

前端体验中的设计原理

Principles of Front-End Experience

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Hi! 🍷❤️



AVENIR ZHENG

Tencent 腾讯 / CDC



数字广东
Digital Guangdong

入行8年，2年创业，6年腾讯

01

前端体验

FRONT-END EXPERIENCE

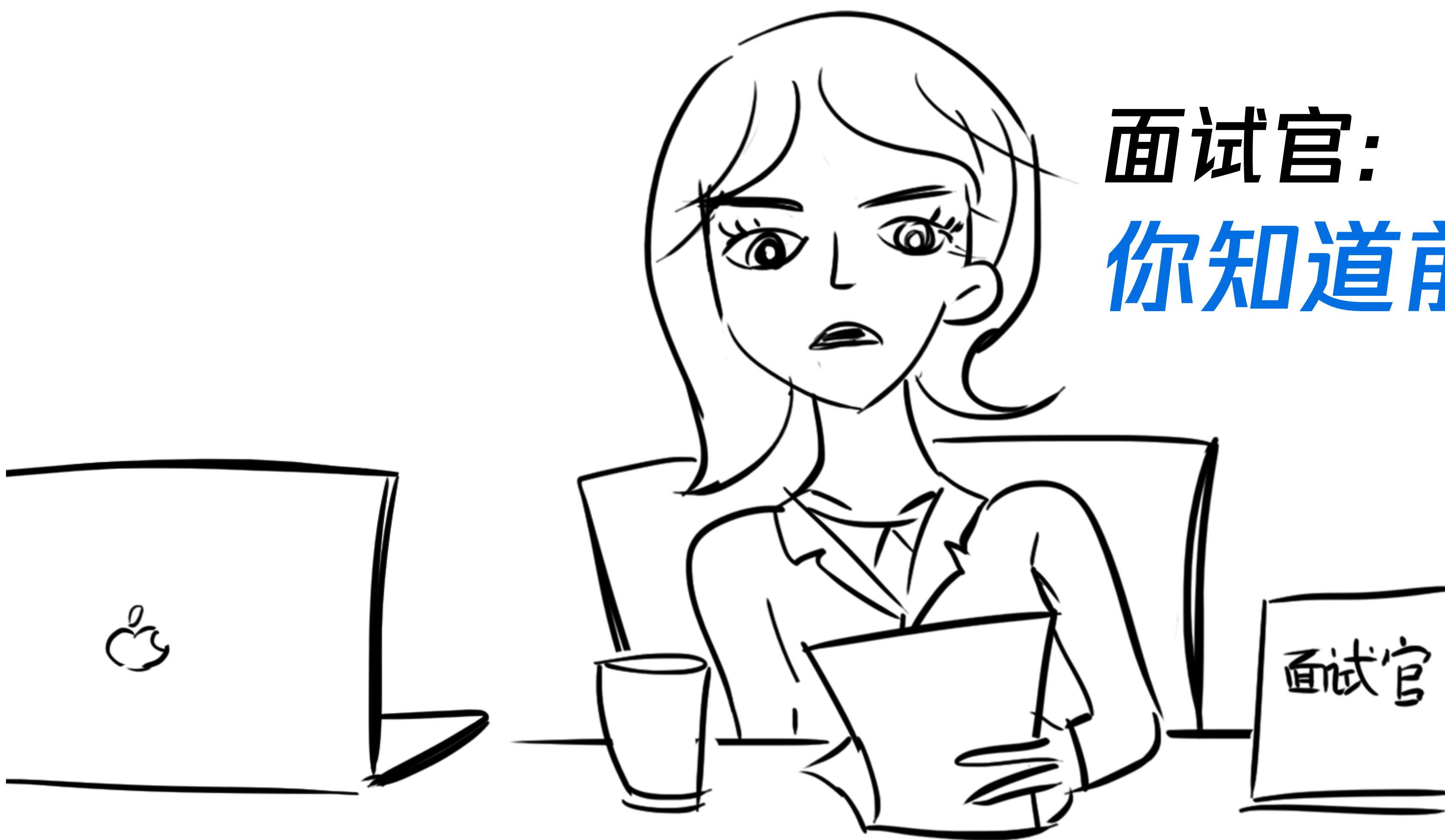
What? 🙋

什么是 前端体验



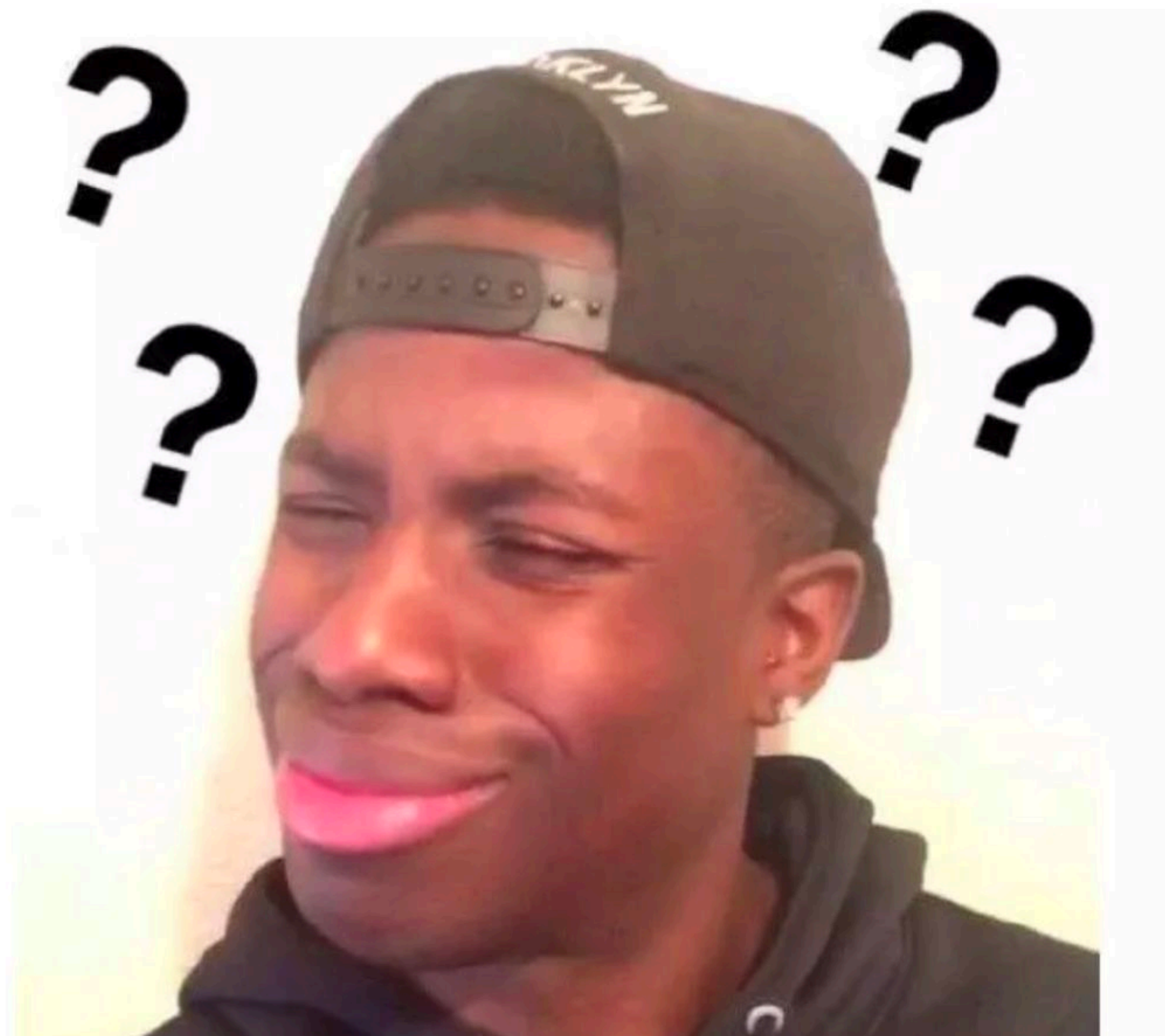
很久很久以前
面试现场

什么是
前端体验



面试官：
你知道前端是做什么吗？

什么是 前端体验



什么是
前端体验

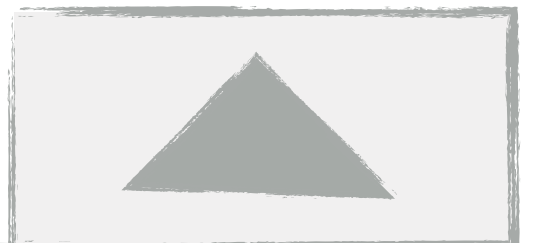


面试官：
请你举个🍎

产品需求：在页面底部实现一个点击后展开的面板



产品需求：在页面底部实现一个点击后展开的操作区域



产品需求：在页面底部实现一个点击后展开的操作区域

1、展开速度与加速度



什么是 前端体验



产品需求：在页面底部实现一个点击后展开的操作区域

1、展开速度与加速度

2、这个模块会应用到什么环境



什么是 前端体验



产品需求：在页面底部实现一个点击后展开的操作区域

1、展开速度与加速度

2、这个模块会应用到什么环境

3、鼠标到下一步区域距离



什么是 前端体验

- 与产品需求有关
- 与交互设计有关
- 与工程实现有关

什么是 前端体验

- 与产品需求有关
- 与交互设计有关
- 与工程实现有关

前端是与用户连接的第一现场

Why? 🙄

为什么需要
设计原理

理想状况

为什么需要 设计原理



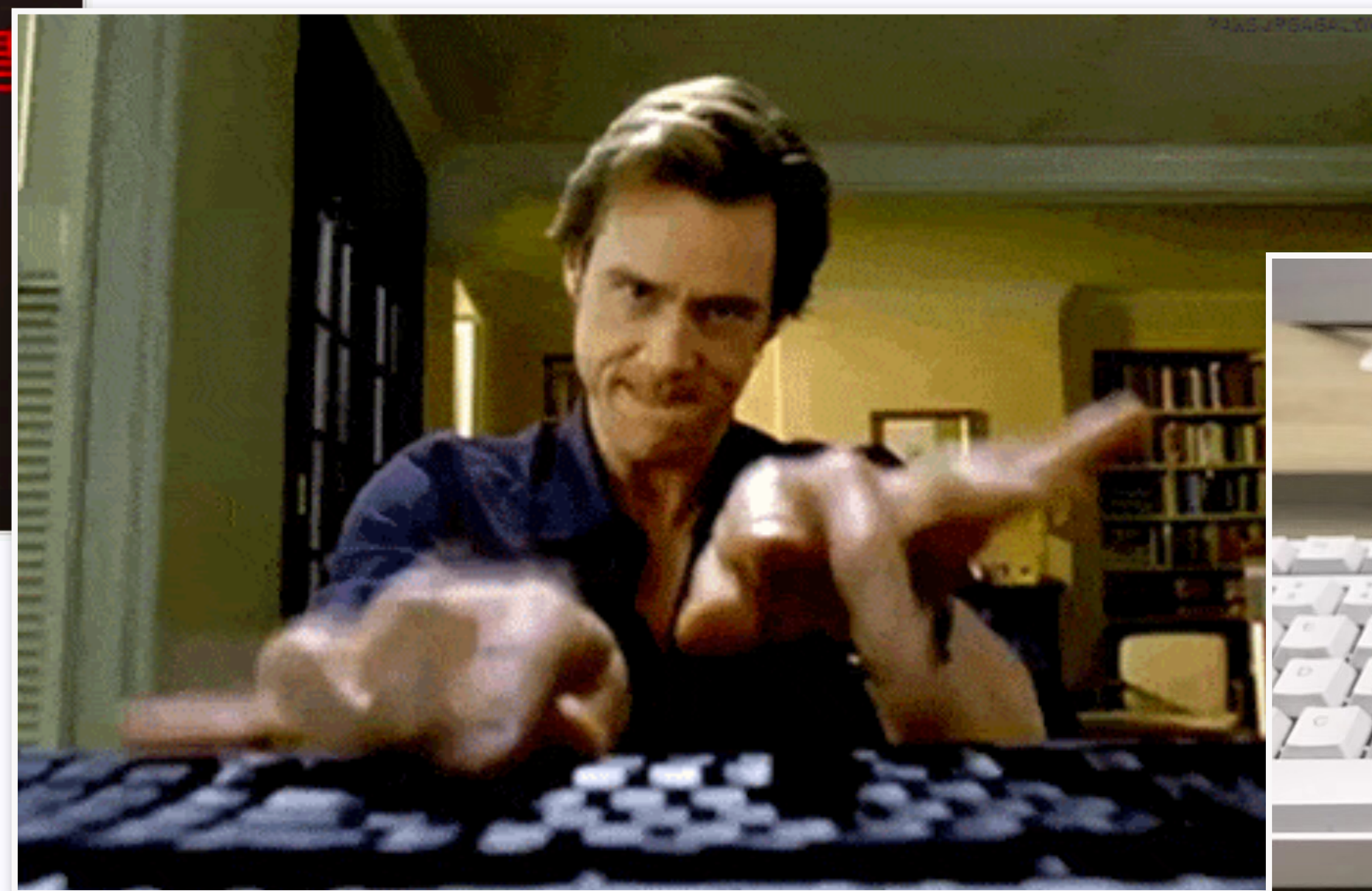
实际状况

为什么需要 设计原理



实际状况

为什么需要 设计原理



实际状况

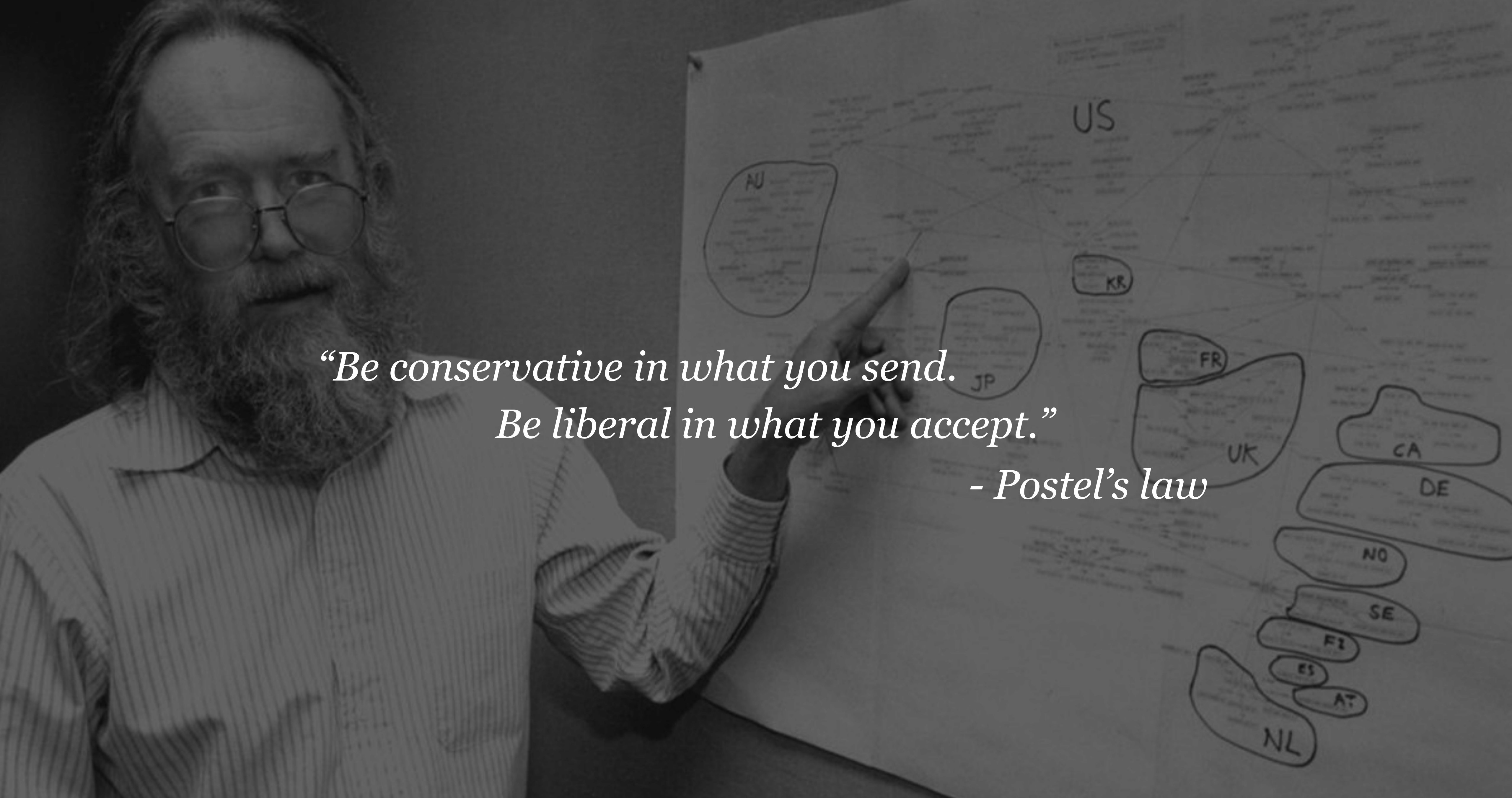
02

设计原理

PRINCIPLES

健壮性原则

ROBUSTNESS PRINCIPLE



*“Be conservative in what you send.
Be liberal in what you accept.”*

- Postel's law

Robustness Principle

健壮性原则

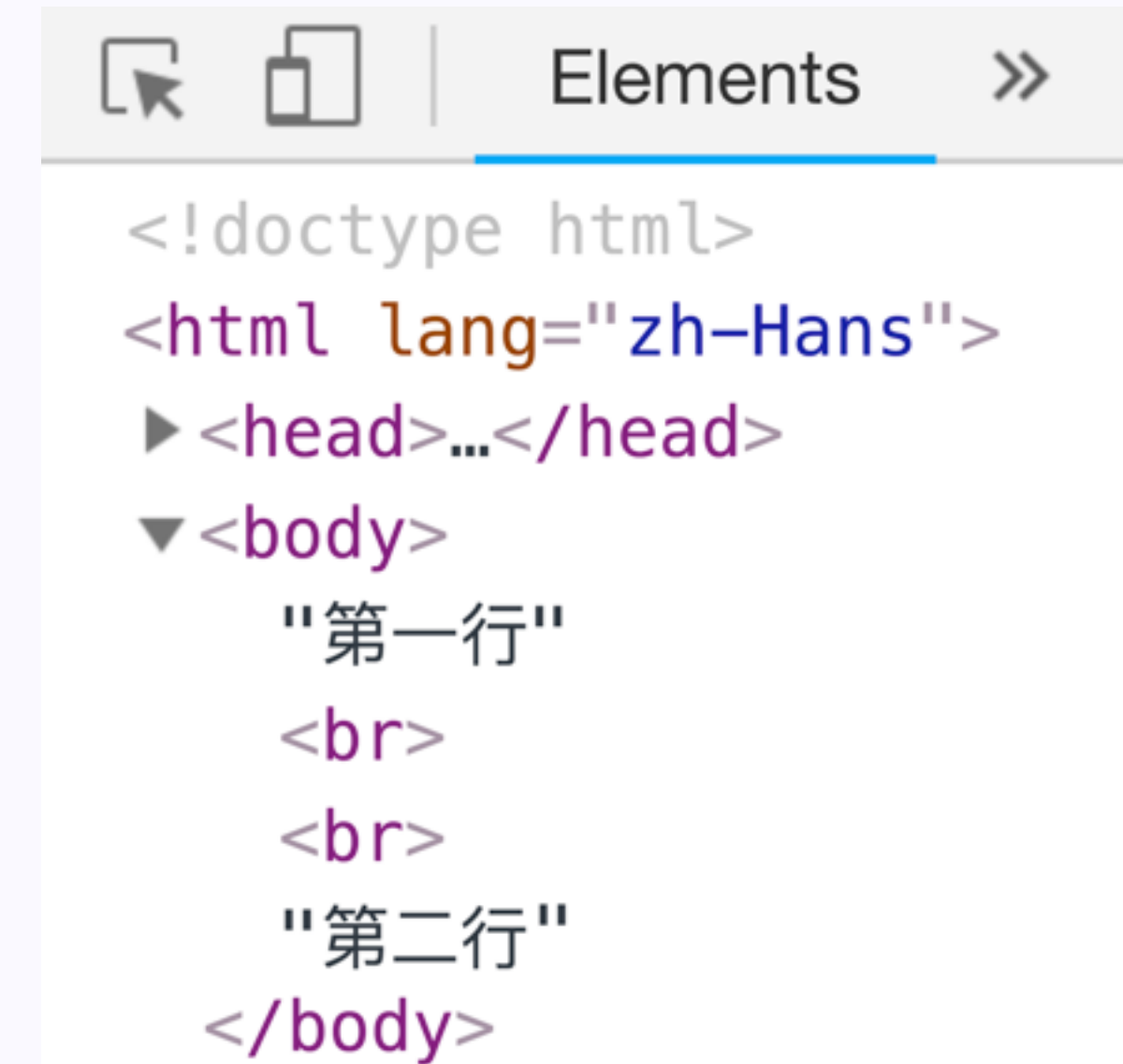
第一行

</br>

第二行

第一行

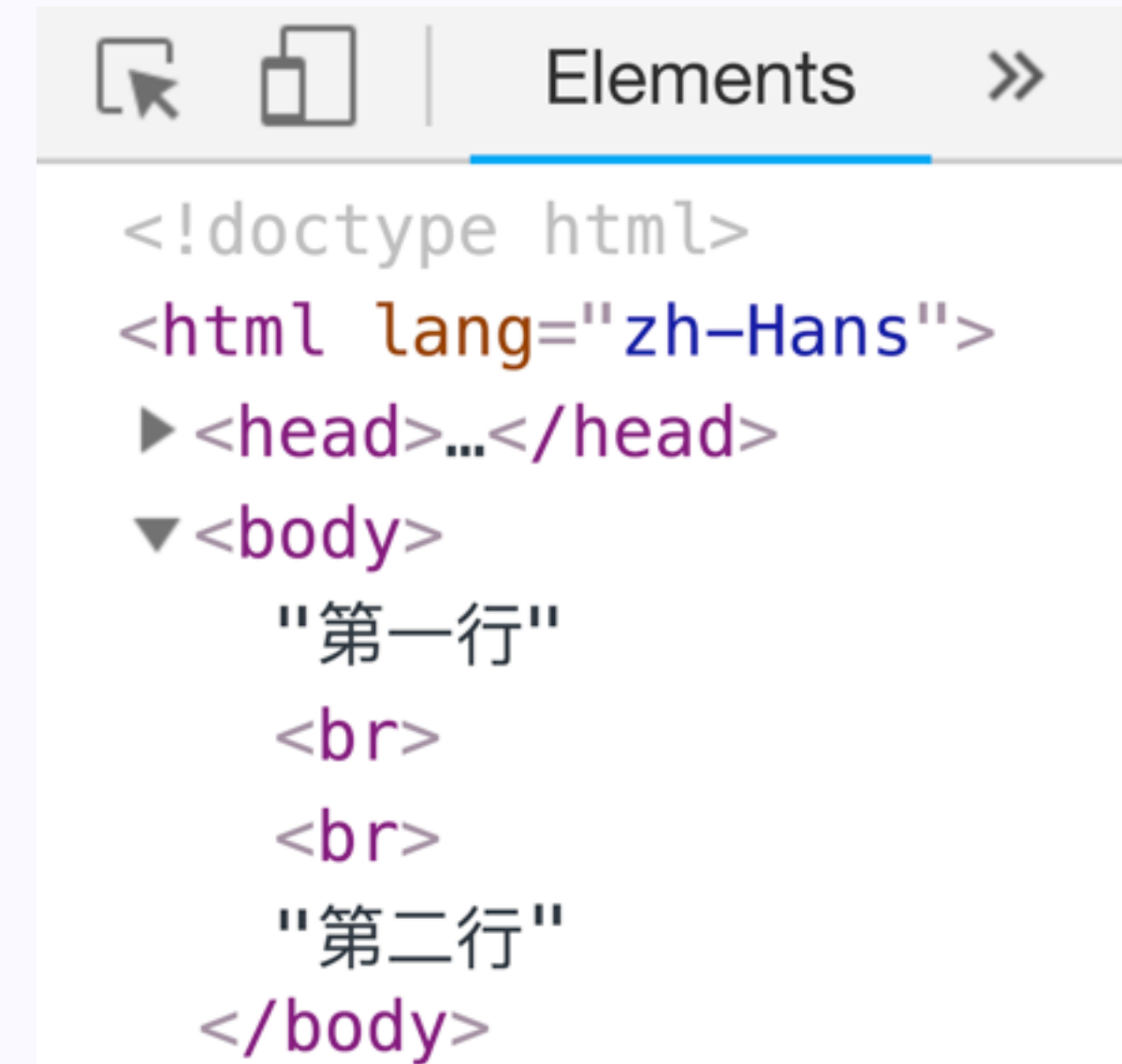
</br>
第二行



```
<!doctype html>
<html lang="zh-Hans">
  <head>...</head>
  <body>
    "第一行"
    <br>
    <br>
    "第二行"
  </body>
```

第一行

</br>
第二行



```
<!doctype html>
<html lang="zh-Hans">
  <head>...</head>
  <body>
    "第一行"
    <br>
    <br>
    "第二行"
  </body>
```

```
if (t->isCloseTag(brTag) && m_document->inCompatMode()) {
  reportError(MalformedBRError);
  t->beginTag = true;
}
```

Robustness Principle

健壮性原则

ÿØÿà JFIF ,ÿp r

image or html



Network tab showing a request to lcamtuf.coredump.cx/squirrel/. The response is a JFIF image header followed by HTML content: `<h1>image or html</h1>` and `!`. The image is displayed on the left side of the browser window.

