

Event Loop

Event LoopNodejsjavascript

Event Loopnodejsevent loop

- Event LoopHTML5
- NodejsEvent Looplibuv
- libuvEvent LoopHTML5Event Loop

javascript(macrotask)task(microtask)jobs

:

- script
- setTimeout
- setInterval
- setImmediate (NodejsIE10)
- requestAnimationFrame ()
- I/O
- UI rendering ()

:

- process.nextTick (Nodejs)
- Promise
- Object.observe ()
- MutationObserver

Event Loop

Javascript main thread () call-stack

JS

Javascript

Task Queue,



知乎 @mr.z

Event Loop:

1. Javascript(setTimeoutPromise.then)
2. Javascript call-stack
3. microtask queue call-stack **microtask**
4. microtask queue **microtask** **queue** **microtask**
5. microtask queue **microtask** **queue**
6. UI rendering
7. macrotask queue
- 8.
9. 3 - 8
- ...

Event Loop3:

1. macrotask queue
- 2.
3. UI rendering

Node.js Event Loop

libuv



NodeJs

NodeJsEvent Loop6



NodeEvent Loop6:

- timers: setTimeout setInterval clearInterval callback
- I/O callbacks: close callback timers setImmediate()
- idle, prepare:
- poll: I/O
- check: setImmediate callback (setImmediate() setImmediate)
- close callbacks: close callback socket.on('close', fn) http.createServer().on('close', fn)

NodeJs4:

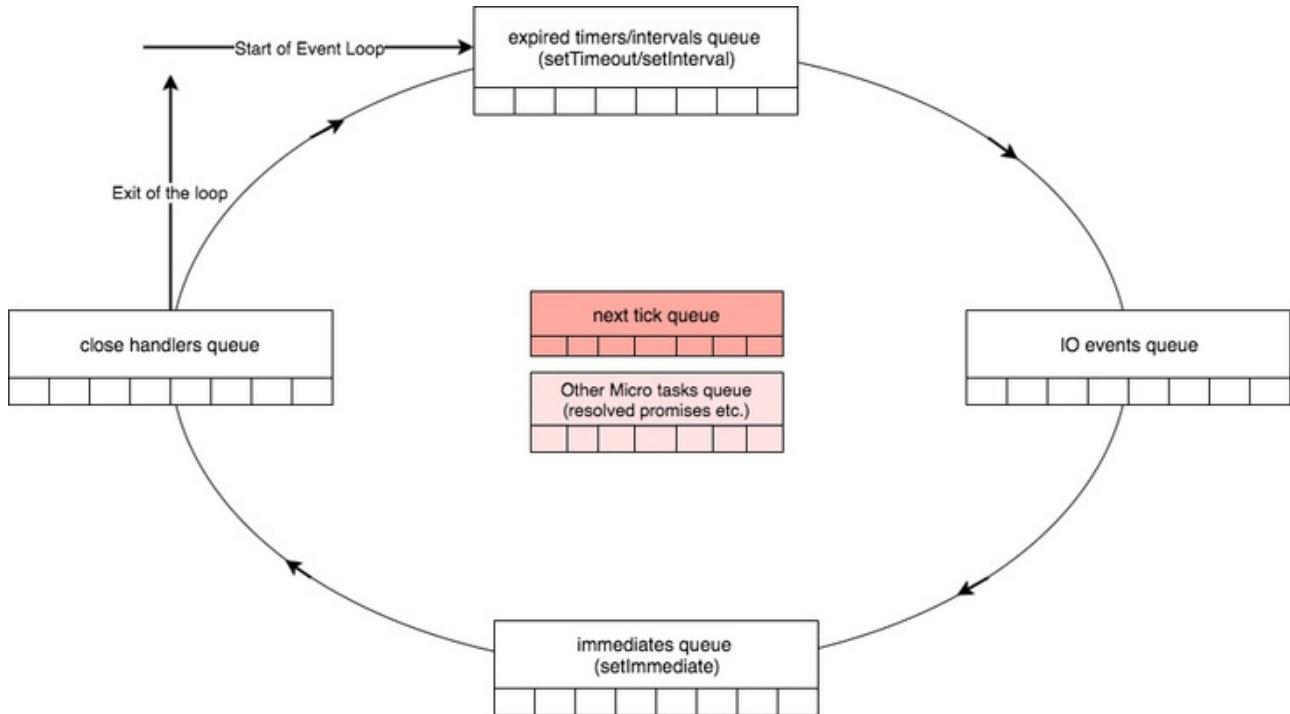
1. Timers Queue
2. I/O Callbacks Queue
3. Check Queue
4. Close Callbacks Queue

NodeJs4

NodeJs2:

1. Next Tick Queue: process.nextTick(callback)
2. Other Micro Queue: microtaskPromise

NodeJs2



NodeJsEvent Loop:

1. Javascript(setTimeoutPromise.then)
 2. Next Tick QueueOther Micro Queue
 3. 61 **Event LoopNodeJsEvent Loop2**
 4. Timers Queue -> 2 -> I/O Callbacks Queue -> 2 -> Check Queue -> 2 -> Close Callback Queue -> 2 -> Timers Queue ->
- :
- NodeJs 11NodeJsEvent Loop
 - NodeJS 11 **timersetTimeout, setInterval...checksetImmediatenode11**

NodeJsEvent Loopmicrotask queue macrotask queue

Microtask





setTimeout(fn, 0) setImmediate(fn)

1. : timer setImmediate Check Queue Timers Queue Timer Queue Check
Queue setImmediate timer setTimeout Timers Queue Timers Queue Timers
Queue setTimeout timer
setImmediate(fn) setTimeout(fn, 0)
2. : timer setTimeout Timers Queue setImmediate Check Queue Timers
Queue Timers Queue timer Check Queue setImmediate
0) setImmediate(fn)
3. setTimeout(fn, 0) setImmediate I/O readFile('xx', function () { // }) IO/I/O Callbacks
Queue setTimeout Timers Queue setImmediate Check Queue I/O Callbacks Queue
Check Queue Timers Queue setImmediate setTimeout(fn, 0)

```

setImmediate(function A() {
  console.log(1);
  setImmediate(function B(){console.log(2);});
});

setTimeout(function timeout() {
  console.log('TIMEOUT FIRED');
}, 0);

// :
// :
// 1
// TIMEOUT FIRED
// 2

// :
// TIMEOUT FIRED
// 1
// 2

```

:

- setImmediate setImmediate setImmediate check check

poll :

poll :

1. timer timer (Executing scripts for timers whose threshold has elapsed, then)
2. poll (Processing events in the poll queue)

poll timers:

- pollEvent Loop poll queue poll queue callback
- poll:
 - setImmediateEvent Loop poll check Check Queue setImmediate
 - setImmediate poll callback

poll timers:

- poll queueEvent Loop Timers QueueEvent Loop timer Timers Queue timers
check I/O callbacks?

setTimeout setImmediate

- setTimeout(fn, 0) timer poll timer
- setImmediate(fn) check

- (main module)
- I/O Circles setImmediate check

setImmediate process.nextTick

- setImmediate(fn)Check Queue
- process.nextTick(fn)Next Tick Queue
- process.nextTick(fn)1000setImmediate

Fetch API

XMLHttpRequestwebfetchXHR

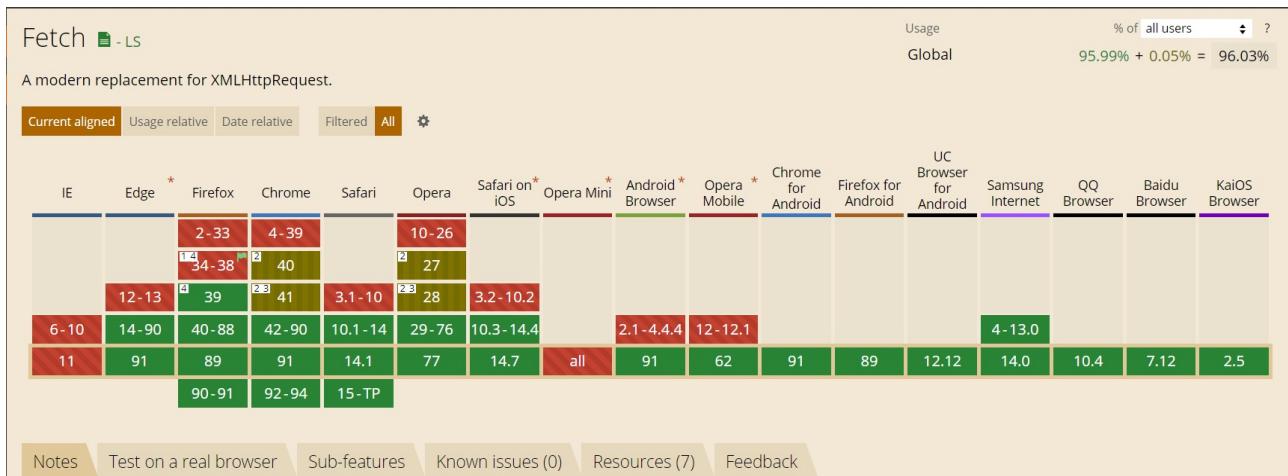
fetchPromiseFetchAPI:

- Promiseasync/await
- isomorphic-fetch

fetchfetch

Fetch

fetchfetch



fetch

fetchfetchpolyfill

fetchPromisePromisePromisePromisepolyfillfetchpolyfill

- promisepolyfilles6-promisebabel-polyfillpromise
- fetchpolyfillisomorphic-fetchwhatwg-fetch

IE8/9IE8ES3IE9ES5ES5polyfill es5-shim

promisepolyfill

babel-runtimePromisepolyfillIE8/9fetchPromisebabel-runtimepolyfillfetchPromise

fetchpolyfill:

fetchPromiseXMLHttpRequestwhatwg-fetchisomorphic-fetchfetchrequire("whatwg-fetch")

fetchcookie

fetchcookie

credentials3

- omit: cookie
- same-origin: cookie
- include: cookie

credentialsXHR2withCredentialscookie

fetchcookiecredentialsfetch(url, {credentials: 'include'});

fetchSet-Cookiecookiecookiecredentials

fetchhttpreject

fetchpromisefetchpromisehttp400500rejectresovlefetch rejectfetch

```
function checkStatus(response) {
  if (response.status >= 200 && response.status < 300) {
    return response;
  }
  const error = new Error(response.statusText);
  error.response = response;
  throw error;
}

function parseJSON(response) {
  return response.json();
}

export default function request(url, options = {}) {
  return fetch(url, { credentials: 'include', ...options })
    .then(checkStatus)
    .then(parseJSON)
    .then((data) => data)
    .catch((err) => err);
}
```

fetchtimeout

fetchajaxtimeoutfetchpolyfill

abort() timeouttimeout+abort

fetchfetchpromisePromiseabortpromisepromise

fetchtimeoutpromisepromiseresolverejecttimeout

github[timeout handling \(https://github.com/github/fetch/issues/175\)](https://github.com/github/fetch/issues/175)

: setTimeout

```
var fetchOrigin = fetch;
window.fetch = function(url, options) {
    return new Promise(function(resolve, reject) {
        var timerId;
        if (options.timeout) {
            timerId = setTimeout(function() {
                reject(new Error('fetch timeout'));
            }, options.timeout);
        }

        fetchOrigin(url, option).then(function(response) {
            timerId && clearTimeout(timerId);
            resolve(response);
        }, function(error) {
            timerId && clearTimeout(timerId);
            reject(error);
        });
    });
}
```

XHRabort

```
var fetchOrigin = fetch;
window.fetch = function(url, options) {
  return new Promise(function(resolve, reject) {
    var abort = function() {
      reject(new Error('fetch abort'));
    };
    const p = fetchOrigin(url, option).then(resolve, reject);
    p.abort = abort;

    return p;
  });
}
```

: Promise.race

Promise.racepromisepromisepromisepromise

```

var fetchOrigin = fetch;
window.fetch = function(url, options) {
  var abortFn = null;
  var timeoutFn = null;

  var timeoutPromise = new Promise(function(resolve, reject) {
    timeoutFn = function () {
      reject(new Error('fetch timeout'));
    }
  });

  var abortPromise = new Promise(function(resolve, reject) {
    abortFn = function () {
      reject(new Error('fetch abort'));
    }
  });

  const fetchPromise = fetchOrigin(url, option);

  if (option.timeout) {
    setTimeout(timeoutFn, option.timeout);
  }

  const promise = Promise.race(
    timeoutPromise,
    abortPromise,
    fetchPromise,
  );

  promise.abort = abortFn;

  return promise;
}

```

fetchtimeout

- timeout
- fetchtimeoutabort

fetchJSONP

fetchJSONP
javascriptJSON““ajaxfetchJSONPJSONP

JSONPfetchfetchajaxfetchJSONPJSONPJSONPfetchPromiseJSONPfetchJSONP

JSONP[fetch-jsonp](https://github.com/camsong/fetch-jsonp) (<https://github.com/camsong/fetch-jsonp>)JSONPJSONP

npmfetch-jsonp

```
npm install fetch-jsonp --save-dev
```

fetch-jsonp:

```
const defaultOptions = {
```

```
    timeout: 5000,
    jsonpCallback: 'callback',
    jsonpCallbackFunction: null,
};

function generateCallbackFunction() {
    return `jsonp_${Date.now()}_${Math.ceil(Math.random() * 100000)}`;
}

function clearFunction(functionName) {
    // IE8 throws an exception when you try to delete a property on window
    // http://stackoverflow.com/a/1824228/751089
    try {
        delete window[functionName];
    } catch (e) {
        window[functionName] = undefined;
    }
}

function removeScript(scriptId) {
    const script = document.getElementById(scriptId);
    if (script) {
        document.getElementsByTagName('head')[0].removeChild(script);
    }
}

function fetchJsonp(_url, options = {}) {
    // to avoid param reassign
    let url = _url;
    const timeout = options.timeout || defaultOptions.timeout;
    const jsonpCallback = options.jsonpCallback || defaultOptions.jsonpCallback;

    let timeoutId;

    return new Promise((resolve, reject) => {
        const callbackFunction = options.jsonpCallbackFunction ||
generateCallbackFunction();
        const scriptId = `${jsonpCallback}_${callbackFunction}`;

        window[callbackFunction] = (response) => {
            resolve({
                ok: true,
                // keep consistent with fetch API
                json: () => Promise.resolve(response),
            });
        };

        if (timeoutId) clearTimeout(timeoutId);

        removeScript(scriptId);

        clearFunction(callbackFunction);
    });
}
```

```

    // Check if the user set their own params, and if not add a ? to start a
    list of params
    url += (url.indexOf('?') === -1) ? '?' : '&';

    const jsonpScript = document.createElement('script');
    jsonpScript.setAttribute('src',
` ${url}${jsonpCallback}=${callbackFunction}`);
    if (options.charset) {
        jsonpScript.setAttribute('charset', options.charset);
    }
    jsonpScript.id = scriptId;
    document.getElementsByTagName('head')[0].appendChild(jsonpScript);

    timeoutId = setTimeout(() => {
        reject(new Error(`JSONP request to ${_url} timed out`));

        removeScript(scriptId);

        clearFunction(callbackFunction);

        //
        window[callbackFunction] = () => {
            clearFunction(callbackFunction);
        };
    }, timeout);

    // Caught if got 404/500
    jsonpScript.onerror = () => {
        reject(new Error(`JSONP request to ${_url} failed`));

        clearFunction(callbackFunction);
        removeScript(scriptId);
        if (timeoutId) clearTimeout(timeoutId);
    };
});

export default fetchJsonp;

```

```

:
fetchJsonp('/users.jsonp', {
    timeout: 3000,
    jsonpCallback: 'custom_callback'
})
.then(function(response) {
    return response.json()
}).catch(function(ex) {
    console.log('parsing failed', ex)
});

```

fetchprogress

XHRprogress

```
var xhr = new XMLHttpRequest();
xhr.open('POST', '/uploads');
xhr.onload = function() {}
xhr.onerror = function() {}
var uploadProgress = function(event) {
  if (event.lengthComputable) {
    var percent = Math.round((event.loaded / event.total) * 100);
    console.log(percent);
  }
};

// progress
xhr.upload.onprogress = uploadProgress;
// progress
xhr.onprogress = uploadProgress;
```

fetchprogressfetchRequestResponseResponseResponseresponse.json()
response.body

response.bodygetRender()

getRender()body

fetchprogress

:

```
// fetch() returns a promise that resolves once headers have been received
fetch(url).then(response => {
  // response.body is a readable stream.
  // Calling getReader() gives us exclusive access to the stream's content
  var reader = response.body.getReader();
  var bytesReceived = 0;

  // read() returns a promise that resolves when a value has been received
  reader.read().then(function processResult(result) {
    // Result objects contain two properties:
    // done - true if the stream has already given you all its data.
    // value - some data. Always undefined when done is true.
    if (result.done) {
      console.log("Fetch complete");
      return;
    }

    // result.value for fetch streams is a Uint8Array
    bytesReceived += result.value.length;
    console.log('Received', bytesReceived, 'bytes of data so far');

    // Read some more, and call this function again
    return reader.read().then(processResult);
  });
});
```

githubPromise+XHRfetchprogress(fetch
<https://github.com/github/fetch/issues/89#issuecomment-256610849>)

```

function fetchProgress(url, opts={}, onProgress) {
  return new Promise((resolve, reject)=>{
    var xhr = new XMLHttpRequest();
    xhr.open(opts.method || 'get', url);

    for (var key in opts.headers||{}) {
      xhr.setRequestHeader(key, opts.headers[key]);
    }

    xhr.onload = function(event) {
      resolve(e.target.responseText)
    };

    xhr.onerror = reject;

    if (xhr.upload && onProgress) {
      xhr.upload.onprogress = onProgress; // event.loaded / event.total * 100 ;
//event.lengthComputable
    }

    xhr.send(opts.body);
  });
}

fetchProgress('/').then(console.log)

```

fetch

ajaxXHR2CORSAccess-Control-Allow-Origin

XHR2fetchXHR2fetchmode

fetchmode3

- same-originerrorresponse typebasic
- cors: CORSCORSresponse typecors
- no-cors: CORSCORSfetchresponse typeopaque

corsfetchno-cors

response typeopaque

APIsServiceWorkerresponseCache APIsscriptcssCDNCORS

fetchCORS

JavaScriptJSnullundefinedArray/Function/Date/RegExpObjectBoolean/Number/String
classJSarguments.lengthES6class

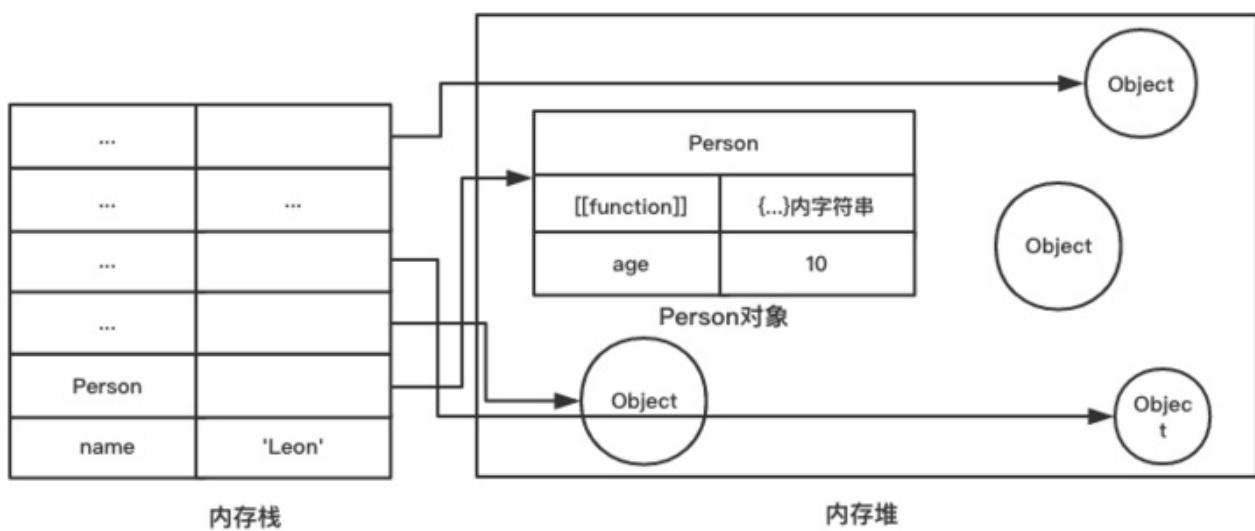
```

var name = 'Hank';
function Person(name) {
    this.name = name;
    this.sayName = function() {
        alert(this.name);
    }
}
Person.age = 10;
console.log(Person.age);      // 10
console.log(Person);
/*
f Person(name) {
    this.name = name;
}
*/

```

JS

`[[function]]()` `eval()`



JSJSPersonPerson[[function]]arguments>this/nameage

JSprototype

constructor

PersonPersonPerson.prototypePerson.prototype.constructorPersonnamesayName()
prototype



```
Person.age; // 10
Person.prototype.age; // 24
```

`new`

```
var person1 = new Person('Lee');
var person2 = new Person('Lucy');
```

person1
person2
[[Prototype]]
Object.setPrototypeOf()

protoES6
Object.getPrototypeOf()
protoAPI
Object.create()

`prototype` **proto**

```
Object.getPrototypeOf({}) === Object.prototype; // true
```

JavaScript
[[Prototype]]
[[Prototype]]
[[Prototype]]
JavaScript
obj.
Object.create()
[[Prototype]]

(function)



```
newPerson()namesayName
```

```
person1.__proto__ === Person.prototype // true
Person.prototype.isPrototypeOf(person1); // true
Object.getPrototypeOf(person2) === Person.prototype; // true
person1 instanceof Person; // true
```

```
person1
```

```
person1.name; // Lee
person1.age; // 24
person1.toString(); // [object Object]
```

```
nameperson1agetoString( )
```

```
nameagetoString( )PersonObject
```

```
Person.prototype.__proto__ === Object.prototype // true
```

```
Person.__proto__ === Function.prototype // true
Function.prototype.__proto__ === Object.prototype // true
```

```
PersonFunctionFunctionObjectPersonObjectJavaScriptJSnullundefined
```



prototype/constructor/proto

- 1.
2. `nullObject.prototype. proto = nullObject.prototypeJS`

```
function Super(){
  this.name = 'web' ;
  this.type = ['JS','HTML','CSS'];
}
Super.prototype.sayName=function(){
  return this.name;
}
function Sub(){}
Sub.prototype = new Super();
Sub.prototype.constructor = Sub;
var sub1 = new Sub();
sub1.sayName();
```

•

:

•

```
var sub1 = new Son();
var sub2 = new Son();
sub1.type.push('VUE');
console.log(sub1.type); // ['JS','HTML','CSS','VUE']
console.log(sub2.type); // ['JS','HTML','CSS','VUE']
```

•

:

call

```
function Super(){
  this.name = 'web' ;
  this.type = ['JS','HTML','CSS'];

  this.sayName = function() {
    return this.name;
  }
}
function Sub(){
  Super.call(this);
}
var sub1 = new Sub();
sub1.type.push('VUE');
console.log(sub1.type); // ['JS','HTML','CSS','VUE']
var sub2 = new Sub();
console.log(sub2.type); // ['JS','HTML','CSS']
```

:

•

-
- :
-
- call

```
function Super(name){  
    this.name = name;  
    this.type = ['JS', 'HTML', 'CSS'];  
}  
  
Super.prototype.sayName=function(){  
    return this.name;  
}  
  
function Sub(name){  
    Super.call(this, name);  
}  
  
Sub.prototype = new Super();  
sub1 = new Sub('');  
sub2 = new Sub('');  
sub1.type.push('VUE');  
sub2.type.push('PHP');  
console.log(sub1.type); // ['JS', 'HTML', 'CSS', 'VUE']  
console.log(sub2.type); // ['JS', 'HTML', 'CSS', 'PHP']  
sub1.sayName(); //  
sub2.sayName(); //
```

- :
-
-
- :
- (call)

```
function create(obj) {
  function Sub(){};
  Sub.prototype = obj;
  Sub.prototype.constructor = Sub;
  return new Sub();
}

var parent = {
  name: '',
  type: ['JS', 'HTML', 'CSS'],
};

var sub1 = create(parent);
var sub2 = create(parent);

console.log(sub1.name); //
console.log(sub2.name); //
```

ES5Object.create()Object.defineProperties()

```
Object.create(null, {name: {value: 'Greg', enumerable: true}});

// 
var parent = {
  name: '',
  type: ['JS', 'HTML', 'CSS'],
};

var sub1 = Object.create(parent);
var sub2 = Object.create(parent);

console.log(sub1.name); //
console.log(sub2.name); //
```

•

:

```

function create(obj) {
  function Sub() {};
  Sub.prototype = obj;
  Sub.prototype.constructor = Sub;

  return new Sub();
}

function Parasitic(obj) {
  var clone = create(obj);
  clone.sayHi = function() {
    console.log('hi');
  };
  return clone;
}

var parent = {
  name: '',
  type: ['JS', 'HTML', 'CSS'],
};

var sub1 = Parasitic(parent);
var sub2 = Parasitic(parent);

console.log(sub1.name); //
console.log(sub2.name); //

```

ES5Object.createcreate:

```

function Parasitic(obj) {
  var clone = Object.create(obj);
  clone.sayHi = function() {
    console.log('hi');
  };
  return clone;
}

var parent = {
  name: '',
  type: ['JS', 'HTML', 'CSS'],
};

var son1 = Parasitic(parent);
var son2 = Parasitic(parent);

console.log(son1.name); //
console.log(son2.name); //
son1.sayHi();
son2.sayHi();

```

:

```

•
:
 

function Super(name) {
  this.name = name;
  this.type = ['JS', 'HTML', 'CSS'];
};

Super.prototype.sayName = function () {
  return this.name;
};

function Sub(name, age) {
  Super.call(this, name);
  this.age = age;
}

// 
function inheritPrototype(Sub, Super) {
  //
  var prototype = Object.create(Super.prototype);
  prototype.constructor = Sub;
  Sub.prototype = prototype;
}

inheritPrototype(Sub, Super);

// inheritPrototype
Sub.prototype.sayAge = function () {
  return this.age;
}

var instance = new Sub(' ', 40);
instance.sayName(); // 
instance.sayAge(); // 40

```

instanceofisPrototypeOf()

: ES6 Class extends

ES6 class **ES5** ES5 ES6

```

//  

class Point {  

    constructor(x, y) {  

        this.x = x;  

        this.y = y;  

    }  

    toString() {  

        return '(' + this.x + ', ' + this.y + ')';  

    }  

}  

var point = new Point(10, 10);

```

constructor this to String() new function this
new ES6 new new.target new new.new.target undefined
static

```

class Foo {  

    static classMethod() {  

        return 'hello';  

    }  

}  

Foo.classMethod() // 'hello'  

var foo = new Foo();  

foo.classMethod()  

// TypeError: foo.classMethod is not a function

```

extends super super super super

```

class ColorPoint extends Point {  

    constructor(x, y, color) {  

        super(x, y); // constructor(x, y)  

        this.color = color;  

    }  

    toString() {  

        return this.color + ' ' + super.toString(); // toString()  

    }  

}

```

24:

1. HTTP

HTTP DNS TCP HTTP

HTTP

Queued at 153.20 ms

Started at 160.96 ms



Explanation

<https://blog.csdn.net/q41> 204.16 ms

HTTP 28.4KB

- Queueing:
- Stalled: TCP
- Proxy negotiation:
- DNS Lookup: DNS
- Initial Connection / Connecting: TCP
- SSL: SSL
- Request sent:
- Waiting(TFFB): TFFB
- Content Download:

$$13.05 / 204.16 = 6.39\% \text{ HTTP}$$

2. HTTP2

HTTP2 HTTP1.1

HTTP1.1 CRLF HTTP2 HTTP2

HTTP1.1 TCP TCP HTTP1.1

HTTP2 TCP ID TCP ID

HTTP2

```
// 1
:authority: unpkg.zhimg.com
:method: GET
:path: /za-js-sdk@2.16.0/dist/zap.js
:scheme: https
accept: /*
accept-encoding: gzip, deflate, br
accept-language: zh-CN,zh;q=0.9
cache-control: no-cache
pragma: no-cache
referer: https://www.zhihu.com/
sec-fetch-dest: script
sec-fetch-mode: no-cors
sec-fetch-site: cross-site
user-agent: Mozilla/5.0 (Windows NT 6.1; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/80.0.3987.122 Safari/537.36

// 2
:authority: zz.bdstatic.com
:method: GET
:path: /linksubmit/push.js
:scheme: https
accept: /*
accept-encoding: gzip, deflate, br
accept-language: zh-CN,zh;q=0.9
cache-control: no-cache
pragma: no-cache
referer: https://www.zhihu.com/
sec-fetch-dest: script
sec-fetch-mode: no-cors
sec-fetch-site: cross-site
user-agent: Mozilla/5.0 (Windows NT 6.1; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/80.0.3987.122 Safari/537.36
```

HTTP/2 ""

```
Header1:foo  
Header2:bar  
Header3:bat
```

62 Header1 foo
63 Header2 bar
64 Header3 bar

```
62 63 64
```

HTTP2

TCP

HTTP2

HTML HTML URL

HTTP2

Name	Status	Protocol	Type	Initiator	Size	T
main.topstory-routes.96...	200	h2	script	<u>hot</u>	(disk ...	3.
hm.js?98beeee57fd2ef70...	200	http/1.1	script	<u>hot</u>	208 B	6.
push.js	200	h2	script	<u>hot</u>	(disk ...	6.
init.js	200	h2	script	<u>init.js</u>	(disk ...	1.
analytics.js	200	http/2+quic...	script	<u>js?id=UA-1...</u>	(disk ...	2.
zap.js	200	h2	script	<u>main.app.7f...</u>	(disk ...	3.
hm.gif?cc=1&ck=1&cl=...	200	http/1.1	gif	<u>hm.js?98be...</u>	299 B	1.
hm.gif?cc=1&ck=1&cl=...	200	http/1.1	gif	<u>hm.js?98be...</u>	299 B	1.
s.gif?r=https%3A%2F%...	200	http/1.1	text/...	<u>push.js:1</u>	116 B	1.
home up	200	h2	fetch	init.js:1	2.1 KB	4.

h2 HTTP2 http/1.1 HTTP1.1

- [HTTP HTTPS HTTP2](https://github.com/woai3c/Front-end-articles/blob/master/http-https-http2.md) (<https://github.com/woai3c/Front-end-articles/blob/master/http-https-http2.md>)

3.

: HTML JavaScript DOM

HTML HTML

- SEO
-

Vue SSR SSR

- 1.
2. <div id="app"></div> HTML
3. HTTP new Vue()

- 1.
2. HTML ajax HTML HTML
3. HTML new Vue()

HTML HTML

(time-to-content)

abcd 1 M

4 HTML 4M HTML HTML HTML KSSR HTML 400K

- [vue-ssr-demo](https://github.com/woai3c/vue-ssr-demo) (<https://github.com/woai3c/vue-ssr-demo>)
- [Vue.js](https://ssr.vuejs.org/zh/) (<https://ssr.vuejs.org/zh/>)

4. CDN

CDN Web CDN

CDN

CDN

1. IP DNS
2. DNS IP
3. DNS IP IP



CDN

1. IP DNS
2. DNS GSLB IP
3. DNS GSLB GSLB DNS IP SLB SLB IP DNS
4. DNS SLB IP SLB
5. SLB
6. SLB
- 7.



- [CDNCDN](https://www.zhihu.com/question/36514327/answer/193768864) (<https://www.zhihu.com/question/36514327/answer/193768864>)
- [CDN](https://juejin.cn/post/6844903873518239752) (<https://juejin.cn/post/6844903873518239752>)

5. CSS JavaScript

head CSS JS CSS JS JS HTML JS

CSS

HTML CSS"" CSS

JS script defer

6. iconfont

font-sizecolor

[fontmin-webpack \(<https://github.com/patrickhulce/fontmin-webpack>\)](https://github.com/patrickhulce/fontmin-webpack)

Save Bytes

Before

```
674f50d287a8c48dc19ba404d20fe713.eot      166 kB      [emitted]
912ec66d7572ff821749319396470bde.svg     444 kB      [emitted]  [big]
b06871f281fee6b241d60582ae9369b9.ttf      166 kB      [emitted]
af7ae505a9eed503f8b8e6982036873e.woff2    77.2 kB      [emitted]
fee66e712a8a08eef5805a46892932ad.woff     98 kB      [emitted]
```

After

```
674f50d287a8c48dc19ba404d20fe713.eot      2.82 kB      [emitted]
912ec66d7572ff821749319396470bde.svg     2.88 kB      [emitted]
b06871f281fee6b241d60582ae9369b9.ttf      2.64 kB      [emitted]
af7ae505a9eed503f8b8e6982036873e.woff2    1.01 kB      [emitted]
fee66e712a8a08eef5805a46892932ad.woff     2.72 kB      [emitted]
```

由吕金技术社区

- [fontmin-webpack \(<https://github.com/patrickhulce/fontmin-webpack>\)](https://github.com/patrickhulce/fontmin-webpack)
- [Iconfont- \(<https://www.iconfont.cn/>\)](https://www.iconfont.cn/)

7.

Expires max-age Expires max-age max-age Expires

URL URL [\(<https://cloud.tencent.com/developer/article/1584742>\)](https://cloud.tencent.com/developer/article/1584742)

- [webpack + express \(<https://github.com/woai3c/node-blog/blob/master/doc/node-blog7.md>\)](https://github.com/woai3c/node-blog/blob/master/doc/node-blog7.md)
- [webpack- \(<https://www webpackjs com/guides/caching/>\)](https://www webpackjs com/guides/caching/)
- [-- \(<https://www.zhihu.com/question/20790576/answer/32602154>\)](https://www.zhihu.com/question/20790576/answer/32602154)

8.

webpack node

webpack

- JavaScriptUglifyPlugin
- CSS MiniCssExtractPlugin
- HTMLHtmlWebpackPlugin

gzip HTTP Accept-Encoding gzip

gzip Vue app.js 1.4MB gzip 573KB 60%

webpack node gzip

```
npm install compression-webpack-plugin --save-dev
npm install compression
```

webpack

```
const CompressionPlugin = require('compression-webpack-plugin');

module.exports = {
  plugins: [new CompressionPlugin()],
}
```

node

```
const compression = require('compression')
// app.use(compression())
```

9.

(1).

```

```

JS

```
const img = document.querySelector('img')
img.src = img.dataset.src
```

- [web \(https://juejin.cn/post/6844903482164510734\)](https://juejin.cn/post/6844903482164510734)

(2).

picture

```
<picture>
  <source srcset="banner_w1000.jpg" media="(min-width: 801px)">
  <source srcset="banner_w800.jpg" media="(max-width: 800px)">
  
</picture>
```

@media

```
@media (min-width: 769px) {
  .bg {
    background-image: url(bg1080.jpg);
  }
}
@media (max-width: 768px) {
  .bg {
    background-image: url(bg768.jpg);
  }
}
```

(3).

1920 * 1080

src

(4).

JPG 100% 90% PS JPG 60%

webpack image-webpack-loader

webpack image-webpack-loader

```
npm install --save-dev image-webpack-loader
```

webpack

```
{
  test: /\.(\png|jpe?g|gif|svg)(\?.*)?$/,
  use:[
    {
      loader: 'url-loader',
      options: {
        limit: 10000, /* 1000 base64 */
        name: utils.assetsPath('img/[name].[hash:7].[ext]')
      }
    },
    /**
    {
      loader: 'image-webpack-loader',
      options: {
        bypassOnDebug: true,
      }
    }
  ]
}
```

- [imgwebpack \(<https://juejin.cn/post/6844903816081457159>\)](https://juejin.cn/post/6844903816081457159)

(5). CSS3

CSS CSS3

(6). webp

WebP Alpha JPEG PNG

- [WebP PNGJPEG \(<https://www.zhihu.com/question/27201061>\)](https://www.zhihu.com/question/27201061)

10. webpack ES6 ES5

import

output filename filename [contenthash] hash[contenthash]

```
{
  output: {
    filename: '[name].[contenthash].js',
    chunkFilename: '[name].[contenthash].js',
    path: path.resolve(__dirname, '../dist'),
  },
}
```

webpack4 splitChunk cacheGroups

```
optimization: {
  runtimeChunk: {
    name: 'manifest' // webpack runtime chunk
  },
  splitChunks: {
    cacheGroups: {
      vendor: {
        name: 'chunk-vendors',
        test: /[\\/]node_modules[\\/]/,
        priority: -10,
        chunks: 'initial'
      },
      common: {
        name: 'chunk-common',
        minChunks: 2,
        priority: -20,
        chunks: 'initial',
        reuseExistingChunk: true
      }
    },
  }
},
```

- **test**: modules modules chunk chunk chunk module RegExpStringFunction
- **priority**: module cacheGroups module
- **reuseExistingChunk**: chunktrue chunk chunk module
- **minChunks(1)**:
- **chunks**(async): initialasynccallchunksall(initial)(async)
- **name(chunks)**: ()

ES6 ES5

Babel

```
class Person {}
```

```
"use strict";

function _classCallCheck(instance, Constructor) {
  if (!(instance instanceof Constructor)) {
    throw new TypeError("Cannot call a class as a function");
  }
}

var Person = function Person() {
  _classCallCheck(this, Person);
};
```

```

_classCallCheck helper      helper
@babel/runtime    @babel/plugin-transform-runtime helper    @babel/runtime

"use strict";

var _classCallCheck2 = require("@babel/runtime/helpers/classCallCheck");
var _classCallCheck3 = _interopRequireDefault(_classCallCheck2);

function _interopRequireDefault(obj) {
  return obj && obj.__esModule ? obj : { default: obj };
}

var Person = function Person() {
  (0, _classCallCheck3.default)(this, Person);
};

```

helper classCallCheck @babel/runtime helpers/classCallCheck

```
npm install --save-dev @babel/plugin-transform-runtime @babel/runtime
```

.babelrc

```
{
  "plugins": [
    "@babel/plugin-transform-runtime"
  ]
}
```

- [Babel 7.1 transform-runtime polyfill env](https://www.jianshu.com/p/d078b5f3036a) (<https://www.jianshu.com/p/d078b5f3036a>)
- [webpack](https://webpack.docschina.org/guides/lazy-loading/) (<https://webpack.docschina.org/guides/lazy-loading/>)
- [Vue](https://router.vuejs.org/zh/guide/advanced/lazy-loading.html#%E8%B7%AF%E7%94%B1%E6%87%92%E5%8A%A0%E8%BD%BD) (<https://router.vuejs.org/zh/guide/advanced/lazy-loading.html#%E8%B7%AF%E7%94%B1%E6%87%92%E5%8A%A0%E8%BD%BD>)
- [webpack](https://webpack.docschina.org/guides/caching/) (<https://webpack.docschina.org/guides/caching/>)
- [webpack4splitChunk](https://juejin.cn/post/6844903614759043079) (<https://juejin.cn/post/6844903614759043079>)

11.

1. HTMLDOM
2. CSSCSSOM
3. DOMCSSOM
- 4.
- 5.



DOM

JavaScript GUI

- DOM
-
-
-
-

- **JavaScript class**
- **DOM DOM display:none documentFragment**

12.

```

<ul>
  <li> </li>
  <li> </li>
  <li> </li>
</ul>
  
```

```
// good
document.querySelector('ul').onclick = (event) => {
  const target = event.target;
  if (target.nodeName === 'LI') {
    console.log(target.innerHTML);
  }
}

// bad
document.querySelectorAll('li').forEach((e) => {
  e.onclick = function() {
    console.log(this.innerHTML);
  }
})
```

13.

- :
- :

```
function sum(arry) {
  let i, sum = 0;
  let len = arry.length;

  for (i = 0; i < len; i++) {
    sum += arry[i];
  }

  return sum;
}
```

sumsum

```
//  
function sum1(arry, rows, cols) {  
    let i, j, sum = 0;  
  
    for (i = 0; i < rows; i++) {  
        for (j = 0; j < cols; j++) {  
            sum += arry[i][j];  
        }  
    }  
  
    return sum;  
}
```

```
//  
function sum2(arry, rows, cols) {  
    let i, j, sum = 0;  
  
    for (j = 0; j < cols; j++) {  
        for (i = 0; i < rows; i++) {  
            sum += arry[i][j];  
        }  
    }  
  
    return sum;  
}
```

1 kk

1 rows

- cpu: i7-10510U
- : 83.0.4103.61

9000900010

```

function sum2(arry, rows, cols) {
  let i, j, sum = 0;

  for (j = 0; j < cols; j++) {
    for (i = 0; i < rows; i++) {
      sum += arry[i][j];
    }
  }

  return sum;
}

// 
function sum1(arry, rows, cols) {
  let i, j, sum = 0;

  for (i = 0; i < rows; i++) {
    for (j = 0; j < cols; j++) {
      sum += arry[i][j];
    }
  }

  return sum;
}

var arry = new Array(9000).fill(new Array(9000).fill(1));

let ts = 0;
for (let i = 0; i < 10; i++) {
  const startTime = new Date().valueOf();
  sum1(arry, 9000, 9000);
  ts += (new Date().valueOf() - startTime);
}

console.log('sum1: ' + (ts / 10)); // 81.5ms

let ts2 = 0;
for (let i = 0; i < 10; i++) {
  const startTime = new Date().valueOf();
  sum2(arry, 9000, 9000);
  ts2 += (new Date().valueOf() - startTime);
}

console.log('sum2: ' + (ts2 / 10)); // 167.3ms

```

1(sum1) 9000(sum2)

81.5ms 167.3ms

1 9000

-
- k

- [\(https://book.douban.com/subject/26912767/\)](https://book.douban.com/subject/26912767/)

14. if-else switch

switch if-else

```
if (color == 'blue') {  
  
} else if (color == 'yellow') {  
  
} else if (color == 'white') {  
  
} else if (color == 'black') {  
  
} else if (color == 'green') {  
  
} else if (color == 'orange') {  
  
} else if (color == 'pink') {  
  
}  
  
switch (color) {  
    case 'blue':  
  
        break;  
    case 'yellow':  
  
        break;  
    case 'white':  
  
        break;  
    case 'black':  
  
        break;  
    case 'green':  
  
        break;  
    case 'orange':  
  
        break;  
    case 'pink':  
  
        break;  
}
```

```
switch color pink if-else 7 switch switch
```

```
switch if-else switch switch
```

15.

```
switch if-else
```

```
switch (index) {  
    case '0':  
        return result0;  
    case '1':  
        return result1;  
    case '2':  
        return result2;  
    case '3':  
        return result3;  
    case '4':  
        return result4;  
    case '5':  
        return result5;  
    case '6':  
        return result6;  
    case '7':  
        return result7;  
    case '8':  
        return result8;  
    case '9':  
        return result9;  
    case '10':  
        return result10;  
    case '11':  
        return result11;  
}
```

```
switch
```

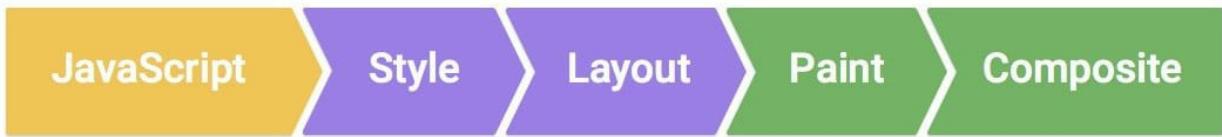
```
const results =  
[result0,result1,result2,result3,result4,result5,result6,result7,result8,result  
9,result10,result11];  
  
return results[index];
```

```
const map = {  
    red: result0,  
    green: result1,  
};  
  
return map[color];
```

16.

