com/libs/seajs/1.1.0/sea.js';  
    l = o.getElementsByTagName('head')[0];  
    l.insertBefore(u, l.firstChild);  
})(window, document, 'seajs');
```

<http://seajs.com/docs/bootstrapping.html#async>

减少脚本阻塞

* sea.js 本身的无阻加载 - AssetsTransfer 方案

1. 第一次访问时，内嵌 sea.js 到 HTML 页面中，并随后预加载 sea.js 文件
2. 再次访问时，用 <script> 正常加载缓存版本
3. 通过 cookie 来记录有无预加载
4. 该方案可使得无缓存访问时首屏速度更快，比 sea.js 的异步载入方案更优

合理调度资源下载和页面渲染

首屏HTML

宝贝描述区域HTML

合理调度资源下载和页面渲染

```
setTimeout(renderNext, delay);
```

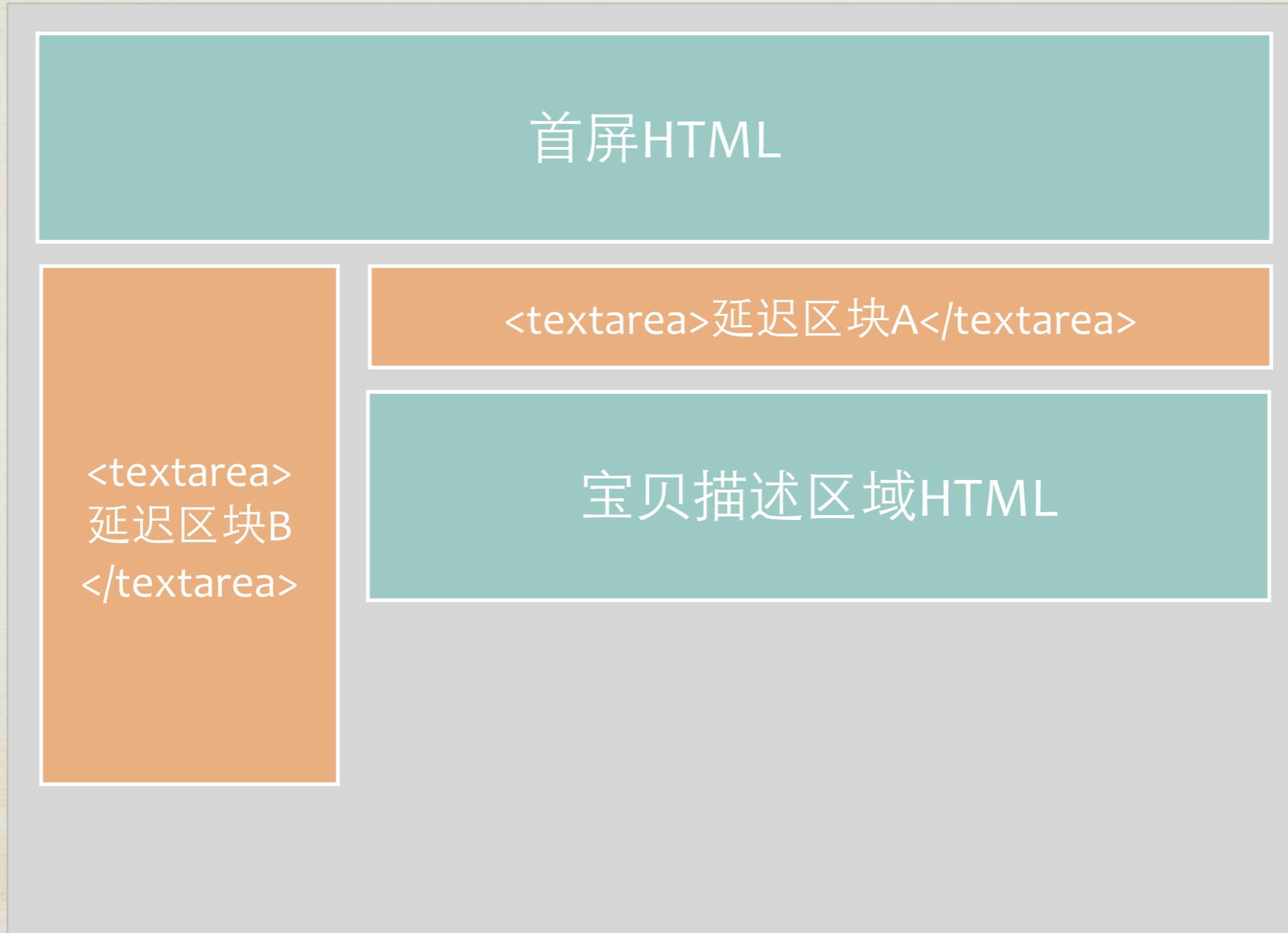
合理调度资源下载和页面渲染

首屏HTML

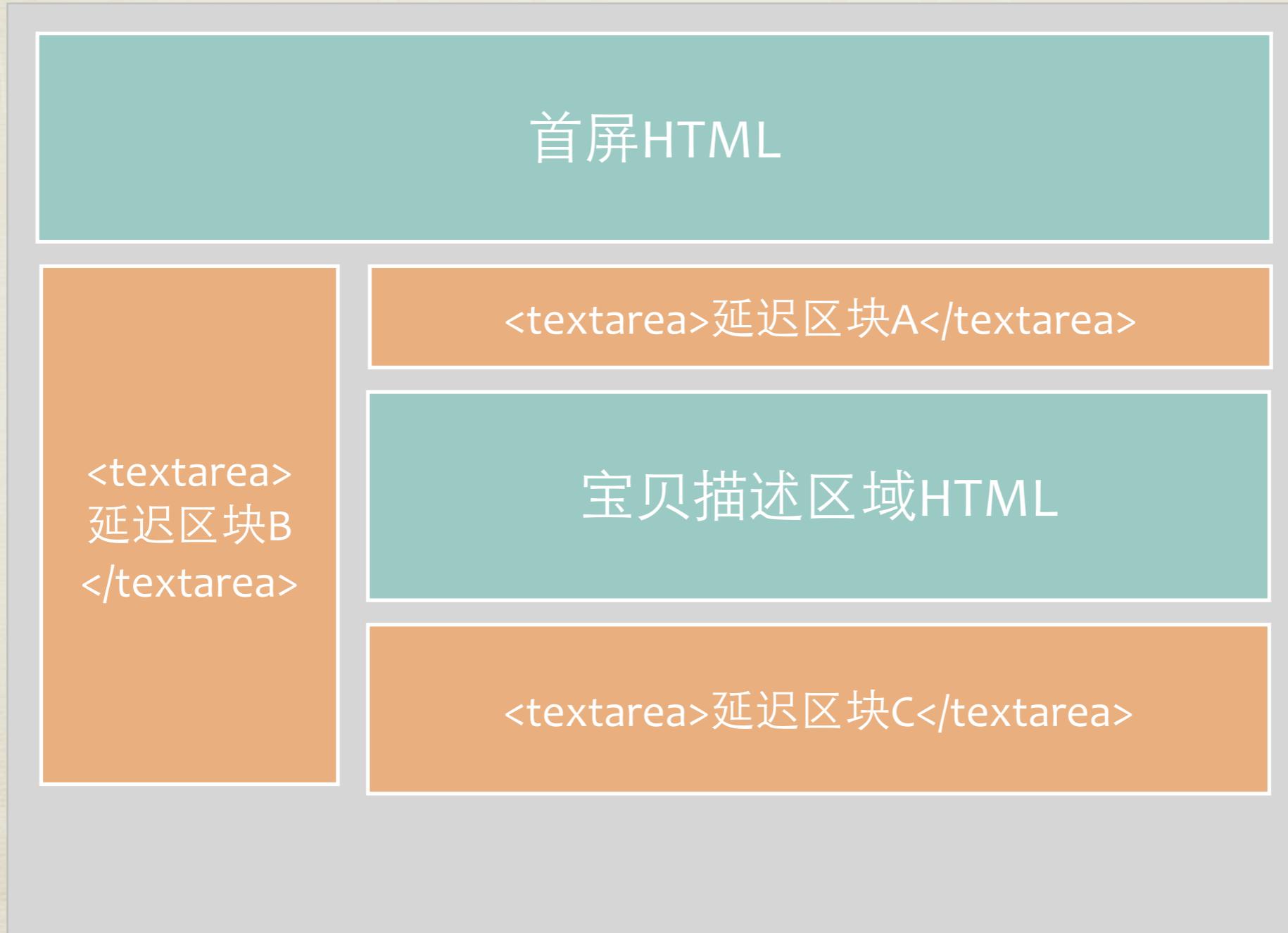