<http://lcamtuf.coredump.cx/squirrel/>

Robustness Principle

健壮性原则

ÿÿà JFIF ,ÿp r
image or html



Elements Console Sources Network Performance Memory Application Security Audits SnappySnippet

View: [Icons] Group by frame [] Preserve log [] Disable cache [] Offline Online [v]

Filter [] Hide data URLs [All] XHR JS CSS Img Media Font Doc WS Manifest Other

10 ms 20 ms 30 ms 40 ms 50 ms 60 ms 70 ms 80 ms 90 ms 100 ms 110

Name	Headers	Preview	Response	Timing
lcamtuf.c... /Users/a...			1 JFIF...r<html><body> 2 3 4 <!-- 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	

2 requests | 0 B ... {} Line 1, Column 1

Console [x] Filter [] Default levels [v] Group similar [x]

<http://lcamtuf.coredump.cx/squirrel/>

Robustness Principle

健壮性原则

ÿÿà JFIF ,ÿp r
image or html



```
1 0000•JFIF•••••,••00•r<html><body>
2
3
4   <!--000•
5
6 .....00••0•0.....00••}00•0•
7 .....
8 .....s.....!•1AQ••a"q0•200••0B#0R003•b0$R00%C45000cs05D'0006•Tdt000•&0
9 •00EF00V0U(•0000000eu00000000fv000000007Gwgw000000008HXhx00000000)9IYiy00000000*:JZjz00000000.....m.....!•1A•Q
10 •S6E•'dtU700()00000000eu00000000FVfv00000000Gwgw000000008HXhx000000009IYiy00000000*:JZjz0000000000.....?•00|•0000r00`
11
12 00•t00) 0•0Lc0W%0T00FdD5I0^L(j@0NeB-$0]R0•^ t00Qh00<0Q0020_n000. •00•tN0•Z•2b0I,0Z0aZW0-
13 EQEF00000aZD0()0q0!•6S0,AFF:o0•A•000}0?•%•(0
14 0>•0•0##;0a0E-{0••00•0t#n0a••+0~0<Up${W00i•0k0}0
15 b00m000•0Dd0:0090•hk0}0•0•
16 ••+0-0b•:
17 00000•0j•0•ZT00000ZH^
18 000j0 0100T•'0{0j00•0•};+•0+0=000H
19 00PA0z000>G00•m•0ZM60XS0V00••200•QJ%•6•,x0b000G\00
20 00#00•007HBI•0QL60@0•_00z0•0x0o000•ZA0M^0S•0Z•ÿG_!
21 00ly0•Tt00w00)0000a•B[•0c0•00d60_v•K•0•000BwC0000G
22 0!T
23 Woz`M"•j•00080)•0
24 V0t•0•0000E6010R60Iz0•b00]0n0m0>10)LAA 0i0j•0L60•
25 )•B0;{x0ES•~60D0b00
26 00@|p0h0000000(0Q•0Mv0060000•0B00Z0t0`00A•{Pcj0EZ0|
27 0y0000•0•00f••'0G00'10F00LxPKR0;n0e00\000L•x02000R
28 0S0$00•0(-0000|R0••o0••6~0k00-0#
```