60fps

$$60 / 16 \quad (1 / 60 = 16.66) \quad 10$$



JavaScript DOM 50 ms 1s / 50ms = 20fps

JavaScript

```
for (let i = 0, len = arry.length; i < len; i++) {  
    process(arry[i]);  
}
```

process()

```
const todo = arry.concat();  
setTimeout(function(){  
    process(todo.shift());  
    if (todo.length) {  
        setTimeout(arguments.callee, 25);  
    } else {  
        callback(arry);  
    }  
}, 25);
```

JavaScript 6 [Web](https://book.douban.com/subject/30170670/) (<https://book.douban.com/subject/30170670/>) 3

17. requestAnimationFrame

16 60 / 16.66 JavaScript JavaScript

requestAnimationFrame

```
/**  
 * If run as a requestAnimationFrame callback, this  
 * will be run at the start of the frame.  
 */  
function updateScreen(time) {  
    // Make visual updates here.  
}  
  
requestAnimationFrame(updateScreen);
```

setTimeout setInterval

setTimeout fires



18. Web Workers

Web Worker worker JavaScript ,

Web Worker UI

worker URI worker main.js

```
var myWorker = new Worker('worker.js');
// postMessage() onmessageevent
first.onchange = function() {
  myWorker.postMessage([first.value,second.value]);
  console.log('Message posted to worker');
}

second.onchange = function() {
  myWorker.postMessage([first.value,second.value]);
  console.log('Message posted to worker');
}
```

worker worker.js

```
onmessage = function(e) {
  console.log('Message received from main script');
  var workerResult = 'Result: ' + (e.data[0] * e.data[1]);
  console.log('Posting message back to main script');
  postMessage(workerResult);
}
```

onmessagedata2postMessage()

onmessageworker

```
myWorker.onmessage = function(e) {
  result.textContent = e.data;
  console.log('Message received from worker');
}
```

dataresulttextContent

workerDOMwindowwindowWebSocketsIndexedDBFireFox OSData Store API

- [Web Workers \(\[https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API/Using_web_workers\]\(https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API/Using_web_workers\)\)](https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API/Using_web_workers)

19.

JavaScript IEEE-754 64 32

0 1

```
if (value % 2) {  
    //  
} else {  
    //  
}  
//  
if (value & 1) {  
    //  
} else {  
    //  
}
```

```
~~10.12 // 10  
~~10 // 10  
~~'1.5' // 1  
~~undefined // 0  
~~null // 0
```

```
const a = 1  
const b = 2  
const c = 4  
const options = a | b | c
```

a/b/c options

```
// b  
if (b & options) {  
    // ...  
}
```

20.

21. CSS

(1).

```
#block .text p {  
    color: red;  
}
```

1. P
2. 1 text
3. 2 id block

(2). CSS

```
> ID > >
```

- 1.
2. ID
3. *

CSS

22. flexbox

CSS [flexbox \(https://developer.mozilla.org/zh-CN/docs/Web/CSS/CSS_Flexible_Box_Layout/Basic_Concepts_of_Flexbox\)](https://developer.mozilla.org/zh-CN/docs/Web/CSS/CSS_Flexible_Box_Layout/Basic_Concepts_of_Flexbox)

1300



flexbox



3.5 14

flexbox

- Chrome 29+
- Firefox 28+
- Internet Explorer 11
- Opera 17+
- Safari 6.1+ (prefixed with -webkit-)
- Android 4.4+
- iOS 7.1+ (prefixed with -webkit-)

Flexbox

23. transform opacity

CSS transforms opacity composite



24.

- 1.
- 2.

23 10 13 23

-
-

</head>

```
<script>
  new Date() - performance.timing.navigationStart
</script>
```

```
window.onload = new Date() - performance.timing.navigationStart
```

chrome

F12 performance stop FPS performance

- [performance.timing.navigationStart](https://developer.mozilla.org/zh-CN/docs/Web/API/PerformanceTiming/navigationStart) (<https://developer.mozilla.org/zh-CN/docs/Web/API/PerformanceTiming/navigationStart>)

-
- Web
- JavaScript
- [Web](https://book.douban.com/subject/30170670/) (<https://book.douban.com/subject/30170670/>)

Best Practices for Speeding Up Your Web Site (<https://developer.yahoo.com/performance/rules.html>)

- content
 - 1. HTTP CSS inline Image
 - 2. DNS DNS DNS DNS
 - 3.
 - 4. Ajax
 - 5.
 - 6.
 - 7. DOM
 - 8.
 - 9. iframe
 - 10. 404

- Server
 - 1. CDN
 - 2. Expires Cache-Control
 - 3. Gzip
 - 4. ETag
 - 5. Flush Buffer Early
 - 6. Ajax GET
 - 7. src img

- Cookie
 - 1. cookie
 - 2. cookie

- CSS
 - 1.
 - 2. CSS
 - 3. <link>@import
 - 4. IE Filter

- Javascript

- 1.
- 2. javascript css
- 3. javascript css
- 4.
- 5. DOM
- 6.

•

- 1.
- 2. css
- 3. HTML
- 4. favicon.ico

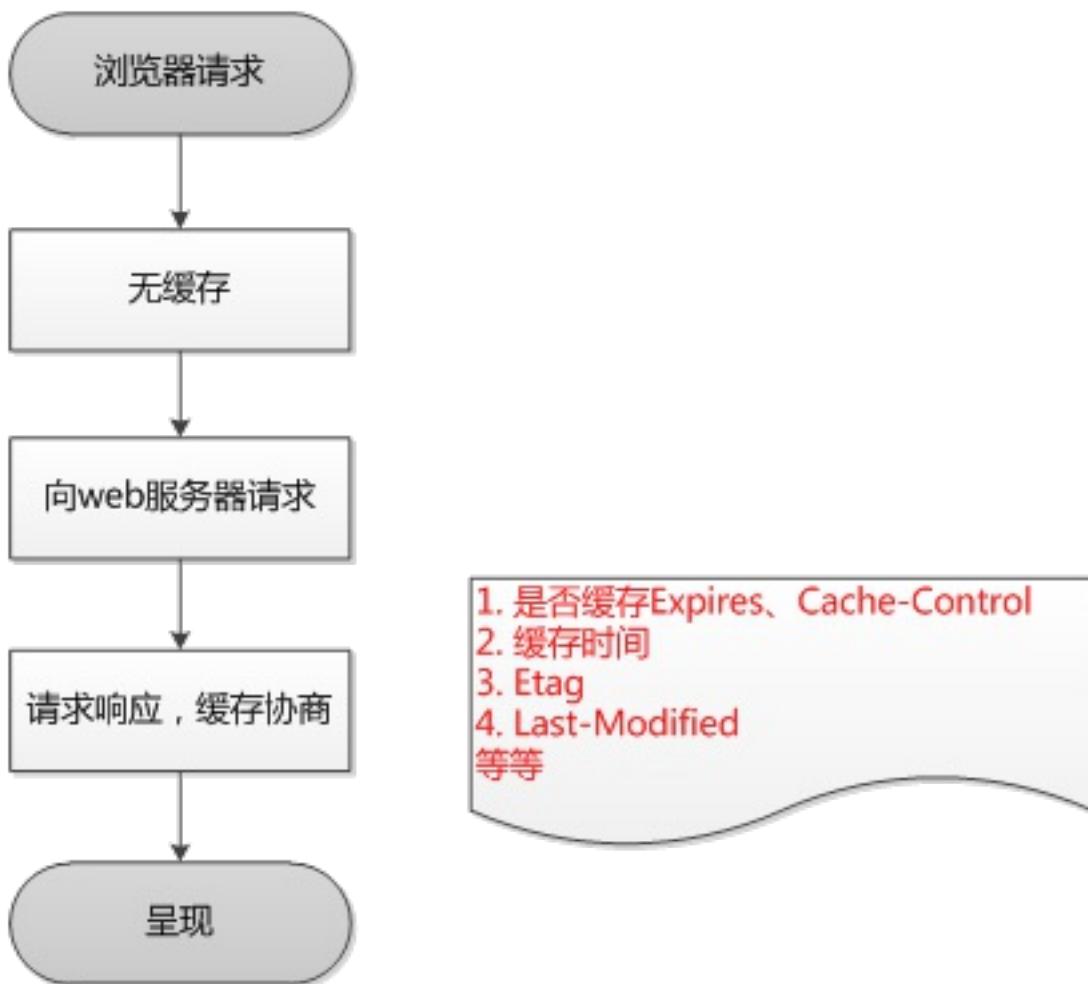
•

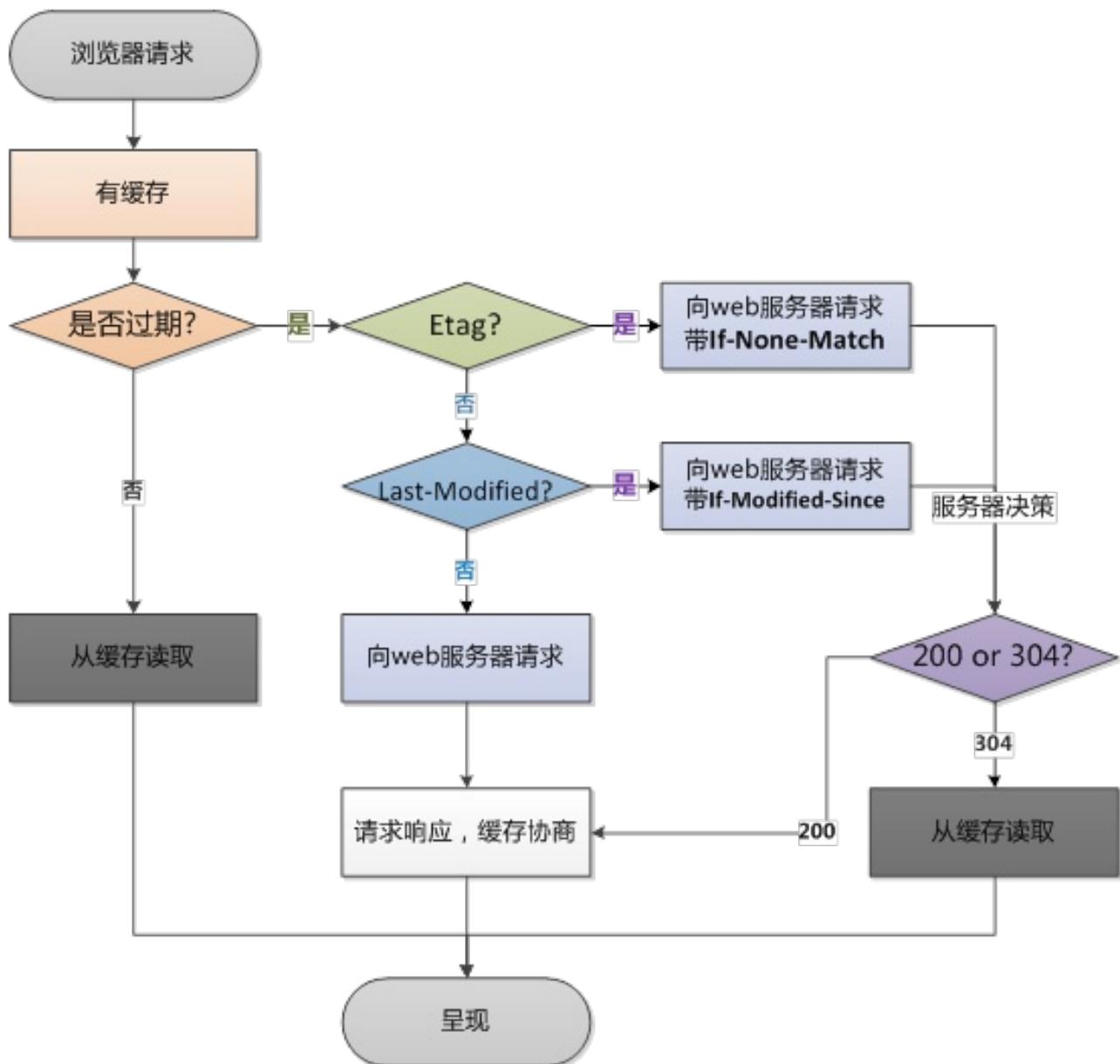
- 1. 25k
- 2. Pack Components into a Multipart Document

response header

- 1.
- 2.
- 3.

,





,,(),,

- header cache-control expires header

```

Accept: xxx
Accept-Encoding: gzip,deflate
Accept-Language: zh-cn
Connection: keep-alive
Host: xxx
Referer: xxx
User-Agent: xxx
    
```

```
Accept-Ranges: bytes
Cache-Control: max-age= xxxx
Content-Encoding: gzip
Content-length: 3333
Content-Type: application/javascript
Date: xxx
Expires: xxx
Last-Modified: xxx
Server:
```

- header Last-Modified/If-Modified-SinceEtag/If-None-Matchheader
headerheader

200from cache

304not modified

header

header

1. **expires**: http1.0GMT **Mon, 10 Jun 2015 21:31:12 GMT**expires
2. **cache-controlmax-age=number** : http1.1headermax-ageCache-Control
cache-control
 - **no-cache**: ETag
 - **no-store**:
 - **public**: CDN
 - **private**: CDN

cache-controlexpirescache-controlexpires

header

header Last-ModifiedEtag If-Modified-SinceIf-None-Match Last-Modified
Etag

1. Last-Modified/If-Modified-Since

GMT

- responseheader Last-Modifiedheaderheader
- requestheader If-Modified-SinceheaderheaderLast-Modified
- If-Modified-Since 304 Not Modified 304 Not Modifiedresponse
header Last-Modifiedheader Last-Modified304response header
- 304
- Last-ModifiedHeader If-Modified-SinceLast-Modified

2. Etag/If-None-Match

Last-Modified/If-Modified-Since Last-Modified 304 Not Modified ETag response
header ETag ETag

Last-Modified Etag

Last-Modified Etag HTTP1.1 Etag Last-Modified

- () GET
- (1sN) If-Modified-Since (UNIX MTIME)
-

Etag Etag

: **Last-Modified Etag Etag Last-Modified 304**

Expires/Cache-Control Last-Modified/ETag

F5

Ctrl + F5

```
<link rel="stylesheet" href="a.css?a=1.0" />
...
<div class="app">app</div>
```

query query

HTTP

HTTP3 HTTP1 9893

HTTP 0.9 Get
 HTML

HTTP 1.0 POST DELETE PUT HEADER

HTTP 1.1 Connection , keep-alive

 cache-control etag

 Header

HTTP 2.0

 Header ,
 2005

1HTTP 0.9

HTTP 0.9 HTTP GET HTTP 0.9 HTML

HTTP 0.9 HTTP 0.9 HTTP 0.9 Web TCP Web

2HTTP 1.0

HTTP HTTP HTTP 0.9

-
-
-
- POST Web GET HEAD POST
- TCP2(head of line blocking)(head of line blocking)

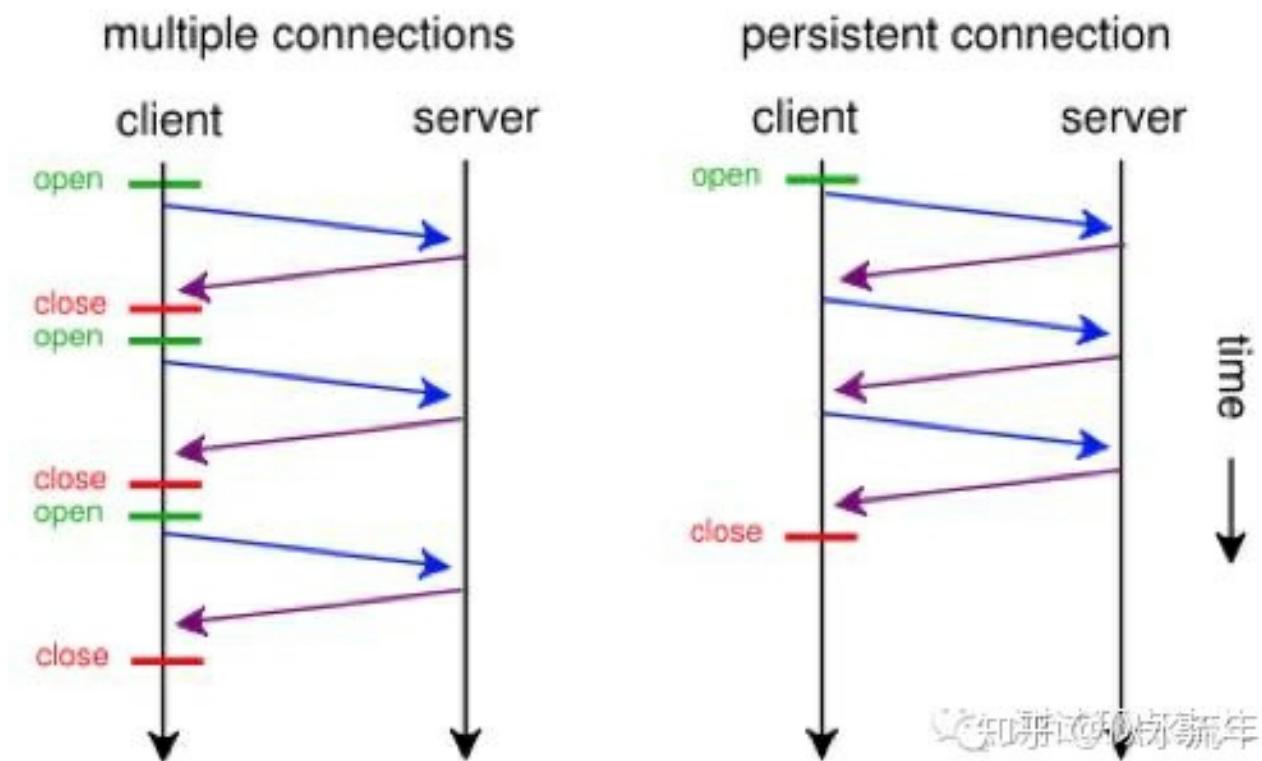
3HTTP 1.1

HTTP HTTP 1.1 HTTP 1.1 HTTP HTTP 1.1

HTTP 1.1 keepalive chunked

Persistent Connection keepalive

HTTP TCP HTTP HTTP 1.0 Connection: Keep-Alive HTTP 1.1 HTTP Connection:
close FIFO Request



chunked

0()

HTTP1.1 rangeContent-Range 206 Partial Content

Header

Accept-Ranges:

Etag: tag

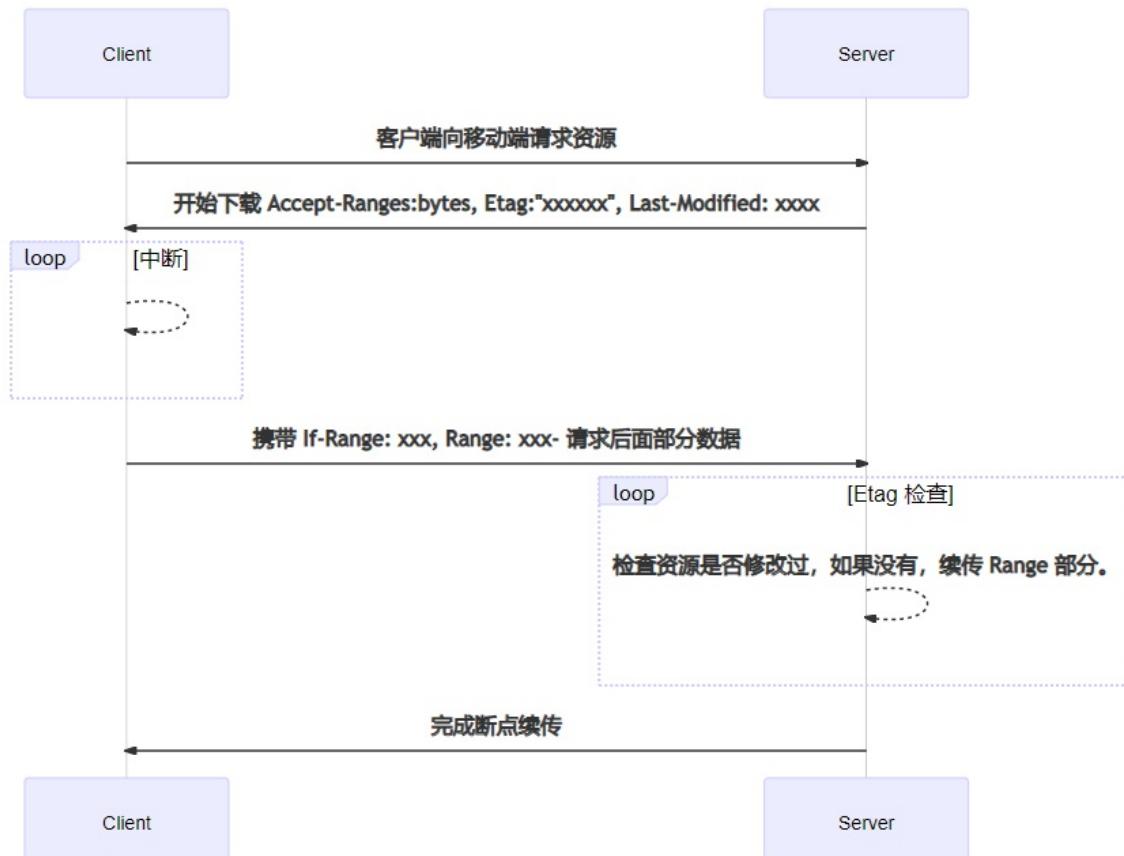
Last-Modified:

Content-Range:

If-Range: Etag

Range:

If-Modified-Since: Last-Modified 304



206

Pipelining

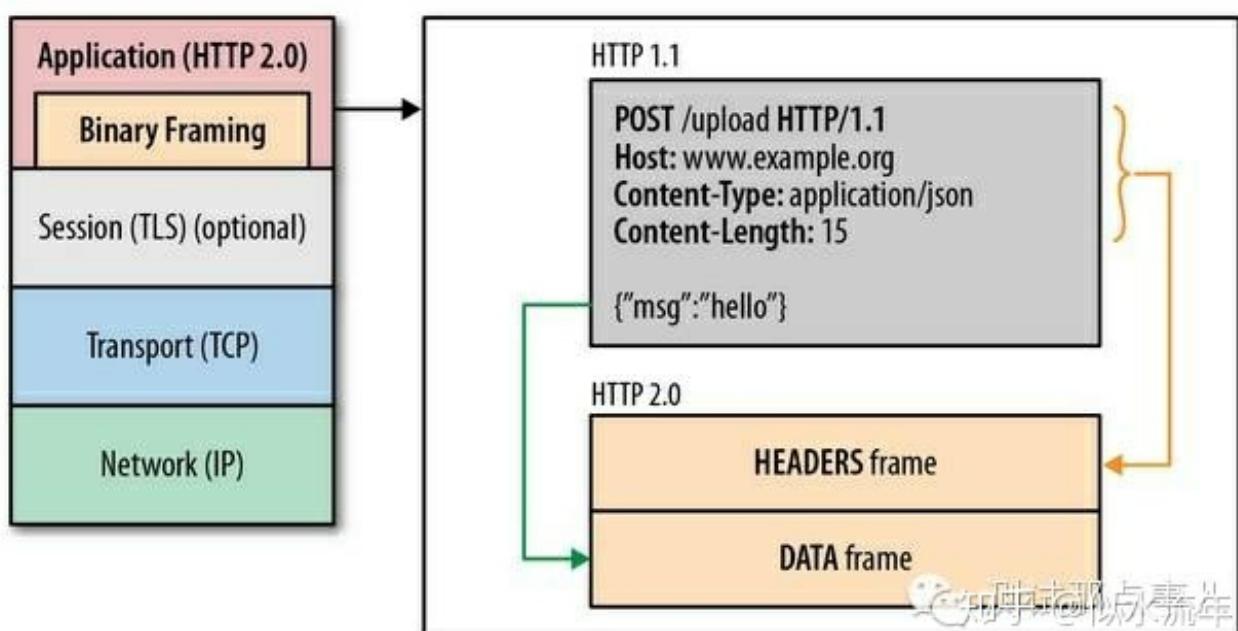
HTTP 1.1

- Host HTTP 1.0 IP URL hostname Multi-homed Web Servers IP Host
- Request method HTTP 1.1 OPTIONS, PUT, DELETE, TRACE, CONNECT
- HTTP/1.1.0 cache-control Cache-Control

4 HTTP 2.0

HTTP 2.0 HTTP

HTTP 2.0 HTTP HTTP URI 2.0 HTTP 2.0 HTTP 1.x Headers
request body Data



HTTP 2.0

HTTP2.0-

HTTP HTTP

-
- 1 IP2

[HTTP2 \(<https://imququ.com/post/header-compression-in-http2.html>\)](https://imququ.com/post/header-compression-in-http2.html)

HTTP2

-
- Header
- Huffman Coding



HTTP1.1HTTPTCPHTTP2RST_STREAM

Server PushXZZ

TCPHTTP1.1TCP

TCP

head-of-line blockingTCP

TCP3Web3

TCP

HTTP

HTTPTCPHTTPHTTPpipelining

HTTP

HTTP1.1 keep-alive



HTTP

HTTP“-”

-
-
- HTTP1.0 HTTP1.0 Keep-Alive HTTP1.1 persistent HTTP
-
- HTTP1.1 pipelining TCP HTTP

HTTP

1. FIFO HTTP
- 2.
3. GET HEAD

HTTP

HTTP

HTTP

HTTP1.1/HTTP2 HTTP2//

HTTP2 HTTP2 TCP TCP

TCP

TCP TCP TCP TCP

google QUIC TCP TCP UDP UDP

SCTP TCP UDP SCTP

TCP HTTP

1. "" TCP HTTP TCP
2. TCP HTTP

quic TCP UDP SCTP

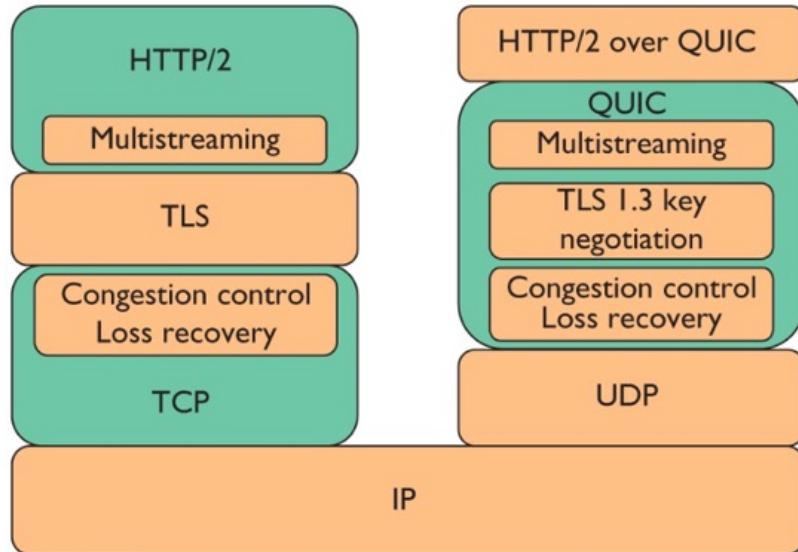
QUIC

QUIC Quick UDP Internet Connection UDP TCP TLS HTTP/2

QUIC UDP TCP

UDP TCP TCP TCP TCP CPU UDP TCP TCP

Web TCP TCP TCP TCP TCP UDP

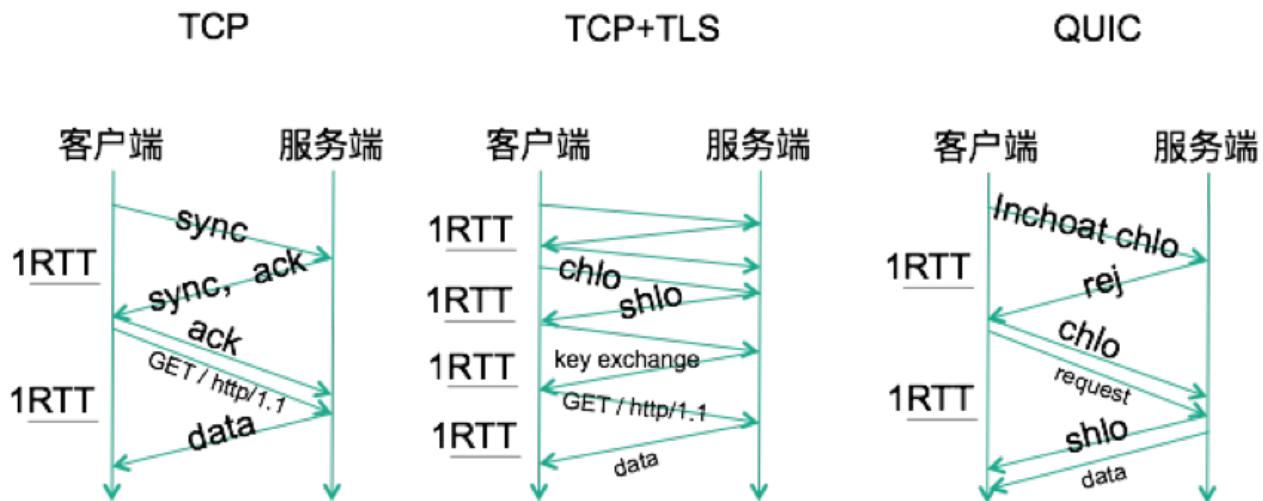


QUICClientServerUDPQUICTCP

QUIC

1.

TCP+TLS 1~2RTT + httpTCP HTTPS 2 ~3RTT QUIC UDP 1RTT 0RTT



2.

QUIC TCP TLS HTTPS/2 TLS

3.

QUIC TCP

4.

QUIC TCP Packet Number RTT

5.

HTTP2TCPHTTPTCPHTTP2TCPHTTP2QUICconnectionstreamstreamstream
stream



功能优势
快速建立连接 0-RTT的握手延迟，建立连接更加迅速
改进的多路复用 彻底解决TCP协议中队头阻塞的问题
更先进的拥塞控制算法 可插拔，RTT计算更加准确，拥塞控制更精准
超强的弱网性能 基于UDP协议的QUIC，在弱网环境下仍能保持业务可用

QUIC UDP TCP

CDN CDN QUIC CDN CDN QUIC QUIC IP

QUIC

- Chrome QUIC Q43 CDN QUIC Q39 CDN QUIC
- App App QUIC IIS quic-client cronet

QUIC

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

HTTP

HTTP

1.

- HTTP
- HTTP
- HTTP
- get post
- HTTP
-
-

-
- CSRF
- TSL

2. HTTP

-
-
-
-

2.1

url	httpurl
-----	---------

2.2

httphttp

2.3

--

2.4

--

session http

3 HTTP



- http
-
-

3.1

①请求方法 ②请求URL ③HTTP协议及版本
④
报文
头
⑤
报文
体
⑥

```
POST /chapter17/user.html HTTP/1.1
Accept: image/jpeg, application/x-ms-application, ..., */*
Referer: http://localhost:8088/chapter17/user/register.html?
code=100&time=123123
Accept-Language: zh-CN
User-Agent: Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 6.1;
Content-Type: application/x-www-form-urlencoded
Host: localhost:8088
Content-Length: 112
Connection: Keep-Alive
Cache-Control: no-cache
Cookie: JSESSIONID=24DF2688E37EE4F66D9669D2542AC17B
name=tom&password=1234&realName=tomson
```

图 15-4 HTTP 请求报文

- urlhttp
-
-
-

3.2



- http
-
-
-

4 HTTP

- GET
- POST
- put
- DELETE
- HEAD

HTTP

- get post`
- put delete
- head

5 get post

POST和GET的区别

- GET在浏览器回退时是无害的，而POST会再次提交请求
 - GET产生的URL地址可以被收藏，而POST不可以
 - GET请求会被浏览器主动缓存，而POST不会，除非手动设置
 - GET请求只能进行url编码，而POST支持多种编码方式
 - GET请求参数会被完整保留在浏览器历史记录里，而POST中的参数不会被保留
 - GET请求在URL中传送的参数是有长度限制的，而POST没有限制
 - 对参数的数据类型，GET只接受ASCII字符，而POST没有限制
 - GET比POST更不安全，因为参数直接暴露在URL上，所以不能用来传递敏感信息
 - GET参数通过URL传递，POST放在Request body中
- **getpost**

-
1. get post
 2. getpost
 3. get post CSRF getpost
 4. geturl 2kb`post
 5. geturl post

6 http

http

1xx：指示信息 – 表示请求已接收，继续处理

2xx：成功 – 表示请求已被成功接收

3xx：重定向 – 要完成请求必须进行更进一步的操作

4xx：客户端错误 – 请求有语法错误或请求无法实现

5xx：服务器错误 – 服务器未能实现合法的请求

http

200 OK: 客户端请求成功

206 Partial Content: 客户发送了一个带有Range头的GET请求, 服务器完成了它

301 Moved Permanently: 所请求的页面已经转移至新的url

302 Found: 所请求的页面已经临时转移至新的url

304 Not Modified: 客户端有缓冲的文档并发出一个条件性的请求, 服务器告诉客户, 原来缓冲的文档还可以继续使用

- 206 range 206
- 301
- 302
- 304

400 Bad Request: 客户端请求有语法错误, 不能被服务器所理解

401 Unauthorized: 请求未经授权, 这个状态代码必须和WWW-Authenticate报头域一起使用

403 Forbidden: 对被请求页面的访问被禁止

404 Not Found: 请求资源不存在

500 Internal Server Error: 服务器发生不可预期的错误原来缓冲的文档还可以继续使用

503 Server Unavailable: 请求未完成, 服务器临时过载或当机, 一段时间后可能恢复正常

- 400 401, 403 404

7 /http

- http1.0 1
- HTTP1.1 Connection:keep-alive

HTTP 1.1 TCP HTTP **header** Keep-Alive Apache

8

8.1



1 --> 1 --> 2 --> 2 --> 3 --> 3



8.2



9 TLS

Transport Layer Security (TLS) TLS

TLS

- Client hello (random_C)
- Server hello(random_S)
-
- Server hello done
-
- Pre-Master Pre-Master
- Pre-Master Pre-Master random_C random_S pre-master
enc_key=Fuc(random_C, random_S, pre-master)
- Change cipher spec
- Client finished
- Change cipher spec
- Server finished
-

WebRTC

WebRTC Web Real-Time Communication API

WebRTC WebRTC

1. WebRTC WebRTC Google WebRTC HTML JavaScript API Web/
2. WebRTC/codec Google
3. WebRTC STUN ICE TURN RTP-over-TCP NAT

1.

2. WebRTCP2P
3. WebRTC
- 4.
5. NativeWebRTCWebNativeAPI

EventSource

EventSource

EventSource EventSourceHTTPtext/event-stream ,

WebSockets,. IndexedDBWebEventSource

- EventSourceServer-sent eventsSSEhttp text/event-stream
EventSource.close()
- EvenSourceXHR-streamingAPI
- EventSource
- EventSource,event IDs,

EventSource:

```
// EventSource
var source = new EventSource('http://localhost:3000');

source.onopen = function (event) { //
  console.log('' );
}

// (event)
source.onmessage = function (event) { //
  console.log('' , event.data);
}

source.onerror = function (error) { //
  console.log('' );
}

//
source.addEventListener("ping", function (event) {
  console.log("ping" , event.data)
})
```

```

const http = require('http');

http.createServer((req, res) => {
  res.writeHead(200, {
    'Content-Type' : 'text/event-stream',
    'Access-Control-Allow-Origin': '*'
  });

  let i = 0;
  const timer = setInterval(()=>{
    const date = {date:new Date()}
    var content ='event: ping\n'+ "data:" +JSON.stringify(date)+"\n\n";
    res.write(content);
  },1000)

  res.connection.on("close", function(){
    res.end();
    clearInterval(timer);
    console.log("Client closed connection. Aborting.");
  });
}

).listen(3000);
console.log('server is run http://localhost:3000');

```

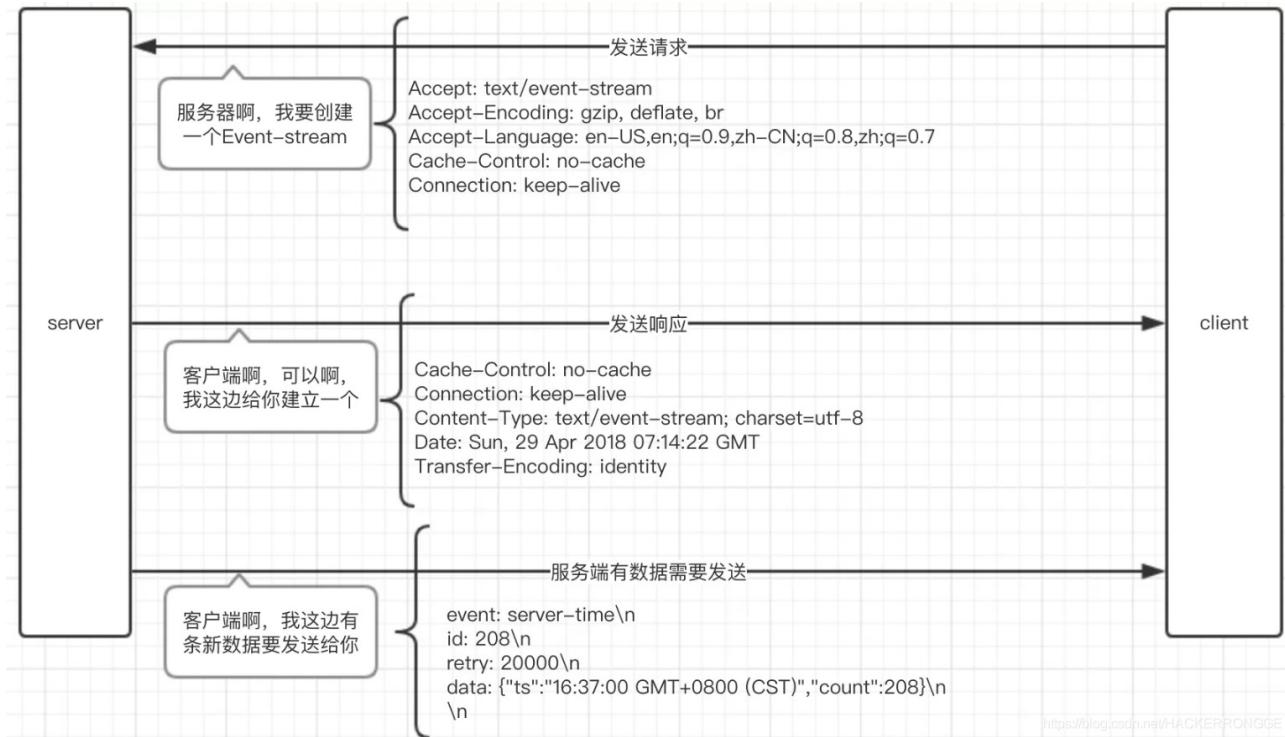
EventSource

- **event**: EventSource.addEventListener()EventSourceeventonmessage
- **data**: data
- **id**: IDEventSource“ID”
- **retry**:

EventSource

- **EventSource.onerror**: EventHandler error
- **EventSource.onmessage**: EventHandler message
- **EventSource.onopen**: EventHandler open
- **EventSource.readyState()**: unsigned short CONNECTING (0), OPEN (1), CLOSED (2)
- **EventSource.url()**: DOMStringURL

EventSource



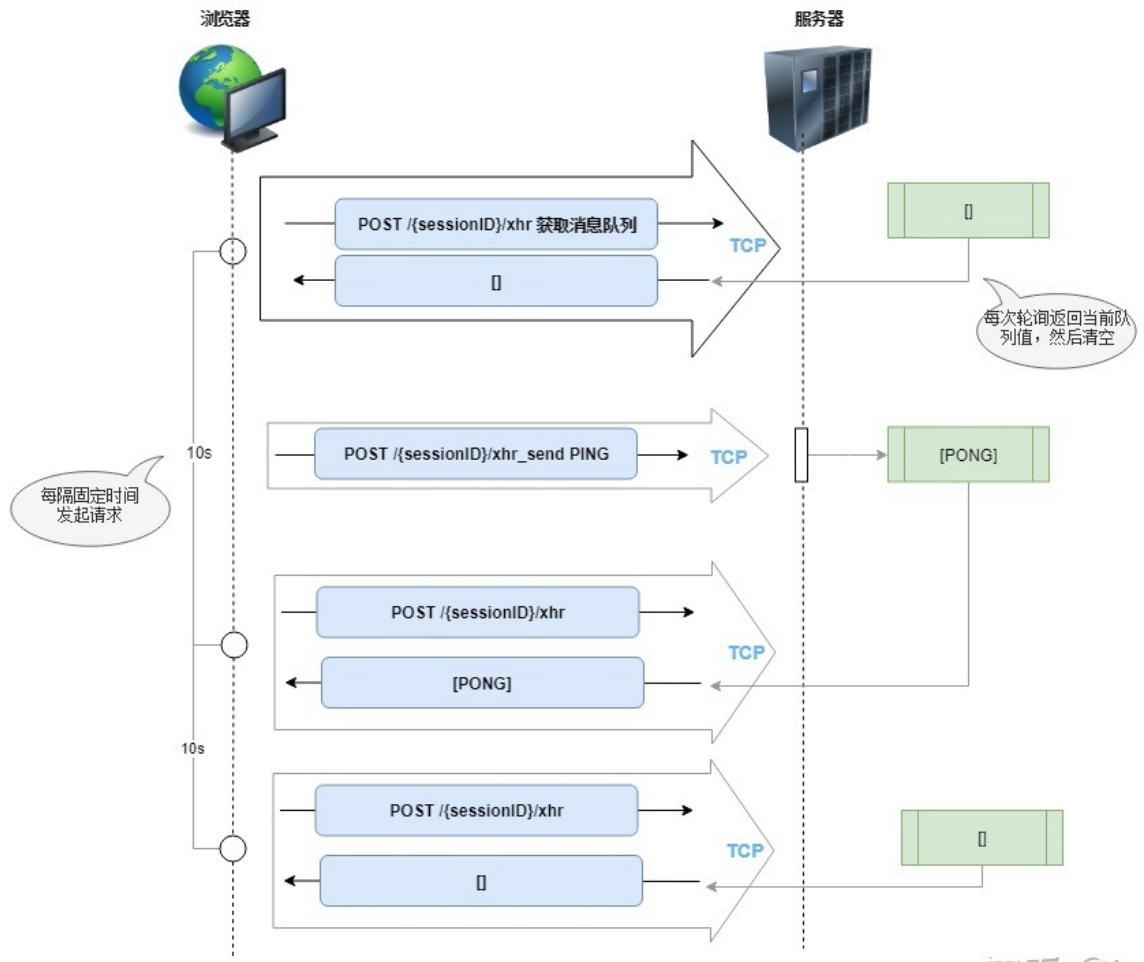
1. ->
2. UTF-8base64

(Polling)

""

```
function Polling() {
  fetch(url).then(data => {
    // somthing
  }).catch(err => {
    console.error(err);
  });
}

//5s
setInterval(polling, 5000);
```



知乎 @ivan
<https://blog.csdn.net/HACKERRONGGE>

- http
- : HTTPCPU
- :

(Long Polling)

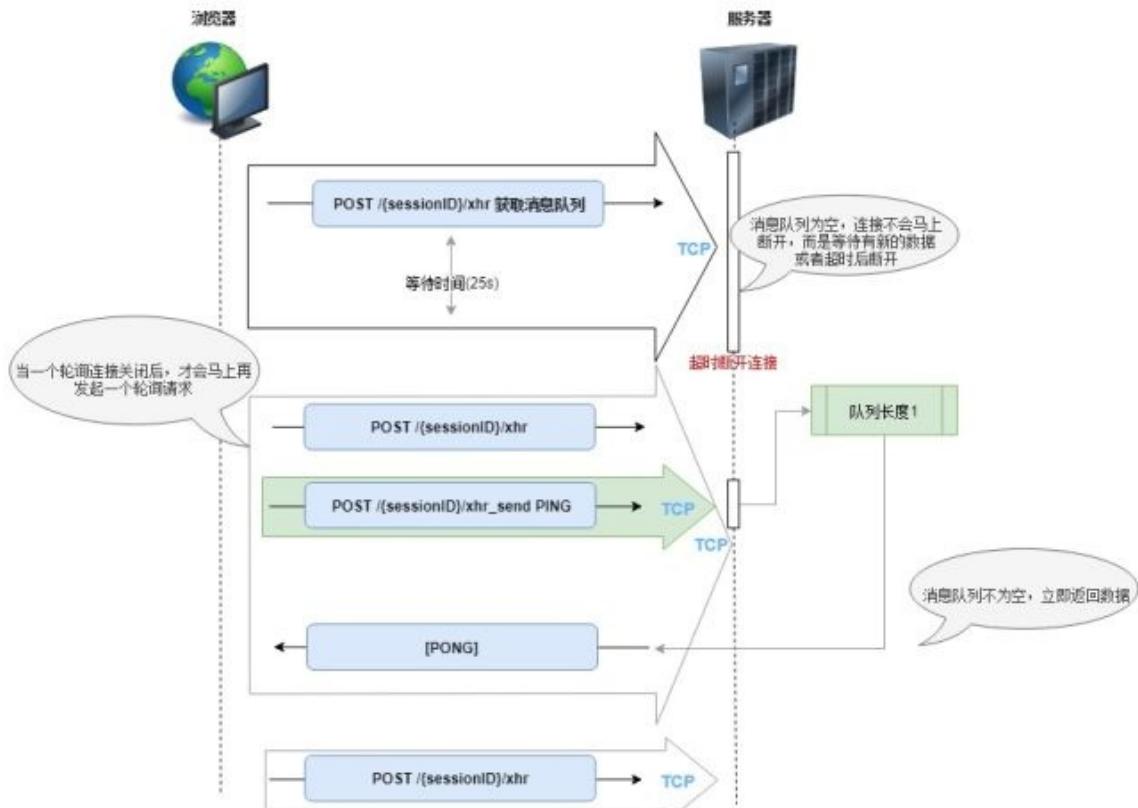
sockjs

:

```

function LongPolling() {
  fetch(url).then(data => {
    LongPolling();
  }).catch(err => {
    LongPolling();
    console.log(err);
  });
}
LongPolling();