<textarea>延迟区块A</textarea>

宝贝描述区域HTML

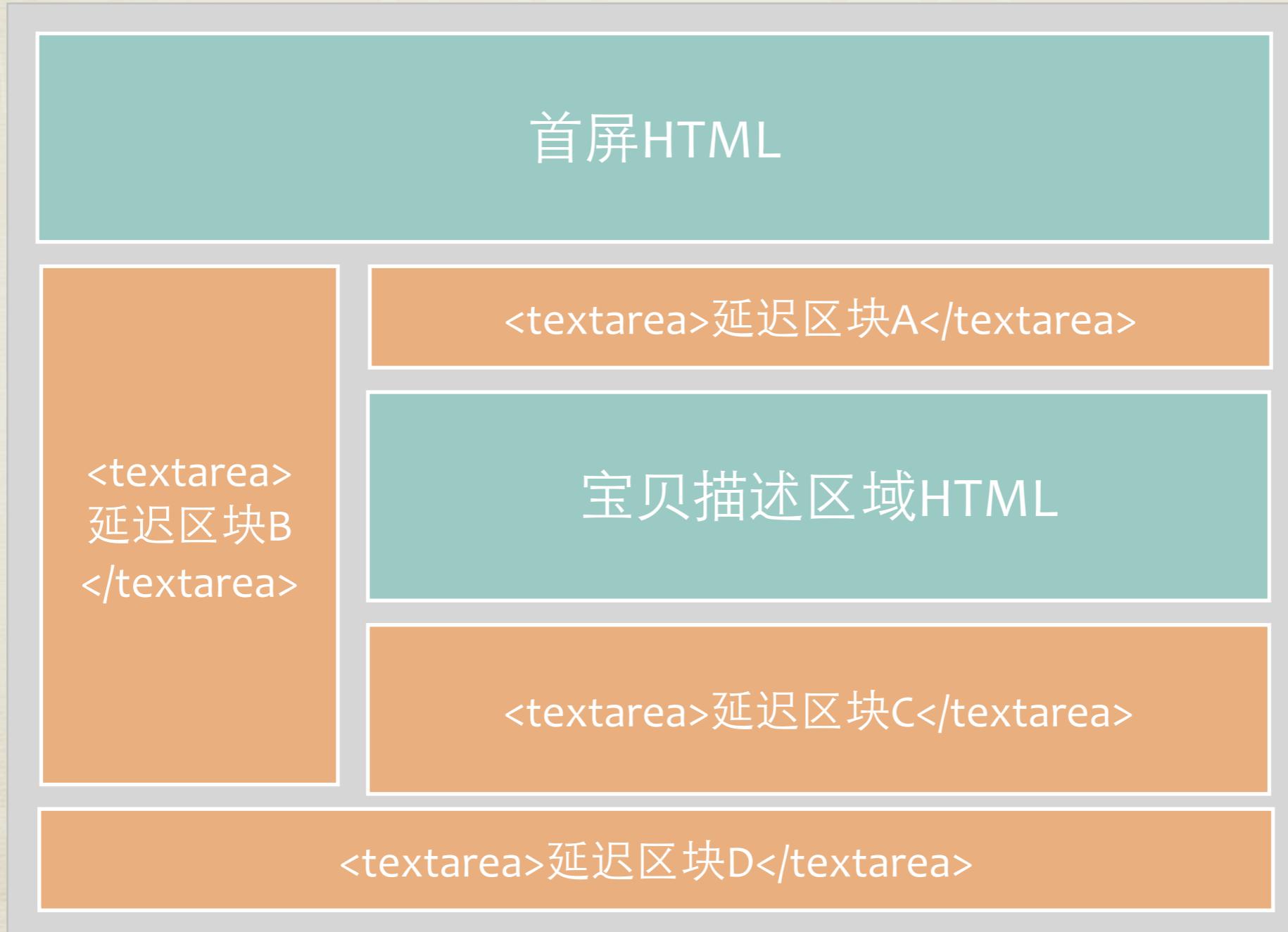
合理调度资源下载和页面渲染



合理调度资源下载和页面渲染



合理调度资源下载和页面渲染



合理调度资源下载和页面渲染

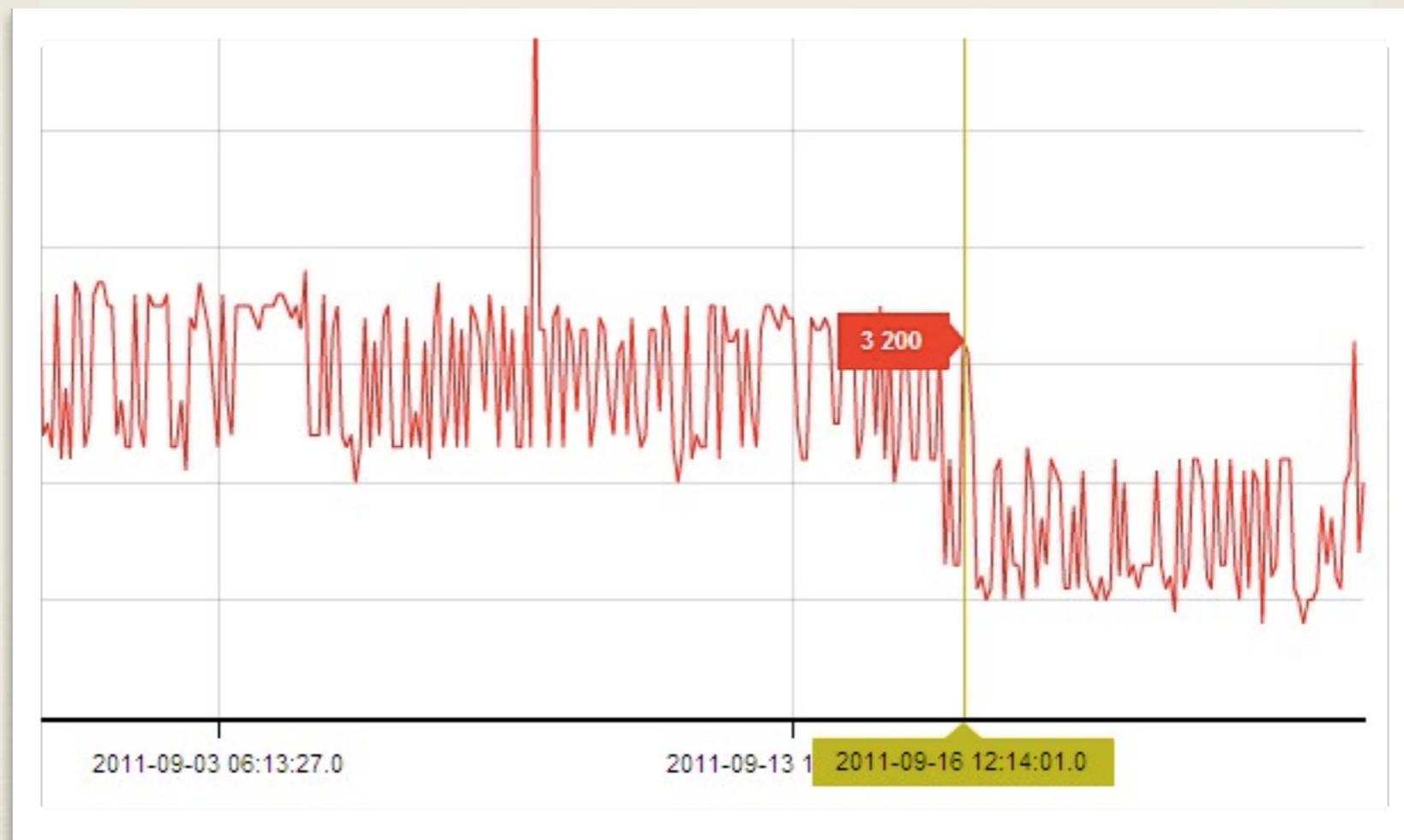