2 requests | 0 B ... {} Line 1, Column 1

Console

Filter

Default levels

junk.html

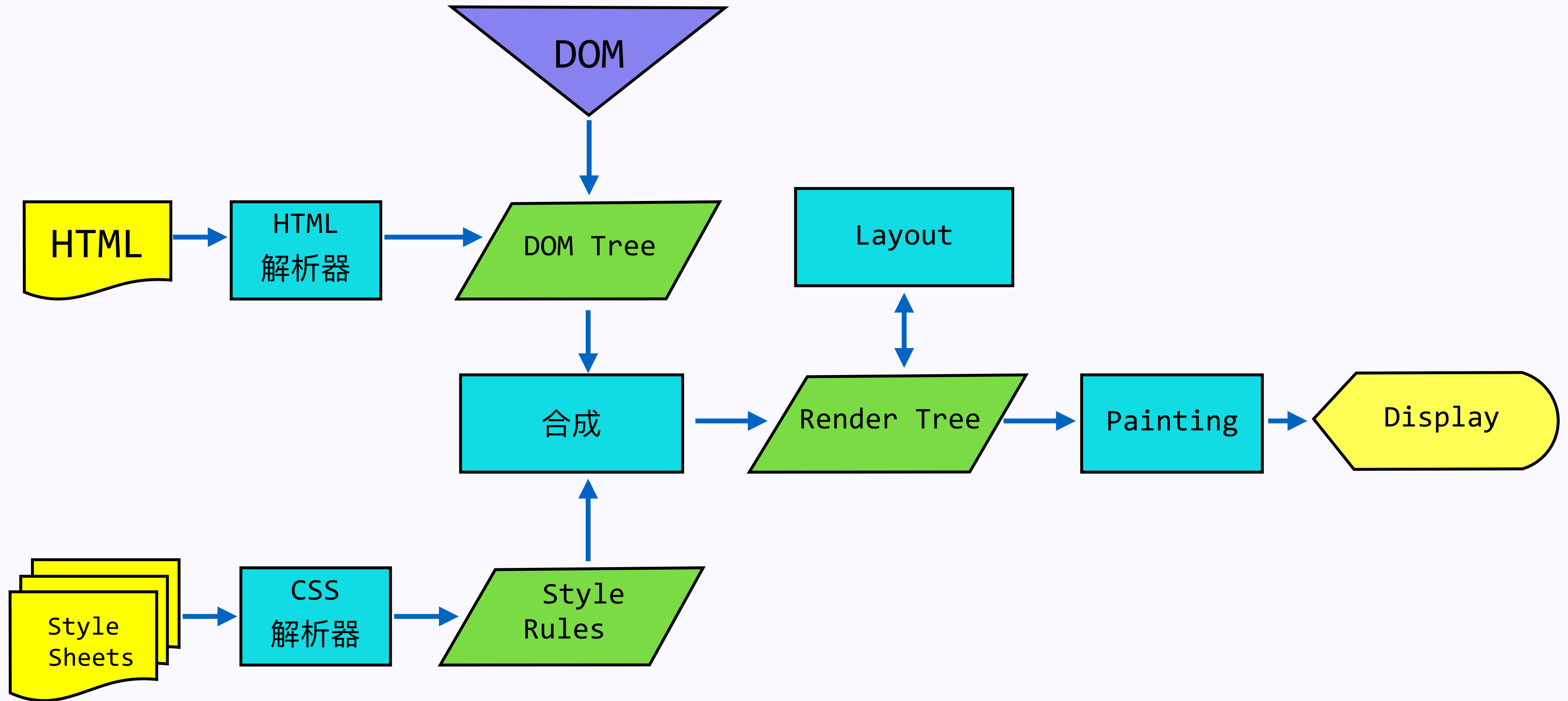
junk.jpg

HTML

<http://lcamtuf.coredump.cx/squirrel/>

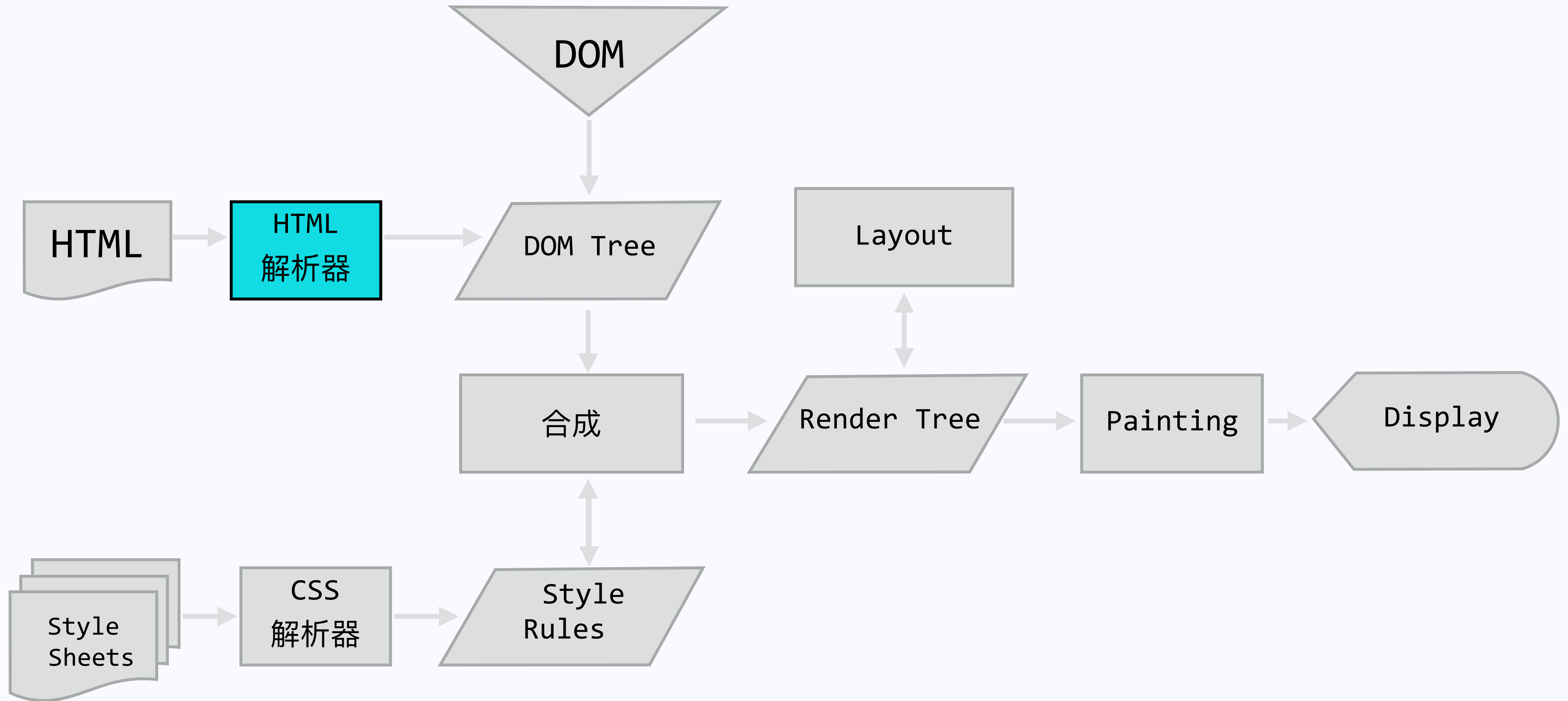
Robustness Principle

健壮性原则



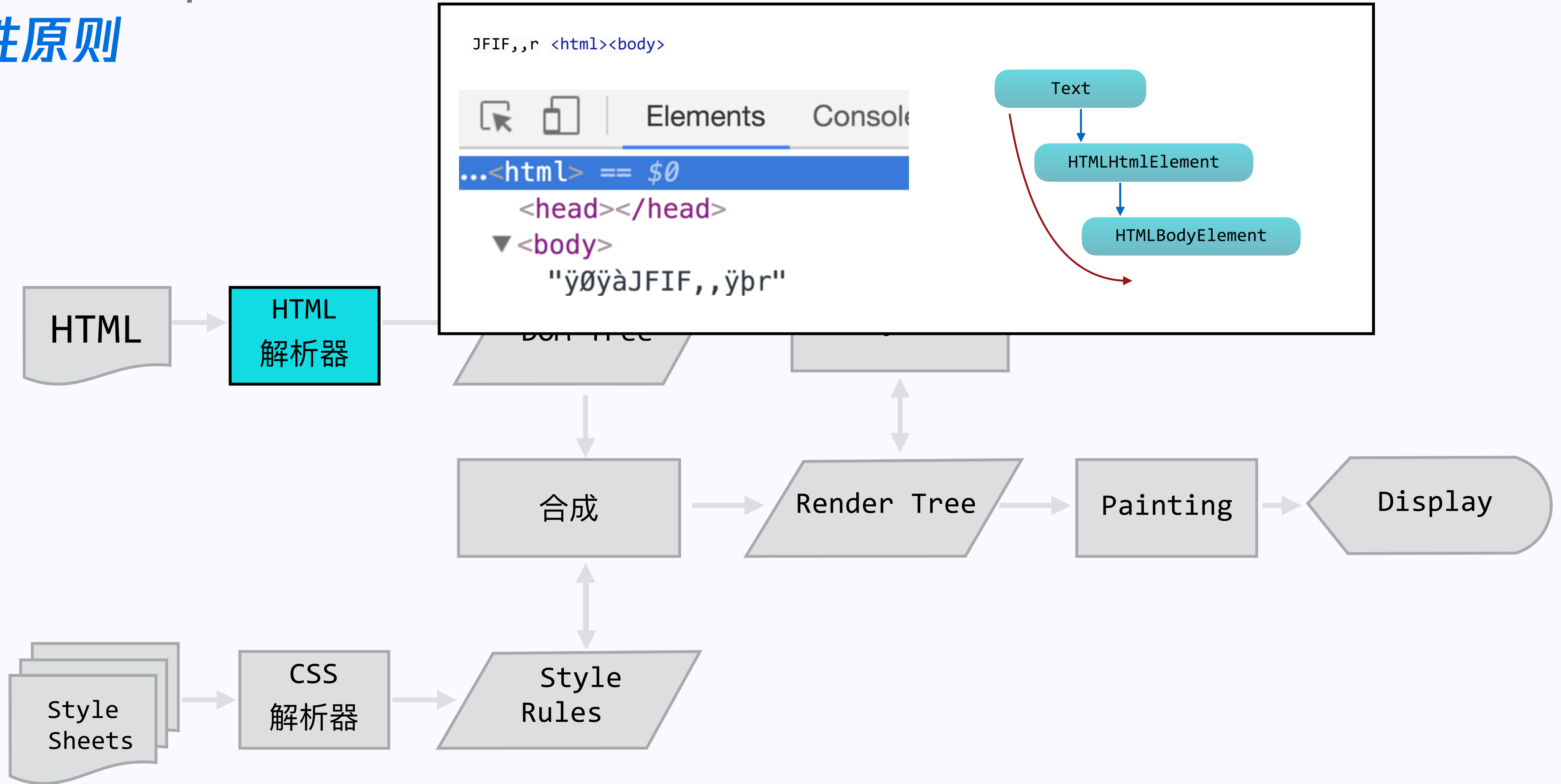
Robustness Principle

健壮性原则



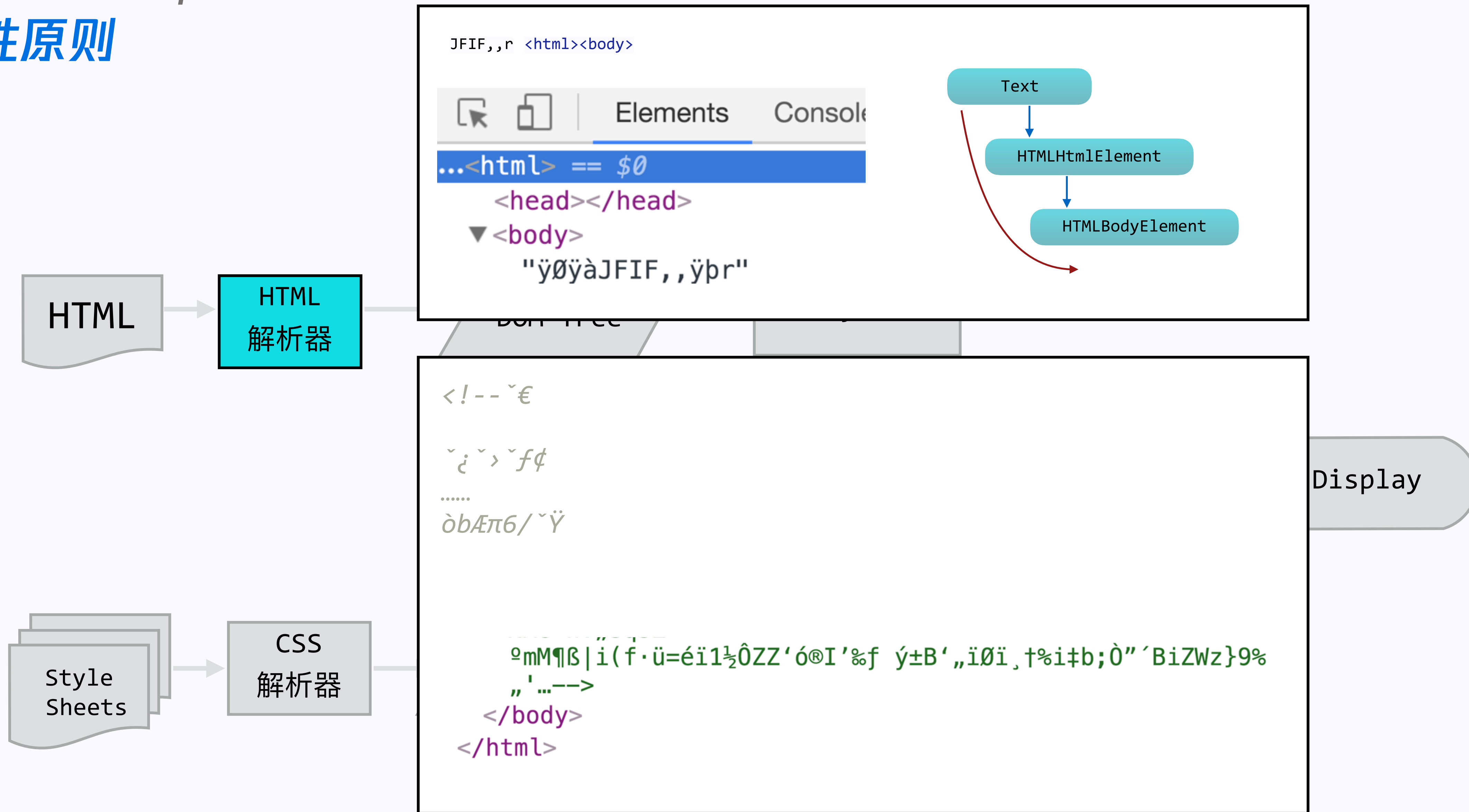
Robustness Principle

健壮性原则



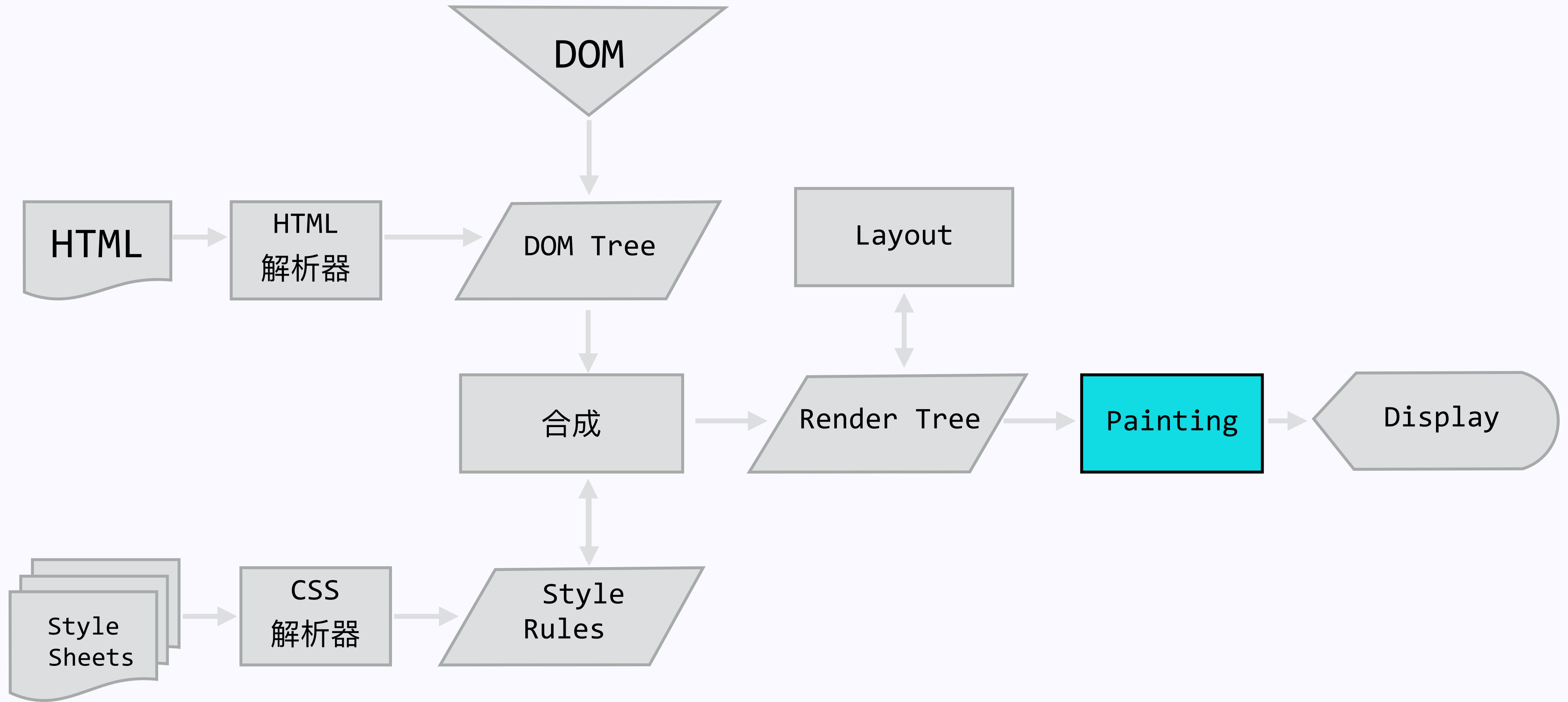
Robustness Principle

健壮性原则



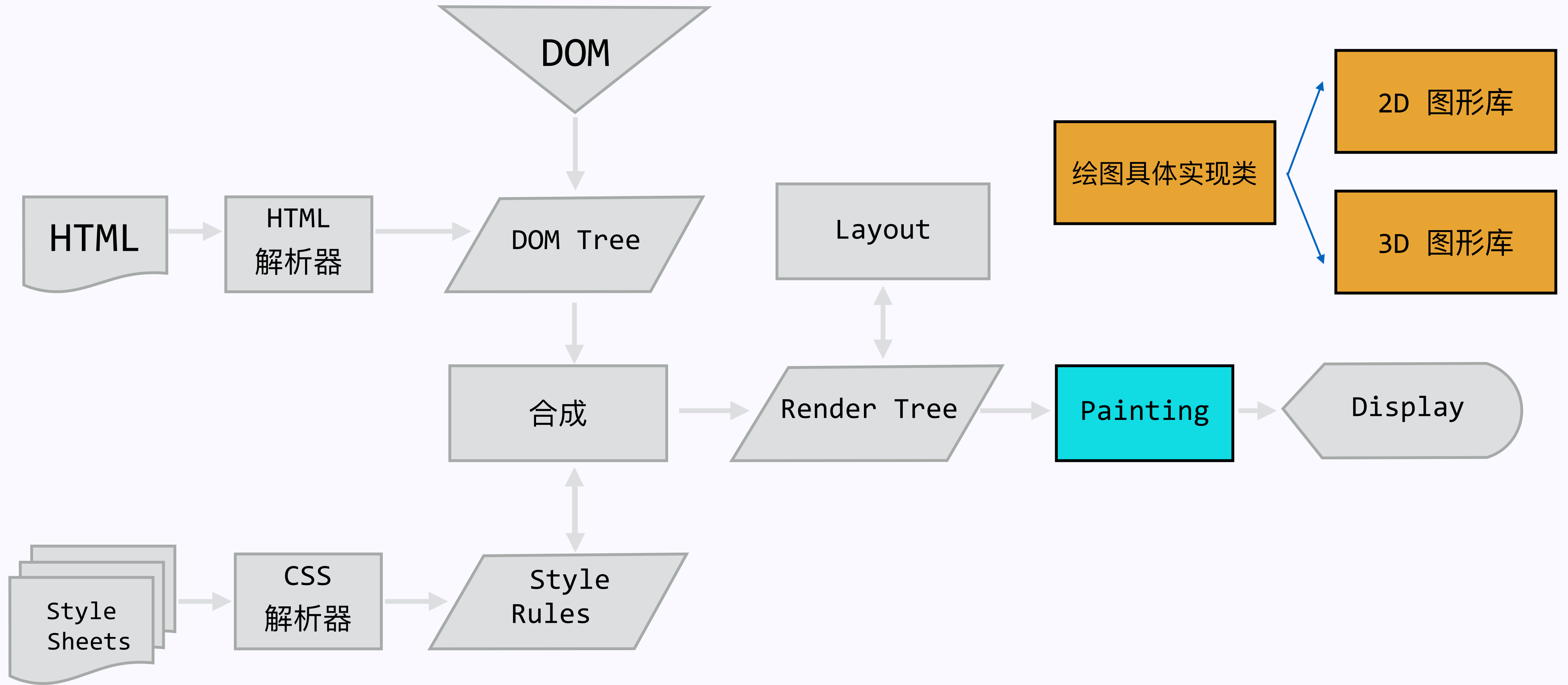
Robustness Principle

健壮性原则



Robustness Principle

健壮性原则



Robustness Principle

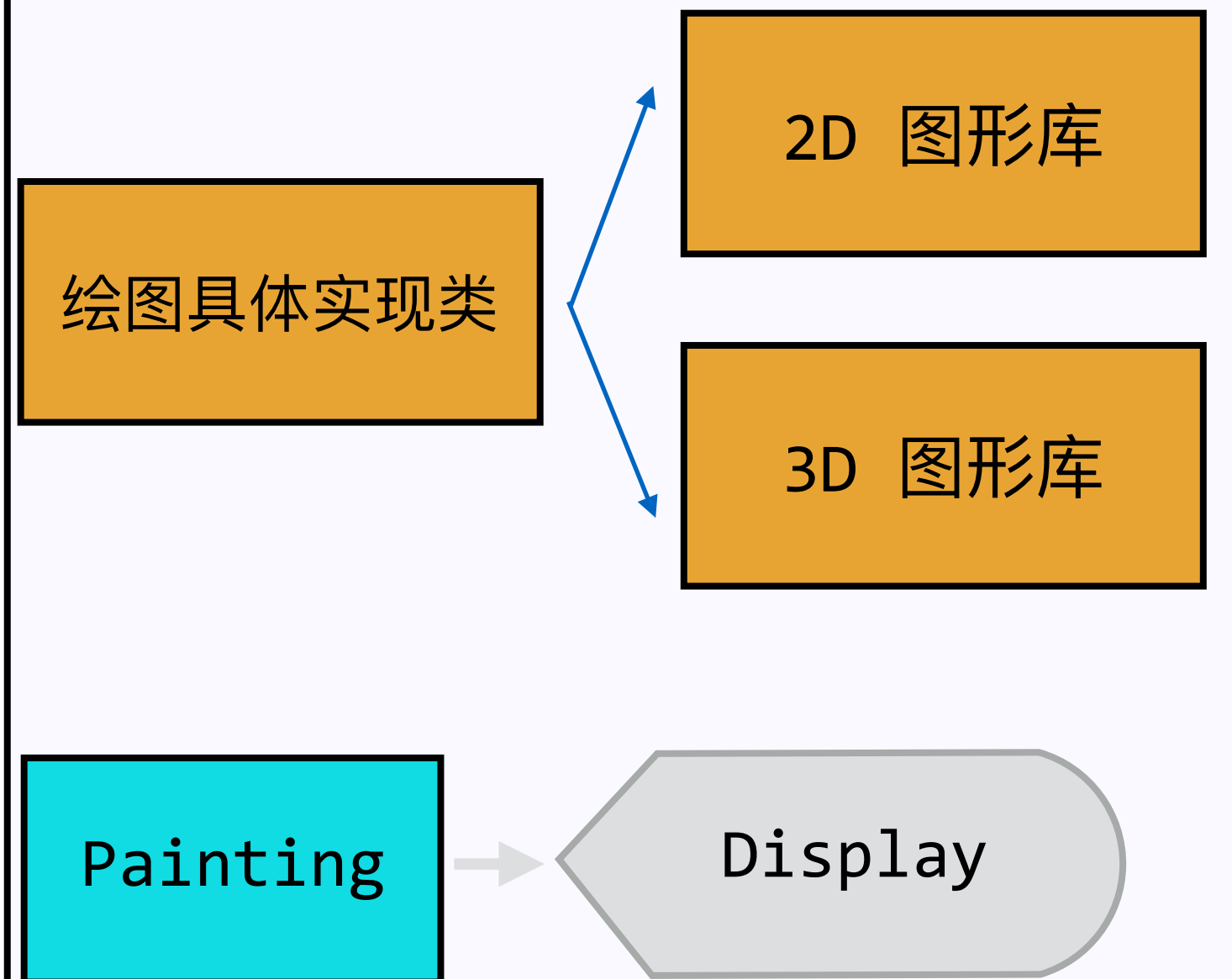
健壮性原则

JFIF,,r

JFIF, JPEG标记

```
<html><body>  
  <h1>image or html</h1>  
    
  <!--
```

0xFFFE, COM (Comment)



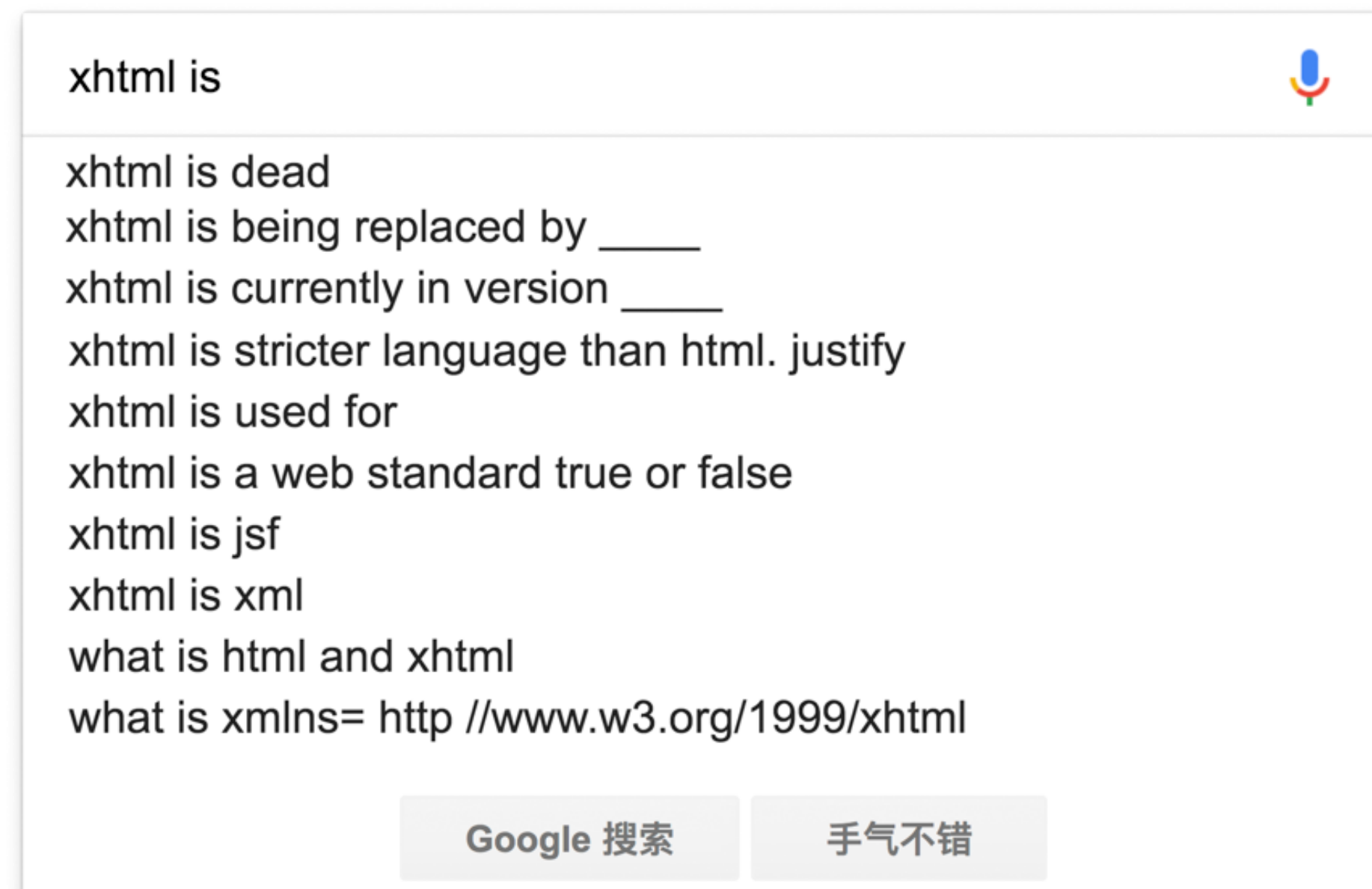


xhtml is 

xhtml is dead
xhtml is being replaced by ____
xhtml is currently in version ____
xhtml is stricter language than html. justify
xhtml is used for
xhtml is a web standard true or false
xhtml is jsf
xhtml is xml
what is html and xhtml
what is xmlns= http //www.w3.org/1999/xhtmll

Google 搜索 手气不错

举报不当的联想查询



举报不当的联想查询

XHTML2 继承 XML严格的 错误处理 模型

Robustness Principle

健壮性原则

发送: *Developer(前端)*

接收: *Client(浏览器)*

发送: *Developer*(前端)

接收: *Client*(浏览器)



发送: *Developer*(前端)

接收: *Client*(浏览器)



发送: *User*(用户)

接收: *Developer*(前端)

Robustness Principle

健壮性原则

笔试题：实现千位分隔符

```
let re = "+" + String). split(""); reverse()
```

```
re.reverse() case res = []
```

```
re.map((v)
```

```
for (let i = 0; i < re.length; i += 3) {
```

```
res.push(res.unshift(re[i], re[i+1], re[i+2]))
```

```
res.reverse()
```

```
return res.join("") }
```

JS实现千位分隔符，位数不限，可兼容浏览器

```
function splitNum (val) {
```

```
var tep = typeof (val) === number ? val : parseInt(val);
```

```
if (tep === NaN) return;
```

```
if (tep < 1000) return tep;
```

```
var point = tep.toString().length - 4;
```

```
tep = tep tep.toString().splice (point, 0, ",")
```

```
return parseInt(tep);
```

```
var t;
if (typeof num !== 'number' || isNaN(num)) return;
if (n < 1000) return num + "";
t = num % 1000;
return t + ',' + '000';
}
```

```
2. var i = 10000;
var istr = i.toString();
```

```
for (var idx = istr.length - 1; idx >= 0; idx--)
```

```
istr.splice (idx, 0, ",")
```

```
Array.prototype.splice
```

```
let re = "+" + String). split("");