```



知乎 @jyan

<https://blog.csdn.net/HACKERRONGGE>

PollingPolling

:

- http

:

-

EventSource VS

(Polling) (Long-Polling) EventSource

http	http	http
client()	client()	clientserver()

- : > > EventSource
- : EvenSource > >
- : EventSource >

WebSocket

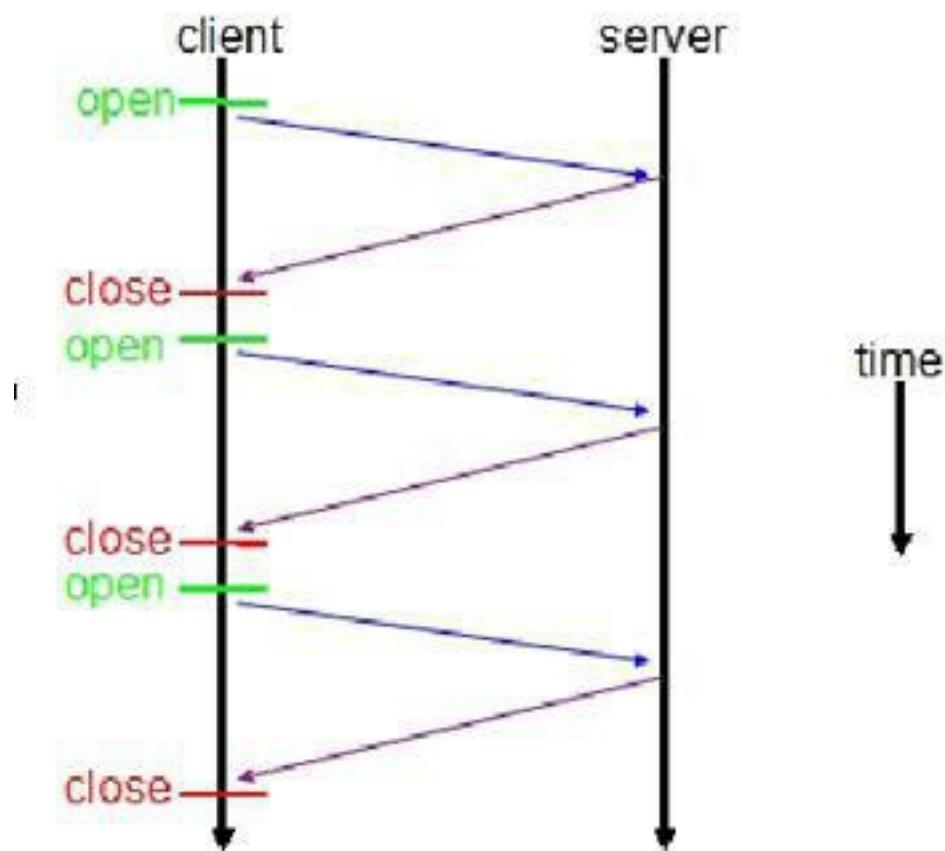
WebSocket

WebSocket

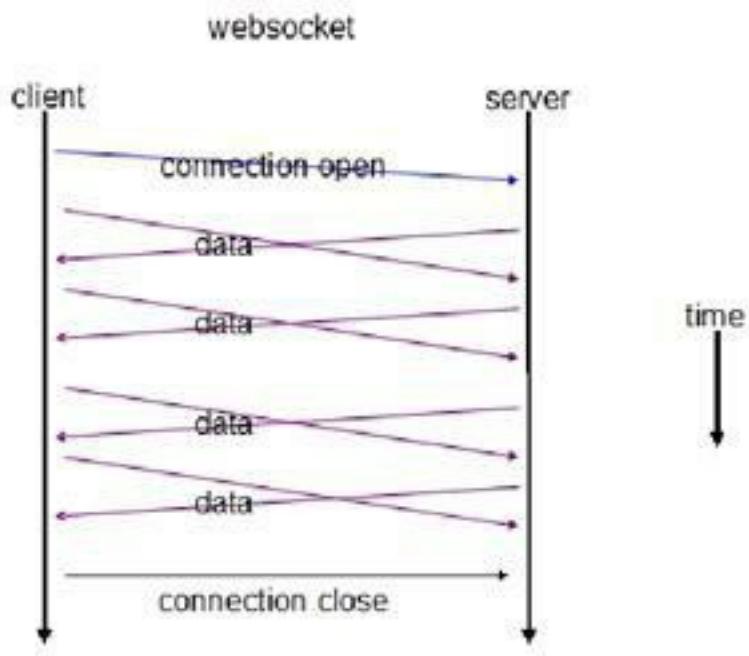
WebSocketHTML5HTTPTCPHTTP

- WebSocketWebSocketSocket
- WebSocketTCP

HTTP



WebSocket



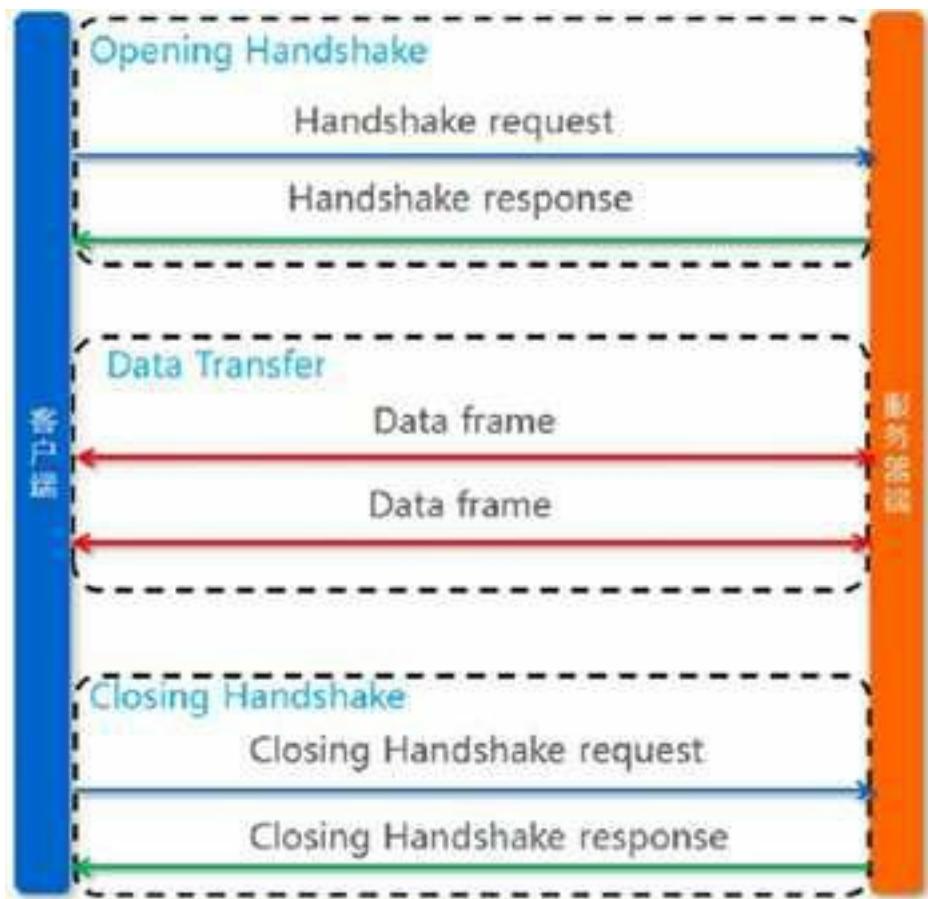
HTTP-WebSocketTCPWebSocketServer

HTTPWebSocket

- HTTPHTTP
- HTTPHTTP headerWebsocketrequestTCP HTTP headerHTTPHTML5
multiplexingURLWebSocketHTTP

WebSocket

httpWebSocketTCPhttpWebSocketWebSockethtp



WebSocket

▼ General

Request URL: ws://127.0.0.1:8080//ws

Request Method: GET

Status Code: 101 Switching Protocols

▼ Response Headers view source

Connection: Upgrade

Sec-WebSocket-Accept: AYtwtwampsFjE0lu3kFQrmOCzLQ=

Upgrade: websocket

▼ Request Headers view source

Accept-Encoding: gzip, deflate, sdch, br

Accept-Language: zh-CN,zh;q=0.8

Cache-Control: no-cache

Connection: Upgrade

Host: 127.0.0.1:8080

Origin: http://127.0.0.1:8080

Pragma: no-cache

Sec-WebSocket-Extensions: permessage-deflate; client_max_window_bits

Sec-WebSocket-Key: mg8LvEqrB2vLpyCNnCJV3Q==

Sec-WebSocket-Version: 13

Upgrade: websocket

User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/55.0.2883.87 Safari/537.36

```
Connection:Upgrade  
Upgrade:websocket  
Sec-WebSocket-Extensions:permessage-deflate; client_max_window_bits  
Sec-WebSocket-Key:mg8LvEqrB2vLpyCNnCJV3Q==  
Sec-WebSocket-Version:13
```

1. ConnectionUpgradeWebSocket
2. Sec-WebSocket-Extensions
3. Sec-WebSocket-KeyBase64
4. Sec-WebSocket-Version

```
Connection:Upgrade  
Upgrade:websocket  
Sec-WebSocket-Accept:AYtwtwampsFjE0lu3kFQrm0CzLQ=
```

1. ConnectionUpgrade
2. Sec-WebSocket-Accept

```
Status Code:101 Switching Protocols
```

http101WebSockethttpTCPhttp

WebSocket

- WebSocket
-

•

WebSocket

-
-
- /
-
- /
-

WebSocket

- websocket/

- 7proxy_read_timeout60s
- 50sWebsocket

1.1 DNS

- DNS IP

```
<link rel="dns-prefetch" href="//yuchengkai.cn">
```

1.2

-
-

```
Expires Cache-Control state code 200
```

```
Expires: Wed, 22 Oct 2018 08:41:00 GMT
```

```
Expires HTTP / 1.0      Wed, 22 Oct 2018 08:41:00 GMT  
Expires
```

```
Cache-control: max-age=30
```

```
Cache-Control HTTP / 1.1 Expires 30
```

- 304
-

Last-Modified If-Modified-Since

- Last-Modified If-Modified-Since Last-Modified
- Last-Modified HTTP / 1.1 ETag

ETag If-None-Match

- ETag If-None-Match ETag ETag ETag Last-Modified

- Cache-control: no-store
- Cache-Control: no-cache ETag

- Cache-Control: max-age=31536000

1.3 HTTP / 2.0

- HTTP / 1.1 RTT TCP
- HTTP / 2.0 TCP Header

1.4

-
- fetch onload

```
<link rel="preload" href="http://example.com">
```



1.5



```
<link rel="prerender" href="http://example.com">
```

-

2.1

-

2.2

-

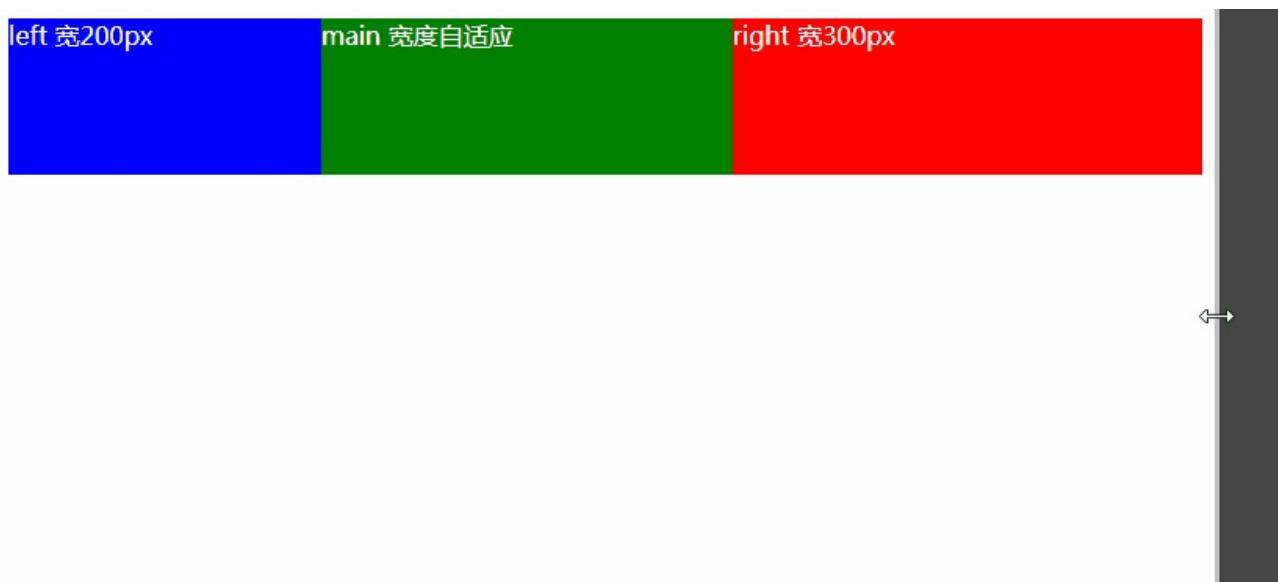


-

5(flexgrid)

csshtmlmainleft200pxright300pxmain

```
<div class="container">
  <div class="main">main      </div>
  <div class="left">left 200px </div>
  <div class="right">right 300px </div>
</div>
```



5

1.

- containerpaddingleftrightleft\rightmain
-
- leftrightcontainer

```

<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>      </title>
</head>
<style>
  .container {
    color: #fff;
    position: relative;
    padding: 0 300px 0 200px;
  }

  .left,
  .main,
  .right {
    top: 0;
    min-height: 100px;
  }

  .left {
    position: absolute;
    width: 200px;
    background: blue;
    left: 0;
  }

  .right {
    position: absolute;
    width: 300px;
    background: red;
    right: 0;
  }

  .main {
    background: green;
  }
</style>
<body>
  <div class="container">
    <div class="main">main      </div>
    <div class="left">left 200px </div>
    <div class="right">right 300px </div>
  </div>
</body>
</html>

```

2.

- containerpaddingleftrightleft\right\main left\rightleftrightmargin-leftmain
100%

-
- left/right/main3

```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>    </title>
</head>
<style>
  .container {
    color: #fff;
    overflow: hidden;
    padding: 0 300px 0 200px;
  }

  .left,
  .main,
  .right {
    float: left;
    position: relative;
    min-height: 100px;
  }

  .left {
    width: 200px;
    background: blue;
    margin-left: -100%;
    left: -200px;
  }

  .right {
    width: 300px;
    background: red;
    margin-left: -300px;
    right: -300px;
  }

  .main {
    width: 100%;
    background: green;
  }
</style>
<body>
  <div class="container">
    <div class="main">main      </div>
    <div class="left">left 200px </div>
    <div class="right">right 300px </div>
  </div>
</body>
</html>
```

- left\right\main left\rightmargin-leftmain100%maincontentcontentleft\right
-
- left/right/main3

```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>      </title>
</head>
<style>
  .container {
    color: #fff;
    overflow: hidden;
  }

  .left,
  .main,
  .right {
    float: left;
    min-height: 100px;
  }

  .left {
    width: 200px;
    background: blue;
    margin-left: -100%;
  }

  .right {
    width: 300px;
    background: red;
    margin-left: -300px;
  }

  .main {
    width: 100%;
    background: green;
  }

  .content {
    margin: 0 300px 0 200px;
  }
</style>
<body>
  <div class="container">
    <div class="main">
      <div class="content">
        main
      </div>
    </div>
    <div class="left">left 200px </div>
    <div class="right">right 300px </div>
  </div>
</body>
</html>
```

4. flex

css3

- container display:flexleftorder:-1main flex-grow:1
- left/right/main3
- ie10+chrome20+-webkit--ms-

```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>flex  </title>
</head>
<style>
  .container {
    color: #fff;
    display: flex;
  }

  .left,
  .main,
  .right {
    min-height: 100px;
  }

  .left {
    order: -1;
    width: 200px;
    background: blue;
  }

  .right {
    width: 300px;
    background: red;
  }

  .main {
    flex-grow: 1;
    background: green;
  }
</style>
<body>
  <div class="container">
    <div class="main">main      </div>
    <div class="left">left 200px </div>
    <div class="right">right 300px </div>
  </div>
</body>
</html>
```

5. grid

css3

- container display:grid grid-template-columns:200px auto 300px left order: -1
- left/right/main3
- ie10+Chrome57+-webkit--ms-

```
<!DOCTYPE html>
<head>
    <meta charset="UTF-8">
    <title>grid </title>
</head>
<style>
    .container {
        color: #fff;
        display: grid;
        grid-template-columns: 200px auto 300px;
    }

    .left,
    .main,
    .right {
        min-height: 100px;
    }

    .left {
        order: -1;
        background: blue;
    }

    .right {
        background: red;
    }

    .main {
        background: green;
    }
</style>
<body>
    <div class="container">
        <div class="main">main      </div>
        <div class="left">left 200px </div>
        <div class="right">right 300px </div>
    </div>
</body>
</html>
```

CSSBFCIFC

BFC

Formatting Context(), W3C CSS2.1

- (FC)
- (FC)

Block Formatting Context (BFC) BFC

BFC

- 1.
2. BFC
3. BFC Box margin
4. BFC
- 5.
6. BFCfloat

BFC BFC

- body
- float none
- position (absolutefixed)
- display inline-blocktable-cellsflex
- overflow visible (hiddenautoscroll)

BFC

BFC

```
<!DOCTYPE html>
<head>
<style>
.p {
  width: 200px;
  height: 50px;
  margin: 50px 0;
  background-color: red;
}
</style>
</head>
<body>
  <div class="p"></div>
  <div class="p"></div>
</body>
</html>
```

:



BFC3

margin

BFC + Box + margin

body BFC

```
<!DOCTYPE html>
<head>
<style>
.wrap {
  overflow: hidden;
}

.p {
  width: 200px;
  height: 50px;
  margin: 50px 0;
  background-color: red;
}
</style>
</head>
<body>
  <div class="p"></div>
  <div class="wrap">
    <div class="p"></div>
  </div>
</body>
</html>
```

:



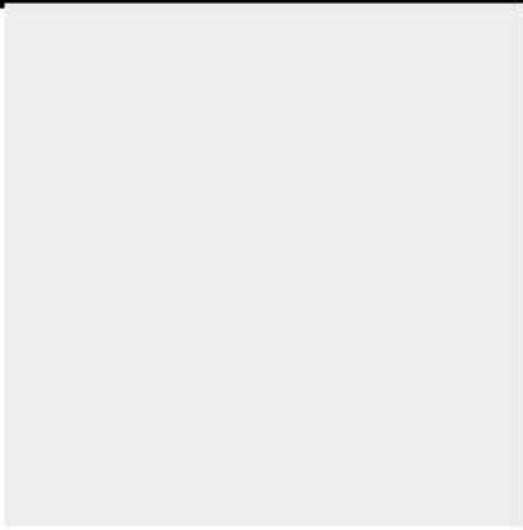
BFC()

```
<!DOCTYPE html>
<head>
<style>
.wrap {
    border: 1px solid #000;
}

.p {
    width: 200px;
    height: 50px;
    background-color: #eee;
    float: left;
}
</style>
</head>
<body>
    <div class="wrap">
        <div class="p"></div>
    </div>
</body>
</html>
```

div div

:



BFCBFC4BFCdiv

```
<!DOCTYPE html>
<head>
<style>
.wrap {
    border: 1px solid #000;
    overflow: hidden;
}

.p {
    width: 200px;
    height: 50px;
    background-color: #eee;
    float: left;
}
</style>
</head>
<body>
    <div class="wrap">
        <div class="p"></div>
    </div>
</body>
</html>
```

:

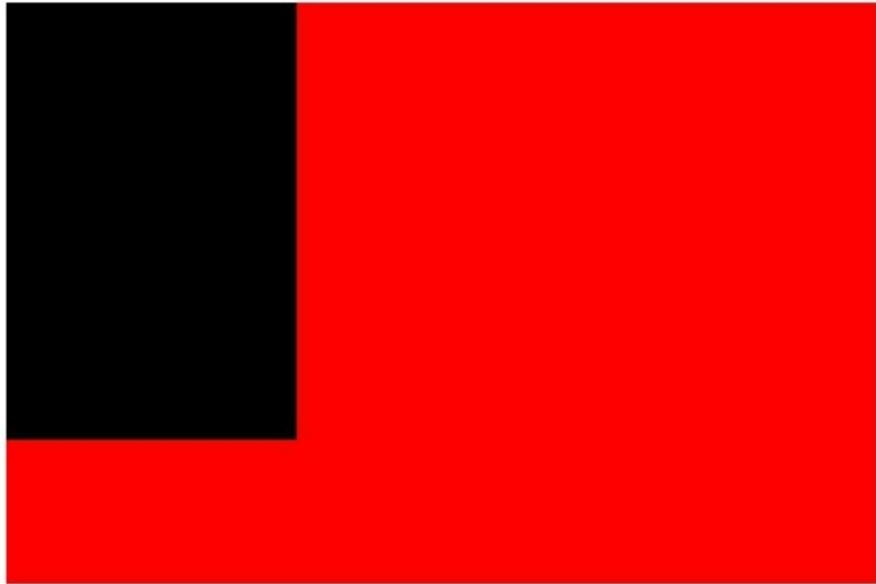


BFC

```
<!DOCTYPE html>
<head>
<style>
aside {
  width: 100px;
  height: 150px;
  float: left;
  background: black;
}

main {
  width: 300px;
  height: 200px;
  background-color: red;
}
</style>
</head>
<body>
  <div class="aside"></div>
  <div class="main"></div>
</body>
</html>
```

:



5

6 BFCfloat <div class="main"> BFC

:

```
<!DOCTYPE html>
<head>
<style>
aside {
  width: 100px;
  height: 150px;
  float: left;
  background: black;
}

.main {
  width: 300px;
  height: 200px;
  background-color: red;
  overflow: hidden;
}
</style>
</head>
<body>
  <div class="aside"></div>
  <div class="main"></div>
</body>
</html>
```



IFC

- 1.
2. +
marginpaddingborder
3. ;

CSS

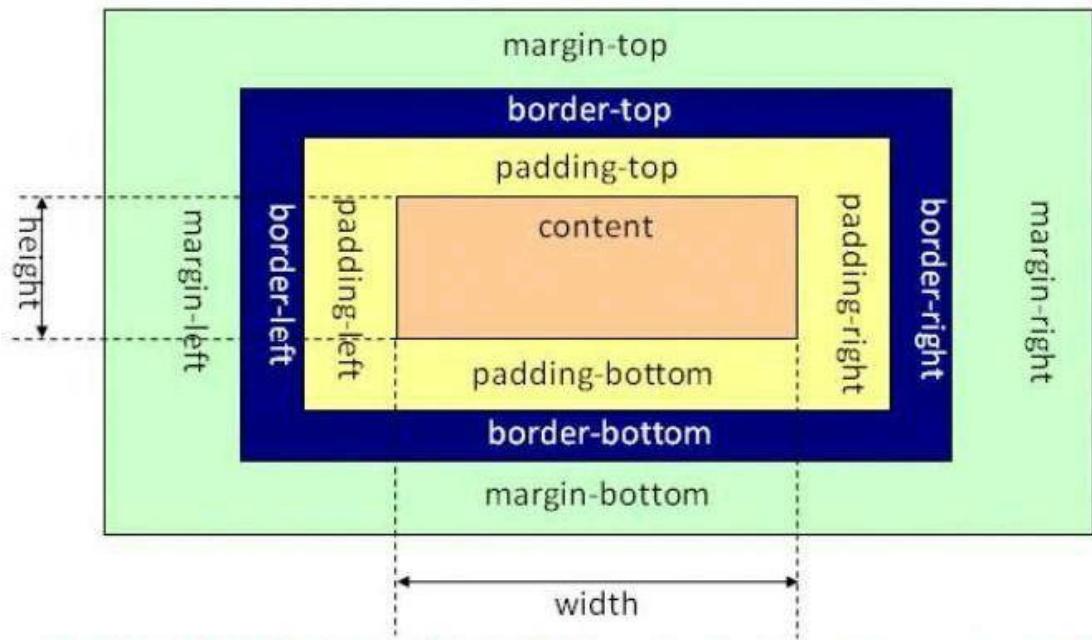
CSS

1. contentpaddingmargin
2. IE IE
3. CSS
4. JS
- 5.

BFC

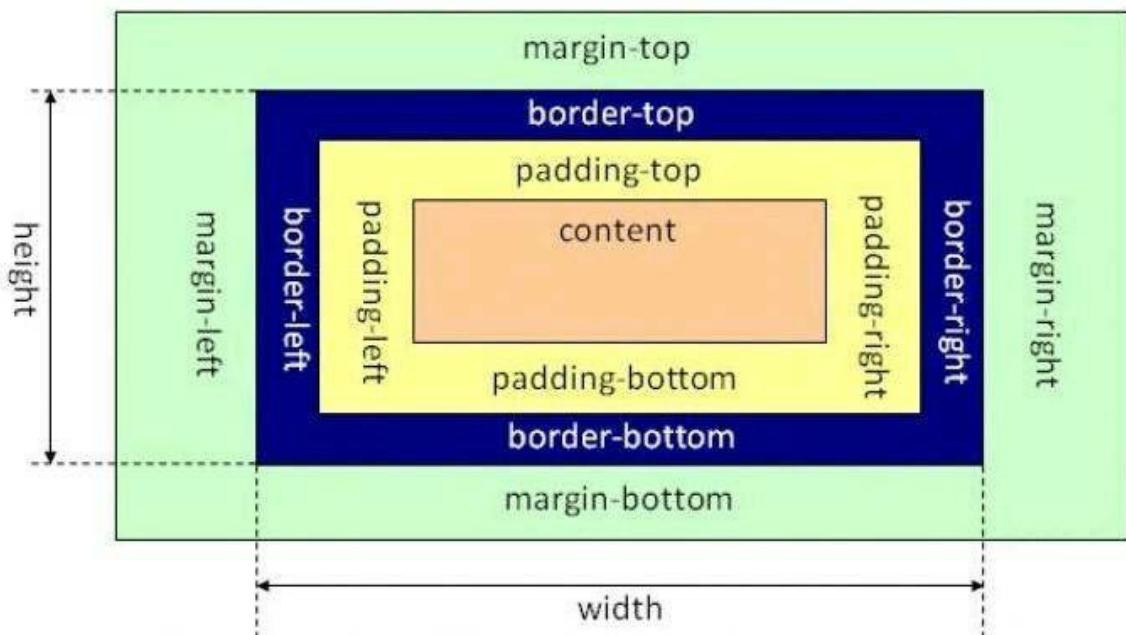
CSSJSCSS

■ 标准盒子模型



从上图可以看到标准 W3C 盒子模型的范围包括 margin、border、padding、content，并且 content 部分不包含其他部分

■ IE 盒子模型



从上图可以看到 IE 盒子模型的范围也包括 margin、border、padding、content，和标准 W3C 盒子模型不同的是：IE 盒子模型的 content 部分包含了 border 和 padding

CSS (Box Model)

- widthheight
- padding
- border
- margin

CSSIE

- **width height**
- **IE width height +border+padding**

CSS

```
/* */  
box-sizing: content-box;  
  
/* IE */  
box-sizing: border-box;
```

JS

DOM style

```
element.style.width/height;
```

Chrome

IE

```
element.currentStyle.width/height;
```

IEcss

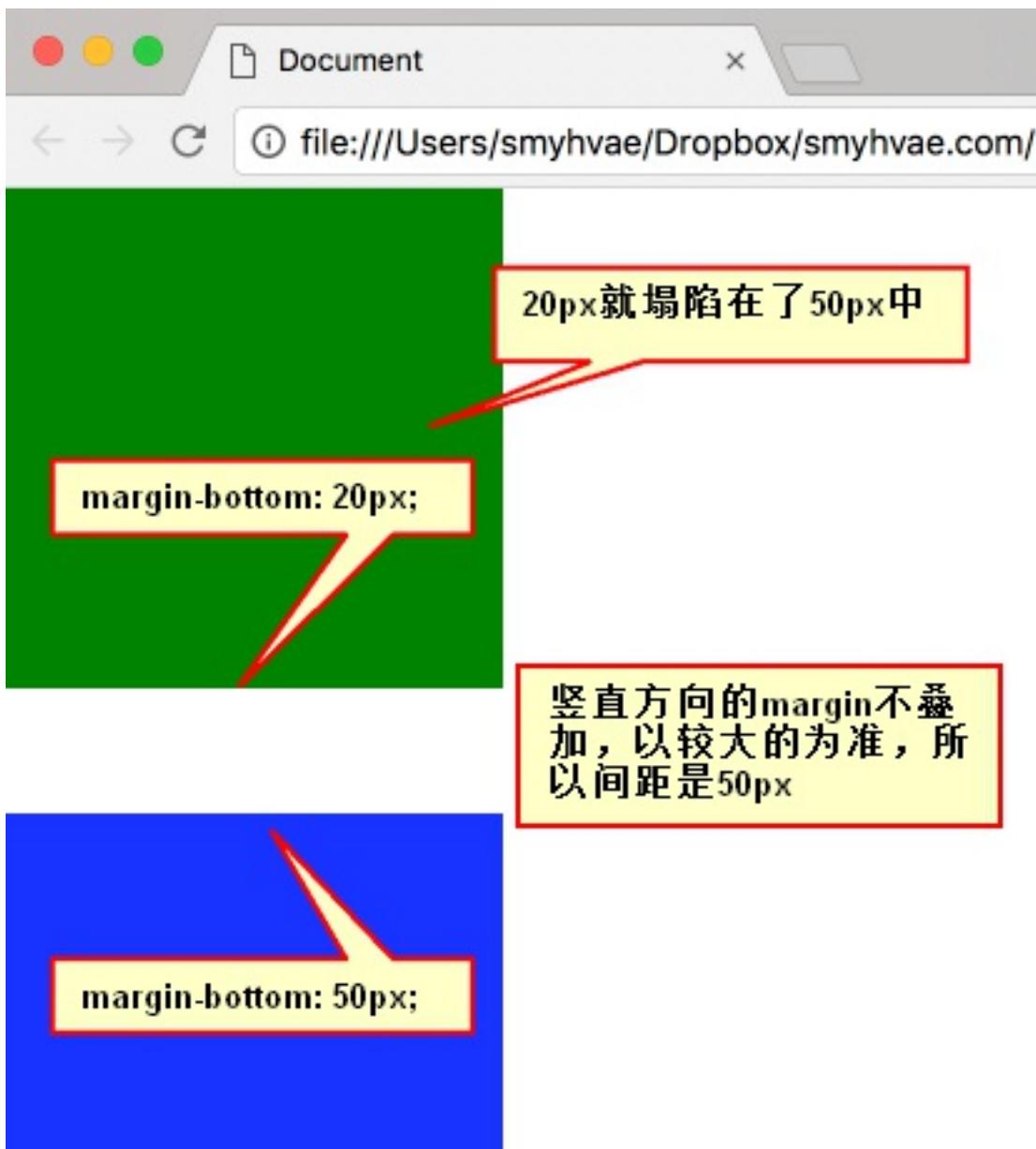
```
element.getBoundingClientRect().width/height;
```

api viewport api lefttopwidthheight

margin/margin

marginmargin (margin)

PS margin



```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style>

        * {
            margin: 0;
            padding: 0;
        }

        .father {
            background: green;
        }

        /* margin-top10 */
        .son {
            height: 100px;
            margin-top: 10px;
            background: red;
        }

    </style>
</head>
<body>
<div class="father">
    <div class="son"></div>
</div>
</body>
</html>
```

height 100px magin-top 10px height 100110 margin

WS Document

localhost:63342/interview/box.html?_jtt=js3h6uq4d6uhr06brla0o3mnt

938px x 150px

Elements Console Sources Network Performance Memory Application Security Audits

Styles Computed Event Listeners DOM Breakpoints Properties Accessibility

margin 10
border 0
padding 10px
938 x 100px

Filter Show all

WS Document

localhost:63342/interview/box.html?_jtt=js3h6uq4d6uhr06brla0o3mnt

938px x 150px

Elements Console Sources Network Performance Memory Application Security Audits

Styles Computed Event Listeners DOM Breakpoints Properties Accessibility

margin 0
border 0
padding 0px
938 x 100px

Filter Show all

overflow: hidden
110pxBFC

paddingmargin

margin

divp

```
<div>
    <p></p>
</div>
```

pmargin-top:50px;50px

```
test.html      *
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style type="text/css">
        *{
            margin: 0px;
            padding: 0px;
        }
        div{
            width: 200px;
            height: 200px;
            background-color: orange;
        }
        p{
            width: 100px;
            height: 100px;
            background-color: green;
            margin-top: 50px;
        }
    </style>
</head>
<body>
    <div>
        <p></p>
    </div>
</body>
</html>
```



divborder

test.html

```

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style type="text/css">
        *{
            margin: 0px;
            padding: 0px;
        }
        div{
            width: 200px;
            height: 200px;
            background-color: orange;
            border: 2px solid red;
        }
        p{
            width: 100px;
            height: 100px;
            background-color: green;
            margin-top: 50px;
        }
    </style>
</head>
<body>
    <div>
        <p></p>
    </div>
</body>
</html>

```

给父亲div加一个border属性，达到了我们的目的。

bordermargin“”“”

margin margin

padding` margin

BFC

BFCBlock Formatting Context

IFC BFC

BFC /BFC

BFC BFC

1. BFC
2. BFC 1
3. **BFCfloat box** 2
4. BFC 3

BFC



- 1 overflow: visible hidden auto
- 2 float: none BFC
- 3 position: static relative absolute fixed BFC
- 4 display: inline-block, table-cell, table-caption, flex, inline-flex

BFC

1 margin

```
margin      BFC
```

div

```
<div class="father">  
  <p class="son">  
    </p>  
</div>
```

```
div margin      BFC
```

```
<div class="father">  
  <p class="son" style="overflow: hidden">  
    </p>  
</div>
```

```
BFC
```

2 BFC float

div

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style>

        .father-layout {
            background: pink;
        }

        .father-layout .left {
            float: left;
            width: 100px;
            height: 100px;
            background: green;
        }

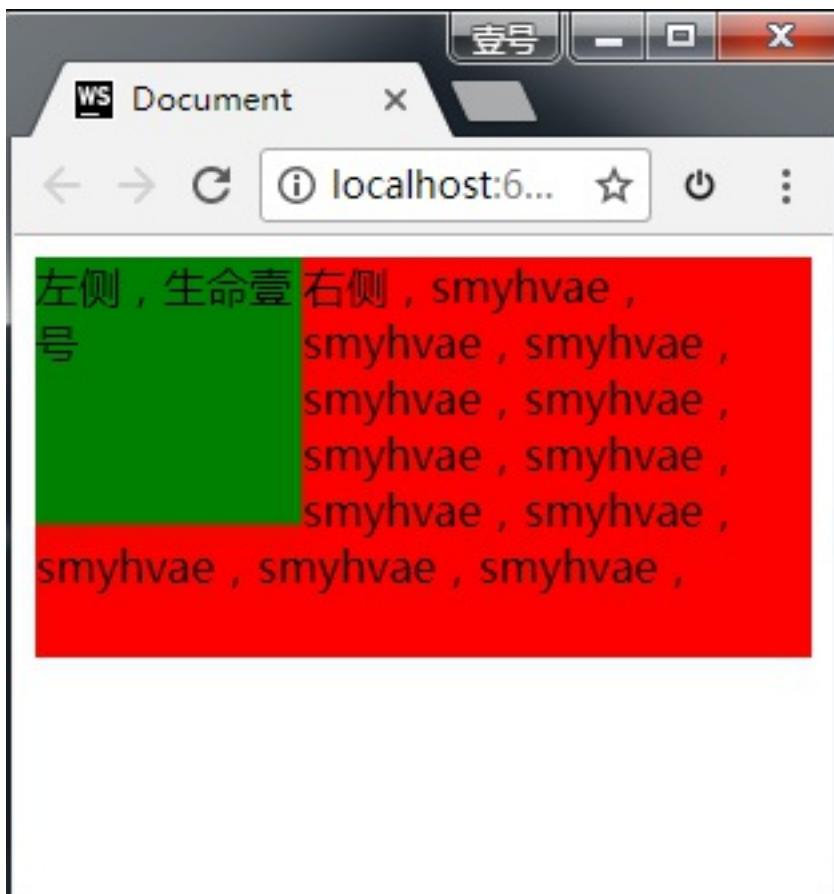
        .father-layout .right {
            height: 150px; /**
            background: red;
        }

    </style>
</head>
<body>

<section class="father-layout">
    <div class="left">

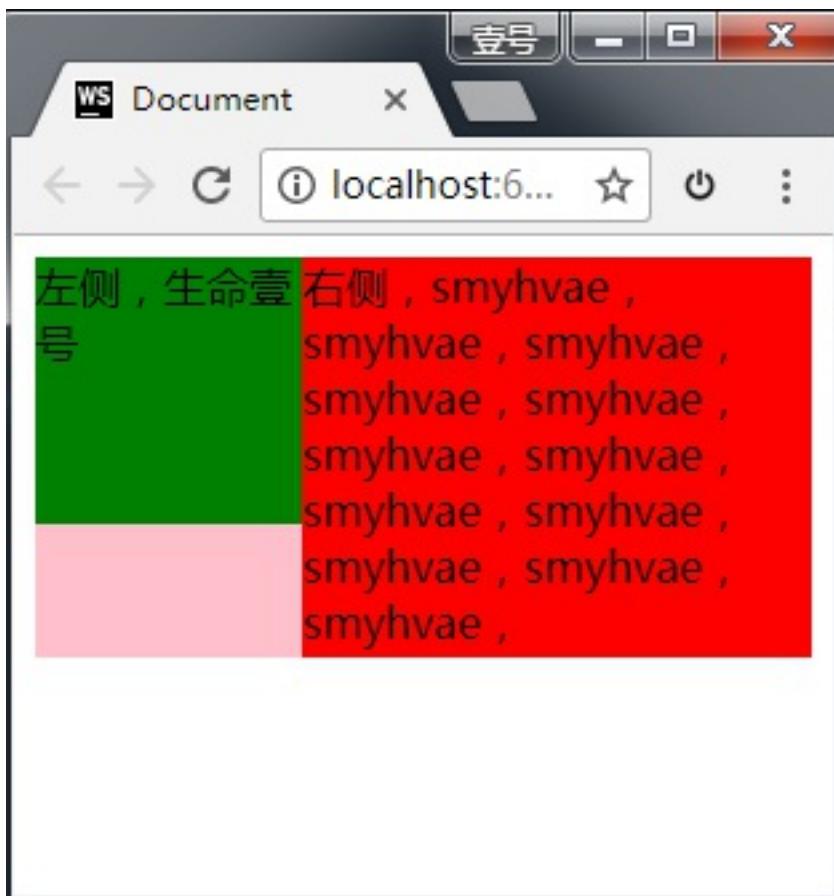
    </div>
    <div class="right">
        smyhvaeemyhvaeesmyhvaeesmyhvaeesmyhvaeesmyhvaeesmyhvae
        smyhvaeesmyhvaeesmyhvaeesmyhvae
    </div>
</section>

</body>
</html>
```



BFC BFC float boxrightoverflow

```
<div class="right" style="overflow: hidden">
    smyhvae smyhvae smyhvae smyhvae smyhvae smyhvae smyhvae
    smyhvae smyhvae smyhvae smyhvae
</div>
```



father-layout

3

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style>

        .father {
            background: pink;
        }

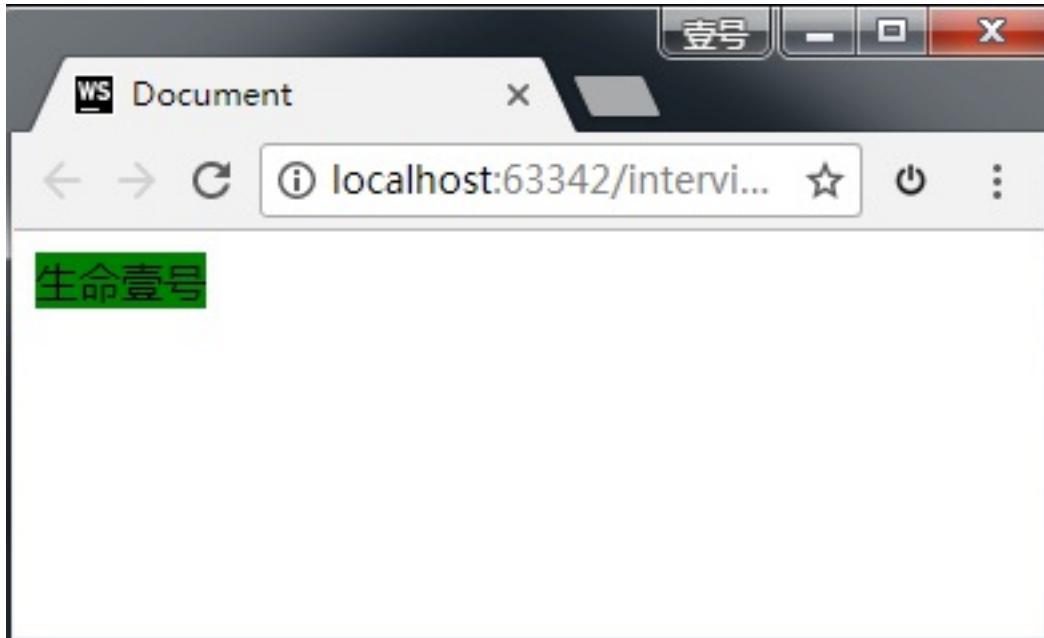
        .son {
            float: left;
            background: green;
        }

    </style>
</head>
<body>

<section class="father">
    <div class="son">

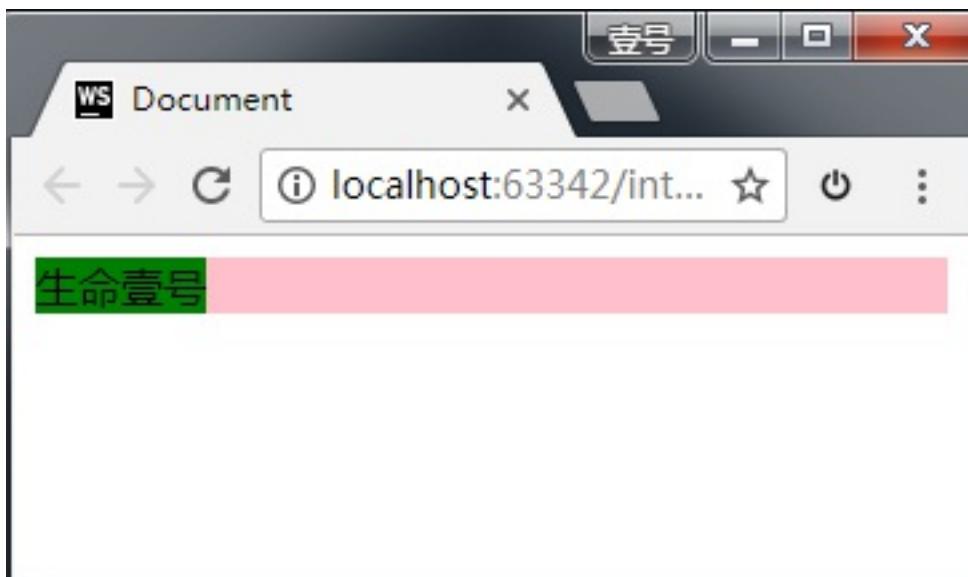
    </div>

</section>
</body>
</html>
```