* 核心逻辑

1. 根据预设的优先级，延迟处理各个 textarea
2. 获取 textarea 的 HTML 内容，放入对应容器
3. 执行动态 HTML 中的 script 脚本
4. 处理 document.write
5. bigrender.js 最后只有不到 200 行源码

http://item.taobao.com/item.htm?id=13259093442&bigrender_delay=1000

<http://a.tbcdn.cn/p/shop/1.0/bigrender.js>

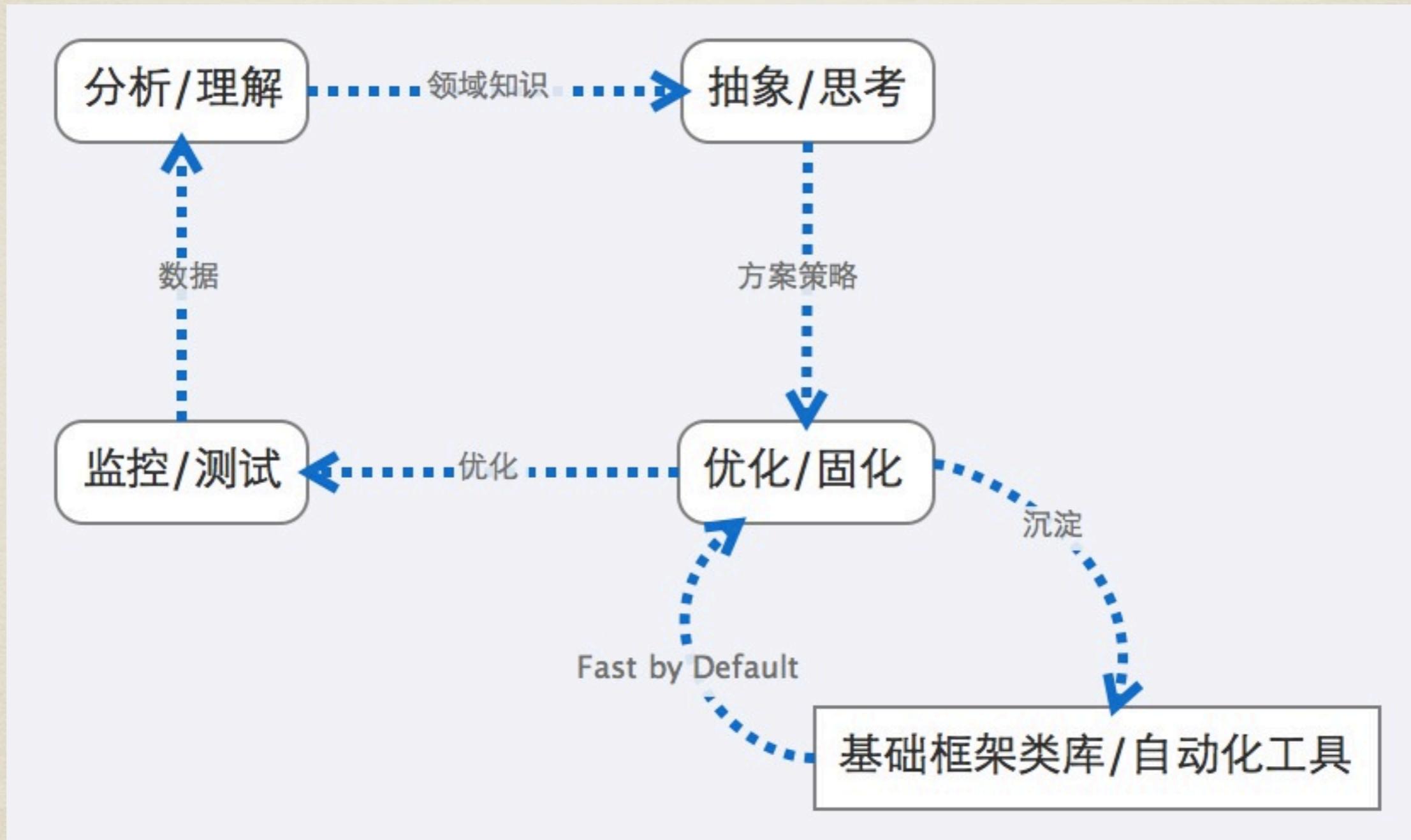
优化成果



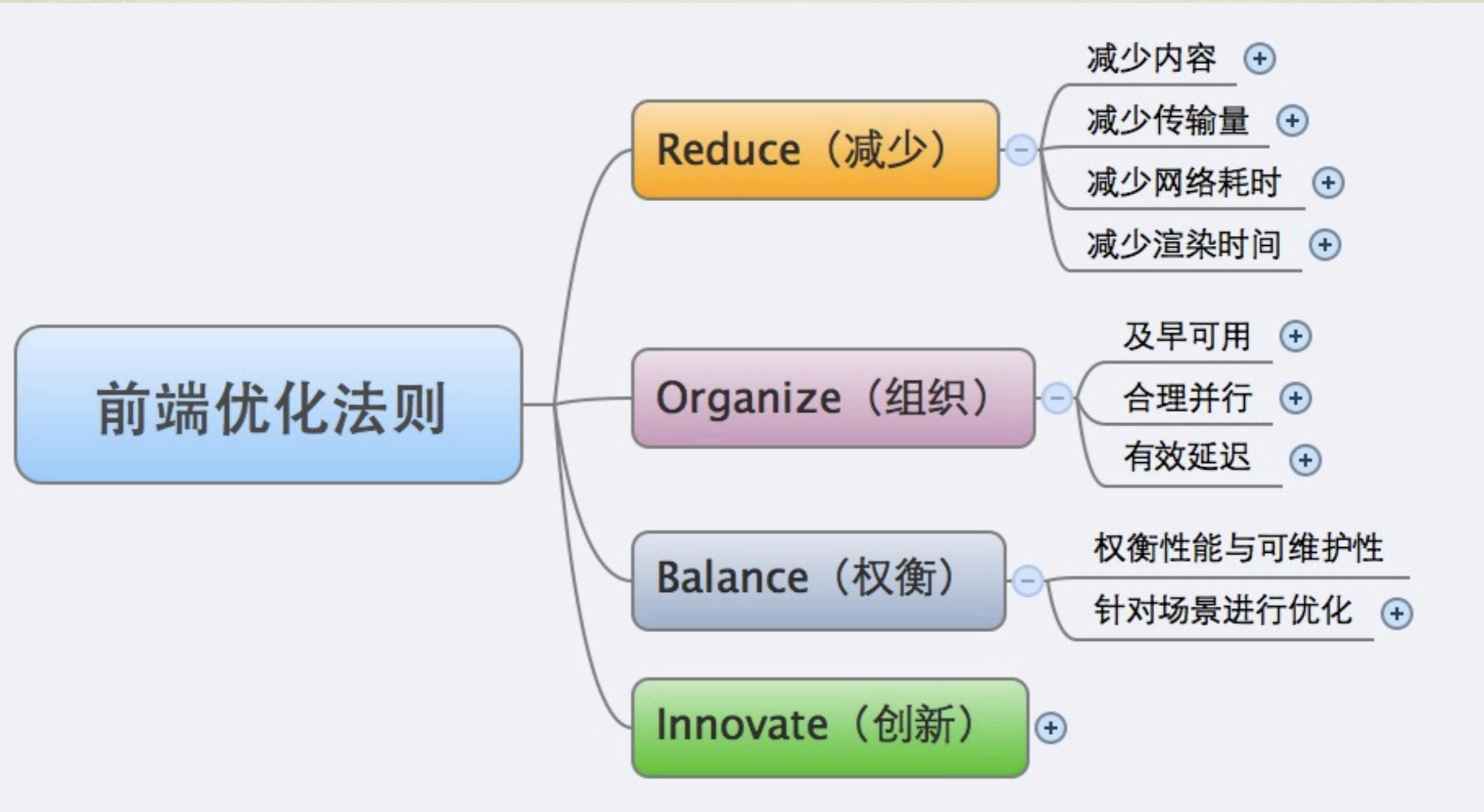
总结

Summary