```

```
re
re.reverse()
re.map
case res = []
```

```
for (let i = 0; i < re.length; i += 3) {
```

```
  res.push res.unshifte(re[i], re[i+1], re[i+2])
  res.unshifte(';')
```

```
res.reverse()
```

```
return res.join("") }
```

JS实现千位分隔符，位数不限，可兼容浏览器

```
function splitNum (val) {
```

```
var tep = typeof (val) === number ? val : parseInt(val);
```

```
if (tep === NaN) return;
```

```
if (tep < 1000) return tep;
```

```
var point = tep.toString().length - 4;
```

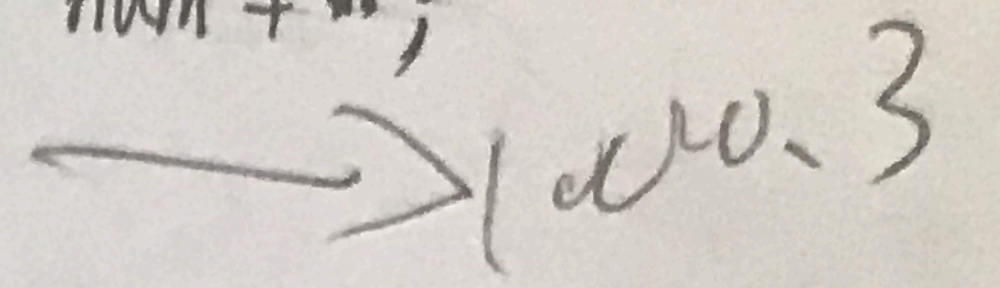
```
tep = tep tep.toString().splice(point, 0, ",")
return parseInt(tep);
```

```
var t;
if (typeof num !== 'number' || isNaN(num)) return
```

```
if (n < 1000) return num + "";
```

```
t = num % 1000;
```

```
return t + ',' + '000';
```



```
2. var i = 10000;
var istr = i.toString();
```

```
for (var idx = istr.length - 1; idx >= 0; idx--)
```

```
istr.splice(idx, 0, ",")
```

Array.prototype.splice


```
let re = ("+String).split("");
```

```
re.reverse() case res = []
```

```
re.map((v)  
for (let i = 0; i < re.length; i += 3) {
```

```
res.push res.unshift(re[i], re[i+1], re[i+2])  
res.unshift(';')
```

```
res.reverse()  
return res.join("") }
```

JS实现千位分隔符，位数不限，可兼容负数

```
function splitNum (val) {
```

```
var tep = typeof (val) === 'number' ? val : parseInt(val);
```

```
if (tep === NaN) return;
```

```
if (tep < 1000) return tep;
```

```
var point = tep.toString().length - 4;
```

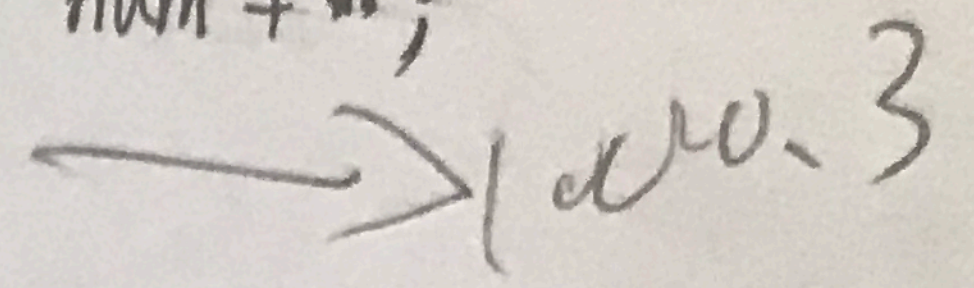
```
tep = tep tep.toString().splice(point, 1) + "  
return parseInt(tep);
```

```
var t;  
if (typeof num !== 'number' || isNaN(num)) return
```

```
if (n < 1000) return num + "";
```

```
t = num % 1000;
```

```
return t + ',' + '000';
```



1000.00
-1000
-1000.00
¥ 1000
壹仟圆整

```
toString().  
tr.length - 1; idx >= 0; t  
ce(idx, 0, "  
prototype.splice
```

```
// 中文数值处理
```

```
if (!(/\d/.test(source))) {  
  source = chineseToNumber(source)  
}
```

```
// 带前置符号的数字字符替换掉符号
```

```
if (typeof source === 'string') {  
  source = source.replace(/^[^0-9\.\-]/g, '')  
}
```

```
// 小数点处理
```

```
let number = (source || 0).toString()  
let splitted = number.split('.')
```

Robustness Principle

健壮性原则

- 一. 安全 [恶意输入]
- 二. 灵活 [接收多样化的输入]
- 三. 完整 [周全的实现]

Robustness Principle

健壮性原则

一. 安全 [恶意输入]

二. 灵活 [接收多样化的输入]

三. 完整 [周全的实现]

永远不要相信用户的输入!