BFC

overflow=hidden



BFC

BFC

BFCfloat box

DOM

- DOM

DOM“

DOM2”

- DOM DOM

“ DOM”

DOM

- DOM

false

true

- EventEventapi

DOM

Event

DOM

DOM DOM

DOM0

```
element.onclick = function () {  
}
```

js html onclick js

DOM2

```
element.addEventListener('click', function () {  
}, false);
```

true falsefalse

DOM3

```
element.addEventListener('keyup', function () {  
}, false);
```

DOM3

PS DOM1 DOM1

“DOM”

DOM

DOM

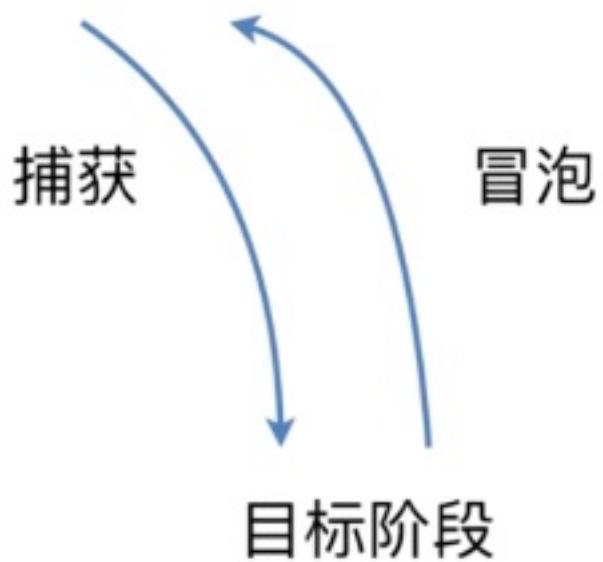
-
-

DOM

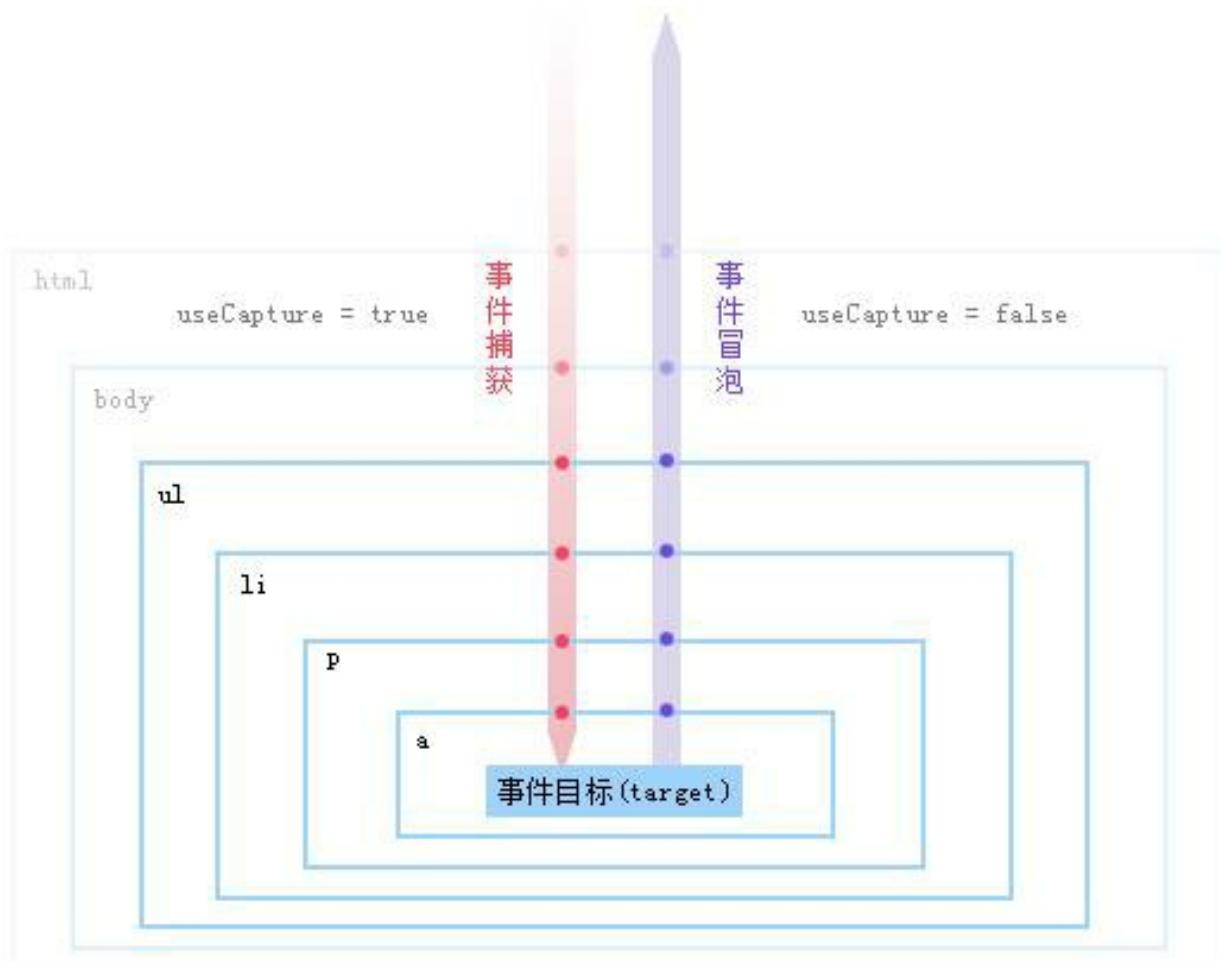
DOM

1. window
- 2.
3. Window

事件流

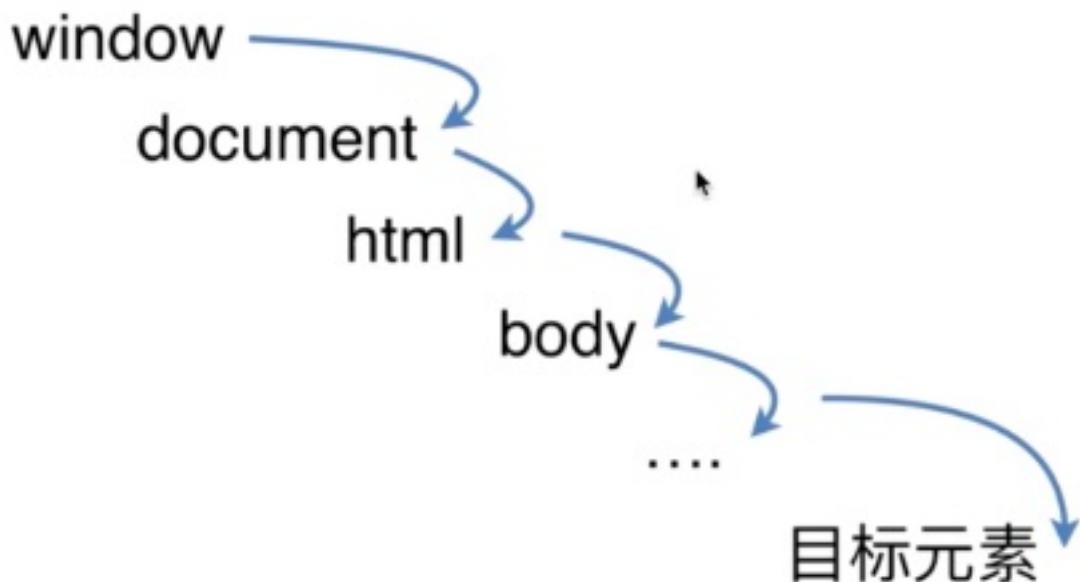


JS事件捕获与事件冒泡原型图



DOM





window --> document --> html--> body -->

- PS1 **window** bodyhtml
- PS2 JSDOM windowdocument

```

window.addEventListener("click", function () {
    alert(" window" );
}, true);

document.addEventListener("click", function () {
    alert(" document" );
}, true);

document.documentElement.addEventListener("click", function () {
    alert(" html" );
}, true);

document.body.addEventListener("click", function () {
    alert(" body" );
}, true);

fatherBox.addEventListener("click", function () {
    alert(" father" );
}, true);

childBox.addEventListener("click", function () {
    alert(" child" );
}, true);
  
```

```
js
```

- body document.body
- html document.documentElement

```
Event
```

```
event.preventDefault();
```

-
- <a>click <a>

```
AB A
```

```
w3c IE11
```

```
event.stopPropagation();
```

```
IE10
```

```
event.cancelBubble = true;
```

```
box3.onclick = function (event) {  
  
    alert("child");  
  
    //  
    event = event || window.event;  
  
    if (event && event.stopPropagation) {  
        event.stopPropagation();  
    } else {  
        event.cancelBubble = true;  
    }  
}
```

box3 fathergrandfatherbody

```
event.stopImmediatePropagation();
```

A addEventListenerABA BA B stopImmediatePropagation

event

45

```
event.currentTarget    //  
  
event.target    //
```

```
var myEvent = new Event('clickTest');
element.addEventListener('clickTest', function () {
    console.log('smyhvae');
});

//  
element.dispatchEvent(myEvent); // myEvent clickTest
```

```
var myEvent = new Event('clickTest');

element.addEventListener('clickTest', function () {
    console.log('smyhvae');
});

setTimeout(function () {
    element.dispatchEvent(myEvent); // myEvent clickTest
}, 1000);
```

CSS transform position GPU CSS

transformposition:absolute

1. position + top/left

left top css

```

<!DOCTYPE html>
<head>
<style>
  html,
  body {
    width: 100%;
    height: 100%;
  }

  .ball-running {
    animation: run-around 4s infinite;
    width: 100px;
    height: 100px;
    background-color: red;
    position: absolute;
  }

@keyframes run-around {
  0%: {
    top: 0;
    left: 0;
  }
  25% {
    top: 0;
    left: 200px;
  }
  50% {
    top: 200px;
    left: 200px;
  }
  75% {
    top: 200px;
    left: 0;
  }
}
</style>
</head>
<body>
  <div class="ball-running"></div>
</body>
</html>

```

60fps topleft reflow repaint

2. transform

transform translate() top left

```

<!DOCTYPE html>
<head>
<style>
  html,
  body {
    width: 100%;
    height: 100%;
  }

  .ball-running {
    animation: run-around 4s infinite;
    width: 100px;
    height: 100px;
    background-color: red;
  }

@keyframes run-around {
  0%: {
    transform: translate(0, 0);
  }
  25% {
    transform: translate(200px, 0);
  }
  50% {
    transform: translate(200px, 200px);
  }
  75% {
    transform: translate(0, 200px);
  }
}
</style>
</head>
<body>
  <div class="ball-running"></div>
</body>
</html>

```

repaintreflow

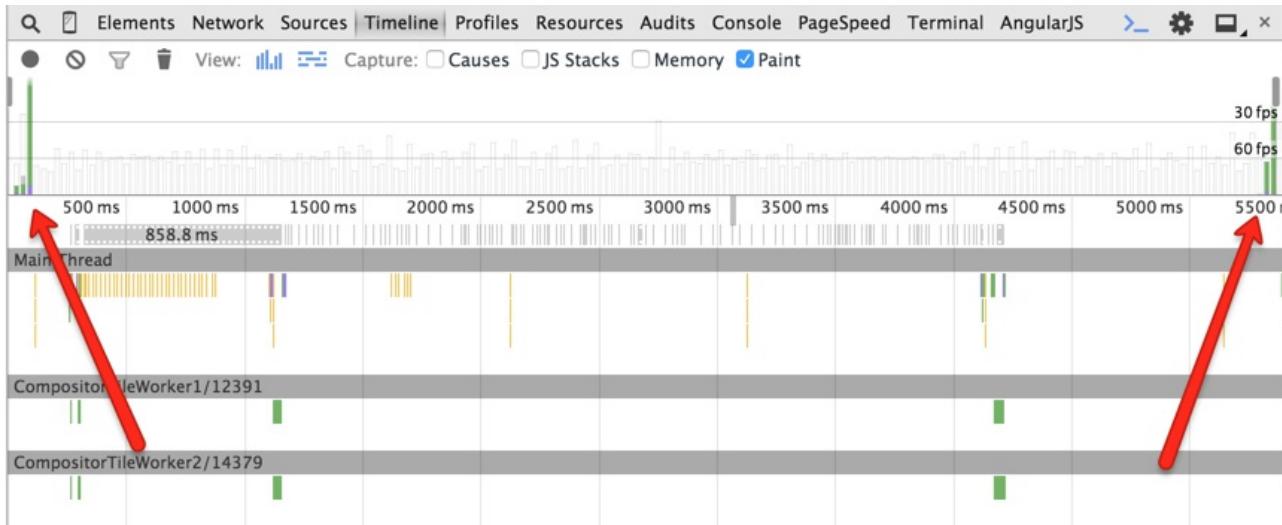
transform repaint transform GPU

DOMDOMCSSGPU transform repaint 3Dtransform

CSS transform GPU transform chrome “show layer borders”

1. 3D CSS transform
2. videocanvas
3. CSS filters
4. z-index

2D transform 3D transform timeline repaint



3D 2D transform 3D2D

GPU repaint GPU repaint

GPU

GPU

CSS GPU

1. transform
2. opacity
3. filter

GPU

2D transform repaint

```
.exam1 {  
  transform: translateZ(0);  
}  
  
.exam2 {  
  transform: rotateZ(360deg);  
}
```

3D transform GPU

1. GPU
2. GPUGPUCPU

will-change

will-change will-change

```
.exam3 {  
  will-change: transform;  
}
```

1. transform GPU position + top/left
- 2.
3. 3D 2D 2D2
4. GPU
5. transform GPU CSS

- HTML DOM
- CSS CSSOM
- DOM CSSOM
-
- GPU



- CSSOM CSSOM CSSOM CSS
- HTML script DOM JS CSS JS JSCSS DOM

5.1

- 3D translate3dtranslateZ
- will-change
- videoiframe
- opacity
- position: fixed

5.2 RepaintReflow

- color
-

- window
-
-
-
-
-

Event loop

- Event loop Microtasks document 60Hz 16ms
- resize scroll resize scroll 16ms
- media query
-
-
-
- requestAnimationFrame
- IntersectionObserver
-
- requestIdleCallback

- translate top
- visibility display: none
- table table
- requestAnimationFrame
- CSS DOM
- video

EventLoop

Event Loop

1. Event Loop
2. requestAnimationFrame microTask
3. requestIdleCallback microTask
4. resizescroll

requestAnimationFrame requestIdleCallback bug

HTML API

- 1.

2.

3. rendering opportunity event loop task

- 60fps 16.66ms 30fps
 - 4fps
 -

1.

2. map of animation frame callbacks requestAnimationFrame

4.

This step enables the user agent to prevent the steps below from running for other reasons, for example, to ensure certain tasks are executed immediately after each other, with only microtask checkpoints interleaved (and without, e.g., animation frame callbacks interleaved). Concretely, a user agent might wish to coalesce timer callbacks together, with no intermediate rendering updates. `microTask`
`requestAnimationFrame`

5. resize

6. scroll

7. requestAnimationFrame

8. IntersectionObserver

9.

10. taskmicroTask Idle requestIdleCallback

resize scroll CSSOM pending scroll event targets scroll
resize

task

An event loop has one or more task queues. For example, a user agent could have one task queue for mouse and key events (to which the user interaction task source is associated), and another to which all other task sources are associated. Then, using the freedom granted in the initial step of the event loop processing model, it could give keyboard and mouse events preference over other tasks three-quarters of the time, keeping the interface responsive but not starving other task queues. Note that in this setup, the processing model still enforces that the user agent would never process events from any one task source out of order.

1.

2. Task

Task“”

```
Vue 2.0.0-rc.7    nextTick  MutationObserver  postMessage Issue  
(https://github.com/vuejs/vue/issues/3771#issuecomment-249692588)  
""          jsfiddle    task  nextTick  nextTick  
microTask  nextTick  promise.then Chrome      queueMicroTask API  
Promise
```

Issue Bug

requestAnimationFrame

```
requestAnimationFrame
```

1.

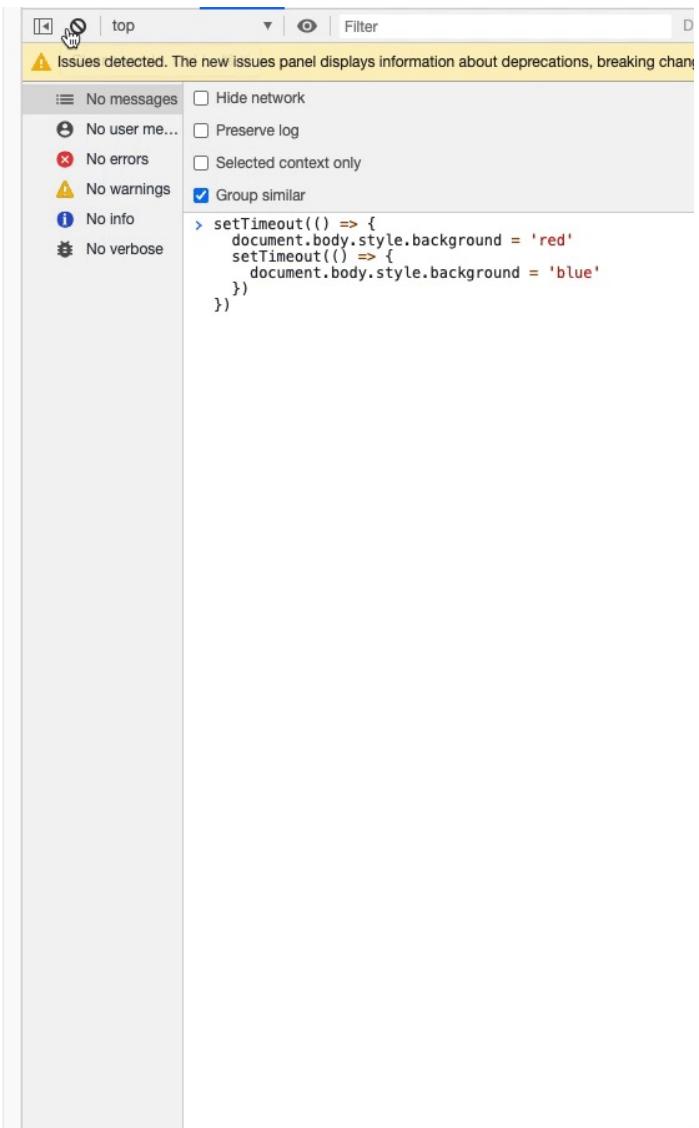
2.

```
rAF API DOM DOM
```

rAF DOM setTimeout

```
setTimeout
```

```
setTimeout(() => {  
  document.body.style.background = "red";  
  setTimeout(() => {  
    document.body.style.background = "blue";  
  });  
});
```



Task

17ms 60fps
API

rAF 10

```
let i = 10;
let req = () => {
  i--;
  requestAnimationFrame(() => {
    document.body.style.background = "red";
    requestAnimationFrame(() => {
      document.body.style.background = "blue";
      if (i > 0) {
        req();
      }
    });
  });
};

req();
```

gif 10 20 performance



4

```
setTimeout(() => {
  console.log("sto1")
  requestAnimationFrame(() => console.log("rAF1"))
})
setTimeout(() => {
  console.log("sto2")
  requestAnimationFrame(() => console.log("rAF2"))
})

queueMicrotask(() => console.log("mic1"))
queueMicrotask(() => console.log("mic2"))
```

```
mic1
mic2
sto1
rAF1
sto2
rAF2
```

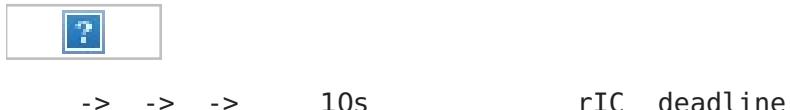
```
mic1  
mic2  
sto1  
sto2  
rAF1  
rAF2
```

requestIdleCallback

requestIdleCallback [MDN \(<https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestIdleCallback>\)](https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestIdleCallback)

React API postMessage

API



50ms deadline 50ms

MDN API (https://developer.mozilla.org/zh-CN/docs/Web/API/Background_Tasks_API)

MDN [requestAnimationFrame \(<https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestAnimationFrame>\)](https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestAnimationFrame)

1. 10 EventLoop
2. rIC rIC timeout
rIC
3. 50 100 50ms 50ms
4. timeRemaining() 0 deadline - now
5. timeRemaining()

rIC 49.xx ms

```
requestIdleCallback((deadline) => console.log(deadline.timeRemaining()))
```

§ 6. Processing

§ 6.1 Start an idle period algorithm

The [start an idle period algorithm](#), which is called by the [event loop processing model](#) when it determines that the [event loop](#) is otherwise idle:

1. Let `last_deadline` be the last idle period deadline associated with `window`
2. If `last_deadline` is greater than the current time, return from this algorithm.
3. Optionally, if the user agent determines the idle period should be delayed, return from this algorithm.

NOTE

This is intended to allow user agents to delay the start of idle periods as needed to optimise the power usage of the device. For example, if the [Document's hidden attribute \(\[page-visibility\]\)](#) is `true` then the user agent can throttle idle period generation, for example limiting the Document to one idle period every 10 seconds to optimize for power usage.

4. Let `now` be the current time.
5. Let `deadline` be a time in the future until which the browser expects to remain idle. The user agent [SHOULD](#) choose `deadline` to ensure that no time-critical tasks will be delayed even if a callback runs for the whole time period from `now` to `deadline`. As such, it should be set to the minimum of: the closest timeout in the list of active timers as set via [setTimeout](#) and [setInterval](#); the scheduled runtime for pending animation callbacks posted via [requestAnimationFrame](#); pending internal timeouts such as deadlines to start rendering the next frame, process audio or any other internal task the user agent deems important.
6. If `deadline - now` is greater than 50ms, then cap `deadline` by setting it to be `now + 50ms`.

NOTE

The cap of 50ms in the future is to ensure responsiveness to new user input within the threshold of human perception.

7. Let `pending_list` be `window`'s list of idle request callbacks.
8. Let `run_list` be `window`'s list of runnable idle callbacks.

```
> requestIdleCallback((deadline) => {
  console.log(deadline.timeRemaining())
})
< 373
49.875
> |
```


NOTE

The user agent is free to end an idle period early, even if `deadline` has not yet occurred, by deciding return from the algorithm in step 1. For example, the user agent may decide to do this if it determines that higher priority work has become runnable.

```
> requestIdleCallback((deadline) => {
  console.log(deadline.timeRemaining())
})
< 378
15.86
> requestIdleCallback((deadline) => {
  console.log(deadline.timeRemaining())
})
< 379
14.26500000000002
> |
```


§ 6.3 Invoke idle callback timeout algorithm

The [invoke idle callback timeout algorithm](#):

1. Let `callback` be the result of finding the entry in `window`'s list of idle request callbacks or the list of runnable idle callbacks that is associated with the value given by the `handle` argument passed to the algorithm.
2. If `callback` is not undefined:
 1. Remove `callback` from both `window`'s list of idle request callbacks and the list of runnable idle callbacks.
 2. Let `now` be the current time.
 3. Let `deadlineArg` be a new [IdleDeadline](#). Set the `time` associated with `deadlineArg` to `now` and set the `timeout` associated with `deadlineArg` to `true`.
 4. Call `callback` with `deadlineArg` as its argument. If an uncaught runtime script error occurs, then report the error.

NOTE

To mitigate cache and statistical fingerprinting attacks, the resolution of the time estimates returned by the [IdleDeadline](#) interface should be set to the same 5 microsecond minimum as the [Performance](#) interface defined in [\[HR-TIME\]](#).

§ A. Acknowledgments

rAF 10px

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Document</title>
    <style>
      #SomeElementYouWantToAnimate {
        height: 200px;
        width: 200px;
        background: red;
      }
    </style>
  </head>
  <body>
    <div id="SomeElementYouWantToAnimate"></div>
    <script>
      var start = null;
      var element = document.getElementById("SomeElementYouWantToAnimate");
      element.style.position = "absolute";

      function step(timestamp) {
        if (!start) start = timestamp;
        var progress = timestamp - start;
        element.style.left = Math.min(progress / 10, 200) + "px";
        if (progress < 200) {
          window.requestAnimationFrame(step);
        }
      }
      //
      window.requestAnimationFrame(step);

      //
      window.requestIdleCallback((deadline) => {
        console.log(deadline.timeRemaining())
        alert("rIC");
      });
    </script>
  </body>
</html>
```

```
requestIdleCallback alert('rIC')
```

rID

确定



alert left rIC

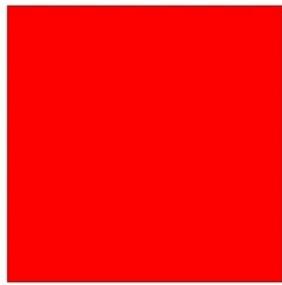
step 1000

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Document</title>
    <style>
      #SomeElementYouWantToAnimate {
        height: 200px;
        width: 200px;
        background: red;
      }
    </style>
  </head>
  <body>
    <div id="SomeElementYouWantToAnimate"></div>
    <script>
      var start = null;
      var element = document.getElementById("SomeElementYouWantToAnimate");
      element.style.position = "absolute";

      function step(timestamp) {
        if (!start) start = timestamp;
        var progress = timestamp - start;
        element.style.left = Math.min(progress / 10, 200) + "px";
        let i = 1000;
        while (i > 0) {
          console.log("i", i);
          i--;
        }
        if (progress < 2000) {
          window.requestAnimationFrame(step);
        }
      }

      //
      window.requestAnimationFrame(step);

      //
      window.requestIdleCallback((deadline) => {
        console.log(deadline.timeRemaining())
        alert("rIC");
      });
    </script>
  </body>
</html>
```



"" , rIC

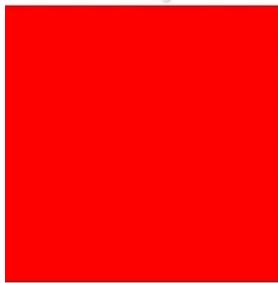
rIC timeout

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Document</title>
    <style>
      #SomeElementYouWantToAnimate {
        height: 200px;
        width: 200px;
        background: red;
      }
    </style>
  </head>
  <body>
    <div id="SomeElementYouWantToAnimate"></div>
    <script>
      var start = null;
      var element = document.getElementById("SomeElementYouWantToAnimate");
      element.style.position = "absolute";

      function step(timestamp) {
        if (!start) start = timestamp;
        var progress = timestamp - start;
        element.style.left = Math.min(progress / 10, 200) + "px";
        let i = 1000;
        while (i > 0) {
          console.log("i", i);
          i--;
        }
        if (progress < 2000) {
          window.requestAnimationFrame(step);
        }
      }

      //
      window.requestAnimationFrame(step);

      //
      window.requestIdleCallback((deadline) => {
        console.log(deadline.timeRemaining())
        alert("rIC");
      }, { timeout: 500 });
    </script>
  </body>
</html>
```



500ms rIC ""

Event Loop rAFrIC

- 1.
- 2.
3. requestAnimationFrame
4. requestIdleCallback timeout
5. resizescroll Event Loop EventTarget

canvas

Canvas API JavaScript HTML <canvas>

Canvas API2D <canvas> WebGL API 2D3D

```
<canvas width="600" height="400" id="canvas"></canvas>
```

300+150

```
// canvas
var canvas = document.getElementById("canvas");
// 
var context = canvas.getContext("2d");
```

api

```
<!DOCTYPE html>
<html>
<body>
```

```
<canvas id="myCanvas" width="600" height="500" style="border:1px solid #d3d3d3;">
    Your browser does not support the HTML5 canvas tag.
</canvas>

<script>

var canvas = document.getElementById("myCanvas");
var context = canvas.getContext("2d");

// 
context.moveTo(100, 100);
context.lineTo(300, 100);
context.lineTo(300, 200);

// 
// 
context.moveTo(100, 300);
context.lineTo(300, 300);

// 
context.stroke();

// 
context.beginPath();
// 
context.moveTo(400, 100);
context.lineTo(400, 300);
context.lineTo(500, 300);
context.lineTo(500, 200);

// stroke
context.stroke();

// 
context.fill();
context.fillStyle = "gray";

// 
context.strokeStyle = "red"; // css
context.stroke();

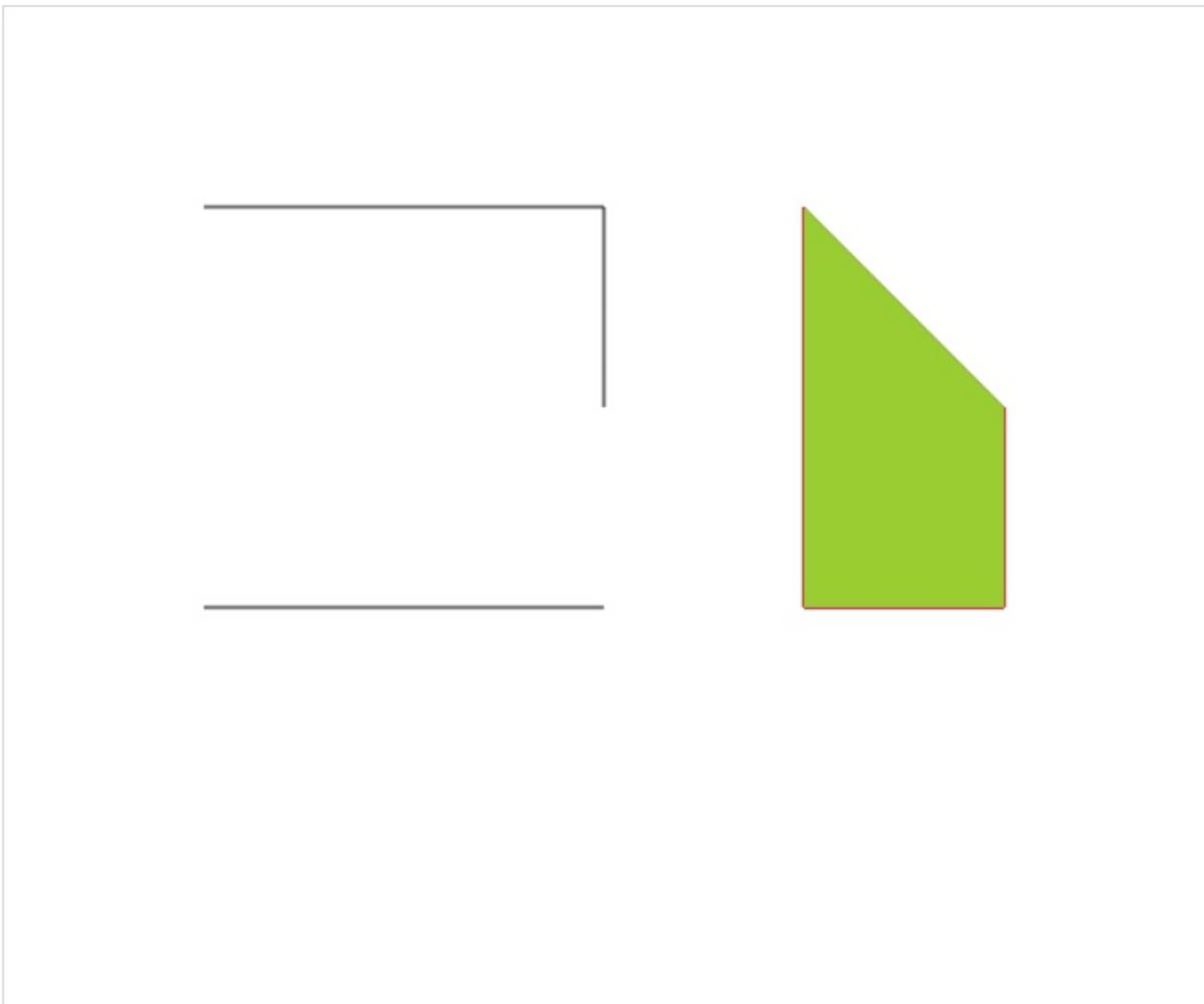
// 
// 
context.fillStyle = "yellowgreen";
context.fill();

// 
context.closePath();

// px
```

```
context.lineWidth = 15;  
//  
context.lineCap = "round"; //butt round  
</script>  
  
</body>  
</html>
```

:



```
// x y width height  
  
context.rect(100, 100, 200, 200);  
context.strokeStyle = "red";  
context.stroke();  
context.fillStyle = "yellow";  
context.fill();
```

```
//  
//  
context.fillRect(100, 100, 200, 200);  
  
//  
context.strokeStyle = "yellow";  
context.stroke();  
// fillRect
```

```
// x0  
// x, y: radius ; startRadian, endRadian dircetion falsetrue  
'  
  
// context.arc(x, y, radius, startRadian, endRadian, direction);  
  
// 3181  
context.arc(300, 200, 100, 31/180*Math.PI, 81/180*Math.PI);  
  
context.strokeStyle = "yellow";  
context.stroke();  
  
context.fillStyle = "red";  
context.fill();
```

```
for (var i = 0; i < 10; i++) {  
    context.moveTo(320+i*20,200);  
    // i % 2  
    context.arc(300, 200, 20 + i * 20, 0, 2*Math.PI, i%2==0);  
}  
context.fillStyle = "green";  
context.fill();  
context.stroke();
```

:



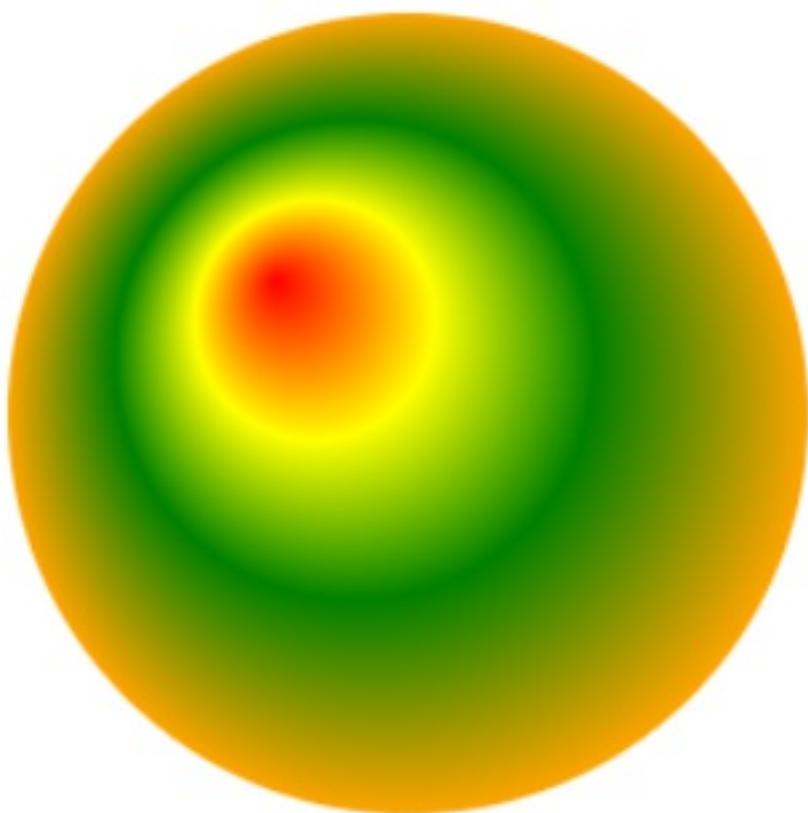
```
// 1.  
//   var gradient = context.createLinearGradient(100, 100, 300, 100);  
//  
var gradient = context.createLinearGradient(100, 100, 300, 380);  
  
// 2.  
gradient.addColorStop(0, "red");  
gradient.addColorStop(0.5, "hotpink");  
gradient.addColorStop(1, "yellowgreen");  
  
// 3.  
context.fillStyle = gradient;  
  
// 4.  
context.fillRect(100, 100, 200, 280);
```

:



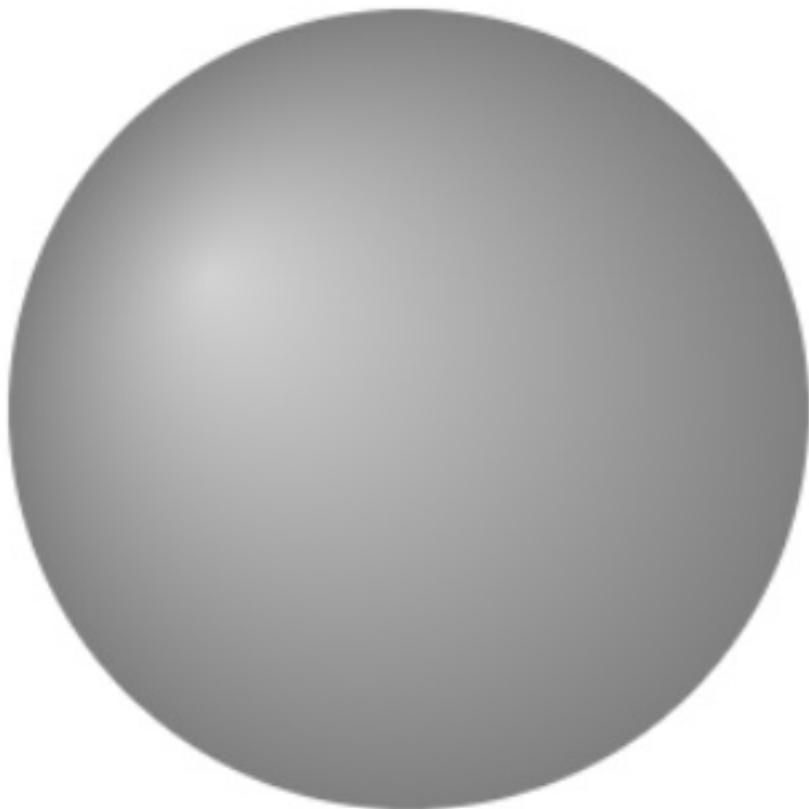
```
// 1.  
//  
var c1 = {x: 260, y: 160, r: 0};  
//  
var c2 = {x: 300, y: 200, r: 120};  
  
var gradient = context.createRadialGradient(c1.x, c1.y, c1.r, c2.x, c2.y,  
c2.r);  
gradient.addColorStop(0, "red");  
gradient.addColorStop(0.3, "yellow");  
gradient.addColorStop(0.6, "green");  
gradient.addColorStop(1, "orange");  
  
// 2.  
context.fillStyle = gradient;  
  
// 3.  
// 0;  
context.arc(c2.x, c2.y, c2.r, 0, 2*Math.PI);  
context.fill();
```

:



```
//1.  
var c1 = {x: 240, y: 160, r: 0};  
var c2 = {x: 300, y: 200, r: 120};  
  
var gradient = context.createRadialGradient(c1.x, c1.y, c1.r, c2.x, c2.y,  
c2.r);  
gradient.addColorStop(1, "gray");  
gradient.addColorStop(0, "lightgray");  
  
//2.  
context.fillStyle = gradient;  
  
//3.  
context.arc(c2.x, c2.y, c2.r, 0, 2*Math.PI);  
context.fill();
```

:



```
//80
var c1 = {x: 300, y: 200, r: 80};
var c2 = {x: 300, y: 200, r: 150};
var gradient = context.createRadialGradient(c1.x, c1.y, c1.r, c2.x, c2.y,
c2.r);
gradient.addColorStop(1, "red");
gradient.addColorStop(6/7, "orange");
gradient.addColorStop(5/7, "yellow");
gradient.addColorStop(4/7, "green");
gradient.addColorStop(3/7, "cyan");
gradient.addColorStop(2/7, "skyblue");
gradient.addColorStop(1/7, "purple");
gradient.addColorStop(0, "white");

//
context.fillStyle = gradient;

//
context.arc(c2.x, c2.y, c2.r, 0, 2*Math.PI);
context.fill();

//
context.fillStyle = "white";
context.fillRect(0, 200, 600, 200);
```

:



```
//css3
//
//
context.shadowOffsetX = 10;
context.shadowOffsetY = 10;
context.shadowBlur = 10;
context.shadowColor = "yellowgreen";

//
context.fillStyle = "red";
context.fillRect(100, 100, 300, 200);
```

:



api

```
//
//text x y
//context.strokeText("text", x, y)

context.font = "60px ";
//context.strokeText("hello, world", 100, 100);
context.fillText("hello, world", 100, 100);
```

:

hello, world

```
//left
//apicontext.textAlign = "left";
context.textAlign = "left";
context.fillText("left", 300, 120);

context.textAlign = "center";
context.fillText("center", 300, 190);

context.textAlign = "right";
context.fillText("right", 300, 260);

// canvas
// 1. right
// 2. canvas.width,0
context.font = "60px ";
context.textAlign = "right";
context.textBaseline = "top";
context.fillText("hello, world", canvas.width, 0);
```

:

left

center

right

```
//top
//apicontext.textBaseline = "top";

context.fillText("default", 50, 200);

context.textBaseline = "top";
context.fillText("top", 150, 200);

context.textBaseline = "middle";
context.fillText("middle", 251, 200);

context.textBaseline = "bottom";
context.fillText("bottom", 400, 200);
```

:

default
top

middle

bottom

3 imgx, y canvas

```
//context.drawImage(img, x, y)

var image = new Image();
image.src = "./img/gls.jpg";

// 
image.onload = function () {
    context.drawImage(image, 100, 200);
}
```

5, x, y, w, h,

```
var image = new Image();
image.src = "./img/gls.jpg";

image.onload = function () {
    context.drawImage(image, 100, 100, 100, 100);
}
```

9 imgimageimageyimagegewimageh (canvasx, canvasy, canvasw, canvash)

```
//
//imageimageyimagegewimageh
//(canvasx, canvasy, canvasw, canvash)

var image = new Image();
image.src = "./img/gls.jpg";
image.onload = function () {
    /*
        image
        150 0 150 * 200
        100 100 150 200
    */
    context.drawImage(image, 150, 0, 150, 200, 100, 100, 150, 200);
}
```

WebWorkerpostMessage

JavaScript CPU

Web Worker JavaScript Worker Worker Worker Worker
UI

Worker Worker

Web Worker

1

Worker

2DOM

Worker DOM document window parentWorker navigator location

3

Worker (postMessage)

4

Worker alert() confirm() XMLHttpRequest AJAX

5

Worker file://

new Worker() Worker

```
var worker = new Worker('work.js');
```

Worker() Worker Worker 404 Worker

worker.postMessage() Worker

```
worker.postMessage('Hello World');
worker.postMessage({method: 'echo', args: ['Work']});
// worker.postMessage() Worker
```

worker.onmessage

```
worker.onmessage = function (event) {
  console.log('Received message ' + event.data);
  doSomething();
}

function doSomething() {
  //
  worker.postMessage('Work done!');
}
```

data Worker

Worker

```
worker.terminate();
```

Worker

Worker message

```
self.addEventListener('message', function (e) {
  self.postMessage('You said: ' + e.data);
}, false);
```

self

```
//
this.addEventListener('message', function (e) {
  this.postMessage('You said: ' + e.data);
}, false);

// 
addEventListener('message', function (e) {
  postMessage('You said: ' + e.data);
}, false);
```

self.addEventListener() self.onmessagedata self.postMessage()

Worker

```
self.addEventListener('message', function (e) {
  var data = e.data;
  switch (data.cmd) {
    case 'start':
      self.postMessage('WORKER STARTED: ' + data.msg);
      break;
    case 'stop':
      self.postMessage('WORKER STOPPED: ' + data.msg);
      self.close(); // Terminates the worker.
      break;
    default:
      self.postMessage('Unknown command: ' + data.msg);
  };
}, false);
```

self.close() Worker

Worker

Worker importScripts()

```
importScripts('script1.js');
```

```
importScripts('script1.js', 'script2.js');
```

Worker

Worker Worker error

```
worker.onerror(function (event) {
  console.log([
    'ERROR: Line ', e.lineno, ' in ', e.filename, ': ', e.message
  ].join('')));
});

// 
worker.addEventListener('error', function (event) {
  // ...
});
```

Worker error

Worker

Worker

```
// 
worker.terminate();

// Worker
self.close();
```

Worker Worker Worker

Worker FileBlobArrayBuffer

```
// 
var uInt8Array = new Uint8Array(new ArrayBuffer(10));
for (var i = 0; i < uInt8Array.length; ++i) {
  uInt8Array[i] = i * 2; // [0, 2, 4, 6, 8,...]
}
worker.postMessage(uInt8Array);