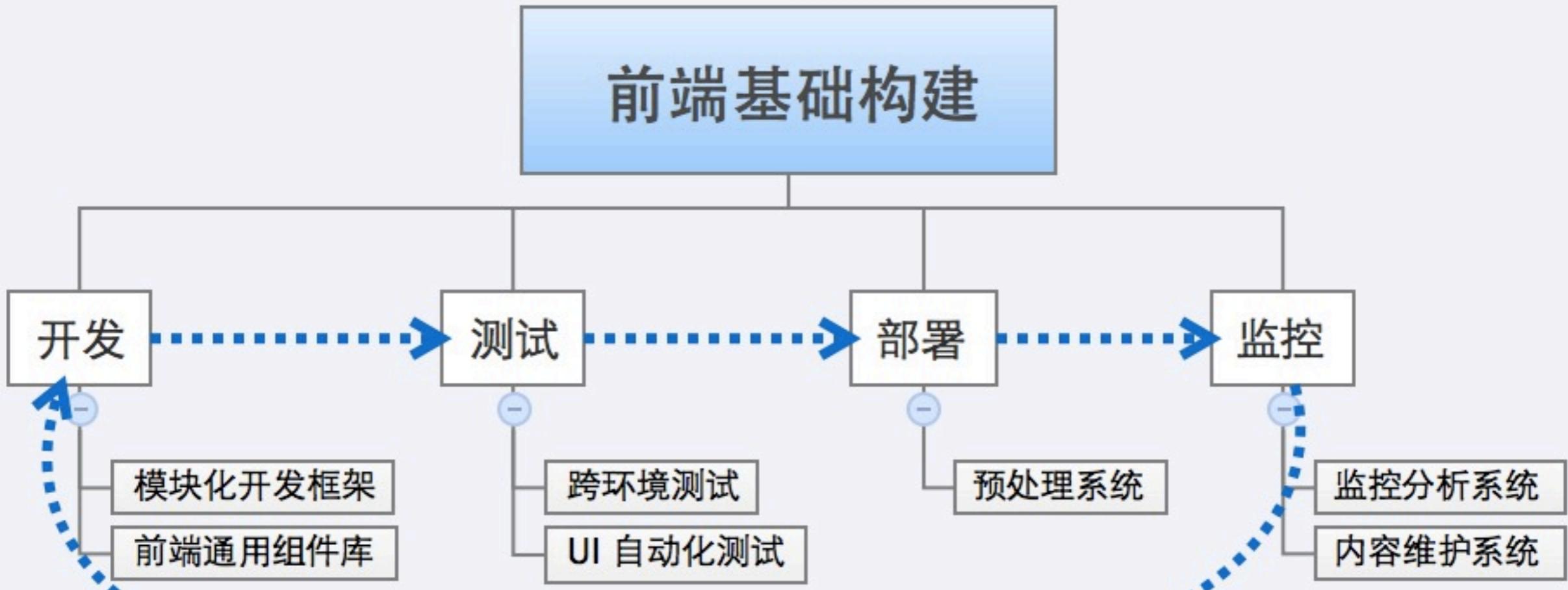
优化过程总结



优化思路总结



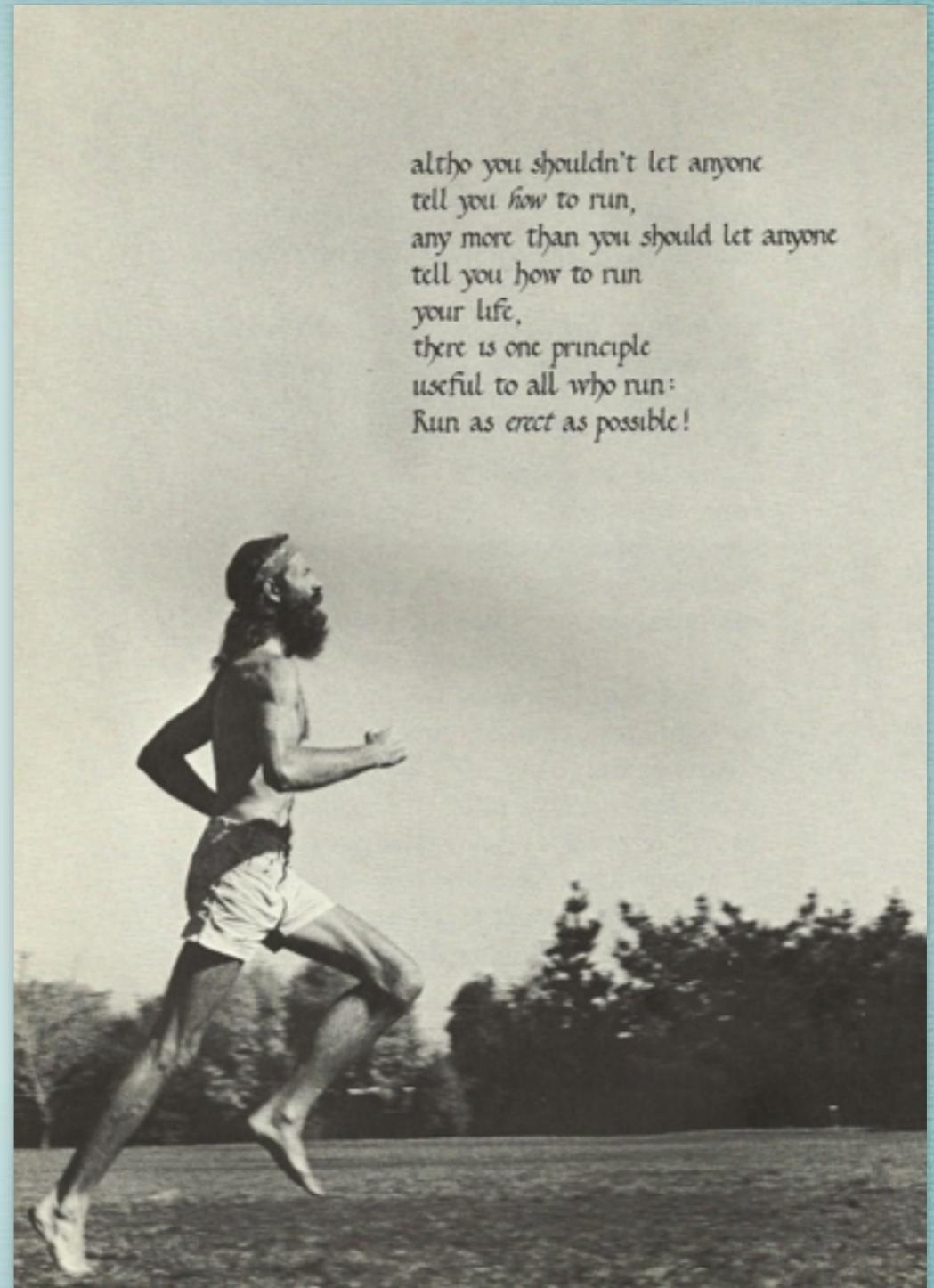
lifesinger.github.com/blog/upload/2011/robi.xmind



Q & A

Twitter: @lifesinger

微博: @玉伯也叫射雕



altho you shouldn't let anyone
tell you how to run,
any more than you should let anyone
tell you how to run
your life,
there is one principle
useful to all who run:
Run as erect as possible!