不确定性

DEVICE-AGNOSTIC

以下假设:

- 1、常用浏览器
- 2、笔记本屏幕
- 3、3G以上网速
- 4、鼠标操作



it suck

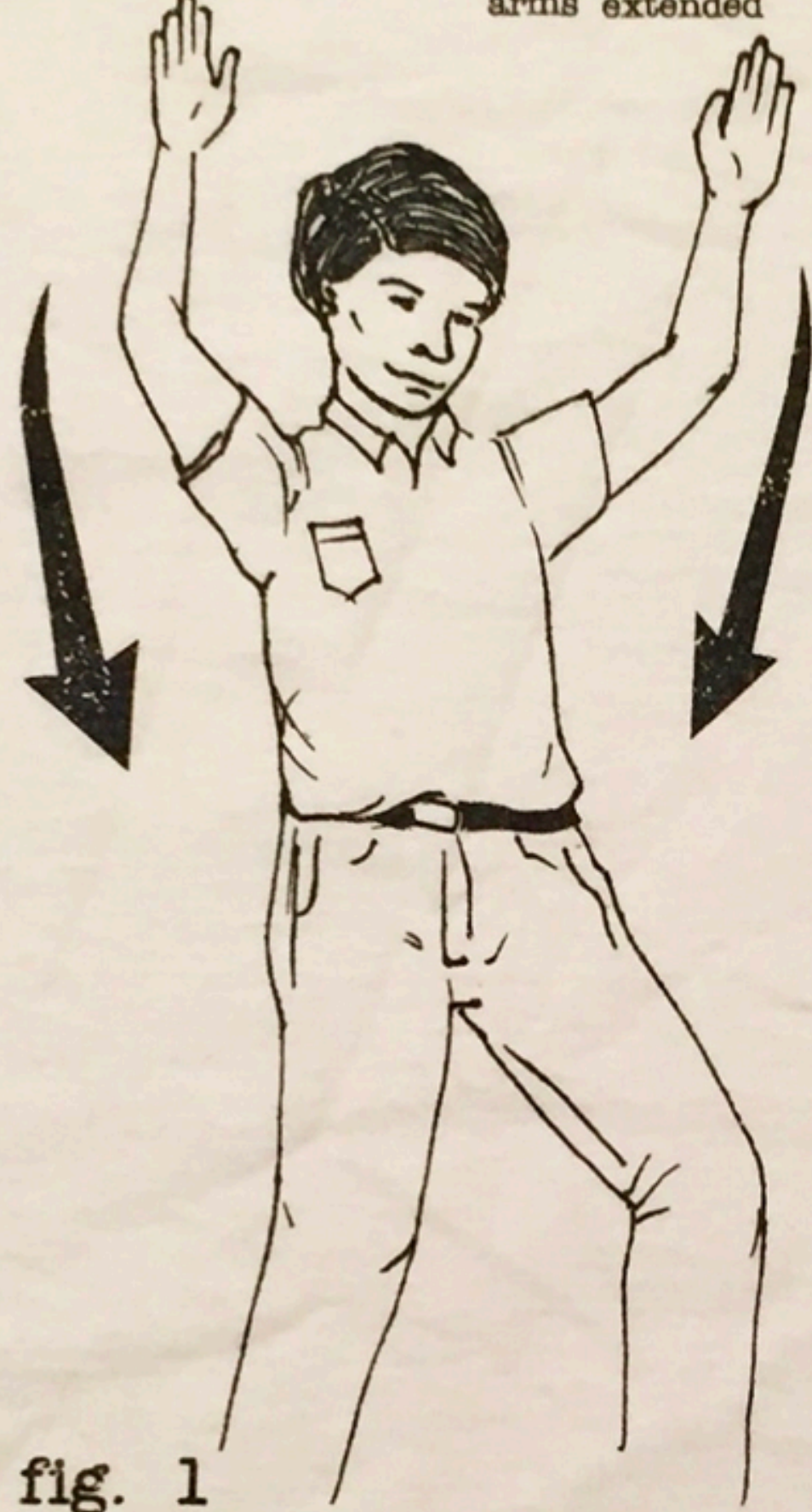


fig. 1

vigorous thrust forward



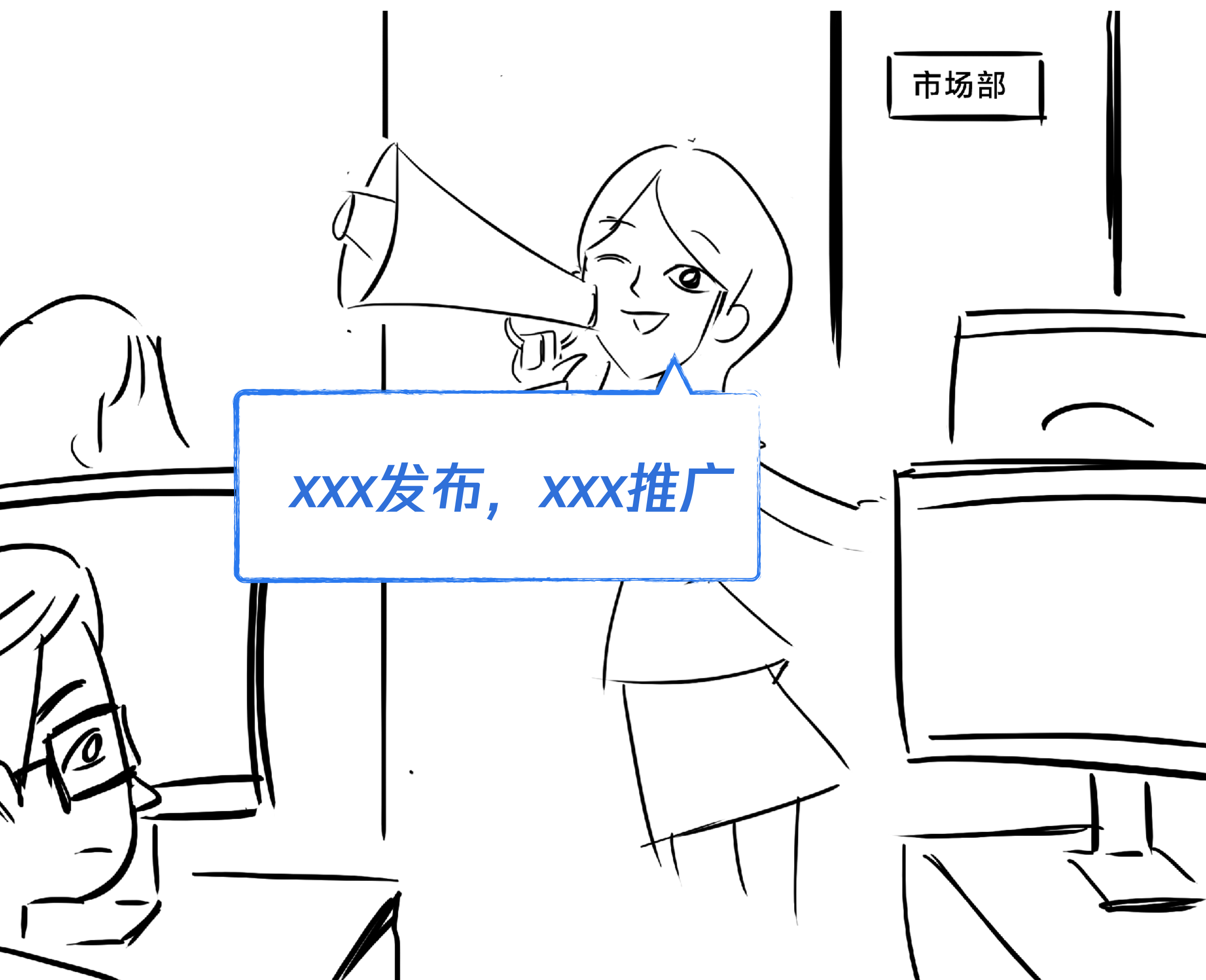
place hands in
"X" formation

fig. 2

(illustration only)

Device-Agnostic

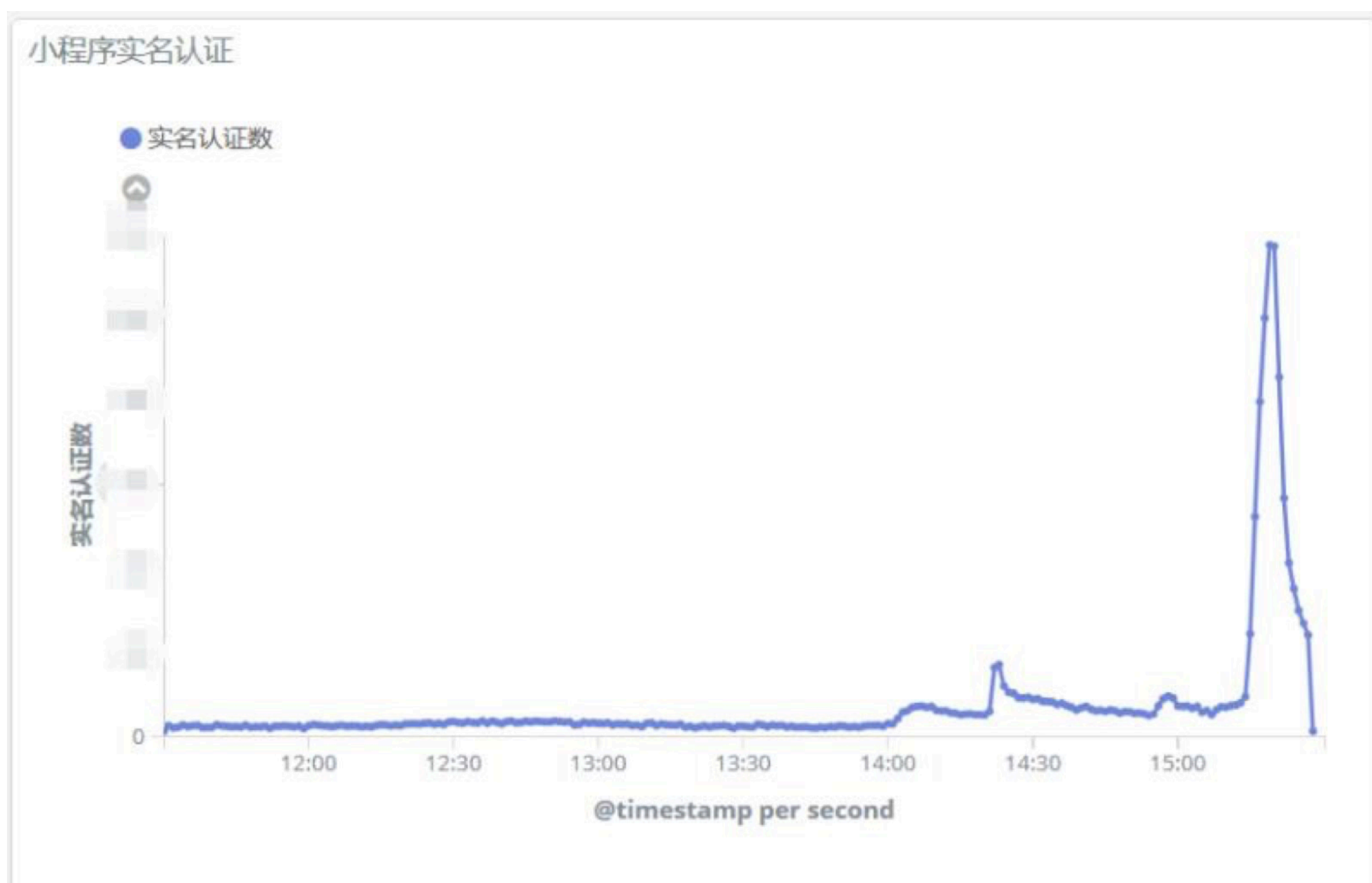
不确定性



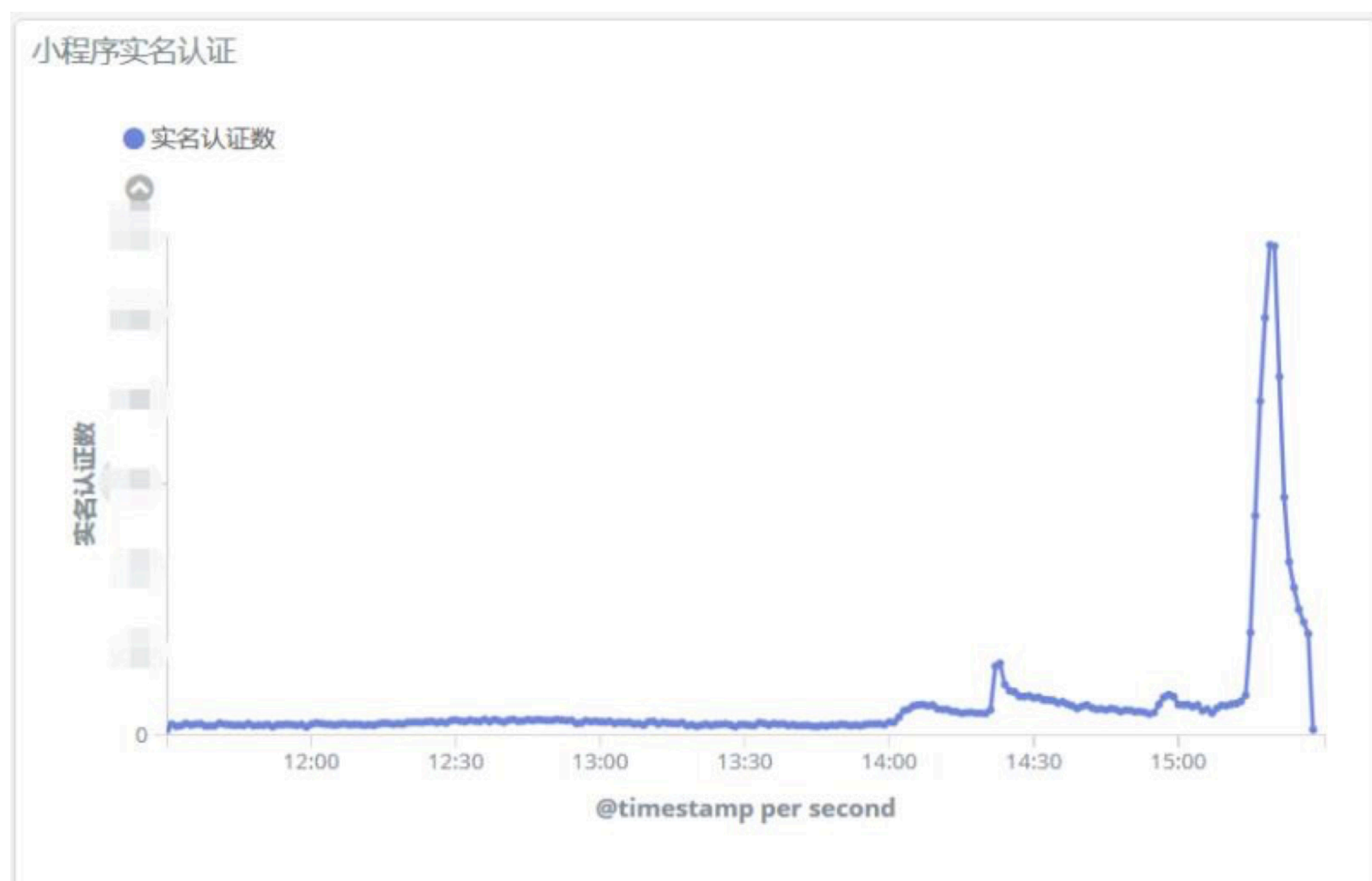
Device-Agnostic
不确定性



Device-Agnostic 不确定性



Device-Agnostic 不确定性



A person is silhouetted while operating a scissor lift at a construction site during dusk. The background shows a building under construction with various structural elements and scaffolding. The overall scene is dark and atmospheric.

“Anything that can go wrong will go wrong.”

- Murphy's law





为什么汽车需要在极端环境测试？

即使车主永远不会这样开

Device-Agnostic
不确定性

Device-Agnostic

不确定性

推向极限:

`min-width: min-content;`

`serviceWorker`

Device-Agnostic

不确定性

推向极限:

```
min-width: min-content;
```

serviceWorker

推翻假设:

```
@media not screen and (hover: hover) {  
  /* ... */  
}
```

Device-Agnostic

不确定性

推向极限:

```
min-width: min-content;
```

serviceWorker

能力监测:

```
@supports not (display: flex) {  
  .box { display: inline-block; width: 25%; }  
}
```

推翻假设:

```
@media not screen and (hover: hover) {  
  /* ... */  
}
```

Device-Agnostic

不确定性

推向极限:

```
min-width: min-content;
```

serviceWorker

能力监测:

```
@supports not (display: flex) {  
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```

推翻假设:

```
@media not screen and (hover: hover) {  
  /* ... */  
}
```

渐进增强:

#CSSNakedDay

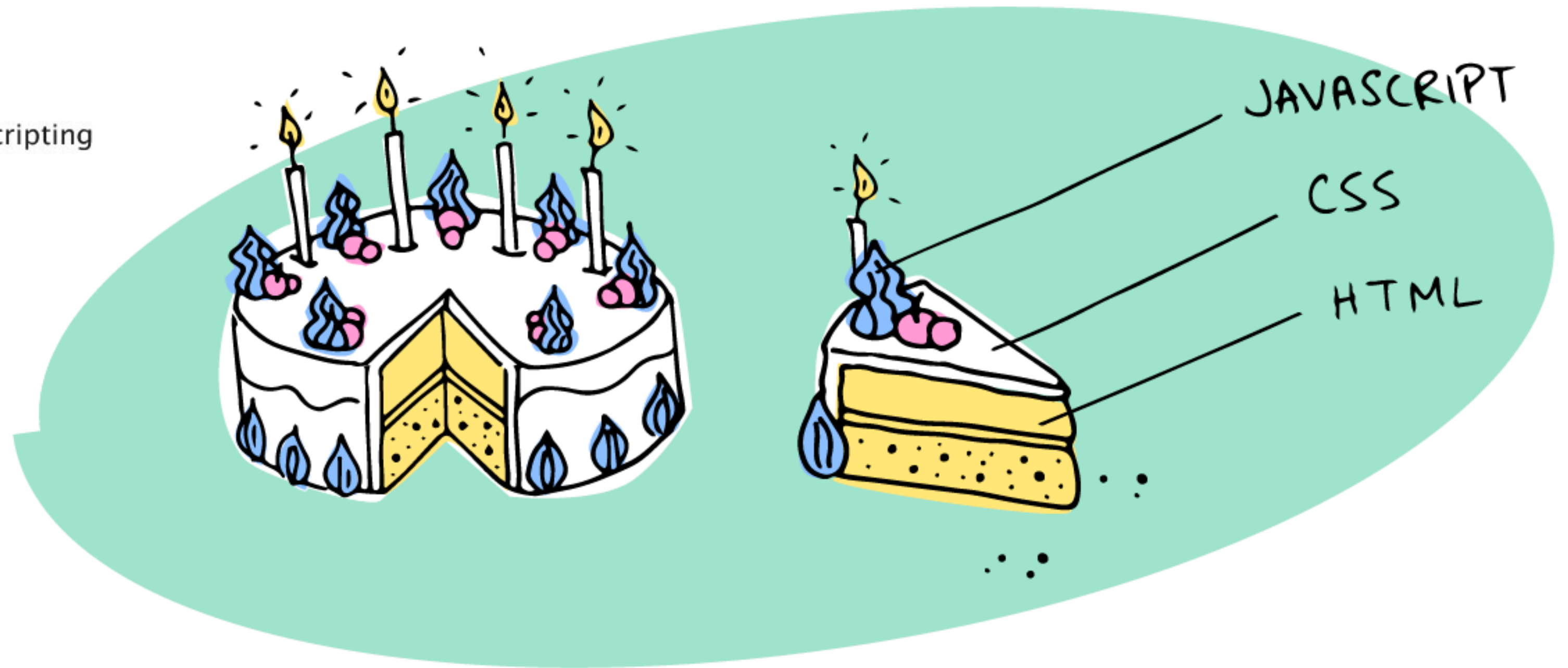
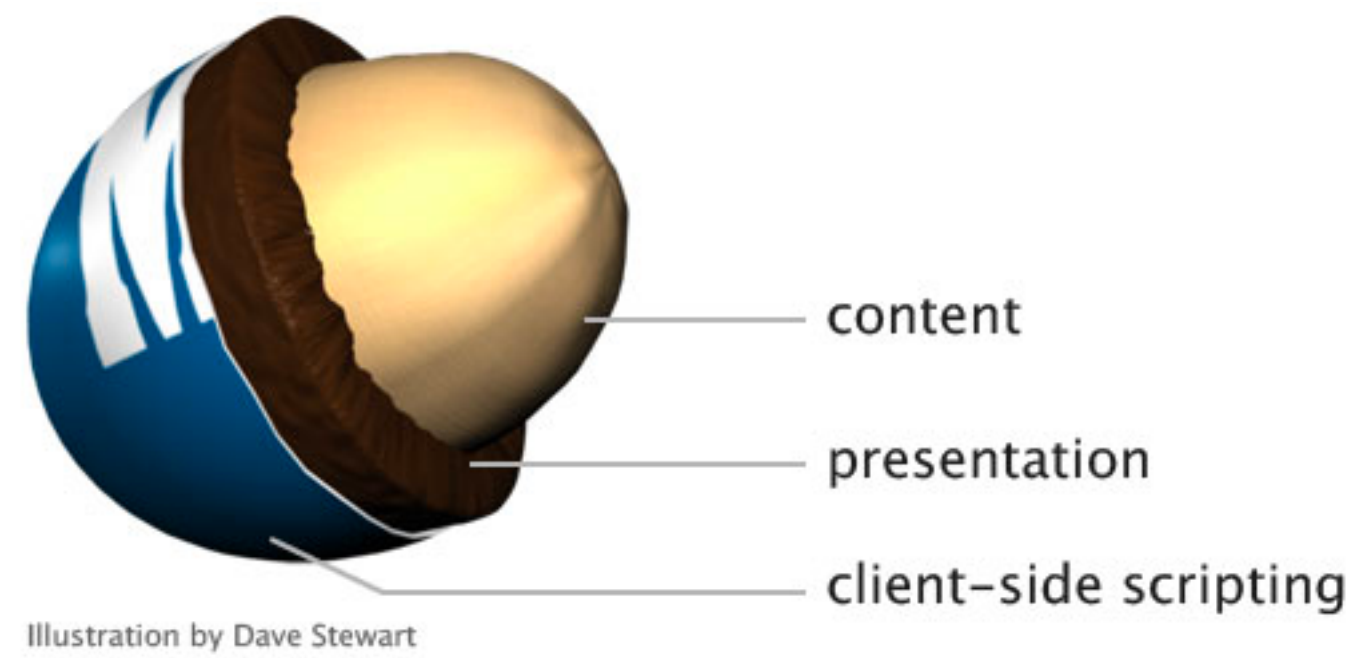
Device-Agnostic
不确定性

时刻准备为用户兜底!

渐进增强

PROGRESSIVE ENHANCEMENT

Progressive Enhancement 渐进增强



<https://www.shopify.com/partners/blog/what-is-progressive-enhancement-and-why-should-you-care>

Progressive Enhancement

渐进增强



爱设计,爱开发,爱摄影,爱互联网.

时代不同了, 忘了向下支持关闭js模式吧, 现在只有很少的纯粹内容类网站才还能完全不用js

发布于 2015-06-11



三流的前端开发者, 二流的音乐爱好者, 好像没有什么一流的...

6 人赞同了该回答

求放过程序员一条生路吧...

又要酷炫拽掉渣天的效果, 又要交互如德芙般丝滑, 最后你还要禁用JS?

发布于 2015-06-12



一只写代码的

6 人赞同了该回答

明显是死读书的典范啊。提倡循序渐进那是很早的事情了。现在能兼容到ie9就是天地良心了。更别说禁用JS。。。

发布于 2015-06-12



跳槽去做前端的嵌入式研究僧

3 人赞同了该回答

现在还有多少不支持js的浏览器?

你手动关闭js 那是你自己的问题。和开发没有关系。开发只关注大多数人。向下支持一部分旧版浏览器。并不会特意去支持一些过于小众的人。

简单说。不支持js 无法使用支付系统, 为啥还要支持你这个浏览器打开网页呢?

换句话说。你连买个很便宜的新电脑的钱都没有, 为啥还要支持你网上购物?

编辑于 2015-06-11

渐进增强就是 `<noscript>`?



特殊字体标题 *stylized font*

```
<h3></h3>
```

特殊字体标题 stylized font

```
<h3>特殊字体标题 stylized font</h3>
```

```
<style>
```

```
h3 {
```

```
  height: 92px;
```

```
  width: 1036px;
```

```
  text-indent: -9999px;
```

```
  background: url(title.png) no-repeat;
```

```
  overflow: hidden;
```

```
}
```

```
</style>
```

特殊字体标题 stylized font

复制粘贴

页面内搜索

放大

翻译取词

.....

特殊字体标题 stylized font

复制粘贴

页面内搜索

放大

翻译取词

.....

特殊字体标题 *stylized font*

```
h3 {  
  font-family: hanzipen;  
  font-size: 88px;  
  font-weight: normal;  
  margin: 0;  
  padding: 0;  
}
```

```
@font-face {  
  font-family: 'hanzipen';  
  src: url('hanzipen.eot');  
  src: url('hanzipen.eot?#iefix') format('embedded-opentype'),  
  url('hanzipen.woff2') format('woff2'),  
  url('hanzipen.woff') format('woff'),  
  url('hanzipen.ttf') format('truetype'),  
  url('hanzipen.svg#svgFontName') format('svg');  
}
```

特殊字体标题 *stylized font*

```
h3 {  
  font-family: hanzipen;  
  font-size: 88px;  
  font-weight: normal;  
  margin: 0;  
  padding: 0;  
}
```

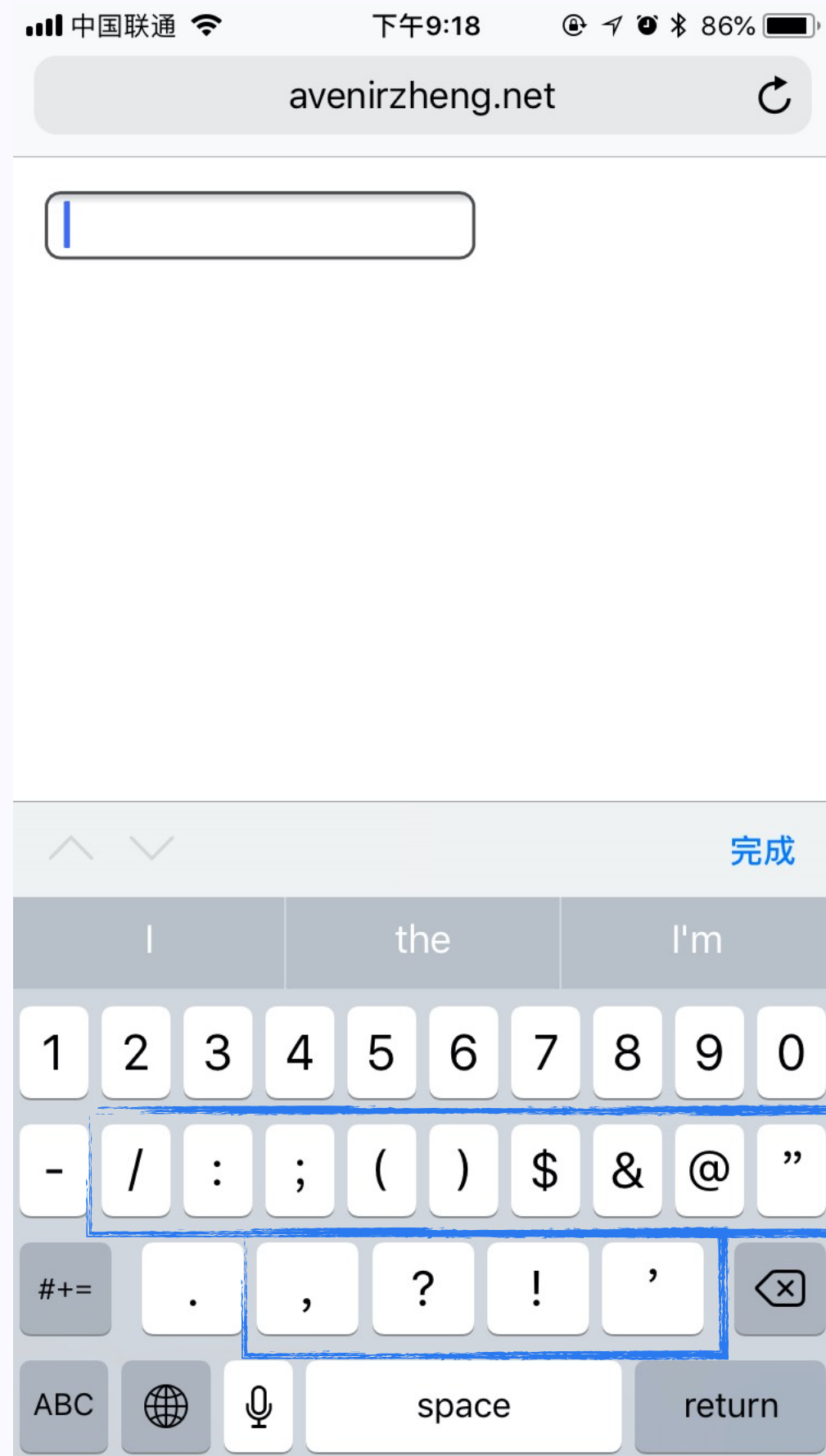
```
@font-face {  
  font-family: 'hanzipen';  
  src: url('hanzipen.eot');  
  src: url('hanzipen.eot?#iefix') format('embedded-opentype'),  
  url('hanzipen.woff2') format('woff2'),  
  url('hanzipen.woff') format('woff'),  
  url('hanzipen.ttf') format('truetype'),  
  url('hanzipen.svg#svgFontName') format('svg');  
}
```

Progressive Enhancement

渐进增强

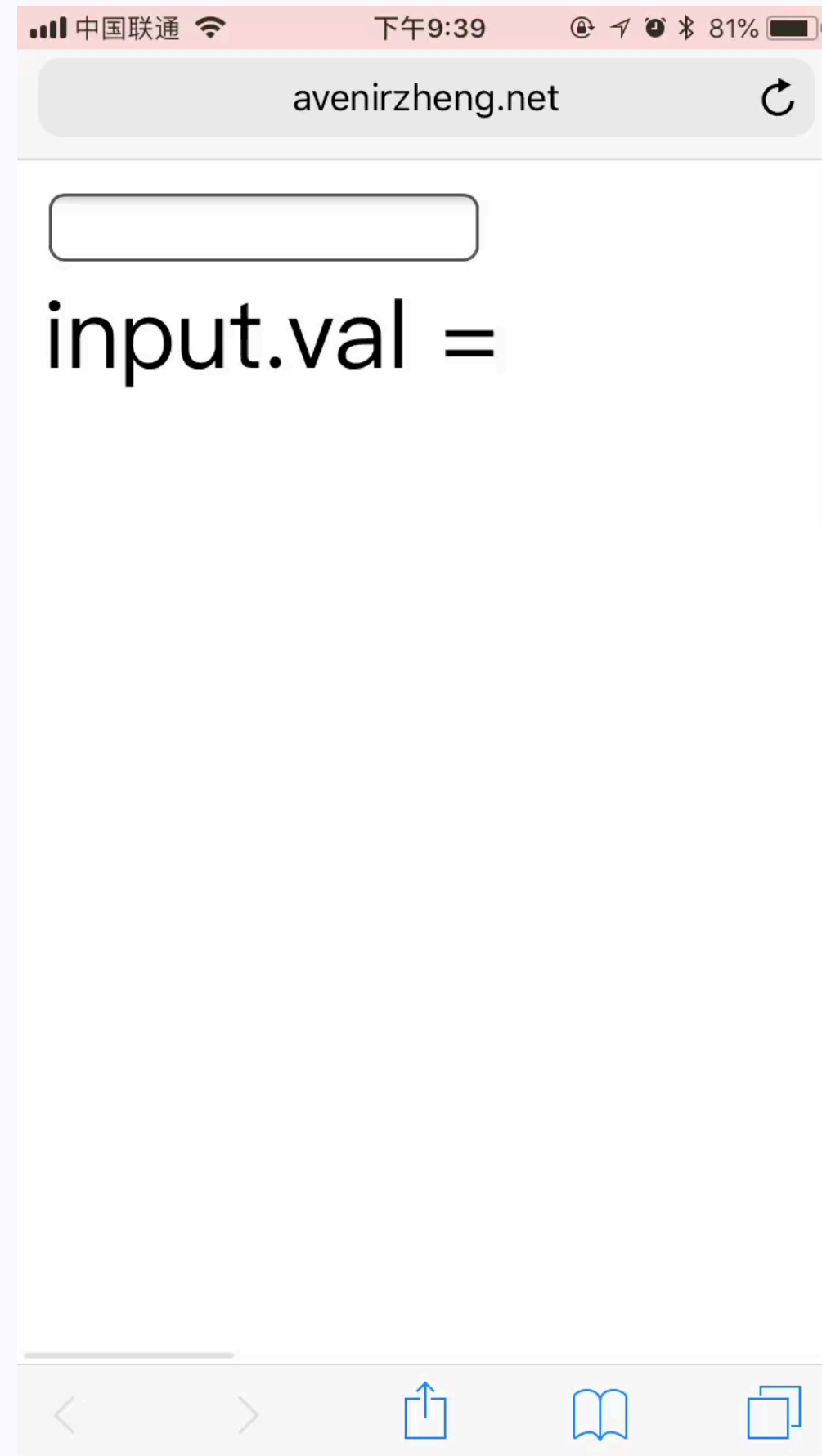
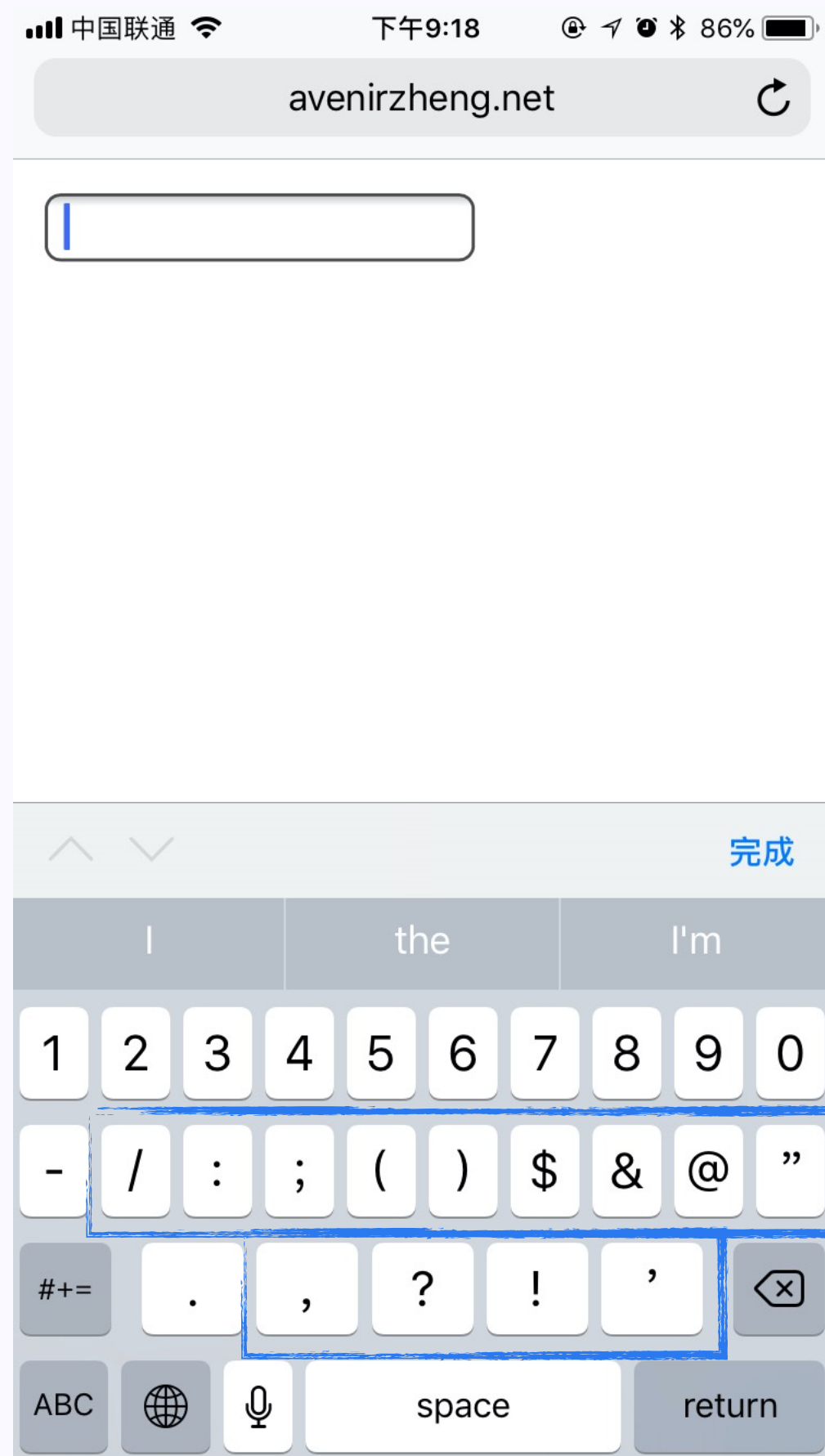
依赖可靠技术，保证核心内容

Progressive Enhancement 渐进增强