// Worker
self.onmessage = function (e) {
  var uInt8Array = e.data;
  postMessage('Inside worker.js: uInt8Array.toString() = ' +
uInt8Array.toString());
  postMessage('Inside worker.js: uInt8Array.byteLength = ' +
uInt8Array.byteLength);
};
```

Worker 500MB JavaScript Transferable Objects Worker

3D

```
// Transferable Objects
worker.postMessage(arrayBuffer, [arrayBuffer]);

// 
var ab = new ArrayBuffer(1);
worker.postMessage(ab, [ab]);
```

Web Worker

Worker JavaScript

```
<!DOCTYPE html>
<body>
  <script id="worker" type="app/worker">
    addEventListener('message', function () {
      postMessage('some message');
    }, false);
  </script>
</body>
</html>
```

```
<script>type app/worker
```

Worker

```
var blob = new Blob([document.querySelector('#worker').textContent]);
var url = window.URL.createObjectURL(blob);
var worker = new Worker(url);

worker.onmessage = function (e) {
  // e.data === 'some message'
};
```

URL Worker URL Worker

Worker

Worker

```

function createWorker(f) {
  var blob = new Blob(['(' + f.toString() + ')()' ]);
  var url = window.URL.createObjectURL(blob);
  var worker = new Worker(url);
  return worker;
}

var pollingWorker = createWorker(function (e) {
  var cache;

  function compare(new, old) { ... };

  setInterval(function () {
    fetch('/my-api-endpoint').then(function (res) {
      var data = res.json();

      if (!compare(data, cache)) {
        cache = data;
        self.postMessage(data);
      }
    })
  }, 1000)
});

pollingWorker.onmessage = function () {
  // render data
}

pollingWorker.postMessage('init');

```

Worker

Worker Worker

Worker Worker Firefox 10 Worker

```

var worker = new Worker('worker.js');
worker.onmessage = function (event) {
  document.getElementById('result').textContent = event.data;
};

```

Worker

```
// worker.js

// settings
var num_workers = 10;
var items_per_worker = 1000000;

// start the workers
var result = 0;
var pending_workers = num_workers;
for (var i = 0; i < num_workers; i += 1) {
  var worker = new Worker('core.js');
  worker.postMessage(i * items_per_worker);
  worker.postMessage((i + 1) * items_per_worker);
  worker.onmessage = storeResult;
}

// handle the results
function storeResult(event) {
  result += event.data;
  pending_workers -= 1;
  if (pending_workers <= 0)
    postMessage(result); // finished!
}
```

Worker 10 Worker 10 Worker

```
// core.js
var start;
onmessage = getStart;
function getStart(event) {
  start = event.data;
  onmessage = getEnd;
}

var end;
function getEnd(event) {
  end = event.data;
  onmessage = null;
  work();
}

function work() {
  var result = 0;
  for (var i = start; i < end; i += 1) {
    // perform some complex calculation here
    result += 1;
  }
  postMessage(result);
  close();
}
```

API

Worker() Worker

```
var myWorker = new Worker(jsUrl, options);
```

Worker() JS Worker Worker

```
//  
var myWorker = new Worker('worker.js', { name : 'myWorker' });  
  
// Worker  
self.name // myWorker
```

Worker() Worker WorkerWorker

- Worker.onerror error
- Worker.onmessage message Event.data
- Worker.onmessageerror messageerror
- Worker.postMessage() Worker
- Worker.terminate() Worker

Worker

Web Worker window Worker window

Worker

- self.name Worker
- self.onmessagemessage
- self.onmessageerror messageerror
- self.close() Worker
- self.postMessage() Worker
- self.importScripts() JS

Service Worker

```
Service workers WebAPI
```

```

// index.js
if (navigator.serviceWorker) {
  navigator.serviceWorker
    .register("sw.js")
    .then(function(registration) {
      console.log("service worker " );
    })
    .catch(function(err) {
      console.log("servcie worker " );
    });
}

// sw.js
// `install`
self.addEventListener("install", e => {
  e.waitUntil(
    caches.open("my-cache").then(function(cache) {
      return cache.addAll(["./index.html", "./index.js"]);
    })
  );
});

// 
// 
self.addEventListener("fetch", e => {
  e.respondWith(
    caches.match(e.request).then(function(response) {
      if (response) {
        return response;
      }
      console.log("fetch source");
    })
  );
});
}

```

Application Service Worker



Cache



Service Worker

OffscreenCanvas Canvas — Web WorkerCanvas

OffscreenCanvas canvas

Canvas

Canvas WebGL

Canvas JavaScript Canvas API

webCanvasApp

, [OffscreenCanvas \(<https://developer.mozilla.org/zh-CN/docs/Web/API/OffscreenCanvas>\)](https://developer.mozilla.org/zh-CN/docs/Web/API/OffscreenCanvas)

Canvas

Canvas <canvas> Canvas API DOM OffscreenCanvas Canvas DOM Canvas API

OffscreenCanvas DOM Canvas Canvas DOM Canvas Web Worker Web Worker
DOM Canvas



WorkerOffscreenCanvas

web worker

[Workers \(\[https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API\]\(https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API\)\)](https://developer.mozilla.org/zh-CN/docs/Web/API/Web_Workers_API) Web——
Worker DOM Worker Canvas API

OffscreenCanvas DOM Worker Canvas API Worker OffscreenCanvas

```
// file: worker.js

function getGradientColor(percent) {
    const canvas = new OffscreenCanvas(100, 1);
    const ctx = canvas.getContext('2d');
    const gradient = ctx.createLinearGradient(0, 0, canvas.width, 0);
    gradient.addColorStop(0, 'red');
    gradient.addColorStop(1, 'blue');
    ctx.fillStyle = gradient;
    ctx.fillRect(0, 0, ctx.canvas.width, 1);
    const imgd = ctx.getImageData(0, 0, ctx.canvas.width, 1);
    const colors = imgd.data.slice(percent * 4, percent * 4 + 4);
    return `rgba(${colors[0]}, ${colors[1]}, ${colors[2]}, ${colors[3]})`;
}

getGradientColor(40); // rgba(152, 0, 104, 255)
```

WorkertransferControlToOffscreen CanvasOffscreenCanvasOffscreenCanvasCanvas

```
<!DOCTYPE html>
<html>
<body>
<canvas id="myCanvas" width="600" height="500" style="border:1px solid #d3d3d3;">
    Your browser does not support the HTML5 canvas tag.
</canvas>
<script>
var canvas = document.getElementById("myCanvas");
// var context = canvas.getContext("2d");

// //
// context.moveTo(100, 100);
// context.lineTo(300, 100);
// context.lineTo(300, 200);

// //
// //
// context.moveTo(100, 300);
// context.lineTo(300, 300);

// //
// context.stroke();

// //
// context.beginPath();
// //
// context.moveTo(400, 100);
// context.lineTo(400, 300);
// context.lineTo(500, 300);
```

```
// context.lineTo(500, 200);

// // stroke
// context.stroke();

// //
// context.fill();
// context.fillStyle = "gray";

// //
// context.strokeStyle = "red"; // css
// context.stroke();

// //
// //
// context.fillStyle = "yellowgreen";
// context.fill();

// //
// context.closePath();

// // px
// context.lineWidth = 15;
// //
// context.lineCap = "round"; //butt round

// : canvascanvascanvascantextcanvastransferControlToOffscreen
OffscreenCanvas
// Uncaught DOMException: Failed to execute 'transferControlToOffscreen' on
'HTMLCanvasElement': Cannot transfer control from a canvas that has a rendering
context.
const offscreen = canvas.transferControlToOffscreen();
const worker = new Worker('worker.js');
worker.postMessage({ canvas: offscreen }, [offscreen]);
</script>
</body>
</html>
```

OffscreenCanvas postMessageWorkerWorkercontext

```
// worker.js

self.onmessage = function (event) {
    // Canvas(OffscreenCanvas)
    var canvas = event.data.canvas;
    var context = canvas.getContext('2d');

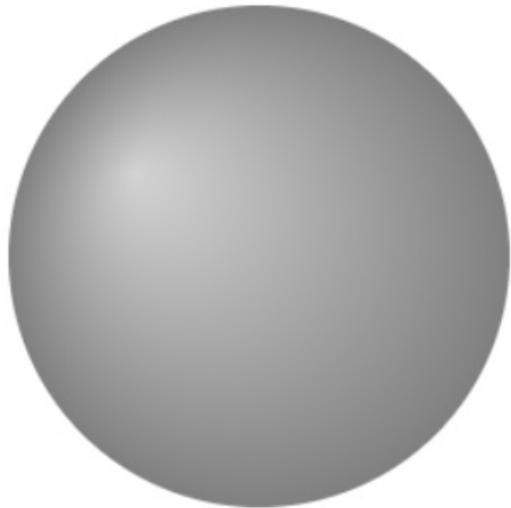
    //
    var c1 = {x: 240, y: 160, r: 0};
    var c2 = {x: 300, y: 200, r: 120};

    var gradient = context.createRadialGradient(c1.x, c1.y, c1.r, c2.x, c2.y,
c2.r);
    gradient.addColorStop(1, "gray");
    gradient.addColorStop(0, "lightgray");

    //2.
    context.fillStyle = gradient;

    //3.
    context.arc(c2.x, c2.y, c2.r, 0, 2*Math.PI);
    context.fill();
}
```

:



Worker

WebRTC YUV

WebRTC YUV YUV Cavans

[yuv-canvas](https://github.com/brion/yuv-canvas) (<https://github.com/brion/yuv-buffer>) YUV

render.js

```
"use strict";
exports.__esModule = true;
var isEqual = require('lodash.isequal');
var YUVBuffer = require('yuv-buffer');
var YUVCanvas = require('yuv-canvas');
var Renderer = /** @class */ (function () {
    function Renderer(workSource) {
        var _this = this;
        this._sendCanvas = function () {
            _this.canvasSent = true;
            _this.worker && _this.worker.postMessage({
                type: 'constructor',
```

```

        data: {
            canvas: _this.offCanvas,
            id: (_this.element && _this.element.id) ||
(Math.random().toString(16).slice(2) + Math.random().toString(16).slice(2))
        }
    }, [_this.offCanvas]);
};

/**
 *
 */
this._checkRendererWay = function () {
    if (_this.workerReady && _this.worker && _this.offCanvas &&
this.enableWorker) {
        return 'worker';
    }
    else {
        return 'software';
    }
};
// workerCanvas
this._workDrawFrame = function (width, height, yUint8Array,
uUint8Array, vUint8Array) {
    if (_this.canvasWrapper && _this.canvasWrapper.style.display !==
'none') {
        _this.canvasWrapper.style.display = 'none';
    }
    if (_this.workerCanvasWrapper &&
this.workerCanvasWrapper.style.display === 'none') {
        _this.workerCanvasWrapper.style.display = 'flex';
    }
    _this.worker && _this.worker.postMessage({
        type: 'drawFrame',
        data: {
            width: width,
            height: height,
            yUint8Array: yUint8Array,
            uUint8Array: uUint8Array,
            vUint8Array: vUint8Array
        }
    }, [yUint8Array, uUint8Array, vUint8Array]);
};
// Canvas
this._softwareDrawFrame = function (width, height, yUint8Array,
uUint8Array, vUint8Array) {
    if (_this.workerCanvasWrapper &&
this.workerCanvasWrapper.style.display !== 'none') {
        _this.workerCanvasWrapper.style.display = 'none';
    }
    if (_this.canvasWrapper && _this.canvasWrapper.style.display ===
'none') {
        _this.canvasWrapper.style.display = 'flex';
    }
}

```

```

    var format = YUVBuffer.format({
        width: width,
        height: height,
        chromaWidth: width / 2,
        chromaHeight: height / 2
    });
    var y = YUVBuffer.lumaPlane(format, yUint8Array);
    var u = YUVBuffer.chromaPlane(format, uUint8Array);
    var v = YUVBuffer.chromaPlane(format, vUint8Array);
    var frame = YUVBuffer.frame(format, y, u, v);
    _this.yuv.drawFrame(frame);
};

this.cacheCanvasOpts = {};
this.yuv = {};
this.ready = false;
this.contentMode = 0;
this.container = {};
this.canvasWrapper;
this.canvas = {};
this.element = {};
this.offCanvas = {};
this.enableWorker = !!workSource;
if (this.enableWorker) {
    this.worker = new Worker(workSource);
    this.workerReady = false;
    this.canvasSent = false;
    this.worker.onerror = function (evt) {
        console.error('[WorkerRenderer]: the renderer worker catch
error: ', evt);
        _this.workerReady = false;
        _this.enableWorker = false;
    };
    this.worker.onmessage = function (evt) {
        var data = evt.data;
        switch (data.type) {
            case 'ready':
                console.log('[WorkerRenderer]: the renderer worker was
ready');
                _this.workerReady = true;
                if (_this.offCanvas) {
                    _this._sendCanvas();
                }
                break;
            case 'exited':
                console.log('[WorkerRenderer]: the renderer worker was
exited');
                _this.workerReady = false;
                _this.enableWorker = false;
                break;
        }
    }
}

```

```
        };
    }
}

Renderer.prototype._calcZoom = function (vertical, contentMode, width,
height, clientWidth, clientHeight) {
    if (vertical === void 0) { vertical = false; }
    if (contentMode === void 0) { contentMode = 0; }
    var localRatio = clientWidth / clientHeight;
    var tempRatio = width / height;
    if (isNaN(localRatio) || isNaN(tempRatio)) {
        return 1;
    }
    if (!contentMode) {
        if (vertical) {
            return localRatio > tempRatio ?
                clientHeight / height : clientWidth / width;
        }
        else {
            return localRatio < tempRatio ?
                clientHeight / height : clientWidth / width;
        }
    }
    else {
        if (vertical) {
            return localRatio < tempRatio ?
                clientHeight / height : clientWidth / width;
        }
        else {
            return localRatio > tempRatio ?
                clientHeight / height : clientWidth / width;
        }
    }
};

Renderer.prototype.getBindingElement = function () {
    return this.element;
};

Renderer.prototype.bind = function (element) {
    // record element
    this.element = element;
    // create container
    var container = document.createElement('div');
    container.className += ' video-canvas-container';
    Object.assign(container.style, {
        width: '100%',
        height: '100%',
        display: 'flex',
        justifyContent: 'center',
        alignItems: 'center',
        position: 'relative'
    });
    this.container = container;
    element && element.appendChild(this.container);
};
```

```
// canvasweb workercanvascanvas
var canvasWrapper = document.createElement('div');
canvasWrapper.className += ' video-canvas-wrapper canvas-renderer';
Object.assign(canvasWrapper.style, {
    width: '100%',
    height: '100%',
    justifyContent: 'center',
    alignItems: 'center',
    position: 'absolute',
    left: '0px',
    right: '0px',
    display: 'none'
});
this.canvasWrapper = canvasWrapper;
this.container.appendChild(this.canvasWrapper);
var workerCanvasWrapper = document.createElement('div');
workerCanvasWrapper.className += ' video-canvas-wrapper webworker-
renderer';
Object.assign(workerCanvasWrapper.style, {
    width: '100%',
    height: '100%',
    justifyContent: 'center',
    alignItems: 'center',
    position: 'absolute',
    left: '0px',
    right: '0px',
    display: 'none'
});
this.workerCanvasWrapper = workerCanvasWrapper;
this.container.appendChild(this.workerCanvasWrapper);
// create canvas
this.canvas = document.createElement('canvas');
this.workerCanvas = document.createElement('canvas');
this.canvasWrapper.appendChild(this.canvas);
this.workerCanvasWrapper.appendChild(this.workerCanvas);
// OffscreenCanvas
this.offCanvas = this.workerCanvas.transferControlToOffscreen();
if (!this.canvasSent && this.offCanvas && this.worker &&
this.workerReady) {
    this._sendCanvas();
}
this.yuv = YUVCanvas.attach(this.canvas, { webGL: false });
};
Renderer.prototype.unbind = function () {
    this.canvasWrapper && this.canvasWrapper.removeChild(this.canvas);
    this.workerCanvasWrapper &&
this.workerCanvasWrapper.removeChild(this.workerCanvas);
    this.container && this.container.removeChild(this.canvasWrapper);
    this.container && this.container.removeChild(this.workerCanvasWrapper);
    this.element && this.element.removeChild(this.container);
    this.worker && this.worker.terminate();
    this.workerReady = false;
```

```

        this.canvasSent = false;
        this.yuv = null;
        this.container = null;
        this.workerCanvasWrapper = null;
        this.canvasWrapper = null;
        this.element = null;
        this.canvas = null;
        this.workerCanvas = null;
        this.offCanvas = null;
        this.worker = null;
    };
    Renderer.prototype.refreshCanvas = function () {
        // Not implemented for software renderer
    };
    Renderer.prototype.updateCanvas = function (options) {
        if (options === void 0) { options = {
            width: 0,
            height: 0,
            rotation: 0,
            mirrorView: false,
            contentMode: 0,
            clientWidth: 0,
            clientHeight: 0
        }; }
        // check if display options changed
        if (isEqual(this.cacheCanvasOpts, options)) {
            return;
        }
        this.cacheCanvasOpts = Object.assign({}, options);
        // check for rotation
        if (options.rotation === 0 || options.rotation === 180) {
            this.canvas.width = options.width;
            this.canvas.height = options.height;
            // canvas transferControlToOffscreen canvascanvasstyle
            this.workerCanvas.style.width = options.width + "px";
            this.workerCanvas.style.height = options.height + "px";
        }
        else if (options.rotation === 90 || options.rotation === 270) {
            this.canvas.height = options.width;
            this.canvas.width = options.height;
            this.workerCanvas.style.height = options.width + "px";
            this.workerCanvas.style.width = options.height + "px";
        }
        else {
            throw new Error('Invalid value for rotation. Only support 0, 90, 180, 270');
        }
        var transformItems = [];
        transformItems.push("rotateZ(" + options.rotation + "deg)");
        var scale = this._calcZoom(options.rotation === 90 || options.rotation === 270, options.contentMode, options.width, options.height, options.clientWidth, options.clientHeight);
    };
}

```

```

        // transformItems.push(`scale(${scale})`)
        this.canvas.style.zoom = scale;
        this.workerCanvas.style.zoom = scale;
        // check for mirror
        if (options.mirrorView) {
            // this.canvas.style.transform = 'rotateY(180deg)';
            transformItems.push('rotateY(180deg)');
        }
        if (transformItems.length > 0) {
            var transform = "" + transformItems.join(' ');
            this.canvas.style.transform = transform;
            this.workerCanvas.style.transform = transform;
        }
    };
    Renderer.prototype.drawFrame = function (imageData) {
        if (!this.ready) {
            this.ready = true;
        }
        var dv = new DataView(imageData.header);
        // let format = dv.getUint8(0);
        var mirror = dv.getUint8(1);
        var contentWidth = dv.getUint16(2);
        var contentHeight = dv.getUint16(4);
        var left = dv.getUint16(6);
        var top = dv.getUint16(8);
        var right = dv.getUint16(10);
        var bottom = dv.getUint16(12);
        var rotation = dv.getUint16(14);
        // let ts = dv.getUint32(16);
        var width = contentWidth + left + right;
        var height = contentHeight + top + bottom;
        this.updateCanvas({
            width: width, height: height, rotation: rotation,
            mirrorView: !!mirror,
            contentMode: this.contentMode,
            clientWidth: this.container && this.container.clientWidth,
            clientHeight: this.container && this.container.clientHeight
        });
        if (this._checkRendererWay() === 'software') {
            // canvas
            this._softwareDrawFrame(width, height, imageData.yUint8Array,
imageData.uUint8Array, imageData.vUint8Array);
        }
        else {
            this._workDrawFrame(width, height, imageData.yUint8Array,
imageData.uUint8Array, imageData.vUint8Array);
        }
    };
    /**
     * Canvas
     *
     * @memberof Renderer

```

```

*/
Renderer.prototype.clearFrame = function () {
    if (this._checkRendererWay() === 'software') {
        this.yuv && this.yuv.clear();
    }
    else {
        this.worker && this.worker.postMessage({
            type: 'clearFrame'
        });
    }
};

Renderer.prototype.setContentMode = function (mode) {
    if (mode === void 0) { mode = 0; }
    this.contentMode = mode;
};

return Renderer;
}());

exports["default"] = Renderer;

```

Worker:

```

// render worker

(function() {
    const dateFormat = function(date, formatter = 'YYYY-MM-DD hh:mm:ss SSS') {
        if (!date) {
            return date;
        }

        let time;

        try {
            time = new Date(date);
        } catch (e) {
            return date;
        }

        const oDate = {
            Y: time.getFullYear(),
            M: time.getMonth() + 1,
            D: time.getDate(),
            h: time.getHours(),
            m: time.getMinutes(),
            s: time.getSeconds(),
            S: time.getMilliseconds()
        };

        return formatter.replace(/(Y|M|D|h|m|s|S)+/g, (res, key) => {
            let len = 2;

            switch (res.length) {

```

```

    case 1:
      len = res.slice(1, 0) === 'Y' ? 4 : 2;
      break;
    case 2:
      len = 2;
      break;
    case 3:
      len = 3;
      break;
    case 4:
      len = 4;
      break;
    default:
      len = 2;
  }
  return (`0${oDate[key]}`).slice(-len);
});
}

let yuv;

try {
  importScripts('./yuv-buffer/yuv-buffer.js');
  importScripts('./yuv-canvas/shaders.js');
  importScripts('./yuv-canvas/depower.js');
  importScripts('./yuv-canvas/YCbCr.js');
  importScripts('./yuv-canvas/FrameSink.js');
  importScripts('./yuv-canvas/SoftwareFrameSink.js');
  importScripts('./yuv-canvas/WebGLFrameSink.js');
  importScripts('./yuv-canvas/yuv-canvas.js');

  self.addEventListener('message', function (e) {
    const data = e.data;
    switch (data.type) {
      case 'constructor':
        console.log(`[${dateFormat(new Date())}] RENDER_WORKER [INFO]: received
canvas: `, data.data.canvas, data.data.id);
        yuv = YUVCanvas.attach(data.data.canvas, { webGL: false });
        break;
      case 'drawFrame':
        // requestAnimationFrame
        const width = data.data.width;
        const height = data.data.height;
        const yUint8Array = data.data.yUint8Array;
        const uUint8Array = data.data.uUint8Array;
        const vUint8Array = data.data.vUint8Array;
        const format = YUVBuffer.format({
          width: width,
          height: height,
          chromaWidth: width / 2,
          chromaHeight: height / 2
        });
    }
  });
}

```

```
const y = YUVBuffer.lumaPlane(format, yUint8Array);
const u = YUVBuffer.chromaPlane(format, uUint8Array);
const v = YUVBuffer.chromaPlane(format, vUint8Array);
const frame = YUVBuffer.frame(format, y, u, v);
yuv && yuv.drawFrame(frame);
break;
case 'clearFrame': {
    yuv && yuv.clear(frame);
    break;
}
default:
    console.log(`[${dateFormat(new Date())}] RENDER_WORKER [INFO]:` +
[RendererWorker]: Unknown message: `, data);
    };
}, false);

self.postMessage({
    type: 'ready',
});
} catch (error) {
    self.postMessage({
        type: 'exited',
    });
}

console.log(`[${dateFormat(new Date())}] RENDER_WORKER [INFO]:` +
[RendererWorker]: catch error`, error);
}
})();
```

OffscreenCanvasAPPWorkercanvasAPP

OffscreenCanvasChrome 69flag Firefox APIcanvasAPPOffscreenCanvasDOM
DOM API

,

各种排序的比较

排序方法	平均情况	最好情况	最坏情况	辅助空间
直接插入	$O(n^2)$	$O(n)$	$O(n^2)$	$O(1)$
希尔排序	$O(n \log_2 n) \sim O(n^2)$	$O(n^{1.3})$	$O(n^2)$	$O(1)$
起泡排序	$O(n^2)$	$O(n)$	$O(n^2)$	$O(1)$
快速排序	$O(n \log_2 n)$	$O(n \log_2 n)$	$O(n^2)$	$O(\log_2 n) \sim O(n)$
简单选择	$O(n^2)$	$O(n^2)$	$O(n^2)$	$O(1)$
堆排序	$O(n \log_2 n)$	$O(n \log_2 n)$	$O(n \log_2 n)$	$O(1)$
归并排序	$O(n \log_2 n)$	$O(n \log_2 n)$	$O(n \log_2 n)$	$O(n)$

SEO

1. title description keyword s title 2. title description
description keywords
2. HTML W3C
3. HTML HTML
4. js js
5. iframe iframe
6. alt
- 7.

web

1. cookie
2. session
3. url
4. input
5. ip

 title alt

1. title global attributes (<http://www.w3.org/TR/html-markup/global-attributes.html#common.attrs.core>) advisory information
2. alt

doctype , doctype

1. <!doctype> HTML <html>HTML5

2. <!doctype> HTML HTML
3. html doctype
4. HTML4.01 <!doctype> DTD HTML4.01 SGML DTD
5. HTML5 SGML DTD

doctype

1. **HTML4.01 strict**: font frameset <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">
2. **HTML4.01 Transitional**: font frameset <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
3. **HTML4.01 Frameset**: frameset <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Frameset//EN" "http://www.w3.org/TR/html4/frameset.dtd">
4. **XHTML1.0 Strict**: frameset XML <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
5. **XHTML1.0 Transitional**: frameset XMI <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
6. **XHTML 1.0 Frameset**: frameset XML <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Frameset//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-frameset.dtd">
7. **HTML 5**: <!doctype html>

HTML (global attribute)

[MDN: html global attribute \(https://developer.mozilla.org/en-US/docs/Web/HTML/Global_attributes\)](https://developer.mozilla.org/en-US/docs/Web/HTML/Global_attributes) [W3C HTML global-attributes \(http://www.w3.org/TR/html-markup/global-attributes.html#common.attrs.core\)](http://www.w3.org/TR/html-markup/global-attributes.html#common.attrs.core)

- accesskey:aaa windows firefox alt + shift + a
- class:CSS javascript class
- contenteditable:
- contextmenu:
- data-*:
- dir:
- draggable:
- dropzone: copy, move, link
- hidden:
- id: id
- lang:
- spellcheck:
- style: css
- tabindex: tab
- title:
- translate:

web ,

web HTML HTML css
HTML h1-h6
css html classid

[Microformat \(http://en.wikipedia.org/wiki/Microformat\)](http://en.wikipedia.org/wiki/Microformat)

-
-
-
-

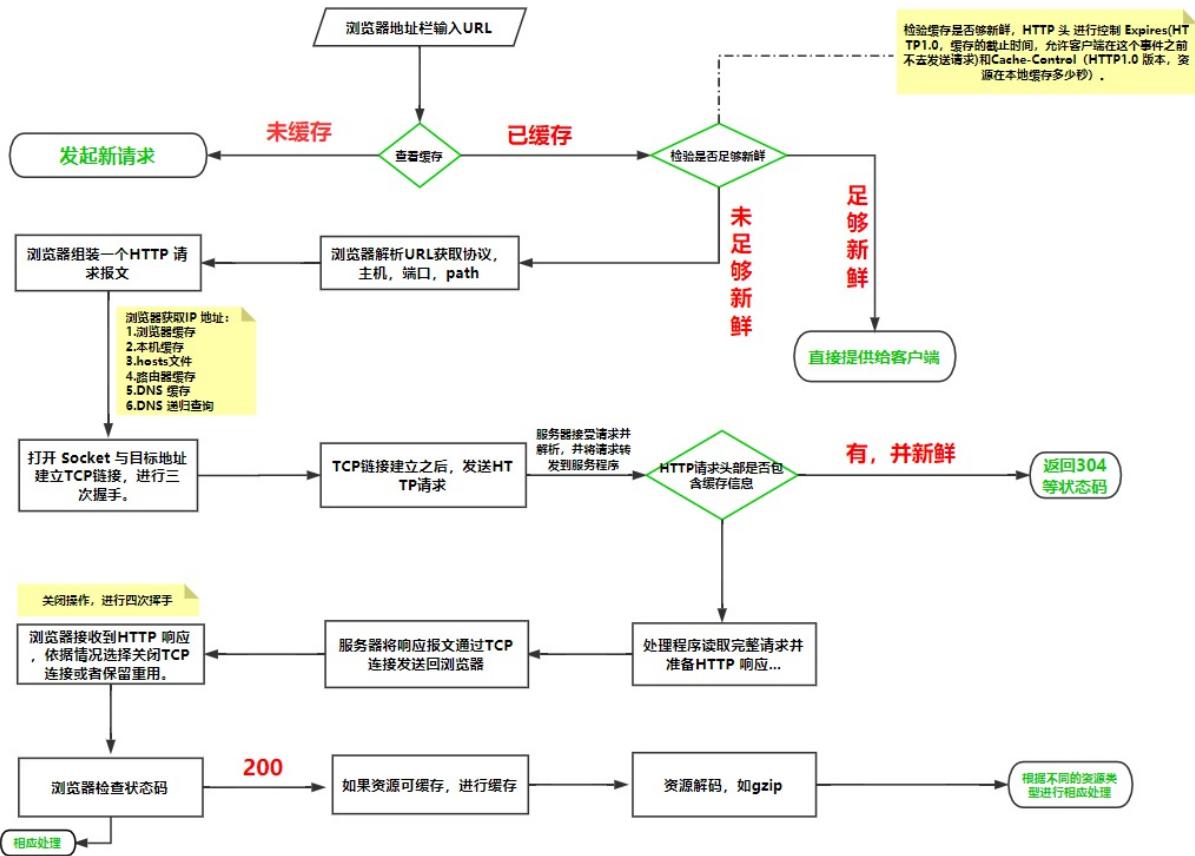
HTTP method

1. HTTP1.1 **GETHEAD**
2. **GET**
3. **HEAD** GET
4. **PUT URL URL**
5. **POST** HTML
6. **TRACE** TRACE TRACE /
7. **OPTIONS** web
8. **DELETE** URL

url (HTTP)

1. URL
2.
 - 1.
 - 2.
 3. HTTP ExpiresCache-Control
 - HTTP1.0 Expires
 - HTTP1.1 Cache-Control: max-age=,
3. **URL** path
4. **HTTPGET**
5. **ip**
 - 1.
 - 2.
 3. hosts
 - 4.
 5. ISP DNS
 6. DNS IP
6. **socket IP TCP**
 1. TCP **SYN=1Seq=X**
 2. **SYN=1 ACK=X+1 Seq=Y**
 3. **ACK=Y+1 Seq=Z**
7. TCP **HTTP**
8. HTTP Host
9. **HTTP 304**

10. HTTP
11. **TCP**
12. HTTP **TCP TCP**
 1. **Fin=1 Ack=Z Seq= X**
 2. **ACK=X+1 Seq=Z**
 3. **Fin=1 ACK=X Seq=Y**
 4. **ACK=Y+1 Seq=X**
13. 1XX3XX 4XX 5XX 2XX
- 14.
15. gzip
16. HTML
17. **HTML DOM CSSOM js**
18. **DOM**
 1. **Tokenizing** HTML
 2. **Lexing**
 3. **DOM construction** HTML DOM
19. js
20. **CSSOM**
 1. **Tokenizing**
 2. **Node**
 3. **CSSOM** CSSOM
21. **DOM CSSOM**
[\(https://developers.google.com/web/fundamentals/performance/critical-rendering-path/render-tree-construction\)](https://developers.google.com/web/fundamentals/performance/critical-rendering-path/render-tree-construction):
 1. DOM 1 script,meta2) css display: none
 2. CSSOM
 - 3.
22. **js**
 1. Document HTML **document.readystate loading**
 2. HTML **async defer** script document.write() **script**
 3. **async** script **document.write()** script
 4. document.readState interactive
 5. **defer** document.write()
 6. **Document DOMContentLoaded**
 7. document.readState complete,window load
23. HTML



HTTP request

[rfc2616 \(<http://www.w3.org/Protocols/rfc2616/rfc2616-sec5.html>\)](http://www.w3.org/Protocols/rfc2616/rfc2616-sec5.html)

1. **Request-Line URI CRLF**
2. **general-headerrequest-headerentity-header CRLF**
3. **CRLF**
- 4.

```

GET /Protocols/rfc2616/rfc2616-sec5.html HTTP/1.1
Host: www.w3.org
Connection: keep-alive
Cache-Control: max-age=0
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/35.0.1916.153 Safari/537.36
Referer: https://www.google.com.hk/
Accept-Encoding: gzip,deflate,sdch
Accept-Language: zh-CN,zh;q=0.8,en;q=0.6
Cookie: authorstyle=yes
If-None-Match: "2cc8-3e3073913b100"
If-Modified-Since: Wed, 01 Sep 2004 13:24:52 GMT

name=qiu&age=25

```

HTTP response

[rfc2616 \(http://www.w3.org/Protocols/rfc2616/rfc2616-sec6.html\)](http://www.w3.org/Protocols/rfc2616/rfc2616-sec6.html)

1. **HTTP** CRLF
- 2.
3. **CRLF**
- 4.

```
HTTP/1.1 200 OK
Date: Tue, 08 Jul 2014 05:28:43 GMT
Server: Apache/2
Last-Modified: Wed, 01 Sep 2004 13:24:52 GMT
ETag: "40d7-3e3073913b100"
Accept-Ranges: bytes
Content-Length: 16599
Cache-Control: max-age=21600
Expires: Tue, 08 Jul 2014 11:28:43 GMT
P3P: policyref="http://www.w3.org/2001/05/P3P/p3p.xml"
Content-Type: text/html; charset=iso-8859-1

{"name": "qiu", "age": 25}
```

HTTP

[RFC 2616 \(http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html\)](http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html)

- 1XX
 - **100 Continue**
 - **101 Switching Protocols** Upgrade Upgrade
- 2XX
 - **200 OK**
 - **201 Created**
 - **202 Accepted**
 - **203 Non-Authoritative Information** HTTP 1.1
 - **204 No Content**
 - **205 Reset Content** HTTP 1.1
 - **206 Partial Content**
- 3XX
 - **300 Multiple Choices** Location
 - **301 Moved Permanently**
 - **302 Found**
 - **303 See Other** 301/302 POST Location GET HTTP 1.1
 - **304 Not Modified**
 - **305 Use Proxy** Location HTTP 1.1
 - **306 unused**
 - **307 Temporary Redirect** 302 Found 302 POST POST 303 HTTP 1.1

307303GETPOST307GETHTTP 1.1

- 4XX
 - **400 Bad Request**
 - **401 Unauthorized**
 - **402 Payment Required**
 - **403 Forbidden**
 - **404 Not Found** URI
 - **405 Method Not Allowed** GETPOSTHEADDELETEPUTTRACEHTTP 1.1
 - **406 Not Acceptable** MIMEAcceptHTTP 1.1
 - **407 Proxy Authentication Required** 401HTTP 1.1
 - **408 Request Timeout** HTTP 1.1
 - **409 Conflict** PUTHTTP 1.1
 - **410 Gone** 404407 404HTTP 1.1
 - **411 Length Required** Content-LengthHTTP 1.1
 - **412 Precondition Failed** HTTP 1.1
 - **413 Request Entity Too Large** Retry-AfterHTTP 1.1
 - **414 Request-URI Too Long** URIHTTP 1.1
 - **415 Unsupported Media Type** HTTP 1.1
 - **416 Requested Range Not Satisfiable** RangeHTTP 1.1
 - **417 Expectation Failed** 100-continueExpect(417)100 (SC_CONTINUE) HTTP 1.1
- 5XX:
 - **500 Internal Server Error**
 - **501 Not Implemented** PUT
 - **502 Bad Gateway**
 - **503 Service Unavailable** Servlet503503 Retry-After
 - **504 Gateway Timeout** HTTP 1.1
 - **505 HTTP Version Not Supported** HTTPHTTP 1.1

web HTML :

-
-
-

- CSS
- javascript
- end-user web browser preferences are respected

CSS

1. * IE6+
2. #X id id X IE6+
3. .X class X IE6+
4. X Y X Y IE6+
5. X X IE6+
6. :link:visited:focus:hover:active LoVe HAte: IE4+
7. X + Y X Y IE7+
8. X > Y X Y IE7+
9. X ~ Y X Y IE7+
10. [attr] attr IE7+
11. [attr=value] value
12. [attr~=value] value
13. [attr|=value] value value-
14. [attr^=value] value
15. [attr\$=value] value
16. [attr*=value] value
17. [:checked] IE9+
18. X:after, X::after after CSS3 :::after IE8+::after IE9+
19. :hover a IE4+ IE7+
20. :not(selector) selector IE9+
21. ::first-letter IE5.5+
22. ::first-line IE5.5+
23. :nth-child(an + b) an + b - 1 n
>= 0 IE9+
24. :nth-last-child(an + b) an + b - 1
n >= 0 IE9+
25. X:nth-of-type(an+b)X an + b - 1 IE9+
26. X:nth-last-of-type(an+b)X an+b-1 IE9+
27. X:first-child X IE7+
28. X:last-child X IE9+
29. X:only-child X IE9+
30. X:only-of-type X IE9+
31. X:first-of-type X
IE9+

css sprite ,

background-position

1. HTTP
- 2.
- 3.

1.

2.

display: none; visibility: hidden;

1. display:none;visibility: hidden;
2. display: none;visibility: hidden; hidden visibility: visible
3. display visibility
4. display: none; visibility: hidden;

css hack hack

CSS hack 1 hack2 hack3IE

- IE [IE5, IE9]

```
<!--[if IE 6]>
Special instructions for IE 6 here
<![endif]-->
```

- hack

```
***** Selector Hacks *****

/* IE6 and below */
* html #uno {
  color: red;
}

/* IE7 */
*:first-child + html #dos {
  color: red;
}

/* IE7, FF, Saf, Opera */
html > body #tres {
  color: red;
}

/* IE8, FF, Saf, Opera (Everything but IE 6,7) */
html>/**/body #cuatro {
  color: red;
}

/* Opera 9.27 and below, safari 2 */
html:first-child #cinco {
  color: red;
}
```

```
/* Safari 2-3 */
html[xmlns=''] body:last-child #seis {
  color: red;
}

/* safari 3+, chrome 1+, opera9+, ff 3.5+ */
body:nth-of-type(1) #siete {
  color: red;
}

/* safari 3+, chrome 1+, opera9+, ff 3.5+ */
body:first-of-type #ochos {
  color: red;
}

/* saf3+, chromel+ */
@media screen and (-webkit-min-device-pixel-ratio: 0) {
  #diez {
    color: red;
  }
}

/* iPhone / mobile webkit */
@media screen and (max-device-width: 480px) {
  #veintiseis {
    color: red;
  }
}

/* Safari 2 - 3.1 */
html[xmlns='']:root #trece {
  color: red;
}

/* Safari 2 - 3.1, Opera 9.25 */
*|html[xmlns=''] #catorce {
  color: red;
}

/* Everything but IE6-8 */
:root * > #quince {
  color: red;
}

/* IE7 */
* + html #dieciocho {
  color: red;
}

/* Firefox only. 1+ */
#veinticuatro,
```

```

x:-moz-any-link {
  color: red;
}

/* Firefox 3.0+ */
#veinticinco,
x:-moz-any-link,
x:default {
  color: red;
}

```

- hack bug

```

/* IE6 */
#once { _color: blue }

/* IE6, IE7 */
#doce { *color: blue; /* or #color: blue */ }

/* Everything but IE6 */
#diecisiete { color/**/: blue }

/* IE6, IE7, IE8 */
#diecinueve { color: blue\9; }

/* IE7, IE8 */
#veinte { color/*\**/: blue\9; }

/* IE6, IE7 -- acts as an !important */
#veintesiete { color: blue !ie; } /* string after ! can be anything */

```

specified value,computed value,used value

- specified value:
 - 1.
 - 2.
 3. css
- computed value: specified value em font-size width margin
computed value line-height computed value used value
- used value window.getComputedStyle
 - background-position
 - bottom, left, right, top
 - height, width
 - margin-bottom, margin-left, margin-right, margin-top
 - min-height, min-width
 - padding-bottom, padding-left, padding-right, padding-top
 - text-indent

link@import

1. link HTML @import CSS
2. link @import [FOUC \(http://www.bluerobot.com/web/css/fouc.asp/\)](http://www.bluerobot.com/web/css/fouc.asp/)
3. linkrel="alternate stylesheet"
4. link@import@import
5. @import css
6. [link @import \(http://www.stevesouders.com/blog/2009/04/09/dont-use-import/\)](http://www.stevesouders.com/blog/2009/04/09/dont-use-import/)

display: block; display: inline;

block

1. width
2. margin/padding
- 3.
- 4.
5. vertical-align

inline

1. direction
- 2.
3. white-space
4. margin/padding
5. width/height
6. line-height height,margin,padding,border
7. block
8. vertical-align

PNG,GIF,JPG

[\(http://www.yuiblog.com/blog/2008/11/04/imageopt-2/\)](http://www.yuiblog.com/blog/2008/11/04/imageopt-2/)

GIF:

1. 8 256
- 2.
- 3.
4. boolean
- 5.

JPEG

1. 256
- 2.
- 3.
- 4.
- 5.

PNG

1. PNG8 truecolor PNG

2. PNG8 GIF 256 alpha

3.

CSS

- - [font](https://developer.mozilla.org/en-US/docs/Web/CSS/font) (<https://developer.mozilla.org/en-US/docs/Web/CSS/font>)
 - [word-break](https://developer.mozilla.org/en-US/docs/Web/CSS/word-break) (<https://developer.mozilla.org/en-US/docs/Web/CSS/word-break>)
 - [letter-spacing](https://developer.mozilla.org/en-US/docs/Web/CSS/letter-spacing) (<https://developer.mozilla.org/en-US/docs/Web/CSS/letter-spacing>)
 - [text-align](https://developer.mozilla.org/en-US/docs/Web/CSS/text-align) (<https://developer.mozilla.org/en-US/docs/Web/CSS/text-align>)
 - [text-rendering](https://developer.mozilla.org/en-US/docs/Web/CSS/text-rendering) (<https://developer.mozilla.org/en-US/docs/Web/CSS/text-rendering>)
 - [word-spacing](https://developer.mozilla.org/en-US/docs/Web/CSS/word-spacing) (<https://developer.mozilla.org/en-US/docs/Web/CSS/word-spacing>)
 - [white-space](https://developer.mozilla.org/en-US/docs/Web/CSS/white-space) (<https://developer.mozilla.org/en-US/docs/Web/CSS/white-space>)
 - [text-indent](https://developer.mozilla.org/en-US/docs/Web/CSS/text-indent) (<https://developer.mozilla.org/en-US/docs/Web/CSS/text-indent>)
 - [text-transform](https://developer.mozilla.org/en-US/docs/Web/CSS/text-transform) (<https://developer.mozilla.org/en-US/docs/Web/CSS/text-transform>)
 - [text-shadow](https://developer.mozilla.org/en-US/docs/Web/CSS/text-shadow) (<https://developer.mozilla.org/en-US/docs/Web/CSS/text-shadow>)
- [line-height](https://developer.mozilla.org/en-US/docs/Web/CSS/line-height) (<https://developer.mozilla.org/en-US/docs/Web/CSS/line-height>)
- [color](https://developer.mozilla.org/en-US/docs/Web/CSS/color) (<https://developer.mozilla.org/en-US/docs/Web/CSS/color>)
- [visibility](https://developer.mozilla.org/en-US/docs/Web/CSS/visibility) (<https://developer.mozilla.org/en-US/docs/Web/CSS/visibility>)
- [cursor](https://developer.mozilla.org/en-US/docs/Web/CSS/cursor) (<https://developer.mozilla.org/en-US/docs/Web/CSS/cursor>)

IE6 bug,,

- IE6 min-height css hack

```
.target {  
    min-height: 100px;  
    height: auto !important;  
    height: 100px; // IE6  
}
```

- olli 1 li display: list-item;
- overflow: auto;position: relative;1 position: relative;; 2
position: relative;

```
<style type="text/css">
.outer {
    width: 215px;
    height: 100px;
    border: 1px solid red;
    overflow: auto;
    position: relative; /* bug */
}
.inner {
    width: 100px;
    height: 200px;
    background-color: purple;
    position: relative;
}
</style>

<div class="outer">
    <div class="inner"></div>
</div>
```

- IE6 a:hover js mouseentermouseleave

```

<style type="text/css">
.p:hover,
.hover {
    background: purple;
}
</style>

<p class="p" id="target">aaaa bbbbb<span>DDDDDDDDDDDDd</span> aaaa lkjlkjdf
j</p>