```
<input type="number"/>
```

Progressive Enhancement 渐进增强



```
<input type="number"/>
```

```
input.type = 'number';

input.onfocus = function() {
  setTimeout(function() {
    input.type = 'text';
  }, 1);
};
```

it suck

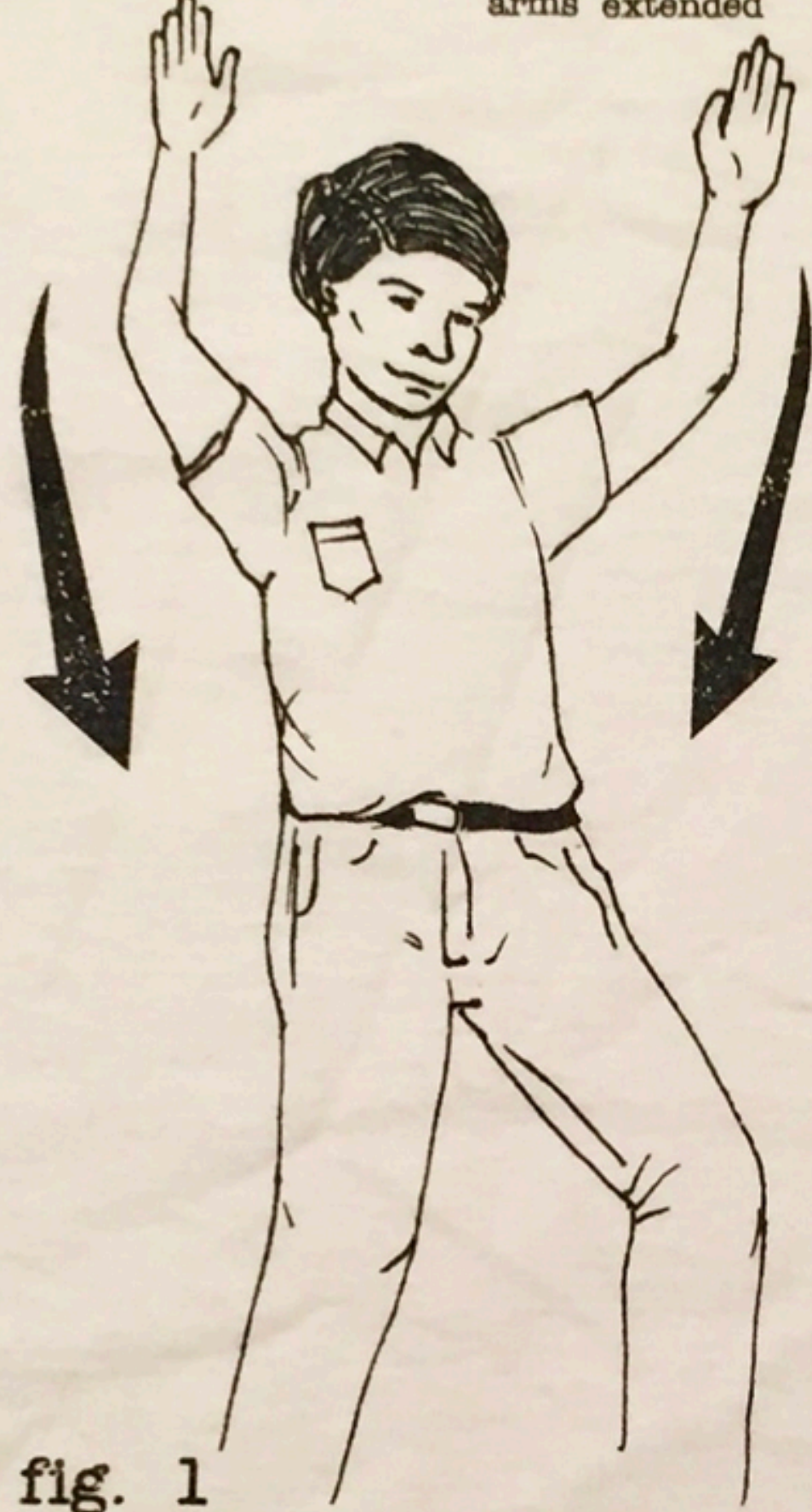


fig. 1

vigorous thrust forward

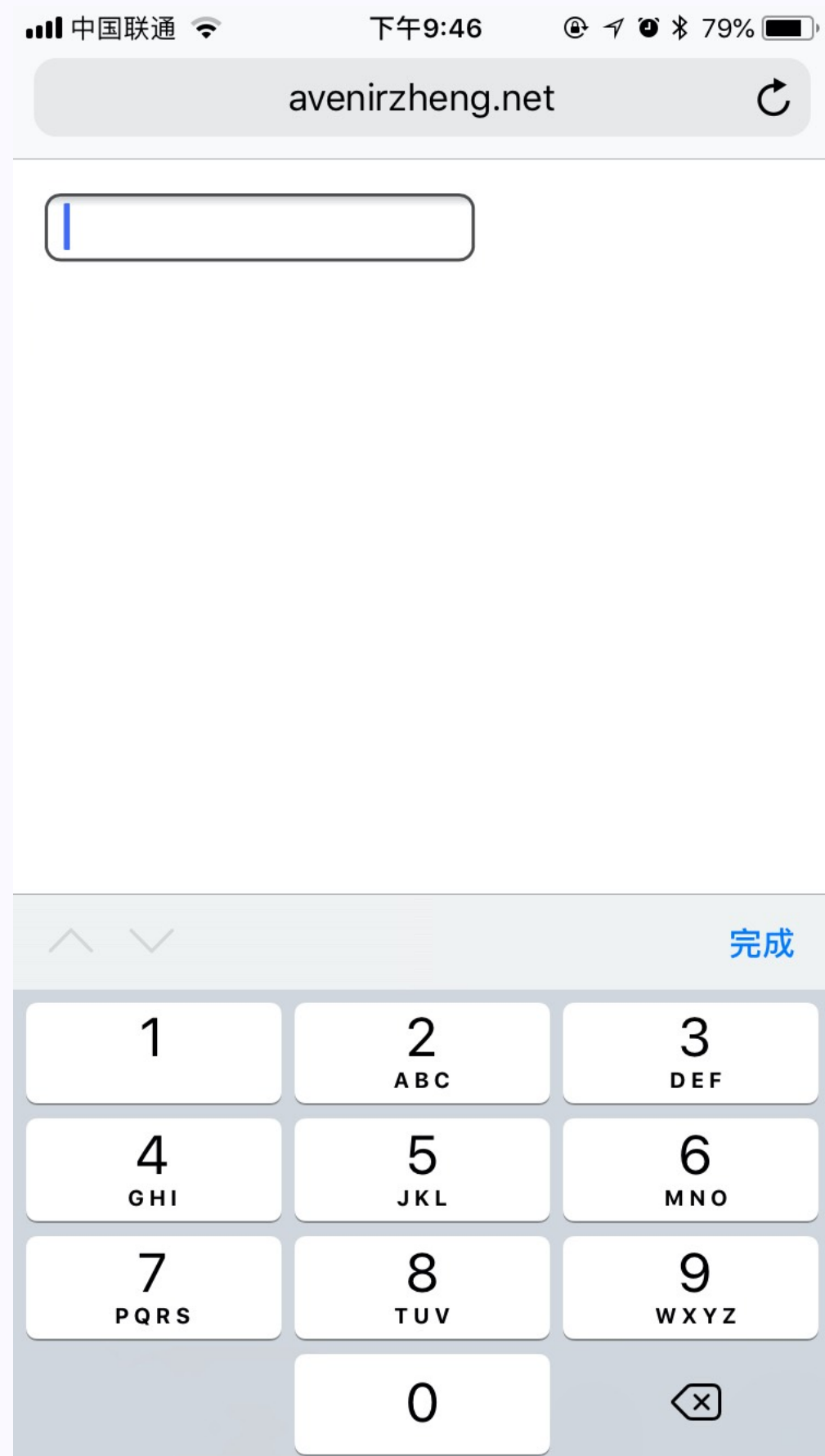


place hands in X formation

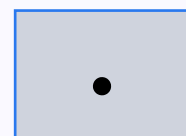
fig. 2

(illustration only)

Progressive Enhancement 渐进增强



```
<input type="number" pattern="[0-9]*"/>
```



Progressive Enhancement

渐进增强

```
<input type="text" pattern="[0-9]+([\.,][0-9]+)?" inputmode="decimal"/>
```

Progressive Enhancement 渐进增强

```
<input type="text" pattern="[0-9]+([\.,][0-9]+)?" inputmode="decimal"/>
```

定制组件

Cancel		Done
1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
.	0	⌫

```
<link rel="import" href="decimal-input.html" />  
<decimal-input></decimal-input>
```

Progressive Enhancement

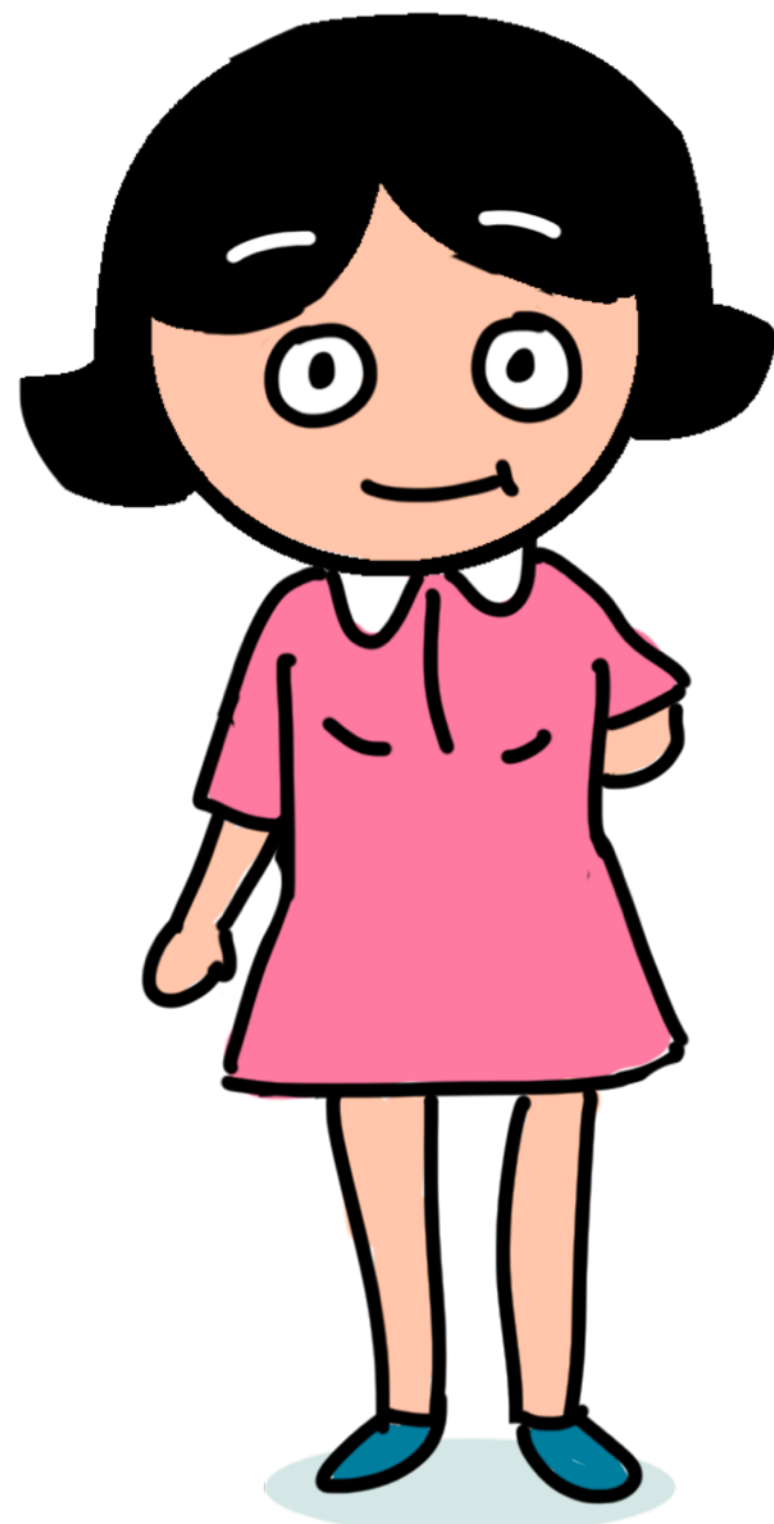
渐进增强

业务场景确定技术底线

通用性设计

UNIVERSAL DESIGN

通用性!≠无障碍



残障



受伤



暂时

永久



场景

通用性 \neq 专门设计

Universal Design 通用性设计

avenirzheng.net

返回省办事大厅 市府首页 政务公开 法人事项 个人事项 政民互动 效能监督 用户登录

广东省网上办事大厅 广州分行 区县分厅

流动人口一孩生育登记

主管部门: 罗南居委办事点 ☆收藏 👤中介服务

在线申办 大厅预约 办事指南评价 表格下载 常见问题

网上申办到现场不超过 1次

基本信息

事项类型	公共服务	实施机构	罗南社区居委会	承诺办结时限
服务对象	符合政策内生一孩的流动人口	服务事项编码	30284500144011118415440111	
办件类型	承诺件	结果名称	暂无	结果样本
物流快递	不支持物流快递			
数量限制	无			

办事窗口

1、基本信息
2、受理条件
3、设定依据
4、申请材料
5、办理流程
6、服务收费
7、常见问题

材料信息
填报须知
受理标准

网上办理流程
窗口办理流程



Universal Design
通用性设计



颜色
图形
声音
操作时长



颜色
图形
声音
操作时长

对所有人都友好

```
<meta name="viewport" content="width=device-width, initial-scale=1,  
minimum-scale=1.0, maximum-scale=1.0, user-scalable=no">
```