<script type="text/javascript">
function addClass(elem, cls) {
    if (elem.className) {
        elem.className += ' ' + cls;
    } else {
        elem.className = cls;
    }
}
function removeClass(elem, cls) {
    var className = ' ' + elem.className + ' ';
    var reg = new RegExp(' ' + cls + ' ', 'g');
    elem.className = className.replace(reg, ' ').replace(/\^ +| +$/ , ' ');
}

var target = document.getElementById('target');
if (target.attachEvent) {
    target.attachEvent('onmouseenter', function () {
        addClass(target, 'hover');
    });
    target.attachEvent('onmouseleave', function () {
        removeClass(target, 'hover');
    })
}
</script>

```

- IE5-8 opacity

```

.opacity {
    opacity: 0.4;
    filter: alpha(opacity=60); /* for IE5-7 */
    -ms-filter: "progid:DXImageTransform.Microsoft.Alpha(Opacity=60)"; /* for
IE 8*/
}

```

- IE6 heightfont-sizefont-size font-size: 0;
- IE6 PNG : **IE6 gif**
- IE6-7 display: inline-block inline hasLayout

```

display: inline-block;
*display: inline;
*zoom: 1;

```

- IE6

```
1 padding
2     display: inline;css display:inline block
• margin auto IE6           text-align: center;
```

()

1. clear: both
2. ()
3. [\(http://nicolasgallagher.com/micro-clearfix-hack/\)](http://nicolasgallagher.com/micro-clearfix-hack/)

```
/***
*
* 1 contentopera
*   contenteditable
* 2 displaytableblock
*   top-margin,BFCIE6/7
*   zoom: 1;
**/


.clearfix:before,
.clearfix:after {
    content: " "; /* 1 */
    display: table; /* 2 */
}

.clearfix:after {
    clear: both;
}

/***
* IE 6/7
* hasLayout
*/
.clearfix {
    *zoom: 1;
}
```

FOUC?

Flash Of Unstyled Content head

(block formatting context),BFC

- 1.
2. float:none
3. position:absolute,fixed
4. display:inline-block,table-cell, table-caption,flex, inline-flex
5. overflow:visible

- 1.
- 2.
3. margin

display, float, position

1. display none position float
2. position absolute fixed float nonedisplay
3. float nonedisplay
4. display
5. display

display

Specified value	Computed value
inline-table	table
inline, table-row-group, table-column, table-column-group, table-header-group, table-footer-group, table-row, table-cell, table-caption, inline-block	block
others	same as specified

(collapsing margins)

margin margin

1. margin
2. /inline-block / margin margin
3. margin
4. margin-bottom margin-top

(containing block)

1. viewport anchored at the canvas origin paged media page area direction
2. positionrelative static displayblock, list-item, table
3. positionfixed viewport paged media page area
4. positionabsolute positionrelative, absolute fixed
 - o the containing block is the bounding box around the **padding boxes** of the first and the last inline boxes generated for that element.
 - o **padding edge**

stacking context,

z

- 1.
2. html
- 3.
4. positioned html

stacking context

- 1.
2. z-index auto
3. a flex item with a z-index value other than 'auto'
4. opacity 1
5. webkit chrome22+z-index autoposition: fixed stacking context

- **inline** text-align: center;
- **block** 12 margin auto3IE6 text-align: center;,

```
<body>
  <div class="content">
    aaaaaa aaaaaa a a a a a a a a a
  </div>
</body>

<style>
  body {
    background: #DDD;
    text-align: center; /* 3 */
  }
  .content {
    width: 500px;      /* 1 */
    text-align: left;   /* 3 */
    margin: 0 auto;    /* 2 */

    background: purple;
  }
</style>
```

- 12 position: relative;3left right 50%4 margin -1

```
<body>
  <div class="content">
    aaaaaa aaaaaa a a a a a a a a
  </div>
</body>

<style>
  body {
    background: #DDD;
  }
  .content {
    width: 500px;          /* 1 */
    float: left;

    position: relative;    /* 2 */
    left: 50%;             /* 3 */
    margin-left: -250px;   /* 4 */

    background-color: purple;
  }
</style>
```

- 12 50%3-1

```
<body>
  <div class="content">
    aaaaaa aaaaaa a a a a a a a a
  </div>
</body>

<style>
  body {
    background: #DDD;
    position: relative;
  }
  .content {
    width: 800px;

    position: absolute;
    left: 50%;
    margin-left: -400px;

    background-color: purple;
  }
</style>
```

- 12 0,3 auto

```

<body>
  <div class="content">
    aaaaaa aaaaaa a a a a a a a a
  </div>
</body>

<style>
  body {
    background: #DDD;
    position: relative;
  }
  .content {
    width: 800px;

    position: absolute;
    margin: 0 auto;
    left: 0;
    right: 0;

    background-color: purple;
  }
</style>

```

[6 Methods For Vertical Centering With CSS](http://www.vanseodesign.com/css/vertical-centering/) (<http://www.vanseodesign.com/css/vertical-centering/>) [8 CSS](http://blog.csdn.net/freshlover/article/details/11579669) (<http://blog.csdn.net/freshlover/article/details/11579669>)

- font-sizeline-height

```

<p class="text">center text</p>

<style>
.text {
  line-height: 200px;
}
</style>

```

DOM e e.getAttribute(propName) e.propName

- e.getAttribute() DOM
- e.propName HTML a HTMLAnchorElement getAttribute
- e.getAttribute() null""
- e.propName undefined
- attribute property idtitle
- <input hidden/> hasAttribute removeAttribute property
- link href property URL
- attribute property form <input value="hello"/> defaultValue value property setAttribute value value property

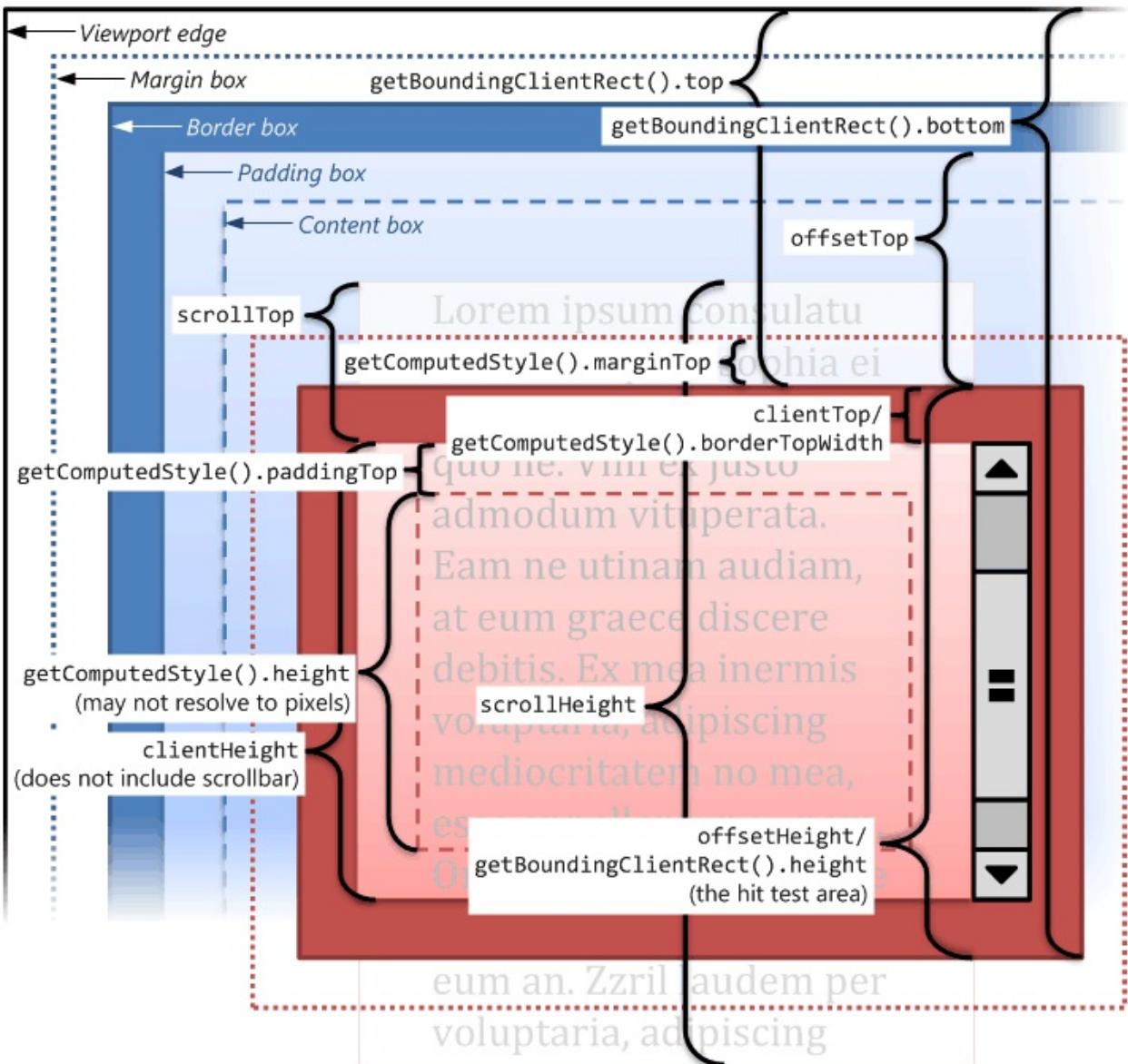
XMLHttpRequest

1. readyState:
 - UNSENT0
 - OPENED1open() xhr send()
 - HEADERS_RECEIVED(2) HTTP
 - LOADING(3)
 - DONE(4)
3. onreadystatechangereadyState
4. status HTTP 200 404
5. statusText: HTTP OKNo Content
6. responseText:
7. responseXML: Document XML
8. abort(): HTTP
9. getAllResponseHeaders(): HTTP //
10. getResponseHeader(headerName): headName
11. open(method, url, asynchronous [, user, password]):method HTTP url
URLasynchronous user password
12. setRequestHeader(name, value): HTTP
13. send(body): body POST GET null

offsetWidth/offsetHeight,clientWidth/clientHeight scrollWidth/scrollHeight

- offsetWidth/offsetHeight **content + padding + border** e.getBoundingClientRect()
- clientWidth/clientHeight **content + padding**
- scrollWidth/scrollHeight **content + padding +**

[Measuring Element Dimension and Location with CSSOM in Windows Internet Explorer 9
\(http://msdn.microsoft.com/en-us/library/ie/hh781509\(v=vs.85\).aspx\)](http://msdn.microsoft.com/en-us/library/ie/hh781509(v=vs.85).aspx)



focus/blur focusin/focusout

1. focus/blur focusin/focusout
2. focus/blur focusin/focusout FireFox FireFox
elem.addEventListener('focus', handler, true)
3.
 1. window
 - 2.
 - 3.
 4. tabindex

mouseover/mouseout mouseenter/mouseleave

1. mouseover/mouseout mouseenter/mouseleave IE5.5 DOM3
2. mouseover/mouseout mouseenter/mouseleave / **mouseover/mouseout**
3. **event.target / event.relatedTarget/ IE** **event.srcElement / event.toElement event.fromElement**

```
div#target
```

```
<div id="target"><span>test</span></div>

<script type="text/javascript">
var target = document.getElementById('target');
if (target.addEventListener) {
    target.addEventListener('mouseout', mouseoutHandler, false);
} else if (target.attachEvent) {
    target.attachEvent('onmouseout', mouseoutHandler);
}

function mouseoutHandler(e) {
    e = e || window.event;
    var target = e.target || e.srcElement;

    //
    if (target.id !== 'target') {
        return;
    }

    //
    var relatedTarget = e.relatedTarget || e.toElement;
    while (relatedTarget !== target
        && relatedTarget.nodeName.toUpperCase() !== 'BODY') {
        relatedTarget = relatedTarget.parentNode;
    }

    //
    if (relatedTarget === target) {
        return;
    }

    //
    //alert('');
}

</script>
```

javascript

- 1.
- 2.
- 3.

js DOM

- log ,<script>,<link>,<iframe> srchref url
- **json** <script> jsonp
- HTML5 targetWindow.postMessage(data, origin); data origin origin

```
window.addEventListener('message', handler, false);handler.event.data  
postMessage event.origin originevent.source  
• url  
• HTML5 CORS HTTP         Access-Control-Allow-Origin: * ajax
```

javascript

- undefined
- null
- string
- boolean
- number
- [\(ES6\)](https://developer.mozilla.org/en-US/docs/Glossary/Symbol)
- Object

,

- 1.
- 2.
- 3.

- 1.
- 2.

javascript

1. [\(\)](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/function)
2. [function](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Operators/function)
3. [Function](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Function)
4. [ES6:arrow function](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/arrow_functions)

[MDN:Functions_and_function_scope](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Functions_and_function_scope) (https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Functions_and_function_scope)

web

HTML5 web

1. html manifest : <html manifest="myapp.appcache" > text/cache-manifest MIME

2. manifest CACHE MANIFEST URL manifest url#
3. url
 - CACHE
 - NETWORK
 - "*"
 - Fallback
 - URLURLURL URL URL

CACHE MANIFEST

CACHE:

myapp.html
myapp.css
myapp.js

FALLBACK:

videos/ offline_help.html

NETWORK:

cgi/

sessionStorage,localStorage,cookie

- 1.
2. cookie cookieweb storage
3. cookie path cookie cookie
4. cookie sessionStorage localStorage
5. sessionStorage localStorage cookie path
6. localStorage update
7. cookie secure HTTPS
8. 300 cookie 20 cookie 4kweb storage 5M

localStorage sessionStorage

- localStorage sessionStorage
- localStorage sessionStorage iframe
- Storage javascript **setItem(key, value)getItem(key)removeItem(key) clear()length key(index)**

```

localStorage.setItem('x', 1); // storage x->1
localStorage.getItem('x'); // return value of x

//  

for (var i = 0, len = localStorage.length; i < len; ++i) {
    var name = localStorage.key(i);
    var value = localStorage.getItem(name);
}

localStorage.removeItem('x'); // remove x
localStorage.clear(); // remove all data

```

cookie

- cookie web HTTP cookie
- cookie
- cookie **max-age=path, domain=secure**
- cookie **max-age=seconds** cookie
- cookie **path=domain** web
- cookie document.cookie
- document.cookie'; 'key=value,

```

document.cookie = 'name=qiu; max-age=9999; path=/; domain=domain; secure';

document.cookie = 'name=aaa; path=/; domain=domain; secure';
// cookie
// cookie

// max-age 0 cookie

// cookie document.cookie
//      '';

```

[cookieUtil.js \(https://github.com/qiu-deqing/google/blob/master/module/js/cookieUtil.js\)](https://github.com/qiu-deqing/google/blob/master/module/js/cookieUtil.js) cookie

javascript

1. var obj = {};
2. var obj = new Object();
3. Object.create(): var obj = Object.create(Object.prototype);

====

- 1.
2. null undefined
3. true false
4. **NaN**
5. -0 0
6. 16 =====
- 7.

==

1. ===
- 2.
3. null undefined
- 4.
5. **true false 0 ==**
6. ==
- 7.

1. `toString()` javascript primitive value string number boolean,
2. `toString()` javascript `valueOf()`
3. javascript `toString()` `valueOf()` throws a `TypeError`

1. `valueOf()` javascript
2. `toString()` javascript
3. throws a `TypeError`

<,>, <=,>=

:

1. `valueOf` `toString`
2. 16 unicode
- 3.

+

- 1.
- 2.
- 3.

arguments ,

- `arguments`
- `arguments[index]` `arguments`
- `arguments.length` `Function.length`
- `arguments.callee` `this`
- `arguments.caller`
- `<code>var args = Array.prototype.slice.call(arguments, 0);</code>`

chrome

1Chrome 4 (Stable)(Beta)(Dev)(Canary)

Chrome iOS Beta iOS 12 12

Chrome Canary 1-2

1. Canary

Canary Chrome Chrome Chrome Canary

Chrome Canary Chrome Flash Chromium

2. (Dev)

Chrome Dev Chromium Chrome Canary Dev Web

IT Chrome API 9 12 Chrome

3. (Beta)

Chrome Beta Dev

5% 4-6 Chrome

4. (Stable)

Chrome Stable Beta Chrome

2-3 6

Chrome API API

2Chrome

Docker Selenium

HttP

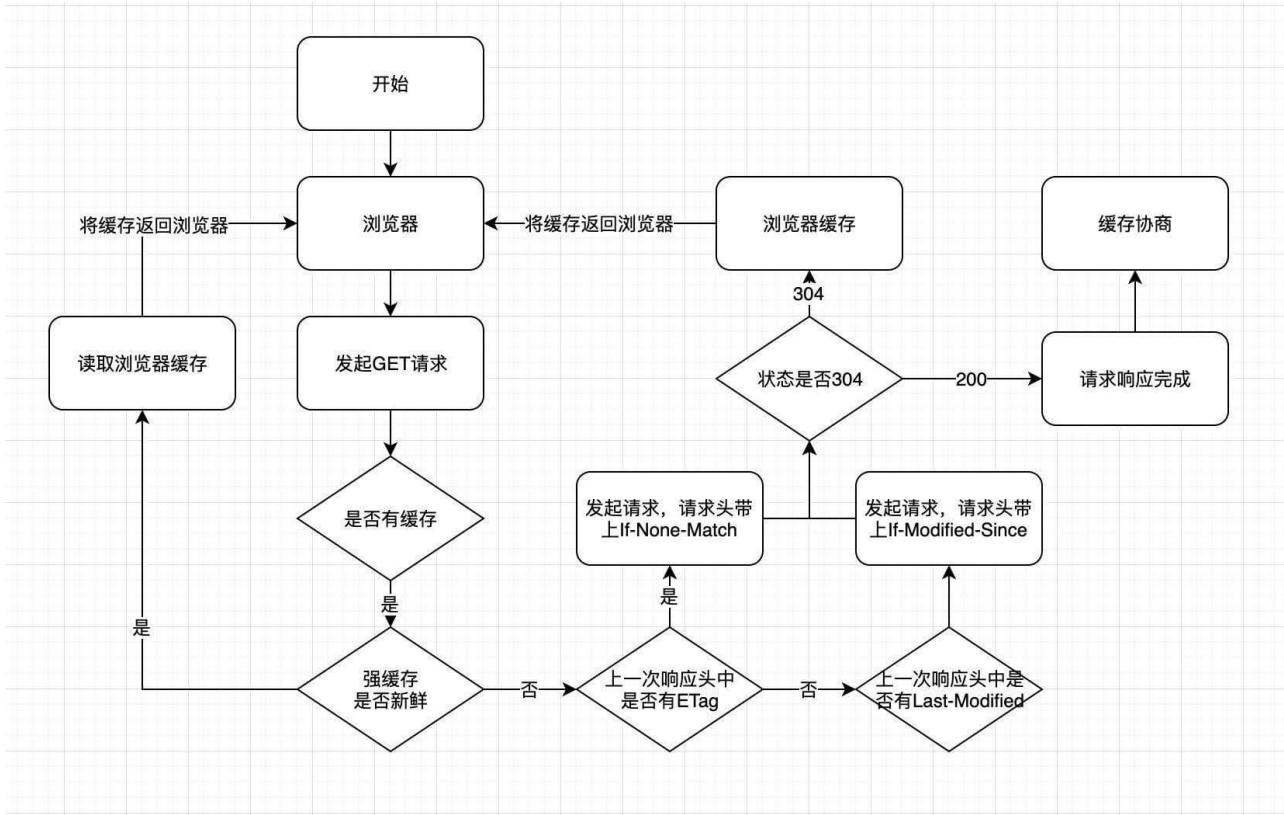
1

HTTP

-
- EtagLast-Modified
304

HTTP

- response header
- 200request header304



2

- network from memory from disk
- Cache-Control http1.1 Expires http1.0
- Cache-control
- Expires
- Cache-Control Expires Expires
- Cache-control

3(expires)

-
- Expires HTTP 1.0 (+)
 - 1. HTTP 1.0 HTTP 1.01.1
 - 2.
-
- 1. (UTC)
- 2.

4(cache-control)

- Expires HTTP/1.1 Cache-control

- Cache-control (MDN)
 - max-age
 - must-revalidate max-age
 - no-cache
 - no-store: ""
 - public (CDN)
 - private
- **Cache-control Expires** HTTP/1.0 HTTP/1.1
 - - - public
 - private
 - no-cacheprivate
 - only-if-cache
 - - max-age=
 - s-maxage=canmax-ageexpires
 - max-stale[=]
 - min-fresh=
 - stale-while-revalidate=
 - stale-if-error=
 - - must-revalidate
 - proxy-revalidate
 - immutable
 - - no-store
 - no-transform
 - - 1. HTTP 1.1 Expires
 - 2. Expires
 - - 1.

5

- 200304
- If-Modified-Since If-None-Match 304 Last-Modified ETag
- 304
- 2 ()Last-Modified/If-Modified-sincehttp1.0Etag/If-None-matchhttp1.1

- Last-Modified/If-Modified-sinceEtag/If-None-match
Etag
- Etag/If-None-matchLast-Modified/If-Modified-since

(Last-Modified/If-Modified-since)

- Last-Modified Last-Modified: Mon, 10 Nov 2018 09:10:11 GMT
-
- "" Last-Modified If-Modified-Since
- If-Modified-Since Last-Modified 304 200
-
- o 1. 304200
-
- o 1.
- o 2.
- o 3.
- o 4.

(Etag/If-None-match)

- Etag If-None-Match
- Etag (hash) Etag Last-Modified Last-Modified Etag
hash If-Modified-Since If-None-Match 304, 200
- Response headerEtagIf-No-MatchedRequest Headerif-no-matchedETag
304200
- **Etag Last-Modified**
-
- o 1.
- o 2.
-
- o 1. ETag
- o 2. ETagETag

JavaScript

1

- nn

```
/**  
 * :  
 *  
 * () ,  
 * :  
 * @params fun (callback) delay  
 *  
 */  
const debounce = (fun, delay = 500) => {  
    let timer = null //  
    return function (...args) {  
        clearTimeout(timer);  
        timer = setTimeout((() => {  
            fun.apply(this, args)  
        }), delay)  
    }  
}
```

```
// n
function debounce(func, wait, immediate) {
  let timeout;
  return function () {
    const context = this;
    const args = arguments;
    if (timeout) clearTimeout(timeout);
    if (immediate) {
      const callNow = !timeout;
      timeout = setTimeout(function () {
        timeout = null;
      }, wait)
      if (callNow) func.apply(context, args)
    } else {
      timeout = setTimeout(function () {
        func.apply(context, args)
      }, wait);
    }
  }
}
```

```
func immediate false setTimeout func.apply(context, args) return  
undefined immediate true
```

```
function debounce(func, wait, immediate) {
  let timeout, result;
  return function () {
    const context = this;
    const args = arguments;
    if (timeout) clearTimeout(timeout);
    if (immediate) {
      const callNow = !timeout;
      timeout = setTimeout(function () {
        timeout = null;
      }, wait)
      if (callNow) result = func.apply(context, args)
    }
    else {
      timeout = setTimeout(function () {
        func.apply(context, args)
      }, wait);
    }
    return result;
  }
}
```

2

- - - resize
-

```
/**  
 *  
 *  
 * : ()n  
 * :  
 *  
 * @params fun (callback) delay  
 *  
 */  
const throttle = (fun, delay = 1000) => {  
  let flag = true;  
  return function (...args) {  
    if (!flag) return;  
    flag = false;  
    setTimeout((() => {  
      fun.apply(this, args);  
      flag = true;  
    }, delay);  
  }  
}
```

•

(0)

```
function throttle(func, wait) {  
  let context, args;  
  let previous = 0;  
  
  return function () {  
    let now = +new Date();  
    context = this;  
    args = arguments;  
    if (now - previous > wait) {  
      func.apply(context, args);  
      previous = now;  
    }  
  }  
}
```

•

```
function throttle(func, wait) {
  let timeout;
  return function () {
    const context = this;
    const args = arguments;
    if (!timeout) {
      timeout = setTimeout(function () {
        timeout = null;
        func.apply(context, args)
      }, wait);
    }
  }
}
```

1XSS

(server)

- - - 1.
 - 2. HTML
 - 3.
 - 4.

(Server)

URL

- URL
- - 1. URL
 - 2. URL URL HTML
 - 3.
 - 4.

Dom ()

DOM XSS JavaScript XSS

- URL

- - 1. URL
 - 2. URL
 - 3. JavaScript URL
 - 4.
- 1. HTMLJSCSSURL
 - HTMLVue/React v-html / dangerouslySetInnerHTML
- 2. CSP HTTP Header Content-Security-PolicyX-XSS-Protection
 - CSP()
 - Content-Security-Policy: default-src 'self' -
 - Content-Security-Policy: default-src 'self' *.trusted.com - (CSP)
 - Content-Security-Policy: default-src https://yideng.com - HTTPS yideng.com
- 3. URL
- 4. XSSHttp Only cookie JavaScript Cookie XSS Cookie
- 5.

CSRF

1. a.comCookie
2. b.com
3. b.com a.com a.com/act=xxa.comCookie
4. a.com
5. a.comact=xx
6. a.com

1. GET img get
2. POST
- 3.

CSRFCSRF

- 1. HeaderOrigin Header Referer Header
- 2. CSRF Token CSRF TokenSessionTokenToken
- 3. cookie
 - - 1Cookiecsrfcookie=v8g9e4ksfhw
 - 2CookieURLPOST https://www.a.com/comment? csrfcookie=v8g9e4ksfhw
 - 3CookieURL
 - - Session
 - Token
 - Token
 - - Cookie
 - XSSCookie
 -
 - CookieHTTPSHTTPS
- 4. Samesite CookieGoogleHTTPSet-CookieSamesite Cookie“ Cookie” CookieCookieCookieSamesite Strict Cookie Lax Cookie , Get

3iframe

- 1. iframe iframe
- 2.
 - iframe iframe
- 3. iframe JS
- 1. iframe sandbox iframe““
- 2. X-Frame-Options HeaderX-Frame-Options HTTP <iframe>
 - eg.X-Frame-Options: SAMEORIGIN
 - SAMEORIGIN: iframe
 - ALLOW-FROM: iframe
 - DENY: iframe
- 3. CSP Content-Security-Policy
- 4. iframe

4

JS Content-Type Header JS

X-Content-Type-Options

5

npm event-stream

6HTTPS

SSL Stripping HTTPSHTTP

HSTSHTTP Strict Transport SecurityHTTP HeaderHTTPSHTTP

`Strict-Transport-Security: max-age=<seconds>; includeSubDomains; preload`

""HTTPSHTTPHTTPS

7

8

(CDNs) CDN CDN CDN CDN

base64 <script> integrity

9

- DNS DNS DNS DNS DNS
- HTTP HTTP HTTP HTTP

HTTPS

10

Man-in-the-middle attack, MITM SSL WiFi

1. Wi-Fi
2. Fiddler / Charles
3. 12306

- 1.
- 2.
- 3.
4. hash
5. hash,hash
6. ,

fiddle

- 1.
2. fiddle
- 3.
4. fiddlefiddle
5. fiddle

- 1.
- 2.
- 3.
4. SSLHTTPSSSL/TLSSSLSSL/TLSHTTPSHTTP
5. DNSDNSHosts
6. ARP ARP(address resolution protocol)APRMACMACMACARP
- 7.

1. CA
- 2.
3. URLHTTPSSSLSSLTLS1.1TLS1.2
- 4.
- 5.

11sql

SQLWebSQL,

- 1.
 2. SQLSQL

12

1. font-face
 2. background
 - 3.
 - 4.
 5. iframe

13

- 1.
 2. CI
 3. code review
 4. Header X-XSS-Protection X-Content-Type-Options X-Frame-Options Header Content-Security-Policy
 5. NSP(Node Security Platform)Snyk

1

null

2

()

- —

3

- 1.
 - 2.
 - 3.

4

- 1.
- 2.
3. (captured value)

5

```
var Yideng = (function () {
  //
  var foo = 0;

  function Yideng() {}
  Yideng.prototype.bar = function bar() {
    return foo;
  };

  return Yideng;
}());
```

3 i i 3

```
for (var i = 0; i < 3; i++) {
  document.getElementById('id' + i).onfocus = function() {
    alert(i);
  };
}

// 
function makeCallback(num) {
  return function() {
    alert(num);
  };
}

for (var i = 0; i < 3; i++) {
  document.getElementById('id' + i).onfocus = makeCallback(i);
}
```

CSS

1(pseudo-classes)

- DOM
- :hover :active :visited :link :first-child :focus :lang
-

- class

2(Pseudo-elements)

- DOM
-
- ::before ::after
-

3

- - CSS2 :,
 - CSS2.1 ,::
 - CSS2 (:before, :after, :first-line, :first-letter)
 - CSS2 (::selection)
 - CSS3::::
- -
 -
- - ""
 - :::
 - ()
 -

4

- DOMhtml

5

- DOMDOM
- DOM

114223456, 4, 5, 6, 11, 23, 42, 56, 78, 90

```

function f1(arr, count) {
    //
    arr.sort((a, b) => b - a);
    //
    let avg = arr.reduce((a,b) => a + b) / count;
    let resArr = [];
    let current = 0;

    //
    for (let i = 0; i < count - 1; i++) {
        if (current + arr[arr.length-1] / 2 < avg && i) {
            arr.pop();
            resArr[i-1].push(arr[arr.length-1]);
        }
        current = 0;
        resArr[i] = [];
        arr.forEach((item, index) => {
            current += item;
            arr.splice(index,1);
            resArr[i].push(item);
            if (current > avg) {
                current -= item;
                arr.splice(index,0,item);
                resArr[i].pop();
            }
        });
    }

    resArr[count-1] = arr;

    return resArr;
}
//  

console.log(f1([11,42,23,4,5,6,4,5,6,11,23,42,56,78,90], 3))

```

lodash `_get`

js a.b.c.d.e a && a.b && a.b.c && a.b.c.d && a.b.c.d.e graphql

get `get(a, 'b.c.d.e')`

1

```

function get(source, path, defaultValue = undefined) {
  // a[3].b -> a.3.b -> [a,3,b]
  // path .
  const paths = path.replace(/\[(\d+)\]/g, ".$1").split(".");
  let result = source;
  for (const p of paths) {
    // null undefined Object
    result = Object(result)[p];
    if (result == undefined) {
      return defaultValue;
    }
  }
  return result;
}
//  

console.log(get({ a: null }, "a.b.c", 3)); // output: 3
console.log(get({ a: undefined }, "a", 3)); // output: 3
console.log(get({ a: null }, "a", 3)); // output: 3
console.log(get({ a: [{ b: 1 }] }, "a[0].b", 3)); // output: 1

```

add(1)(2)(3)

Currying

1

```

function add (a) {
  return function (b) {
    return function (c) {
      return a + b + c;
    }
  }
}
console.log(add(1)(2)(3)); // 6

```

2

```

const curry = (fn) =>(judge = (...args) => args.length === fn.length ?
fn(...args) : (...arg) => judge(...args, ...arg));
const add = (a, b, c) => a + b + c;
const curryAdd = curry(add);
console.log(curryAdd(1)(2)(3)); // 6
console.log(curryAdd(1, 2)(3)); // 6
console.log(curryAdd(1)(2, 3)); // 6

```

```

function add (...args) {
  //
  return args.reduce((a, b) => a + b);
}

function currying (fn) {
  let args = [];

  return function temp (...newArgs) {
    if (newArgs.length) {
      args = [
        ...args,
        ...newArgs
      ];
      return temp;
    } else {
      let val = fn.apply(this, args);
      args = []; //
      return val;
    }
  }
}

let addCurry = currying(add);
console.log(addCurry(1)(2)(3)(4, 5)()); //15
console.log(addCurry(1)(2)(3, 4, 5)()); //15
console.log(addCurry(1)(2, 3, 4, 5)()); //15

```

dom

1

- ,
- 1. length
- 2. length
- 3. Array.prototype
- 4. 'Array'
- length

2

```

//  

let arrayLike = {  

    length: 10,  

};  

console.log(arrayLike instanceof Array); // false  

console.log(arrayLike.__proto__.constructor === Array); // false  

console.log(arrayLike.toString()); // [object Object]  

console.log(arrayLike.valueOf()); // {length: 10}  

let array = [];  

console.log(array instanceof Array); // true  

console.log(array.__proto__.constructor === Array); // true  

console.log(array.toString()); // ''  

console.log(array.valueOf()); // []

```

3

- - 1. Array.from()
 - 2. Array.prototype.slice.call()
 - 3. Array.prototype.forEach()
- - length
 -

```

let al1 = {  

    length: 4,  

    0: 0,  

    1: 1,  

    3: 3,  

    4: 4,  

    5: 5,  

};  

console.log(Array.from(al1)) // [0, 1, undefined, 3]

```

- 0

```

//  

let al2 = {  

    length: 4,  

    '-1': -1,  

    '0': 0,  

    a: 'a',  

    1: 1  

};  

console.log(Array.from(al2)); // [0, 1, undefined, undefined]

```

- slice

```
//  
let al2 = {  
    length: 4,  
    '-1': -1,  
    '0': 0,  
    a: 'a',  
    1: 1  
};  
console.log(Array.prototype.slice.call(al2)); // [0, 1, empty × 2]
```

4

```
let arrayLike2 = {  
    2: 3,  
    3: 4,  
    length: 2,  
    push: Array.prototype.push  
}  
  
// push length  
arrayLike2.push(1);  
console.log(arrayLike2); // {2: 1, 3: 4, length: 3, push: f}  
arrayLike2.push(2);  
console.log(arrayLike2); // {2: 1, 3: 2, length: 4, push: f}
```

webpack CDN polyfill

1.

speed-measure-webpack-plugin

-
- plugin loader

```
npm install --save-dev speed-measure-webpack-plugin
```

webpack.config.js

```
//  
const SpeedMeasurePlugin = require("speed-measure-webpack-plugin");  
  
//  
const smp = new SpeedMeasurePlugin();  
  
const webpackConfig = smp.wrap({  
  entry: {  
    // ...  
  },  
  output: {  
    // ...  
  },  
  resolve: {  
    // ...  
  },  
  module: {  
    rules: [  
      // ....  
    ]  
  },  
  plugins: [new MyPlugin(), new MyOtherPlugin()],  
});  
  
module.exports = webpackConfig;
```

15.48 secs

:

```
SMP ⏱
General output time took 15.48 secs

SMP ⏱ Plugins
Object took 1.7 secs
HtmlWebpackPlugin took 0.215 secs
HotModuleReplacementPlugin took 0.037 secs
NamedModulesPlugin took 0.013 secs
DefinePlugin took 0 secs
NoEmitOnErrorsPlugin took 0 secs

SMP ⏱ Loaders
modules with no loaders took 14.65 secs
  module count = 719
  css-loader, and
  postcss-loader took 9.35 secs
    module count = 3
  babel-loader, and
  eslint-loader took 8.95 secs
    module count = 41
  css-loader, and
  postcss-loader, and
  less-loader took 8.066 secs
    module count = 1
  css-loader, and
  vue-loader, and
  less-loader, and
  vue-loader took 4.78 secs
    module count = 54
  babel-loader, and
  vue-loader took 4.55 secs
    module count = 55
  css-loader, and
  vue-loader, and
  vue-loader took 4.33 secs
    module count = 1
  vue-loader, and
  eslint-loader took 3.91 secs
    module count = 55
  vue-loader, and
  vue-loader took 2.57 secs
    module count = 55
  svg-sprite-loader took 1.67 secs
    module count = 50
```

2.

webpack-bundle-analyzer 8888

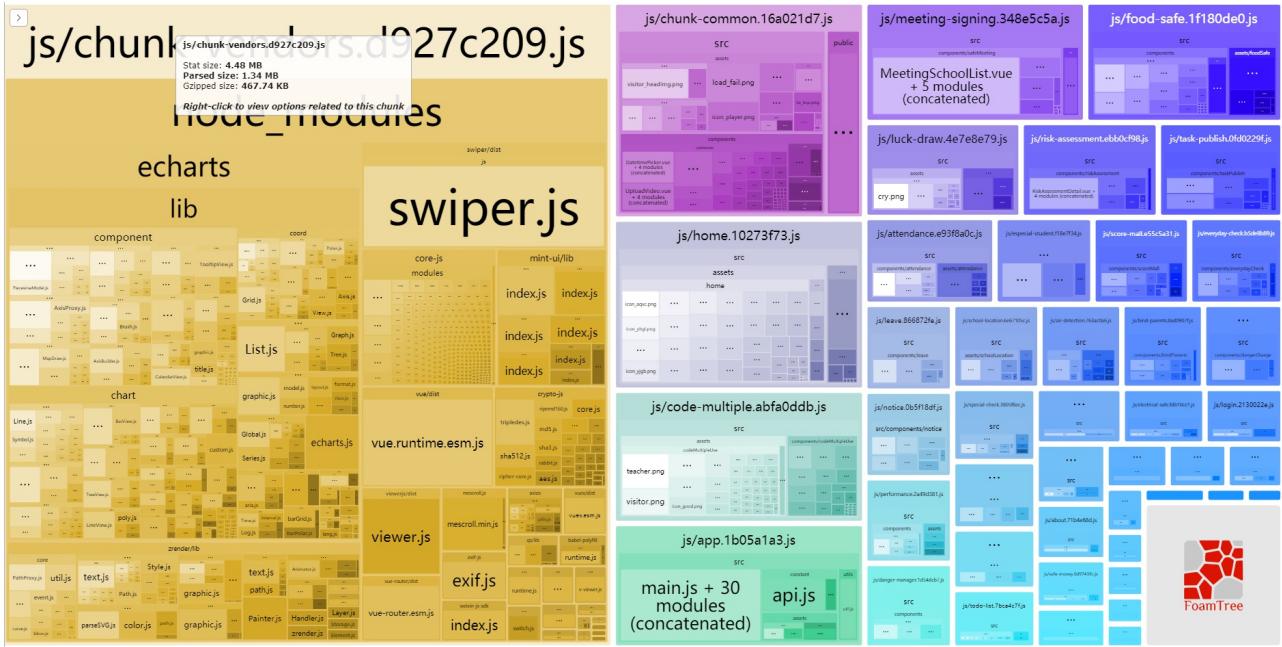
```
npm install --save-dev webpack-bundle-analyzer
```

webpack.config.js

```
//  
const SpeedMeasurePlugin = require("speed-measure-webpack-plugin");  
  
//  
const BundleAnalyzerPlugin = require("webpack-bundle-analyzer").BundleAnalyzerPlugin;  
  
//  
const smp = new SpeedMeasurePlugin();  
  
const webpackConfig = smp.wrap({  
  entry: {  
    // ...  
  },  
  output: {  
    // ...  
  },  
  resolve: {  
    // ...  
  },  
  module: {  
    rules: [  
      // ....  
    ]  
  },  
  plugins: [  
    //  
    new BundleAnalyzerPlugin(),  
    new MyPlugin(),  
    new MyOtherPlugin(),  
  ],  
});  
  
module.exports = webpackConfig;
```

chunk-vendors 1.34MB

:



1.

- thread-loader ()
- parallel-webpack
- HappyPack

thread-loader

loader

```
npm install --save-dev thread-loader
```

loader

webpack.config.js

```

const path = require("path");
//
const SpeedMeasurePlugin = require("speed-measure-webpack-plugin");

//
const smp = new SpeedMeasurePlugin();

const webpackConfig = smp.wrap({
  entry: {
    // ...
  },
  output: {
    // ...
  },
  resolve: {
    // ...
  },
  module: {
    rules: [
      rules: [
        {
          test: /\.js$/,
          include: path.resolve('src'),
          use: [
            'thread-loader',
            // your expensive loader (e.g babel-loader)
          ],
        }
      ]
    },
    plugins: [
      new MyPlugin(),
      new MyOtherPlugin(),
    ],
  });
}

module.exports = webpackConfig;

```

2. CDN

vue.jswebpackCDNvuevuexvue-routeraxiosechartsswiperwebpackexternals

html-webpack-plugin webpack-cdn-plugin

```
npm install --save-dev html-webpack-plugin, webpack-cdn-plugin
```

webpack.config.js

```
const path = require("path");
//  
const SpeedMeasurePlugin = require("speed-measure-webpack-plugin");  
  
//  
const BundleAnalyzerPlugin = require("webpack-bundle-analyzer").BundleAnalyzerPlugin;  
  
const HtmlWebpackPlugin = require('html-webpack-plugin');  
  
//  
const isProduction = process.env.NODE_ENV === 'production';  
  
//  
const smp = new SpeedMeasurePlugin();  
  
// CDN bootstrap cdn  
const cdn = {  
  css: [  
    'https://cdn.bootcss.com/Swiper/4.5.1/css/swiper.min.css'  
  ],  
  js: [  
    'https://cdn.bootcss.com/vue/2.6.10/vue.min.js',  
    'https://cdn.bootcss.com/vue-router/3.1.3/vue-router.min.js',  
    'https://cdn.bootcss.com/vuex/3.1.1/vuex.min.js',  
    'https://cdn.bootcss.com/axios/0.19.0/axios.min.js',  
    'https://cdn.bootcss.com/echarts/4.3.0/echarts.min.js',  
    'https://cdn.bootcss.com/Swiper/4.5.1/js/swiper.min.js',  
  ]  
}  
  
const webpackConfig = smp.wrap({  
  entry: {  
    // ...  
  },  
  output: {  
    // ...  
  },  
  resolve: {  
    // ...  
  },  
  // cdn  
  externals: isProduction && {  
    'vue': 'Vue',  
    'vuex': 'Vuex',  
    'vue-router': 'VueRouter',  
    'axios': 'axios',  
    'echarts': 'echarts',  
    'swiper': 'Swiper'  
  } || {},  
  module: {
```

```
rules: [
  rules: [
    {
      test: /\.js$/,
      include: path.resolve('src'),
      use: [
        'thread-loader',
        // your expensive loader (e.g babel-loader)
      ],
    }
  ]
],
plugins: [
  new HtmlWebpackPlugin({ filename: '../index.html' }), // output file
relative to output.path
  new WebpackCdnPlugin({
    modules: [
      {
        name: 'vue',
        var: 'Vue',
        path: 'vue.min.js'
      },
      {
        name: 'vuex',
        var: 'Vuex',
        path: 'vuex.min.js'
      },
      {
        name: 'vue-router',
        var: 'VueRouter',
        path: 'vue-router.min.js'
      },
      {
        name: 'axios',
        var: 'axios',
        path: 'axios.min.js'
      },
      {
        name: 'echarts',
        var: 'echarts',
        path: 'echarts.min.js'
      },
      {
        name: 'swiper',
        var: 'Swiper',
        path: 'swiper.min.js'
      },
    ],
    prod: isProduction,
    prodUrl: '//cdn.bootcdn.net/ajax/libs/:name/:version/:path' // =>
https://cdn.bootcdn.net/ajax/libs/xxx/xxx/xxx(`:name`, `:version` `:path`)
```

```

        publicPath: '/node_modules/dist', // override when prod is false
    },
    new MyPlugin(),
    new MyOtherPlugin(),
],
});

module.exports = webpackConfig;

```

inde.html:

```

<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title>Webpack App</title>
    <link href="https://cdn.bootcdn.net/ajax/libs/Swiper/6.7.5/swiper-
bundle.min.css" rel="stylesheet">
  </head>
  <body>
    <script type="text/javascript"
src="https://cdn.bootcdn.net/ajax/libs/vue/2.6.13/vue.min.js"></script>
    <script type="text/javascript" src="https://cdn.bootcdn.net/ajax/libs/vue-
router/3.1.3/vue-router.min.js"></script>
    <script type="text/javascript"
src="https://cdn.bootcdn.net/ajax/libs/vuex/3.1.1/vuex.min.js"></script>
    <script type="text/javascript"
src="https://cdn.bootcdn.net/ajax/libs/axios/0.19.0/axios.min.js"></script>
    <script type="text/javascript"
src="https://cdn.bootcdn.net/ajax/libs/echarts/4.3.0/echarts.min.js"></script>
    <script type="text/javascript"
src="https://cdn.bootcdn.net/ajax/libs/Swiper/6.7.5/js/swiper.min.js"></script>
    <script type="text/javascript" src="/assets/app.js"></script>
  </body>
</html>

```

3.

- parallel-uglify-plugin
- uglifyjs-webpack-plugin parallel
- terser-webpack-plugin parallel ES6

```
npm install --save-dev terser-webpack-plugin
```

webpack.config.js

```
const path = require("path");
```

```
//  
const SpeedMeasurePlugin = require("speed-measure-webpack-plugin");  
  
//  
const TerserPlugin = require("terser-webpack-plugin");  
  
//  
const BundleAnalyzerPlugin = require("webpack-bundle-analyzer").BundleAnalyzerPlugin;  
  
const HtmlWebpackPlugin = require('html-webpack-plugin');  
  
//  
const isProduction = process.env.NODE_ENV === 'production';  
  
//  
const smp = new SpeedMeasurePlugin();  
  
// CDN bootstrap cdn  
const cdn = {  
  css: [  
    'https://cdn.bootcss.com/Swiper/4.5.1/css/swiper.min.css'  
  ],  
  js: [  
    'https://cdn.bootcss.com/vue/2.6.10/vue.min.js',  
    'https://cdn.bootcss.com/vue-router/3.1.3/vue-router.min.js',  
    'https://cdn.bootcss.com/vuex/3.1.1/vuex.min.js',  
    'https://cdn.bootcss.com/axios/0.19.0/axios.min.js',  
    'https://cdn.bootcss.com/echarts/4.3.0/echarts.min.js',  
    'https://cdn.bootcss.com/Swiper/4.5.1/js/swiper.min.js',  
  ]  
}  
  
const webpackConfig = smp.wrap({  
  entry: {  
    // ...  
  },  
  output: {  
    // ...  
  },  
  resolve: {  
    // ...  
  },  
  module: {  
    rules: [  
      rules: [  
        {  
          test: /\.js$/,  
          include: path.resolve('src'),  
          use: [  
            'thread-loader',  
            // your expensive loader (e.g babel-loader)  
          ]  
        }  
      ]  
    ]  
  }  
});
```

```
        ],
      }
    ]
  },
// cdn
externals: isProduction && {
  'vue': 'Vue',
  'vuex': 'Vuex',
  'vue-router': 'VueRouter',
  'axios': 'axios',
  'echarts': 'echarts',
  'swiper': 'Swiper'
} || {},
optimization: {
  minimizer: [
    new TerserPlugin({
      parallel: 4
    })
  ]
},
plugins: [
  new HtmlWebpackPlugin({ filename: '../index.html' }), // output file
relative to output.path
  new WebpackCdnPlugin({
    modules: [
      {
        name: 'vue',
        var: 'Vue',
        path: 'vue.min.js'
      },
      {
        name: 'vuex',
        var: 'Vuex',
        path: 'vuex.min.js'
      },
      {
        name: 'vue-router',
        var: 'VueRouter',
        path: 'vue-router.min.js'
      },
      {
        name: 'axios',
        var: 'axios',
        path: 'axios.min.js'
      },
      {
        name: 'echarts',
        var: 'echarts',
        path: 'echarts.min.js'
      },
      {

```

```
        name: 'swiper',
        var: 'Swiper',
        path: 'swiper.min.js'
    },
],
prod: isProduction,
prodUrl: '//cdn.bootcdn.net/ajax/libs/:name/:version/:path' // =>
https://cdn.bootcdn.net/ajax/libs/xxx/xxx/xxx(`:name`, `:version` `:path`)
    publicPath: '/node_modules/dist', // override when prod is false
}),
new MyPlugin(),
new MyOtherPlugin(),
],
});
}

module.exports = webpackConfig;
```

4. polyfill

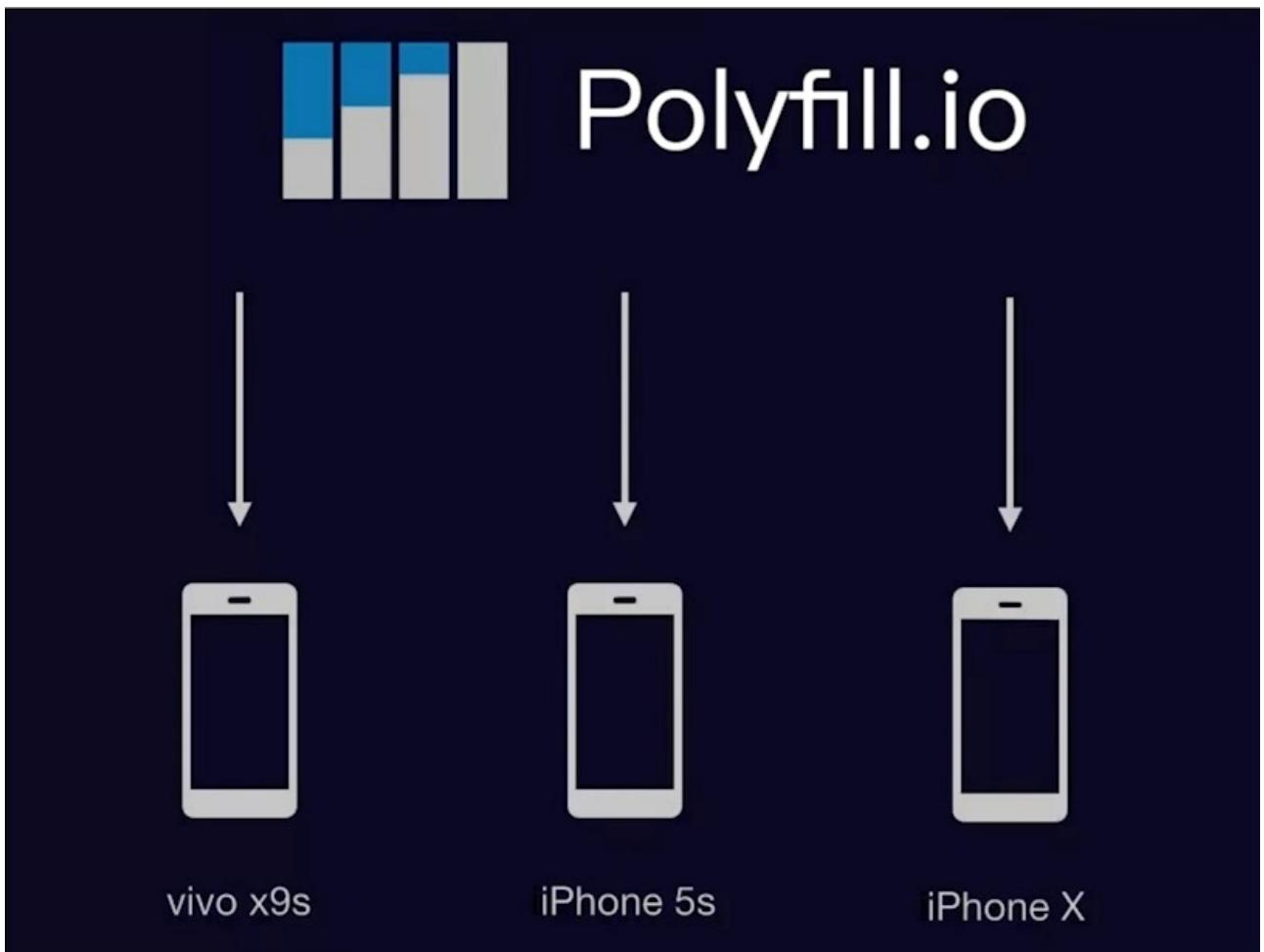
Polyfill API IE Promise fetch es6-promise whatwg-fetch Polyfill.io JS

Polyfill.io UserAgent polyfills Polyfill.io polyfills document.querySelector
Element.classList ES5 Array Date.now ES6 Object.assign Promise

polyfill polyfill Polyfill.io polyfill

Polyfill Service

User Agent Polyfill



index.html script

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<title>Document</title>
</head>
<body>
</body>
<script src="https://cdn.polyfill.io/v2/polyfill.min.js?callback=main" async
defer></script>
<script>
function main () {
  var node=document.createElement("script");
  node.src="index.js";
  document.body.appendChild(node);
}
</script>
</html>
```

webpack

1 Webpack

- Webpack webpack4
- /HappyPack()thread-loader
- - exclude/include (loader)
 - resolve.modules ()
 - resolve.extensions
 - noParse (bundle importrequiredefine)
 - IgnorePlugin ()
 - alias
- - babel-loader
 - terser-webpack-plugin
 - cache-loader hard-source-webpack-plugin
 - thread-loader cache-loader cache-loader thread-loader heavy-loader
- DLL
 - DllPlugin DllReferencePlugin() manifest.json

2webpack4-

1. V8for offorEachMapSetObjectincludesindexOf
2. md4 hash
3. webpacs ASTloaderAST
- 4.

noParse

-
- jquery
-

```
module.exports = {
  module: {
    noParse: /jquery/,
    rules: []
  }
}
```

IgnorePlugin

-
- moment ./local
- local import 'moment/locale/zh-cn'

```
module.exports = {
  plugins: [
    new Webpack.IgnorePlugin(/./local/, /moment/),
  ]
}
```

dllPlugin

-
-
- manifest.json
- webpack.config
- webpack.DllPlugin Webpack.DllReferencePlugin

happypack -> thread-loader

-
-

thread-loader

thread-loader loader worker
loader loader example loader loader worker (worker pool)

```
// webpack.config.js
module.exports = {
  module: {
    rules: [
      {
        test: /\.js$/,
        include: path.resolve("src"),
        use: [
          "thread-loader",
          // loader (e.g babel-loader)
        ]
      }
    ]
  }
}
```

worker 600ms node.js loader

- webpack-paralle-uglify-plugin issue pr
Webpack 4.0 uglifyjs-webpack-plugin parallel

```
module.exports = {
  optimization: {
    minimizer: [
      new UglifyJsPlugin({
        parallel: true,
      }),
    ],
  },
};
```

- terser-webpack-plugin

```
module.exports = {
  optimization: {
    minimizer: [
      new TerserPlugin({
        parallel: true // 
      })
    ],
  },
};
```

2 Webpack

- - webpack-paralle-uglify-plugin
 - uglifyjs-webpack-plugin parallel (ES6)
 - terser-webpack-plugin parallel
 -
 - mini-css-extract-plugin Chunk CSS optimize-css-assets-webpack-plugin cssnano CSS
- - html-webpack-externals-plugin CDN bundle
 - SplitChunksPlugin ()(Webpack4) CommonsChunkPlugin
 - cdnvuewebpack externalvaluebundle
- Tree shaking
 - purgecss-webpack-plugin mini-css-extract-plugin()
 - bundle(ES6 Modlue) ES6 Moduletree shaking
 - babel-loader Webpack CommonJS tree-shaking
 - PurifyCSS() uncss CSS
- Scope hosting
 - Scope hosting
 - ES6 CommonJS Scope hosting mainFields jsnext:main ES6
- - Node imagemin ()
 - image-webpack-loader

- Polyfill
 - polyfill-service polyfill(UApolyfill)
 - @babel-preset-env useBuiltIns: 'usagepolyfill'

3speed-measure-webpack-plugin

SMP Webpack Loader Plugin

4

terser-webpack-plugin

```
const TerserPlugin = require('terser-webpack-plugin')
module.exports = {
  optimization: {
    minimizer: [
      new TerserPlugin({
        parallel: true,
        terserOptions: {
          ecma: 6,
        },
      }),
    ]
  }
}
```

speed-measure-webpack-plugin

loader,plugin

```
// webpack.config.js
const SpeedMeasurePlugin = require('speed-measure-webpack-plugin');
const smp = new SpeedMeasurePlugin();
//.....
// smp.warp() config
module.exports = smp.wrap(merge(_mergeConfig, webpackConfig));
```

webpack-build-notifier

```
// webpack.config.js
const WebpackBuildNotifierPlugin = require('webpack-build-notifier');
const webpackConfig= {
  plugins: [
    new WebpackBuildNotifierPlugin({
      title: 'webpack' ,
      // logo: path.resolve('./img/favicon.png') ,
      suppressSuccess: true
    })
  ]
}
```

progress-bar-webpack-plugin

```
// webpack.config.js
const ProgressBarPlugin = require('progress-bar-webpack-plugin');
const webpackConfig= {
  plugins: [
    new ProgressBarPlugin(),
  ]
}
```

webpack-dashboard

```
// webpack.config.js
const DashboardPlugin = require('webpack-dashboard/plugin');
const webpackConfig= {
  plugins: [
    new DashboardPlugin()
  ]
}
```

```
// package.json
{
  "scripts": {
    "dev": "webpack-dashboard webpack --mode development",
  },
}
```

: node-bash-title

macitemwindows

```
// webpack.config.js
const setTitle = require('node-bash-title');
setTitle('server');
```

friendly-errors-webpack-plugin

friendly-errors-webpack-plugin

```
const webpackConfig= {
  plugins: [
    new FriendlyErrorsWebpackPlugin({
      compilationSuccessInfo: {
        messages: ['Your application is running here http://localhost:3000'],
        notes: ['Some additionnal notes to be displayed upon successful
compilation']
      },
      onErrors: function (severity, errors) {
        // You can listen to errors transformed and prioritized by the plugin
        // severity can be 'error' or 'warning'
      },
      // Should the console be cleared between each compilation?
      // default is true
      clearConsole: true,
      // add formatters and transformers (see below)
      additionalFormatters: [],
      additionalTransformers: []
    })
  ]
}
```

node

NodeJSHttpHttpipCookieWeb

Java

```

const http = require('http')
function compose(middlewareList) {
  return function (ctx) {
    function dispatch (i) {
      const fn = middlewareList[i]
      try {
        return Promise.resolve(fn(ctx, dispatch.bind(null, i + 1)))
      } catch (err) {
        Promise.reject(err)
      }
    }
    return dispatch(0)
  }
}
class App {
  constructor(){
    this.middlewares = []
  }
  use(fn){
    this.middlewares.push(fn)
    return this
  }
  handleRequest(ctx, middleware) {
    return middleware(ctx)
  }
  createContext (req, res) {
    const ctx = {
      req,
      res
    }
    return ctx
  }
  callback () {
    const fn = compose(this.middlewares)
    return (req, res) => {
      const ctx = this.createContext(req, res)
      return this.handleRequest(ctx, fn)
    }
  }
  listen(...args) {
    const server = http.createServer(this.callback())
    return server.listen(...args)
  }
}
module.exports = App

```

node

1

- -----> nodejs -----> ----->nodejs----->

- nodejsjava
- WebSSR
- SSRSEO

2

-
- node
- node
- node
-
-
-
- nodeSSRJS

3nodeAPInode

- java|php
-
-

4

- expressmultifetch
- express+http-proxy-middleware

5nodejs

- 1. httpNodehttpcreateServer
 - 2.
 - 3. httprequest
-
- http

```
const http = require("http");
const server = http.createServer();
server.on('request',(req,res)=>{
  res.end("hello world")
})
server.listen(3000, ()=>{
  console.log("running");
})
```

-

```
const http = require("http");
const server = http.createServer();
server.on('request', (req, res)=>{
  // reqdataend
  // Buffer.concat
  //
  let postbody = [];
  req.on("data", chunk => {
    postbody.push(chunk);
  })
  req.on('end', () => {
    let postbodyBuffer = Buffer.concat(postbody);
    res.end(postbodyBuffer);
  })
})
server.listen(3000,()=>{
  console.log("running");
})
```

nodejsbufferchunkBuffer.concatbuffer

- httprequest

```

const http = require("http");
const server = http.createServer();

server.on("request", (req, res) => {
  var { connection, host, ...originHeaders } = req.headers;
  var options = {
    "method": req.method,
    //
    "hostname": "www.nanjingmb.com",
    "port": "80",
    "path": req.url,
    "headers": { originHeaders }
  };
  //
  var p = new Promise((resolve, reject) => {
    let postbody = [];
    req.on("data", chunk => {
      postbody.push(chunk);
    })
    req.on('end', () => {
      let postbodyBuffer = Buffer.concat(postbody);
      resolve(postbodyBuffer)
    });
  });
  //
  p.then((postbodyBuffer) => {
    let responsebody = [];
    var request = http.request(options, (response) => {
      response.on('data', (chunk) => {
        responsebody.push(chunk);
      });
      response.on("end", () => {
        responsebodyBuffer = Buffer.concat(responsebody)
        res.end(responsebodyBuffer);
      });
    });
    //
    // requestwrite
    request.write(postbodyBuffer);
    // end
    request.end();
  });
});
server.listen(3000, () => {
  console.log("running");
});

```

promise Promise

1Promise

1. Promise pending() fulfilled() rejected()

2. Promise, resolverejectresolve PromiserejectError
3. thenPromiseonResolved(fulfilled)onRejected(rejected)
4. catchPromise
5. finallyPromise
6. Promise.all()PromisePromisePromise(Promise.all()IteratorPromise)catch
Promise.all()catchcatchPromise.all()catch
7. Promise.race()Promise.allPromise.race()Promise.race()Promise
8. Promise.resolve()PromisePromisePromise.resolve()thenable(then)
Promise.resolve()PromisethenPromise.resolvePromisefulfilledthen
onResolvedPromise.resolvefulfilled Promise resolve() Promise “
“event loop””
9. Promise.reject()Promiserejectedreject()

2Promise

- API
Promise API API
- Promise
Promise Promise Promise Promise
- Promise
- Promise Array.prototype.map()

3Promise

1. Promise
2. Promise
3. Pending
4. Promise Promise Promise

4

Promise7, state(), value(), reason(), resolve, reject, then

```
class Promise {
  constructor(executor) {
    this.state = 'pending';
    this.value = undefined;
    this.reason = undefined;

    this.callbacks = [];

    const resolve = (value) => {
      if (this.state === 'pending') {
        this.state = 'fulfilled';
        this.value = value;

        if (this.callbacks.length) {
          this.callbacks.forEach((cb, index) => {
            if (index === 0) {
              try {
                const result = cb.onResolved(this.value);
              }
            }
          });
        }
      }
    };

    const reject = (reason) => {
      this.state = 'rejected';
      this.reason = reason;

      if (this.callbacks.length) {
        this.callbacks.forEach((cb, index) => {
          if (index === 0) {
            try {
              const result = cb.onRejected(this.reason);
            }
          }
        });
      }
    };

    executor(resolve, reject);
  }

  state() {
    return this.state;
  }

  value() {
    if (this.state === 'fulfilled') {
      return this.value;
    } else {
      throw new Error('Promise is not fulfilled');
    }
  }

  reason() {
    if (this.state === 'rejected') {
      return this.reason;
    } else {
      throw new Error('Promise is not rejected');
    }
  }

  then(onResolved, onRejected) {
    const promise2 = new Promise((resolve, reject) => {
      if (this.state === 'pending') {
        this.callbacks.push({
          onResolved,
          onRejected
        });
      } else if (this.state === 'fulfilled') {
        resolve(this.value);
      } else {
        reject(this.reason);
      }
    });

    return promise2;
  }

  catch(onRejected) {
    return this.then(null, onRejected);
  }

  static all(promises) {
    return new Promise((resolve, reject) => {
      if (promises.length === 0) {
        resolve([]);
      } else {
        let count = 0;
        let resolvedPromises = [];

        promises.forEach((promise, index) => {
          promise
            .then(value => {
              resolvedPromises.push(value);
              count++;
              if (count === promises.length) {
                resolve(resolvedPromises);
              }
            })
            .catch(error => {
              reject(error);
            });
        });
      }
    });
  }

  static race(promises) {
    return new Promise((resolve, reject) => {
      promises
        .map(promise => promise
          .then(resolve)
          .catch(reject))
        .filter(promise => promise !== undefined);
    });
  }
}
```

```

        if (result instanceof Promise) {
            result.then((value) => cb.resolve(value), reason =>
cb.reject(reason));
        } else {
            cb.resolve(result);
        }
    } catch (error) {
        cb.reject(error);
    }
} else {
    cb.onResolved(this.value);
}
});
}
}

const reject = (reason) => {
if (this.state === 'pending') {
    this.state = 'rejected';
    this.reason = reason;

    if (this.callbacks.length) {
        this.callbacks.forEach((cb) => {
            cb.onRejected(this.reason);
        });
    }
}
}

try {
    executor(resolve, reject);
} catch (error) {
    reject(error)
}
}
}
}

```

Promise.all

1

1. Promise Iterator
2. promise
3. Promise.resolve()""promise
- 4.
5. Promise Promise.all

2

Promise.all

```

function promiseAll(promises) {
  return new Promise(function(resolve, reject) {
    if (!Array.isArray(promises)) {
      throw new TypeError(`argument must be a array`);
    }
    var resolvedCounter = 0;
    var promiseNum = promises.length;
    var resolvedResult = [];
    for (let i = 0; i < promiseNum; i++) {
      Promise.resolve(promises[i]).then(value=>{
        resolvedCounter++;
        resolvedResult[i] = value;
        if (resolvedCounter === promiseNum) {
          return resolve(resolvedResult);
        }
      }, error=>{
        return reject(error);
      });
    }
  });
}

// test
let p1 = new Promise(function (resolve, reject) {
  setTimeout(function () {
    resolve(1);
  }, 1000);
})
let p2 = new Promise(function (resolve, reject) {
  setTimeout(function () {
    resolve(2);
  }, 2000);
})
let p3 = new Promise(function (resolve, reject) {
  setTimeout(function () {
    resolve(3);
  }, 3000);
})
promiseAll([p3, p1, p2]).then(res => {
  console.log(res); // [3, 1, 2]
});

```

delete

- 1. deletedelete
- 2. delete:
 - 1non-configurable;
 - 2 false

- 3. `deleteglobal(window)`
- 4. `delete`
 - 1
 - 2
 - 3
 - 4 ECMAScript 6 const let "temporal dead zone" (TDZ) delete
- 5. `delete`
 - 1
 - 2
 - 3
- 6. `delete`
 - 1 length undefined
 - 2 delete
 - 3 undefined undefined delete
- 7. `delete`

AMDCMD

- AMD RequireJS
- CMDSeaJS
- CMD AMD
- CMD AMD
- CMDAMD

SPA

SPA single-page application Web HTML JavaScript CSS SPA HTML UI

SPA

-
- SPA
-

SPA

- Web JavaScript CSS
-
- SEO SEO

Vue.js DOM

1

- DOM API DOM DOM DOM
- **DOM** DOM View-Model DOM

- DOM JavaScript , DOM DOM weex

2

- DOM + DOM VScodeDOM

Node

work_thread

Node 10.5.0 work_thread Node worker_thread 4 2

- isMainThread: threadId === 0
- MessagePort: EventEmitter
- MessageChannel:
- threadId: ID
- Worker: filename
- parentPort: worker MessagePort null
- workerData: data

```

const {
  isMainThread,
  parentPort,
  workerData,
  threadId,
  MessageChannel,
  MessagePort,
  Worker,
} = require("worker_threads");

function mainThread() {
  for (let i = 0; i < 5; i++) {
    const worker = new Worker(__filename, { workerData: i });
    worker.on("exit", (code) => {
      console.log(`main: worker stopped with exit code ${code}`);
    });
    worker.on("message", (msg) => {
      console.log(`main: receive ${msg}`);
      worker.postMessage(msg + 1);
    });
  }
}

function workerThread() {
  console.log(`worker: workerData ${workerData}`);
  parentPort.on("message", (msg) => {
    console.log(`worker: receive ${msg}`);
  }),
  parentPort.postMessage(workerData);
}

if (isMainThread) {
  mainThread();
} else {
  workerThread();
}

//
```

CSSLess

CSS

css

csscss

less, sasscsscsscss

less@sass\$

css

@import

css

css

(lighten,darken,transparentize)mixinssloopscsscss

Sass

Sass (Syntactically Awesome Stylesheets) Hampton Catlin Natalie Weizenbaum

Sass CSS

Sass CSS CSS

Sass CSS

Sass CSS3

Sass CSS

Sass .scss

Sass Sass Sass CSS

React?

React JavaScript React Facebook Jordan Walke 2011 React
Facebook 2012 Instagram

React ?

- DOM VirtualDOM DOM
-
-
- / UI

react

1React 16.x Time Slicing, Suspensehooks

- Time SlicingCPUreact
- Suspense IOlazy , react
- componentDidCatch, fallback

2React16.8

- hooksReact
- hooksReact
 -
 -
 - class this
 -
- hookshooks
 - useState
 - useEffect
 - useContext React.createContext
 - useReducer useState(stateaction) => newState reducer dispatch
 - useCallback memoized
 - useMemo
 - useRef ref.current ref
 - useImperativeMethods ref
 - useMutationEffect ReactDOM
 - useLayoutEffect DOMDOM

3React16.9

- Unsafe UNSAFE_ review debug
- javascript: URL javascript: URL
- “Factory” React
- act() await
- <React.Profiler>

4React16.13.0

- setState
-
- unstable_createPortal createPortal
- bug

JSX?

JSX ECMAScript XML React.createElement() JavaScript HTML

Pure Components?

React.PureComponent	React.Component	shouldComponentUpdate()
PureComponent		shouldComponentUpdate true

?

state props JavaScript Props

States vs Props

Conditions States Props

?

```
//Wrong  
this.state.message = 'Hello world'
```

setState()

```
//Correct  
this.setState({ message: 'Hello World' })
```

constructor JavaScript

React this.state this.setState

- setStatesetStatesetState
- shouldComponentUpdate====
/
1. slice
2. Object.assign
3. ES6 Spread operator
4.

String Refs ?

React API ref ref={'textInput'} DOM this.refs.textInput refs
React v16

1. thisReactReact
2. refref
3. FlowFlow this.refs Callback refs
4. stringrefsrefDataTableMyComponent

```

class MyComponent extends Component {
  renderRow = (index) => {
    // This won't work. Ref will get attached to DataTable rather than
    MyComponent:
    return <input ref={'input-' + index} />;

    // This would work though! Callback refs are awesome.
    return <input ref={input => this['input-' + index] = input} />;
  }

  render() {
    return <DataTable data={this.props.data} renderRow={this.renderRow} />
  }
}

```

Virtual DOM?

Virtual DOM (VDOM) Real DOM UI DOM reconciliation

Real DOM vs Virtual DOM

Real DOM Virtual DOM

HTML	HTML
DOM	JSX
DOM	DOM

Virtual DOM ?

Virtual DOM

1. UI Virtual DOM
2. Virtual DOM Virtual DOM
3. DOM

dom

domjsdomdom diffdom

- JavaScript DOM DOM
-
- 21DOM

react diff

- 1.
2. key
3. React class component class
4. component setState , React dirty. , React dirty component .
5. shouldComponentUpdate diff

React FiberrequestIdleCallback

requestIdleCallback API

requestIdleCallback Web API React Fiber API

API

[requestIdleCallback \(<https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestIdleCallback>\)](https://developer.mozilla.org/zh-CN/docs/Web/API/Window/requestIdleCallback)

“”

60

160160

2430

160 1000/60 ≈ 16ms

16 ms

(16ms

requestIdleCallback

requestIdleCallback UI

```
var handle = window.requestIdleCallback(callback[, options])
```

- callback
 - IdleDeadline
 - timeRemaining()
 -
 -
 - 0
 -
 - didTimeout(Boolean)
 -
 - requestIdleCallback options.timeout
- options
 - timeout

DIV DIV

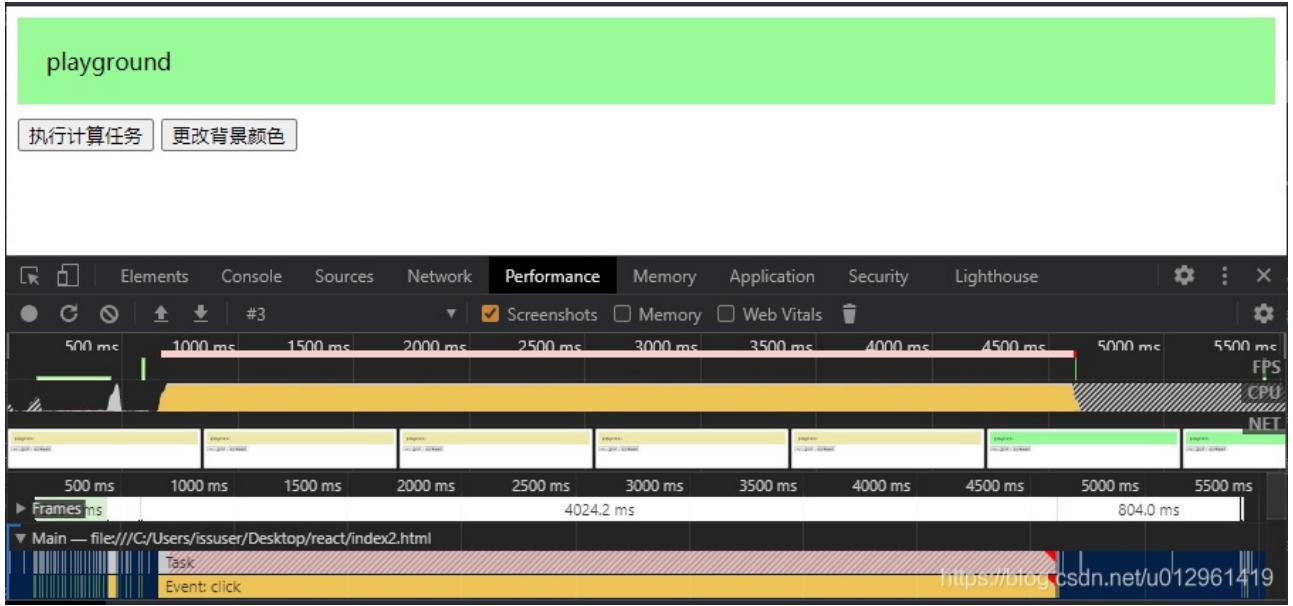
```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <title>requestIdleCallback</title>
    <style>
      #box {
        background: palegoldenrod;
        padding: 20px;
        margin-bottom: 10px;
      }
    </style>
  </head>
  <body>
    <div id="box">playground</div>
    <button id="btn1">      </button>
    <button id="btn2">      </button>

    <script>
      var box = document.querySelector('#box');
      var btn1 = document.querySelector('#btn1');
      var btn2 = document.querySelector('#btn2');
      var number = 100000000;
      var value = 0;

      function calc() {
        while (number > 0) {
          value = Math.random() < 0.5 ? Math.random() : Math.random();
          number--;
        }
      }

      btn1.onclick = function () {
        calc();
      }

      btn2.onclick = function () {
        console.log(number); // 0
        box.style.background = 'palegreen';
      }
    </script>
  </body>
</html>
```



requestIdleCallback

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <title>requestIdleCallback</title>
    <style>
      #box {
        background: palegoldenrod;
        padding: 20px;
        margin-bottom: 10px;
      }
    </style>
  </head>
  <body>
    <div id="box">playground</div>
    <button id="btn1">      </button>
    <button id="btn2">      </button>

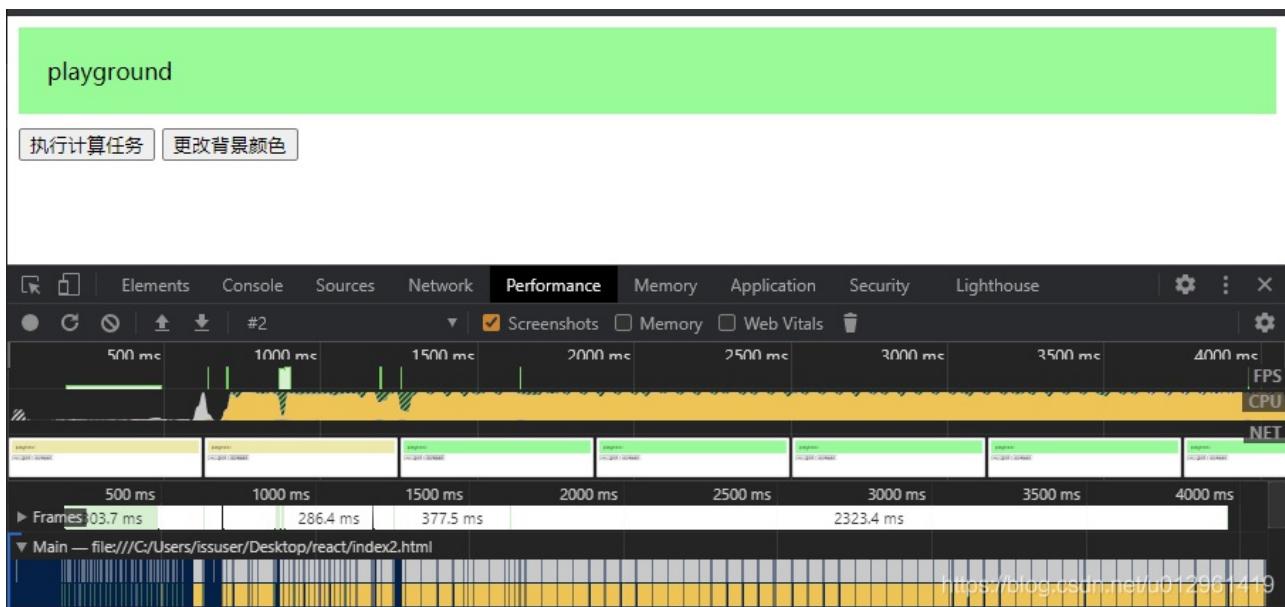
    <script>
      var box = document.querySelector('#box');
      var btn1 = document.querySelector('#btn1');
      var btn2 = document.querySelector('#btn2');
      var number = 100000000;
      var value = 0;

      function calc(IdleDeadline) {
        while (number > 0 && IdleDeadline.timeRemaining() > 1) {
          value = Math.random() < 0.5 ? Math.random() : Math.random();
          number--;
        }

        if (number > 0) {
          requestIdleCallback(calc);
        } else {
          console.log('      ');
        }
      }

      btn1.onclick = function () {
        requestIdleCallback(calc);
      }

      btn2.onclick = function () {
        console.log(number); // 0
        box.style.background = 'palegreen';
      }
    </script>
  </body>
</html>
```



- calc
- 1ms while
- calc number
- btn2 ""
- ""

Fiber

Fiber React 16 DOM DOM Stack

React 16

React 16 VirtualDOM

VirtualDOM

JavaScript DOM Stack()

JavaScript

Stack

React 16 DOM DOM

```
// jsx
const jsx = (
  <div id="a1">
    <div id="b1">
      <div id="c1"></div>
      <div id="c2"></div>
    </div>
    <div id="b2"></div>
  </div>
)
```

jsx Babel React.createElement() DOM

```
"use strict";

const jsx = /*#__PURE__*/React.createElement("div", {
  id: "a1"
}, /*#__PURE__*/React.createElement("div", {
  id: "b1"
}, /*#__PURE__*/React.createElement("div", {
  id: "c1"
}), /*#__PURE__*/React.createElement("div", {
  id: "c2"
})), /*#__PURE__*/React.createElement("div", {
  id: "b2"
}));
```

```
const jsx = {
  type: 'div',
  props: {
    id: 'a1',
    children: [
      {
        type: 'div',
        props: {
          id: 'b1',
          children: [
            {
              type: 'div',
              props: {
                id: 'c1'
              }
            },
            {
              type: 'div',
              props: {
                id: 'c2'
              }
            }
          ]
        }
      },
      {
        type: 'div',
        props: {
          id: 'b2'
        }
      }
    ]
  }
}
```

DOM

```

const jsx = {...}
function render(vdom, container) {
  //
  const element = document.createElement(vdom.type);
  //
  Object.keys(vdom.props)
    .filter(prop => prop !== 'children')
    .forEach(prop => (element[prop] = vdom.props[prop]));
  //
  if (Array.isArray(vdom.props.children)) {
    vdom.props.children.forEach(child => render(child, element));
  }
  //
  container.appendChild(element);
}

render.jsx, document.getElementById('root'));

```

DOM Virtual DOM

React 16 - Fiber

1.
 - React requestIdleCallback API
 - VirtualDOM VirtualDOM
 - VirtualDOM
 - VirtualDOM
 -
2.
 -
 -
 -
3.
 -
 -
 -
 - VirtualDOM
 - VirtualDOM
 -

React 1 23 1

Fiber ""

[Demo \(https://claudiopro.github.io/react-fiber-vs-stack-demo/\)](https://claudiopro.github.io/react-fiber-vs-stack-demo/) Stack Fiber

Fiber DOM

1. render
 - VirtualDOM Fiber
 2. commit
 - DOM
-
1. React JSX
 2. Babel JSX `React.createElement()`
 3. `React.createElement()` VirtualDOM
 4. **Fiber**
 - VirtualDOM VirtualDOM
 - VirtualDOM Fiber
 - Fiber JavaScript VirtualDOM typepropschildren
 - Fiber
5. **DOM**
 - DOM VirtualDOM --> Fiber --> Fiber DOM
 - DOM `newFiber(Fiber)` --> `newFiber vs oldFiber(Fiber)` -->
 Fiber DOM

Fiber

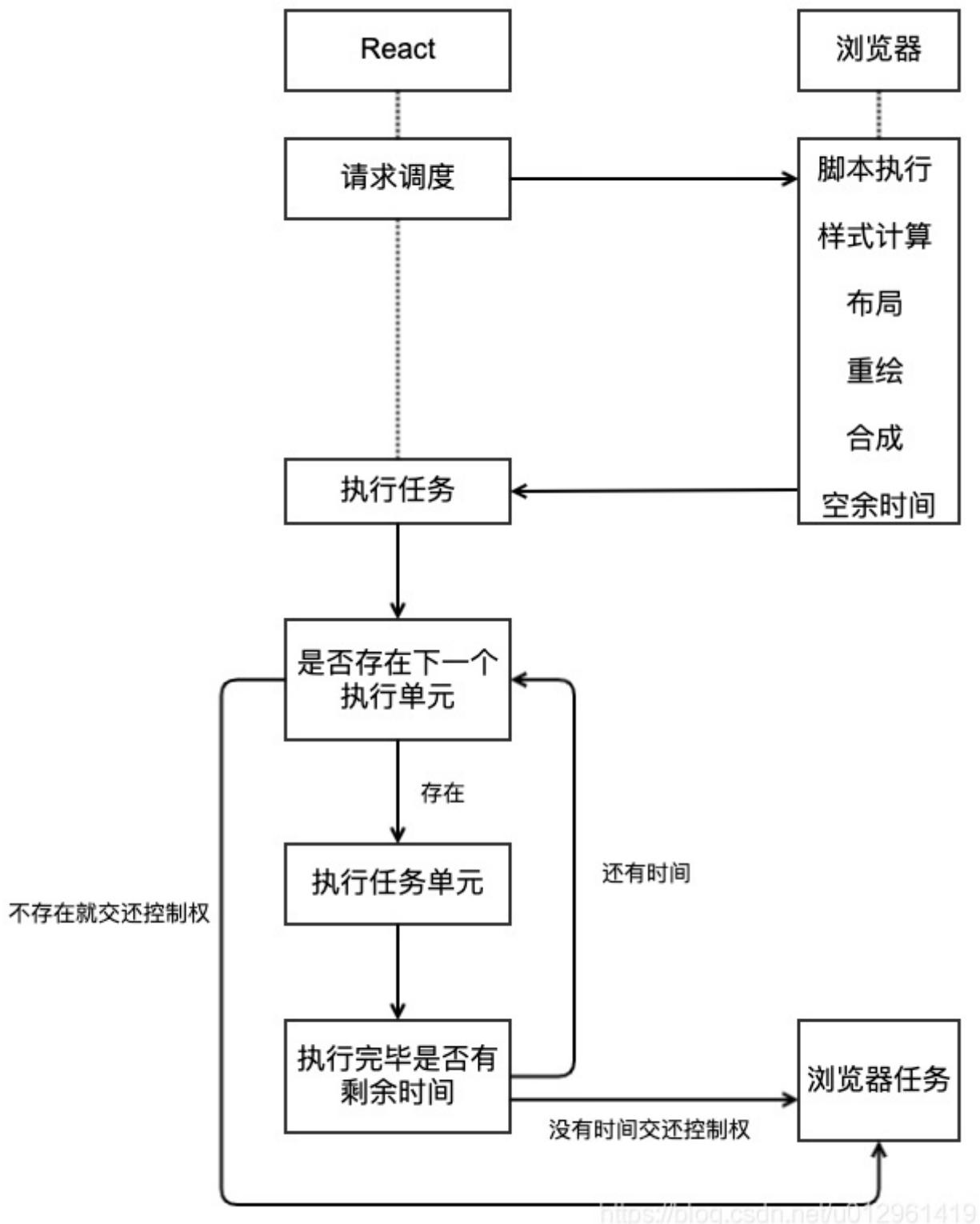
Fiber

- Fiber
- Fiber

React 16 Virtual DOM

React 16 Fiber

React



Fiber React

Fiber JavaScript DOM

render React root Fiber Root Fiber

•

- Root

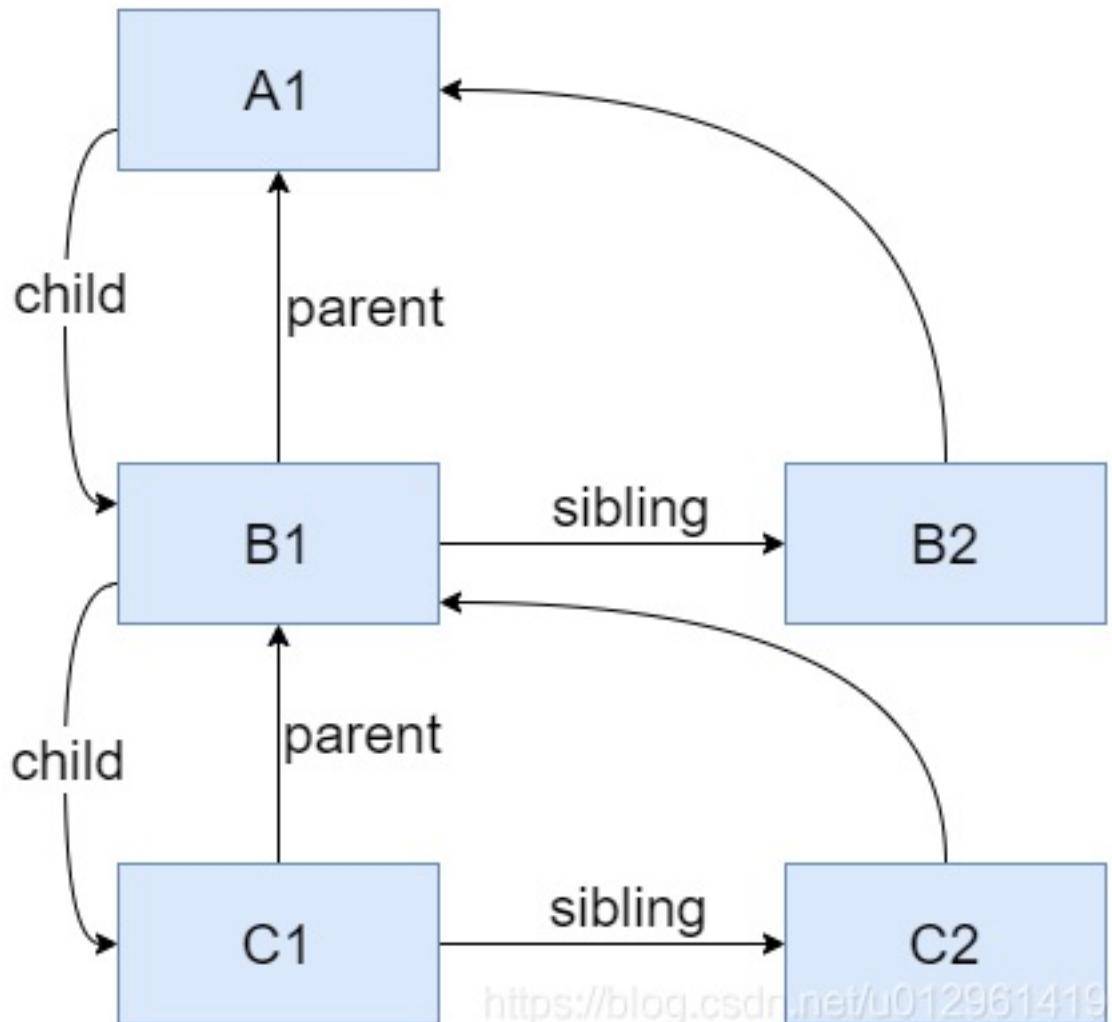
-

-
-
-
-
-

child sibling parent DOM DOM

```
// Fiber
{
  type // 
  props // props.children VirtualDOM
  stateNode // DOM | |
  tag // host_root[root] || host_component[DOM] || class_component[]
  || function_component[]
  effectTag // Fiber commit /
  nextEffect // sideEffect
  lastEffect // nextEffect
  firstEffect // root DOM
  parent // Fiber FiberReact `return`
  child // Fiber Fiber
  sibling // Fiber Fiber
  alternate // Fiber Fiber
}
```