```
body {  
  -webkit-text-size-adjust: 100% !important;  
}
```

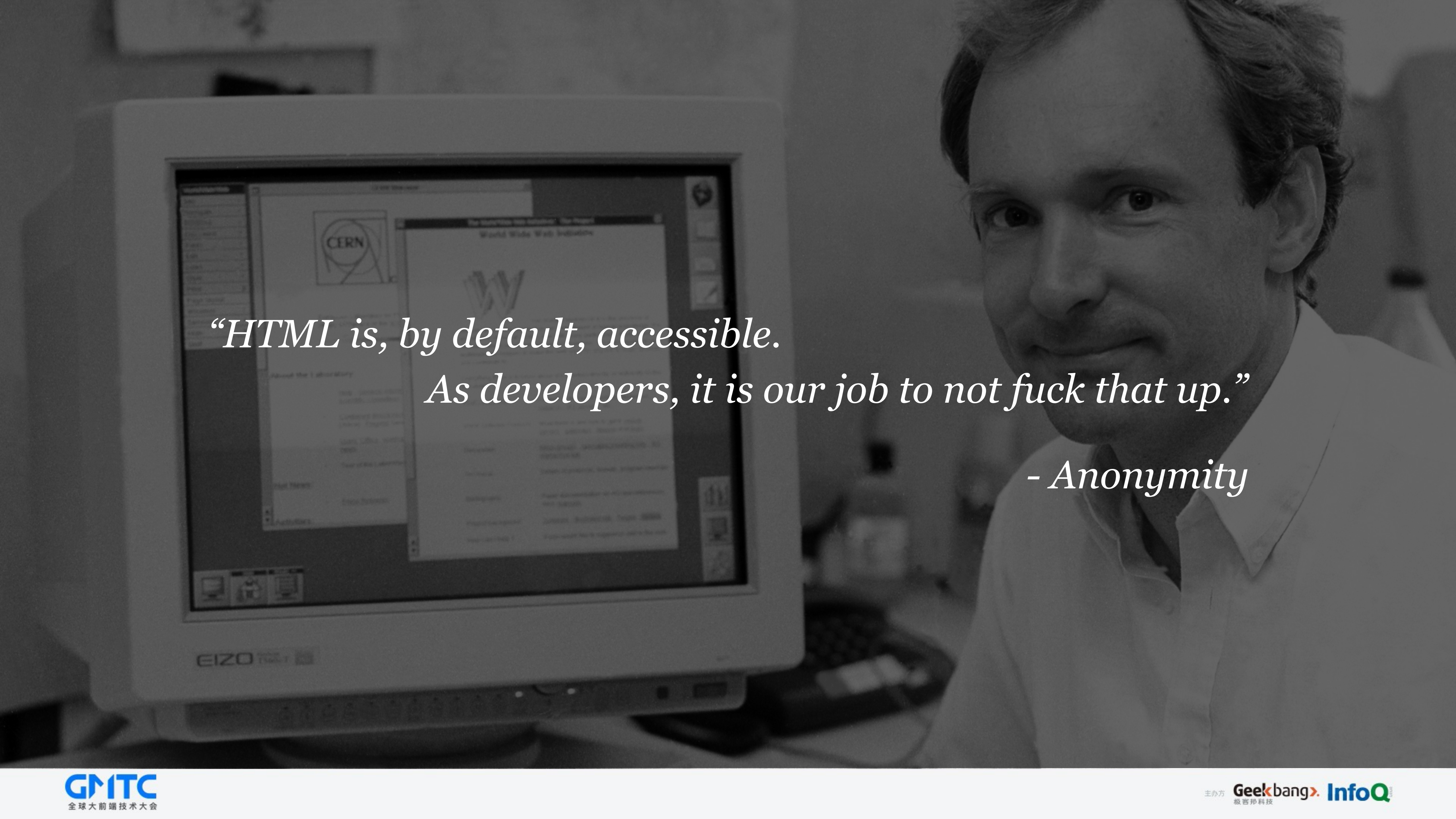


```
<meta name="viewport" content="width=device-width, initial-scale=1,  
minimum-scale=1.0, maximum-scale=1.0, user-scalable=no">
```

```
body {  
  -webkit-text-size-adjust: 100% !important;  
}
```



关闭了用户自主选择能力

A man with short dark hair, wearing a light-colored button-down shirt, is looking towards the camera with a slight smile. In the background, a computer monitor displays a web browser window showing the CERN World Wide Web Initiative website. The website has a CERN logo and the text "World Wide Web Initiative". The monitor is an EIZO brand. The overall scene is dimly lit, with the man and the monitor being the primary focus.

*“HTML is, by default, accessible.
As developers, it is our job to not fuck that up.”*

- Anonymity

Universal Design

通用性设计

```
<template>
  <label>开户地市:</label>

  <autocomplete
    :items="[ '广州市', '深圳市', '汕头市', '汕尾市', ..... ]"
  />

  <p>请选择开户地市</p>

</template>
```

*开户地市：

汕
汕头市
汕尾市

⚠ 请选择开户地市

Universal Design

通用性设计

```
<template>
  <label id="cityLabel">开户地市:</label>

  <autocomplete
    :items="[ '广州市', '深圳市', '汕头市', '汕尾市', .....]"
    :aria-labelledby="cityLabel" :aria-describedby="cityMessage"
  />

  <p id="cityMessage" :aria-live="polite" >请选择开户地市</p>
</template>
```

*开户地市：

⚠ 请选择开户地市

Universal Design

通用性设计

```
<template>
  <div
    .....
    role="combobox" aria-haspopup="listbox" aria-owns="cityResults"
  >
    <input
      .....
      aria-controls="cityResults"
    />
    <ul
      id="cityResults"
      role="listbox"
      @keyup.down="onArrowDown"
      @keyup.up="onArrowUp"
      @keyup.enter="onEnter"
      .....
    >
      <li></li>
    </ul>
  </div>
</template>
```

*开户地市：

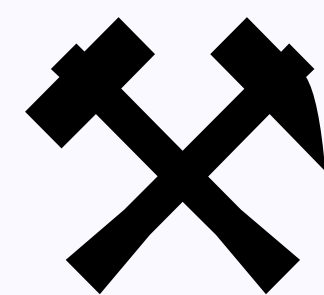
汕
汕头市
汕尾市

Universal Design 通用性设计

```
<template>
  <div
    .....
    role="combobox" aria-haspopup="listbox" aria-owns="cityResults"
  >
    <input
      .....
      aria-controls="cityResults"
    />
    <ul
      id="cityResults"
      role="listbox"
      @keyup.down="onArrowDown"
      @keyup.up="onArrowUp"
      @keyup.enter="onEnter"
      .....
    >
      <li></li>
    </ul>
  </div>
</template>
```

*开户地市：

汕
汕头市
汕尾市



提供原生能力

Universal Design

通用设计

对所有人都友好

四条 设计原理

- 一. 健壮性原则 *Robustness Principle*
- 二. 不确定性 *Device-Agnostic*
- 三. 渐进增强 *Progressive Enhancement*
- 四. 通用性设计 *Universal Design*

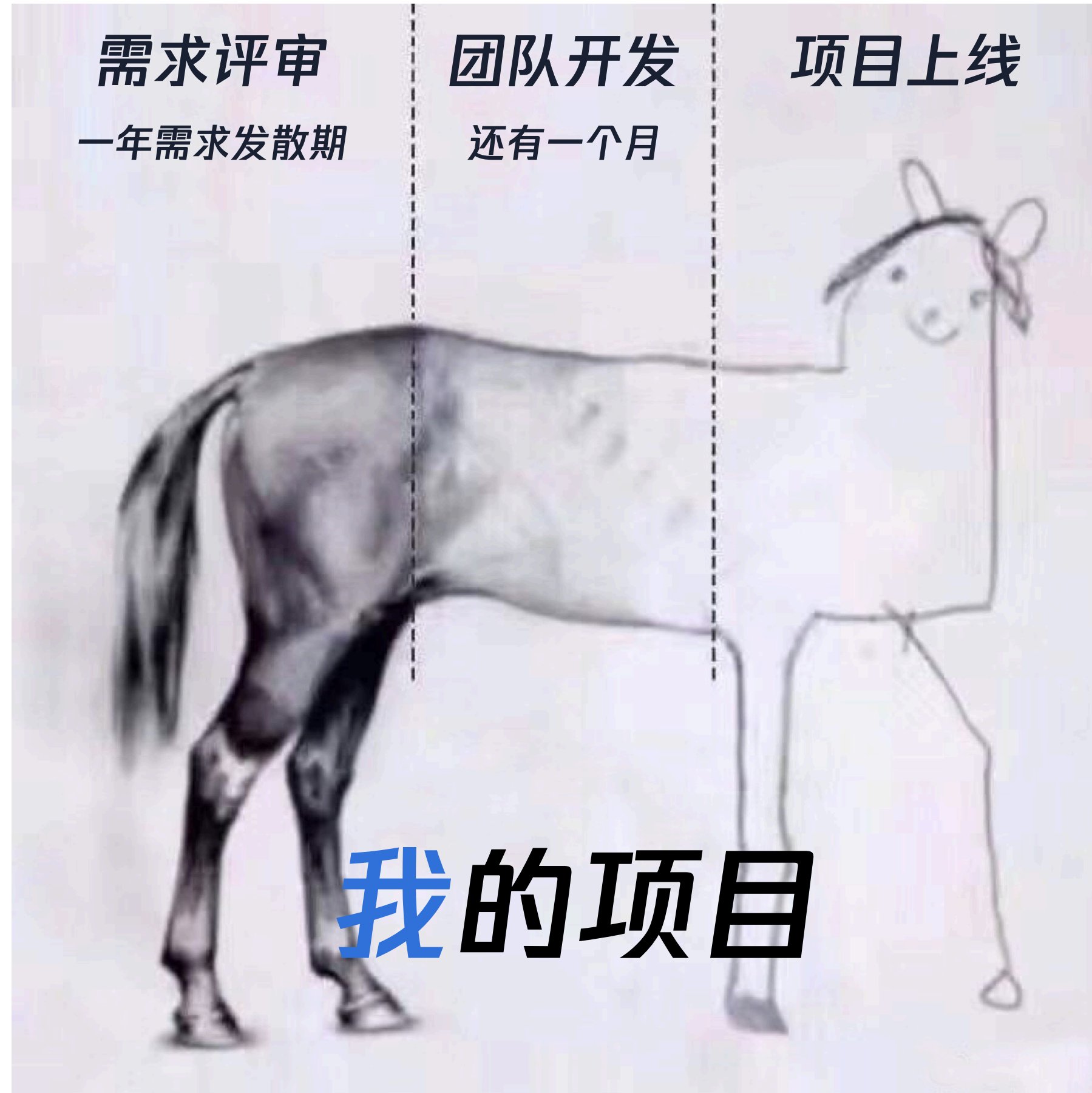
How? 

03

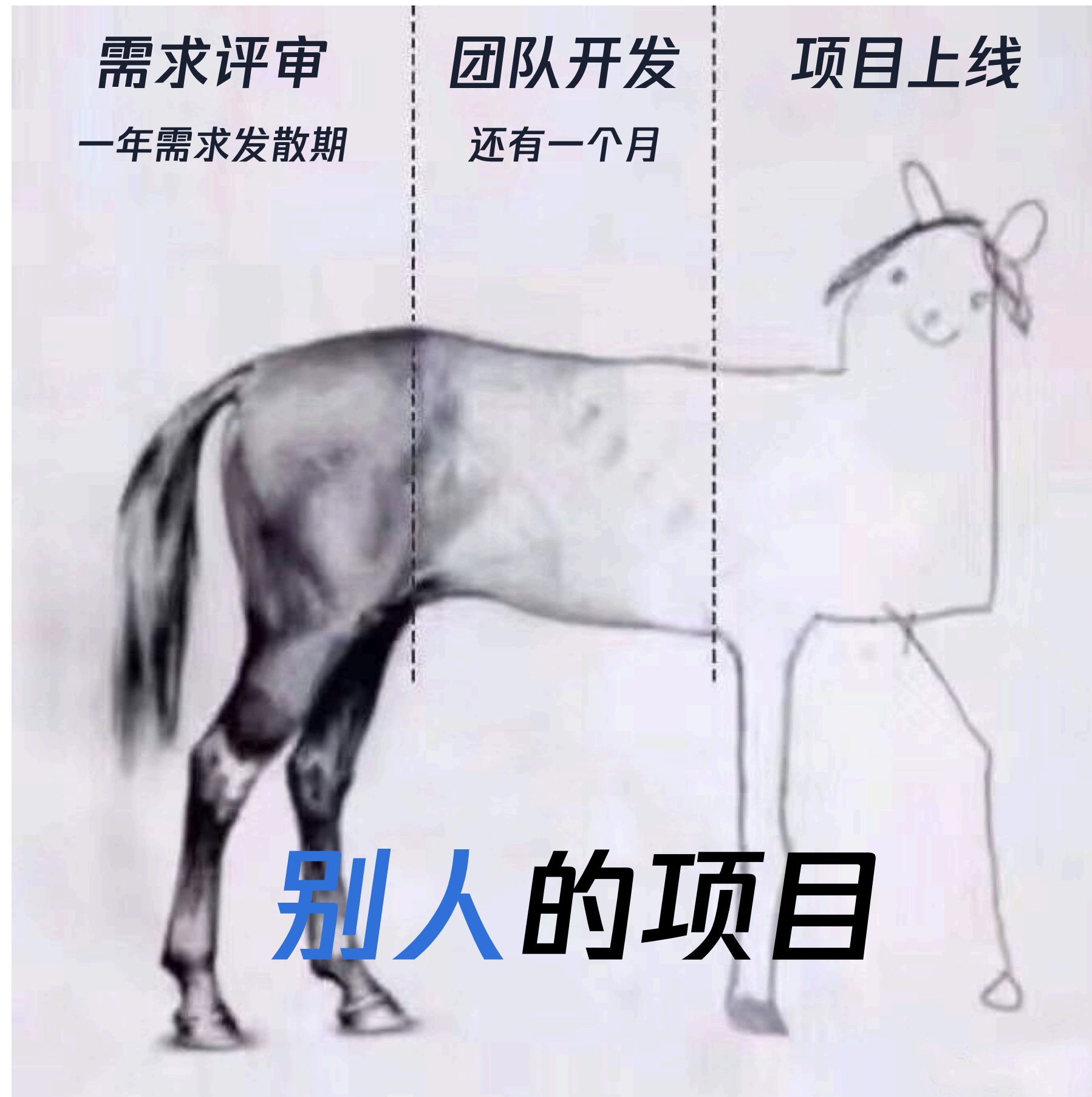
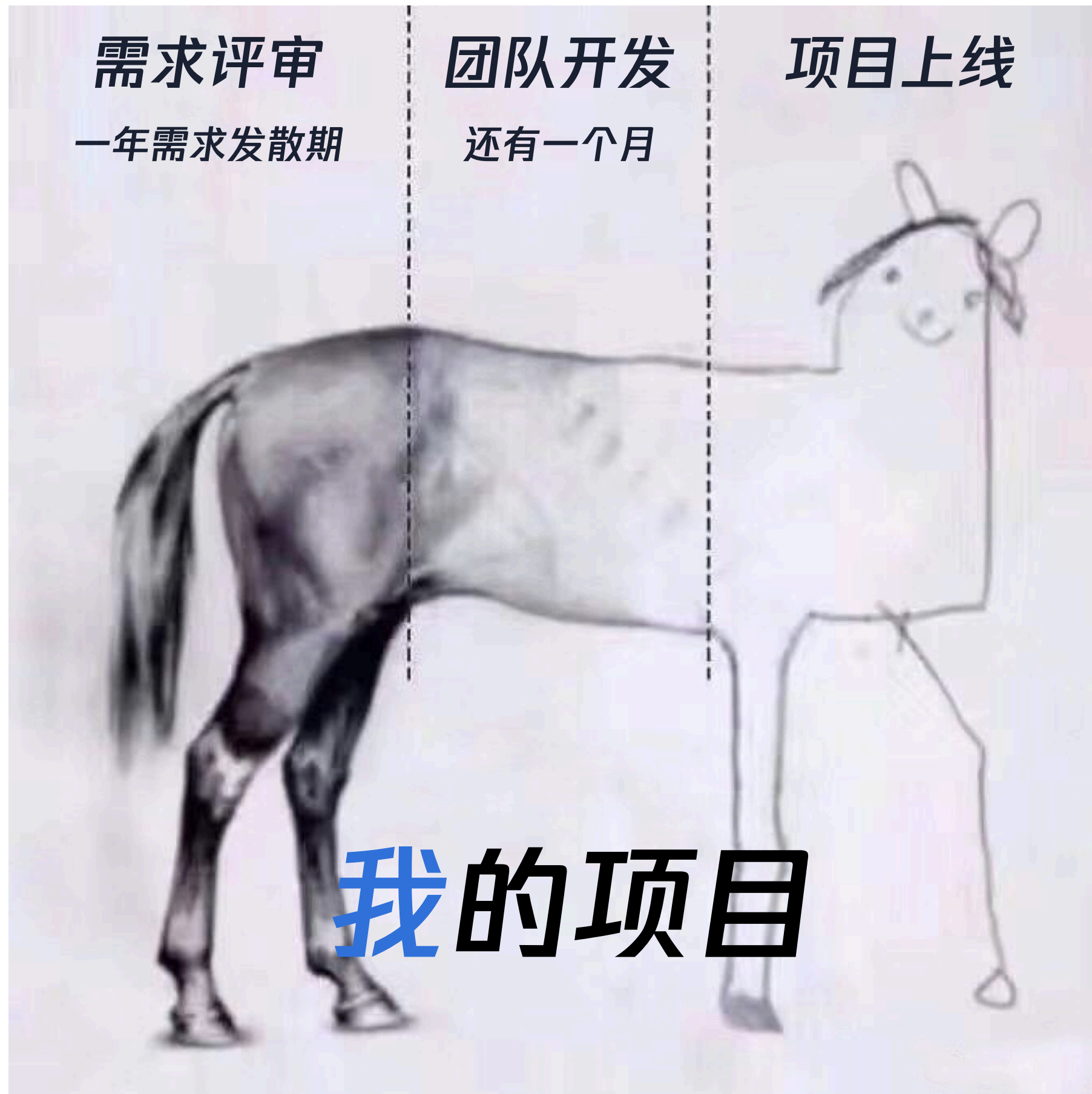
现实

REALITY

Reality
项目现实



Reality
项目现实





用户体验 > 开发者体验

Reality
现实

Reality
现实

前端是与用户连接的第一现场

Thank! 🙌