```
<div id="a1">
  <div id="b1">
    <div id="c1"></div>
    <div id="c2"></div>
  </div>
  <div id="b2"></div>
</div>
```



```
// B1 Fiber
{
  child: C1_Fiber,
  sibling: B2_Fiber,
  parent: A1_Fiber
}
```

react-fiber

1

- reactsetState””jsreact
- Stack reconcilervDOMreconciliation(x00ms)16ms,js

2

React JS FiberrequestIdleCallback API

Fiber JS

```

const fiber = {
  stateNode,      //
  child,          //
  sibling,        //
  return,         //
}

```

- react
 - Virtual DOM
 - Reconciler Diff
 - Renderer ReactDOM ReactNative
- (Scheduler) Diff
 - synchronousStack Reconciler
 - tasknext tick
 - animation
 - high
 - low
 - offscreenrenderscroll
- Fiber Reconcilerreact
 - Fiber
 -
- FiberReact render React.createElement Element Virtual DOM Tree

Fiber Element Fiber Node Fiber Node Fiber TreeFiber Tree

requestIdleCallback API,
- Stack ReconcilerFiber Reconciler

(Presentational component)(Container component)

- props UI
- (behavior) Flux actions()

(Class component) (Functional component)

1. JSX
- 2.
3. store
4. props '(stateless component)'(dumb components)

(Functional Component)(Class Component)

(state) Class

ReactFunctional Components) Class Components

```
function Welcome = (props) => {
  const sayHi = () => {
    alert(`Hi ${props.name}`);
  }
  return (
    <div>
      <h1>Hello, {props.name}</h1>
      <button onClick ={sayHi}>Say Hi</button>
    </div>
  )
}
```

```
import React from 'react'

class Welcome extends React.Component {
  constructor(props) {
    super(props);
    this.sayHi = this.sayHi.bind(this);
  }
  sayHi() {
    alert(`Hi ${this.props.name}`);
  }
  render() {
    return (
      <div>
        <h1>Hello, {this.props.name}</h1>
        <button onClick ={this.sayHi}>Say Hi</button>
      </div>
    )
  }
}
```

- 1.
2. DOMStateless ComponentsStatePresentational ComponentsProps
DOM
3. thisthisthissayHi
4. UIDOM
5. ReactReact
6. UI

createElement cloneElement

React.createElement(): JSX React.createElement() React divspan React

```
React.createElement(type, [props], [...children]);
```

React.cloneElement() React.createElement() React

```
React.cloneElement(element, [props], [...children]);
```

React

React SyntheticEvent React

SyntheticEvent React React DOM React

React ?

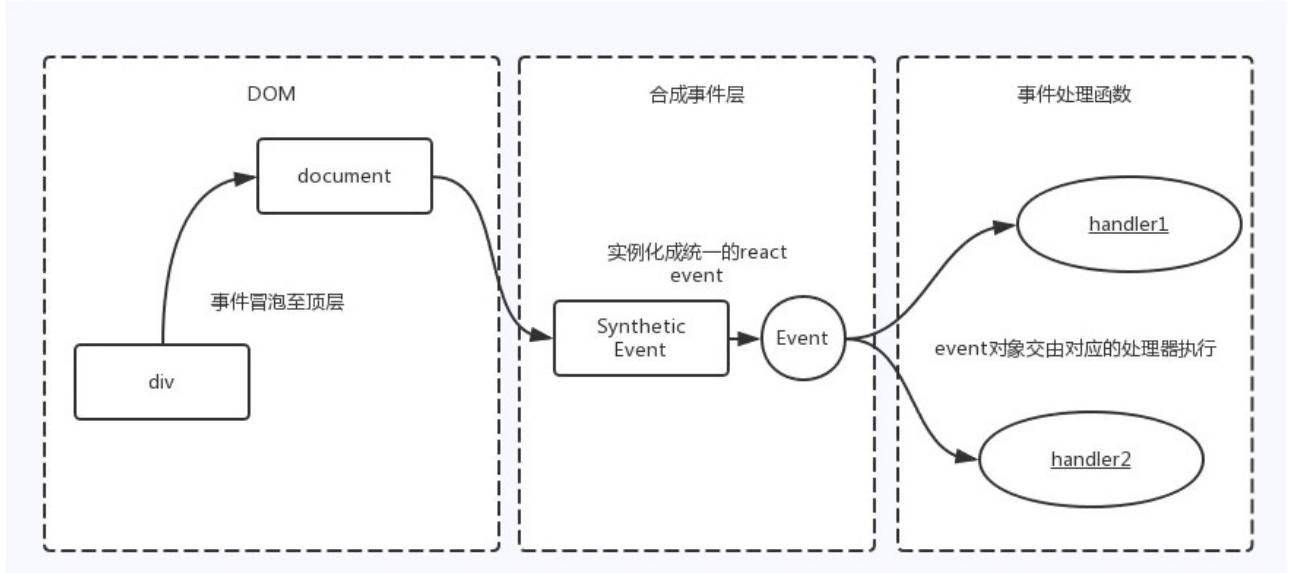
Pointer Events Pointer Events

React DOM

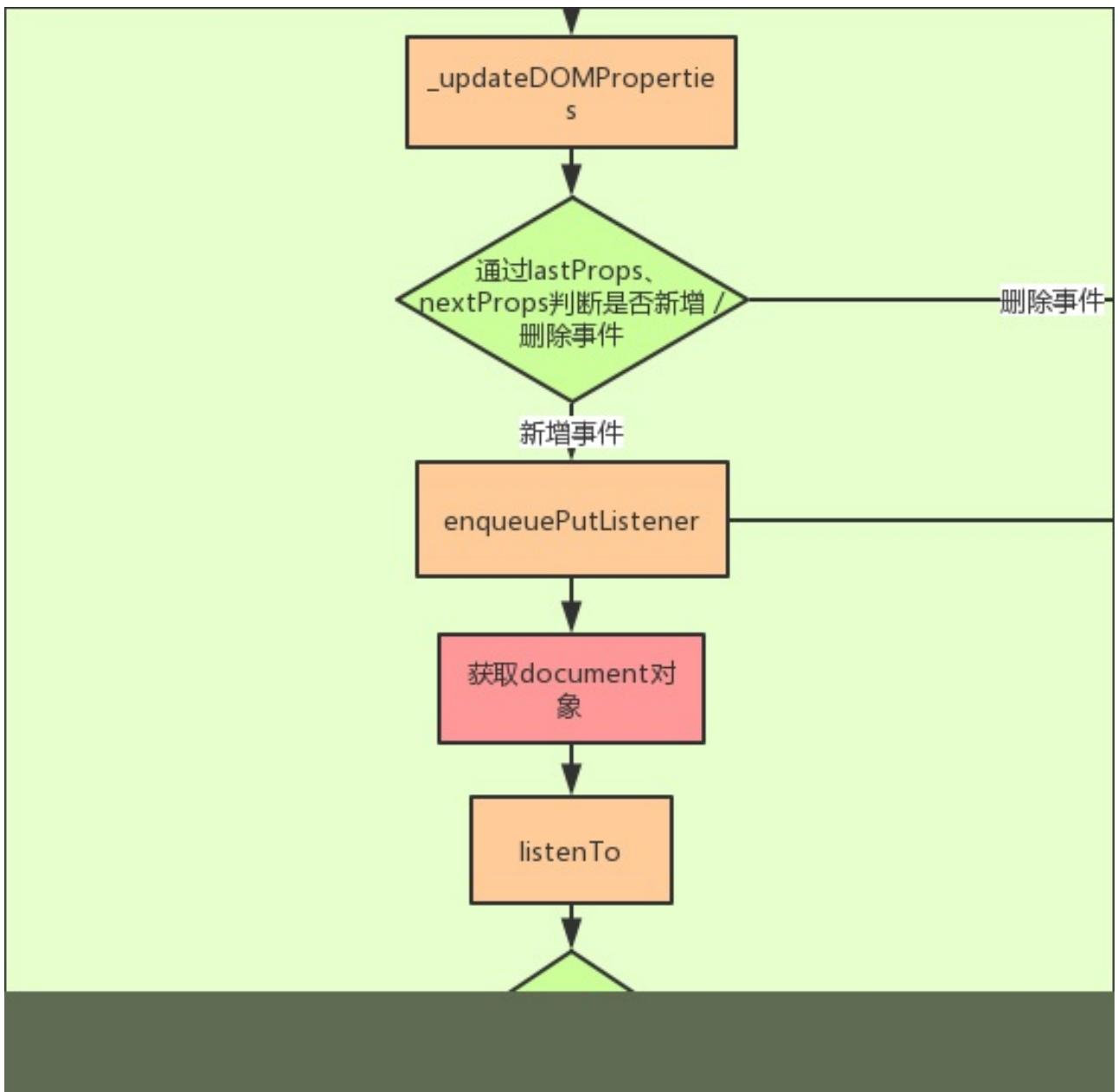
1. onPointerDown
2. onPointerMove
3. onPointerUp
4. onPointerCancel
5. onGotPointerCapture
6. onLostPointerCaptur
7. onPointerEnter
8. onPointerLeave
9. onPointerOver
10. onPointerOut

React

React click div DOM document document React
document React SyntheticEvent event.stopPropagation
event.preventDefault

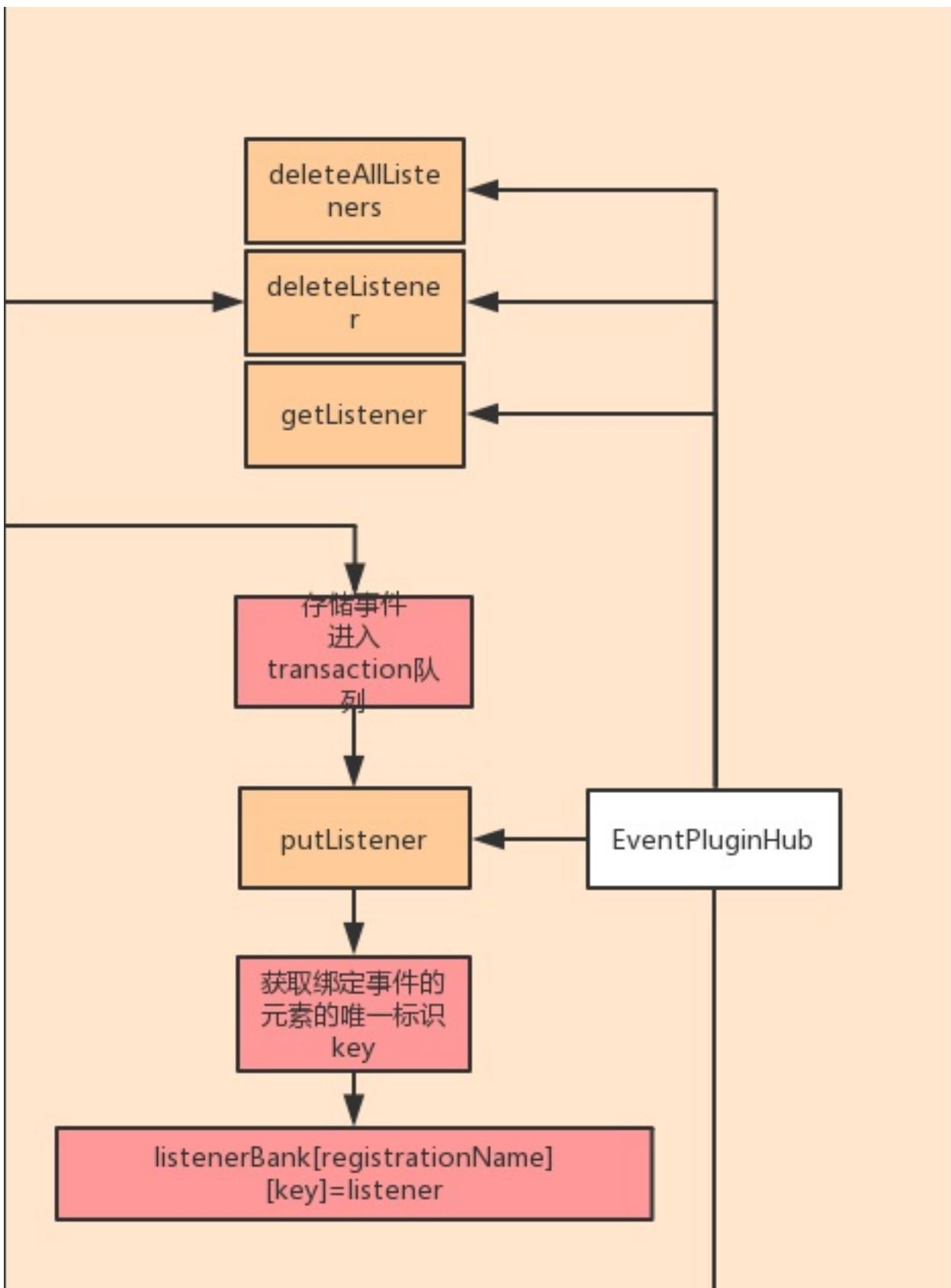


1



- /
- lastPropsnextProps
- EventPluginHubenqueuePutListener
- document
- onClickonCaptureClick
- addEventListenerattachEventIE
- documentdispatchEvent

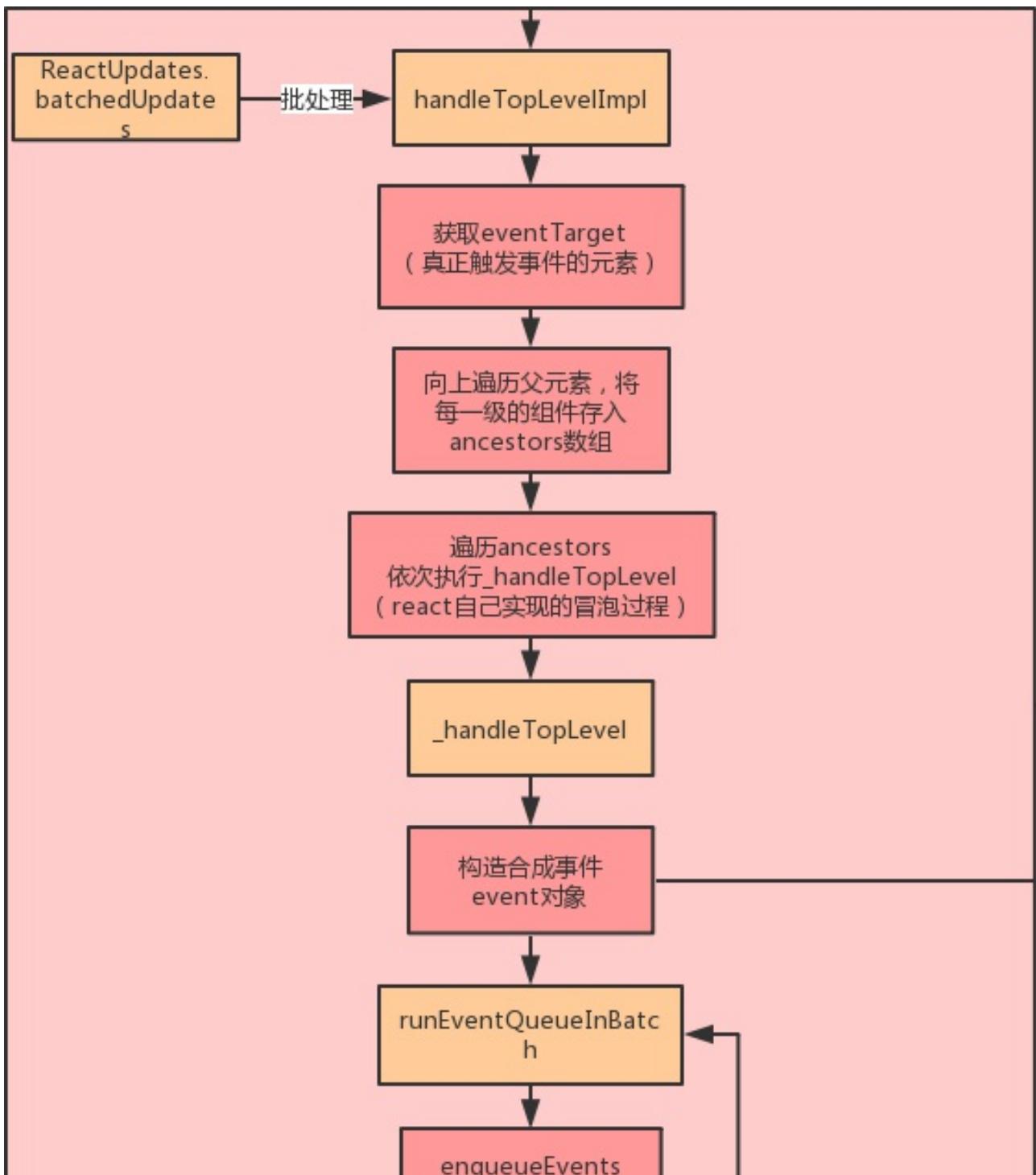
2

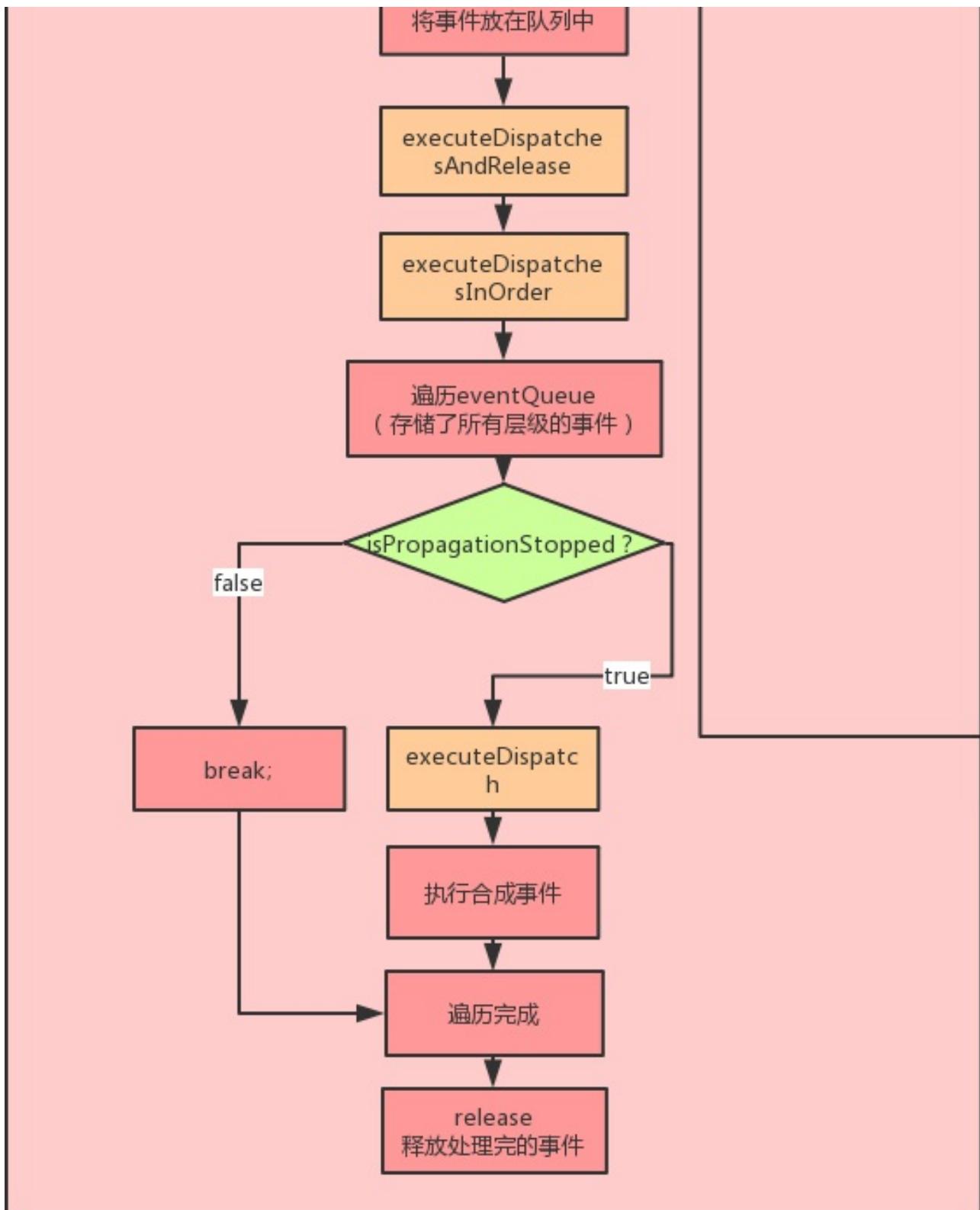


- `EventPluginHubReactcallbackcallbacklistenerBankPlugin`
- `EventPluginHubputListenerlistener`
- `key`
- `callbackkeylistenerBank`
- `listenerBanklistenerBank[registrationName][key]`

```
{  
  onClick:{  
    nodeid1: ()=>{...}  
    nodeid2: ()=>{...}  
  },  
  onChange:{  
    nodeid3: ()=>{...}  
    nodeid4: ()=>{...}  
  }  
}
```

3



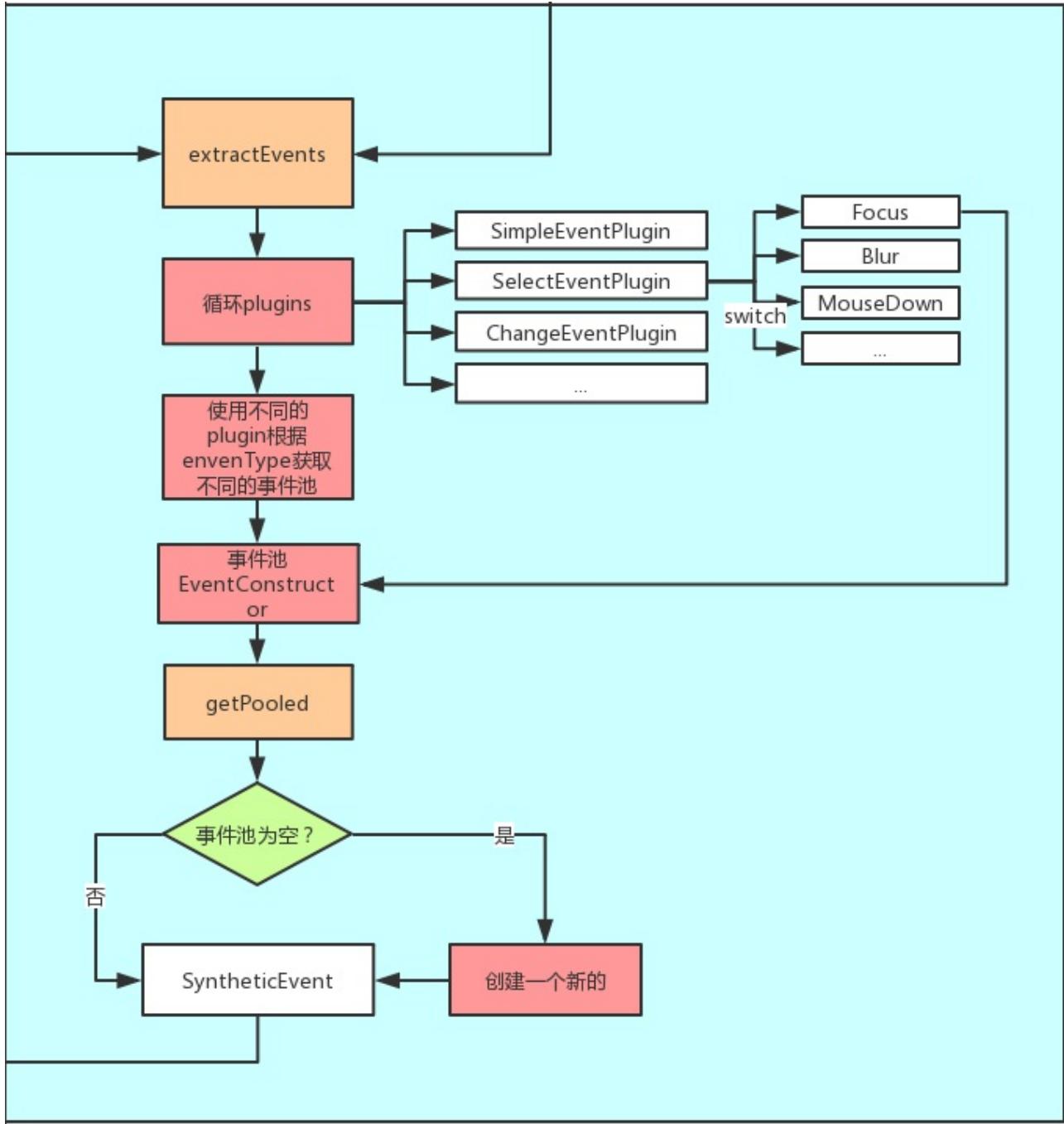


- `documentdispatchEvent`
- React

```
<div onClick={this.parentClick} ref={ref => this.parent = ref}>
  <div onClick={this.childClick} ref={ref => this.child = ref}>
    test
  </div>
</div>
```

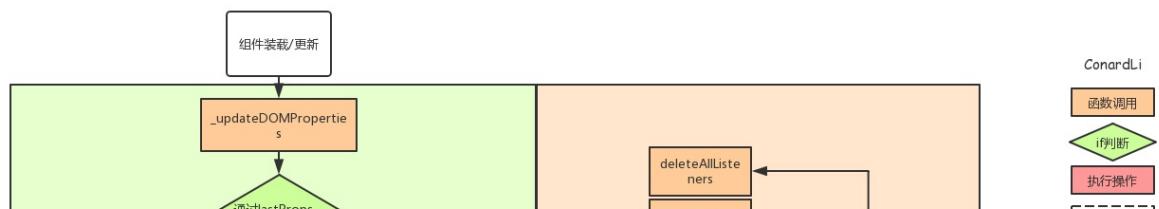
- this.child
-
-
- eventQueue
- eventQueue
- isPropagationStopped
- executeDispatch
-

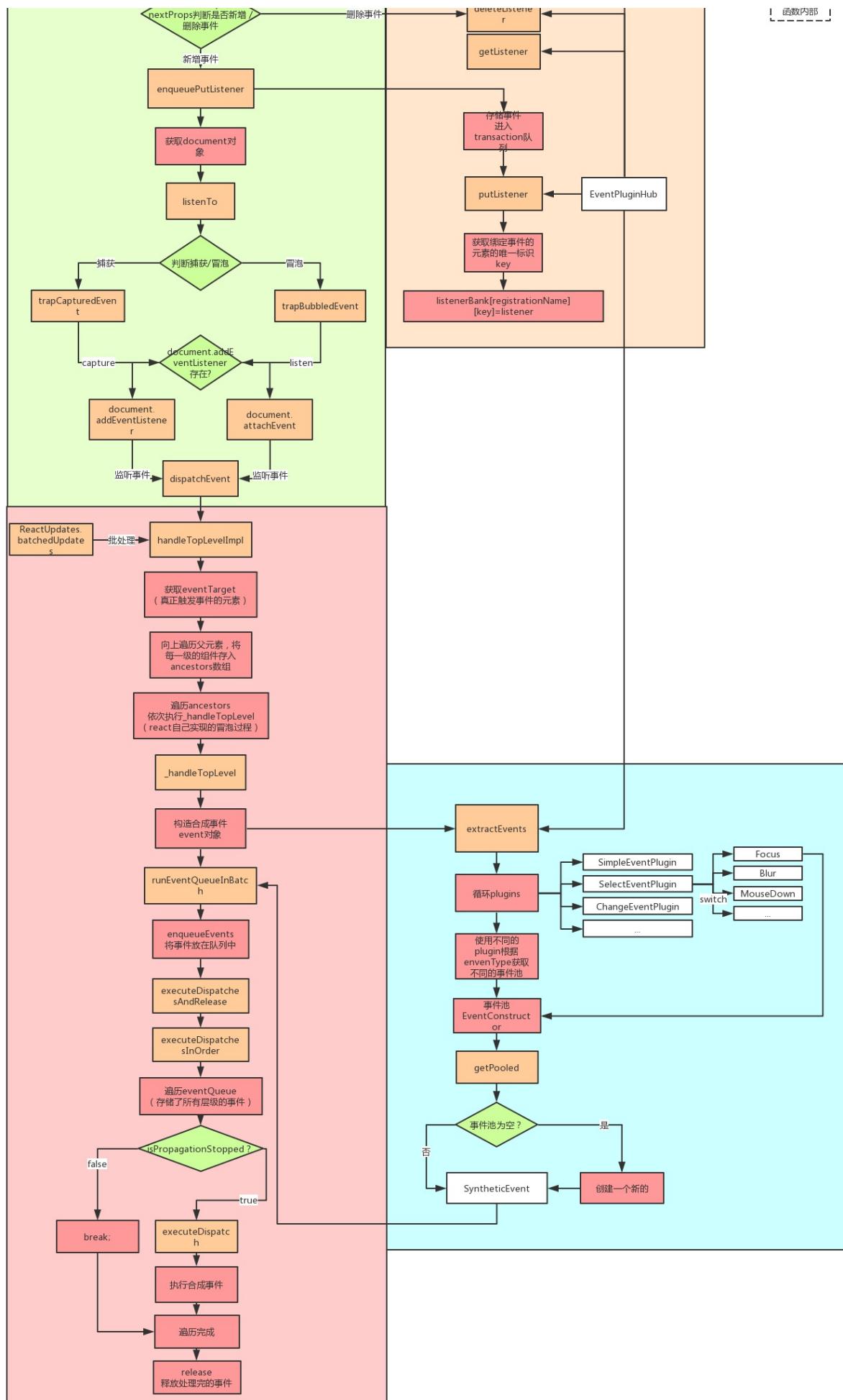
4



- EventPluginHub.extractEvents
- EventPlugin
- EventPlugin
-
- nodeid(key).listenerBink
-

5





hooks?

Hooks React

Hooks ?

hooks

1. React hooks hooks useState useEffect hooks
2. React hooks JavaScript hooks

React memo ?

pureComponent shouldComponentUpdate React.memo

```
const MyComponent = React.memo(function MyComponent(props) {  
  /* only rerenders if props change */  
});
```

React lazy ?

React.lazy Promise Promise React

React.lazy Suspense React Loadable

Flow?

Flow JavaScript Flow Flow null

Flow PropTypes ?

- Flow
- PropTypes React

Flow/TypeScript

React Native React ?

React JavaScript Web Web

React Native JavaScript iOSAndroidWindows React

MVV ?

1. DOM
- 2.
3. Google Docs

4.

Jest?

Jest Facebook Jasmine JavaScript jsdom

Jest Jasmine ?

Jasmine

-
-
-
- jsdom DOM
-

React Router?

React Router React UI URL

React linters?

ESLint JavaScript linter React eslint-plugin-react npm prop
eslint-plugin-jsx-a11y JSX HTML alt tabindex

React ReactDOM ?

react React.createElement(), React.Component, React.Children react-dom
ReactDOM.render() react-dom/server ReactDOMServer.renderToString()
ReactDOMServer.renderToStaticMarkup()

ReactDOM React ?

React DOM ReactDOM React v0.14 react-native react-art react-canvas
react-threeReact DOM React React React react react-dom React
React Native Web

setState ?

render() forceUpdate() React

React setState render

reactstatesetStatesetStatedom

reactisBatchingUpdatestruefalsereactrender

React ?

Webpack DefinePlugin NODE_ENV production propType Uglify

React ?

1. Virtual DOM
2. JSX
- 3.
4. AngularBackbone
5. Jest

React

1. React DOM DOM javascript DOM
2. DOM API IE8
3. component
4. Flux JavaScript React Facebook
5. javascript JavaScript
6. RequireJS Browserify Webpack

React ?

1. React
2. Web
3. React MVC
4. JSX
- 5.

react

- shouldComponentUpdatedom
- production react.js
- keyReact

React

1

- - FPFCPFMPFCP
 -
 - CSRFCPjscssjsCSRsuspencelazy
 - SSRSSRNodestreamnode
 - CSRSSRService worker
 - reactReact.ProfilerProfilecommitreactperformance API

- React.PropTypes.renderReact.PureComponent.React.memo
ShouldComponentUpdate
- renderReact.useMemoReact.useCallback
- reduxcontextreducer
- componentDidCatch
-
- 1.
- 2.
- 3. web worker
- 4. render
- 5. React.Fragments

?

this

?

stateconstructor

Fragments div ?

1. DOM Fragments
2. CSS FlexboxCSS Grid div
3. DOM

HOC?

(HOC) react

```
const EnhancedComponent = higherOrderComponent(WrappedComponent)
```

HOC

- 1.
- 2.
3. state
4. props

?

mounting render stage

1. static
2. constructor()
3. getChildContext()

4. componentWillMount()
5. componentDidMount()
6. componentWillReceiveProps()
7. shouldComponentUpdate()
8. componentWillUpdate()
9. componentDidUpdate()
10. componentWillUnmount()
11. onClickSubmit() onChangeDescription()
12. getSelectReason() getFooterContent()
13. renderNavigation() renderProfilePicture()
14. render()

getSnapshotBeforeUpdate() ?

getSnapshotBeforeUpdate() DOM componentDidUpdate()

componentDidUpdate() componentWillUpdate()

getDerivedStateFromProps() ?

getDerivedStateFromProps() null

componentDidUpdate() componentWillReceiveProps()

React v16 ?

1. componentWillMount()
2. componentWillReceiveProps()
3. componentWillUpdate()

React v16.3 UNSAFE_ React v17

React ?

React 16.3+

- **getDerivedStateFromProps:** render() .
- **componentDidMount:** Ajax DOM
- **shouldComponentUpdate:** true false
- **getSnapshotBeforeUpdate:** DOM DOM
- **componentDidUpdate:** DOM prop state shouldComponentUpdate() false
- **componentWillUnmount:** DOM

Before 16.3

- **componentWillMount:** render()
- **componentDidMount:** Ajax DOM
- **componentWillReceiveProps:** this.propsnextPropsthis.setState()
- **shouldComponentUpdate:** true false

- **componentWillUpdate**: shouldComponentUpdate return true this.setState()
- **componentDidUpdate**: DOM prop state shouldComponentUpdate() false
- **componentWillUnmount**: DOM

?

1. **Mounting**: DOM . constructor(), getDerivedStateFromProps(), render(), componentDidMount()
2. **Updating**: setState() forceUpdate() . getDerivedStateFromProps(), shouldComponentUpdate(), render(), getSnapshotBeforeUpdate() componentDidUpdate()
3. **Unmounting**: DOM componentWillUnmount()

DOM React

1. **Render** Pure Component React
2. **Pre-commit** DOM React getSnapshotBeforeUpdate() DOM
3. **Commit** React DOM componentDidMount() DOM , componentDidUpdate() , componentWillUnmount() React 16.3+ ()

React

react:

- 1.
- 2.
- 3.
- 4.

1

props

2

props+

3

- props, props, props
- context, context, context

4

- 1.
2. redux
3. ,

Flux?

Flux MVC React React Facebook

flux

Flux ""

1. View
2. View Action
3. Dispatcher Action Store
4. Store "change"
5. View "change"

redux redux

Redux Flux JavaScript Redux React 2kB

1redux

Reactprops, reduxstate

2Redux

Reduxstore, store tree, (dispatch)(action)store, storestate

redux

3Redux

1.
statestore
2.
statestateactionaction
3.
actionstatedreducers

4Redux

1. Store
 - storestore
 - ReduxcreateStoreStore

```
import {
  createStore
} from 'redux'
const store = createStore(fn);
```

2. State

statestorestorestateReduxstateView, stateviewstore.getState()

```
import {
  createStore
} from 'redux'
const store = createStore(fn);
const state = store.getState();
```

3. Action

stateViewreduxstatethis. setStateViewReduxStorestateActiontypeAction

```
const action = {
  type: 'ADD_TODO',
  payload: 'redux'
}
```

ActionADD_TODO'redux'Actionstate

4. store.dispatch() store.dispatch() // viewAction

```
store.dispatch({
  type: 'ADD_TODO',
  payload: 'redux'
})
```

store.dispatchActionstorestorestate

5. Reducer

StoreActionstateviewstateReducer ReducerActionstatestate

Reducerstateactionstateaction

```
const reducer = (state, action) => {
  switch (action.type) {
    case ADD_TODO:
      return newstate;
    default
      return state
  }
}
```

5Redux

```

let createStore = (reducer) => {
  let state;
  //
  //
  let listeners = [];
  let getState = () => state;
  //action
  let dispath = (action) => {
    //reducerstate
    state = reducer(state, action);
    //
    listeners.forEach((l) => l())
  }
  //
  let subscribe = (listener) => {
    listeners.push(listener);
  }
  dispath();
  return {
    getState,
    dispath,
    subscribe
  }
}
let combineReducers = (reducers) => {
  //reducersreducer
  return function(state = {}, action = {}) {
    let newState = {};
    for (var attr in reducers) {
      newState[attr] = reducers[attr](state[attr], action)
    }
    return newState;
  }
}
export {
  createStore,
  combineReducers
};

```

Redux

Redux

- 1.
- 2.
3. reducersReducers

redux

```
action -> reducer action -> middlewares -> reducer action  
action
```

- redux-logger
- redux-thunk
- redux-promise actionCreatorpromise

Redux react ?

Redux UI””

Redux

- 1.
- 2.
- 3.
- 4.
- 5.

Flux Redux ?

Redux Flux

1. Flux Redux Redux dev-only redux-immutable-state-invariant
Immutable.js
2. Flux / Redux
3. **Flow** Flux Redux

Relay Redux ?

Relay Redux Store relay GraphQLRelay

Redux ?

```
applyMiddleware()
```

```
redux-thunkloggerapplyMiddleware()
```

```
import { createStore, applyMiddleware } from 'redux'  
const createStoreWithMiddleware = applyMiddleware(ReduxThunk, logger)  
(createStore)
```

Redux Form?

Redux Form React Redux React Redux Redux Form HTML5 UI
Material UIReact WidgetsReact Bootstrap

Redux Thunk?

Redux Thunk Action thunk Action Store dispatch()getState()

redux-saga?

redux-saga React/Redux

NPM :

```
$ npm install --save redux-saga
```

redux-saga call() put() ?

call()put() Effect call() Effect promiseput() Effect Action Store

Effect

```
function* fetchUserSaga(action) {
  // `call` function accepts rest arguments, which will be passed to
  `api.fetchUser` function.
  // Instructing middleware to call promise, its resolved value will be assigned
  to `userData` variable
  const userData = yield call(api.fetchUser, action.userId)

  // Instructing middleware to dispatch corresponding action.
  yield put({
    type: 'FETCH_USER_SUCCESS',
    userData
  })
}
```

redux-saga redux-thunk ?

Redux ThunkRedux SagaThunk Promises Saga GeneratorsThunk Promise
Sagas/Generators Thunks Sagas

redux-saga mobx

1

- redux-sage redux
- mobx redux

2

- redux-sage flux
- mobx flux

3

- redux-sage Generator action action creator pure action
- Generator call put takeEverytakeLasttrace
- mobx Store state actionstate action state Computed values
state Reactions state state

4

- redux-sage state state action reducer state state state
- mobx state state state

5

- redux-sage redux action reducer dispatch state mapStateToProps state
- mobx action reducer action state

6

- redux-sage redux redux
- mobx

Redux DevTools?

Redux DevTools Redux Action UI Redux DevTools Chrome Firefox

React Angular ?

React	Angular
React View	Angular MVC
React	AngularJS Angular 2
React JS HTML JSX	Angular HTML
React Native React	IonicAngular app app
React	Angular

Vue.js React ?

Vue.js React

- 1.
- 2.
- 3.
- 4.

ReactVue

1. Virtual DOM
2. props
3. , DOM,
- 4.
5. native, React, React Native, Vue, Weex

1. : vue,react
2. , React JSX , HTMLCSSJavaScript,'all in js'; Vuewebpack+vue-loader,html,css,js
3. statereact,setState;vue,state,dataVue
4. virtual DOM,vue,React,,,reactshouldComponentUpdate
5. ReactMVCview,VueMVVM

VueReact Virtual DOM

1. vuereactdomDOM
2. tree diff, component diff, element diff tree diff domcomponent tree diff

dom

react diff

vue

1. reactdiff, render dom tree, dom tree patchdom. react
shouldComponentUpdaterender dom
2. vue Object.defineProperty data getter/setterwatcherdep, dep
setterwatch

Diff Key

1. tree diff
 - DOMDOM
 - CSS DOM
2. component diff
 - shouldComponentUpdate()
 - component diff
3. element diff
 -
 - key

mvvm

MVVMModel-View-ViewModelmvvmModel ModelView UI UI
ViewModel View Model

- MVVM View Model ViewModel Model View Model Model View
- ViewModel View Model View Model DOM, MVVM

MVC MVP MVVM

MVC

View Controller

Controller Model

Model View

MVP

View Model Presenter

View ""Passive View Presenter

MVVM

MVVM Presenter ViewModel MVP

data-binding View ViewModel

MVVM

MVVM

- View
- Model
- ViewModel View Model

- JQuery UI DOM UI
- MVVM UI UIUI ViewModel View View Model ViewModel View ViewModel

- MVVM Angular Vue

- \$digest \$watch \$digest
- UI DOM

- Vue Object.defineProperty() set get

```
var data = { name: 'yck' }
observe(data)
let name = data.name // -> get value
data.name = 'yyy' // -> change value

function observe(obj) {
  //
  if (!obj || typeof obj !== 'object') {
    return
  }
  Object.keys(data).forEach(key => {
    defineReactive(data, key, data[key])
  })
}

function defineReactive(obj, key, val) {
  //
  observe(val)
  Object.defineProperty(obj, key, {
    enumerable: true,
    configurable: true,
    get: function reactiveGetter() {
      console.log('get value')
      return val
    },
    set: function reactiveSetter(newVal) {
      console.log('change value')
      val = newVal
    }
  })
}
```

set get

```
<div>
  {{name}}
</div>
```

 {{name}} name

```

// Dep
class Dep {
  constructor() {
    this.subs = []
  }
  addSub(sub) {
    // sub Watcher
    this.subs.push(sub)
  }
  notify() {
    this.subs.forEach(sub => {
      sub.update()
    })
  }
}
// Watcher
Dep.target = null

function update(value) {
  document.querySelector('div').innerText = value
}

class Watcher {
  constructor(obj, key, cb) {
    // Dep.target
    // getter
    // Dep.target
    Dep.target = this
    this.cb = cb
    this.obj = obj
    this.key = key
    this.value = obj[key]
    Dep.target = null
  }
  update() {
    //
    this.value = this.obj[this.key]
    // update Dom
    this.cb(this.value)
  }
}
var data = { name: 'yck' }
observe(data)
// `{{name}}`
new Watcher(data, 'name', update)
// update Dom innerText
data.name = 'yyy'

```

, defineReactive

```

function observe(obj) {
  //
  if (!obj || typeof obj !== 'object') {
    return
  }
  Object.keys(data).forEach(key => {
    defineReactive(data, key, data[key])
  })
}

function defineReactive(obj, key, val) {
  //
  observe(val)
  let dp = new Dep()
  Object.defineProperty(obj, key, {
    enumerable: true,
    configurable: true,
    get: function reactiveGetter() {
      console.log('get value')
      // Watcher
      if (Dep.target) {
        dp.addSub(Dep.target)
      }
      return val
    },
    set: function reactiveSetter(newVal) {
      console.log('change value')
      val = newVal
      // watcher update
      dp.notify()
    }
  })
}

```

getter

Proxy Obeject.defineProperty

- Obeject.defineProperty
 -
 -

Vue hack

vue

- View Model ViewModel "View" View Model Model View

- ViewModel view
- ViewModel
- ViewModel

Vue

1 vue jQuery

2 Angular

3 OO(Object-Oriented)

Vue

- 1 vue js form
- 2 boss dom Vue v-for DOM
- 3: webapp vue

1-3 js

Vue2.0 “”””

Angular

-
-
-

Angular

ReactAngular

ReactFluxReduxMobxReduxsaga

```
const getData = () => {  
  //  
  //  
}
```

ReactReact

bug

1. JS
- 2.

bugOO

React

AngularReactAngularOO

VueReactAngularjQueryAngularOO

Vue computed

- data Store
 -
-
- data Object.defineProperty getter/setter
 - computed, computed computed watch getter
Object.defineProperty
 - Object.defineProperty getter
 - computed computed

Vue complier

- html mv*
 - Vue complier template render
-

- parse template AST
- optimize diff
- generate render

template

1. vue
2. vuemount
3. mountcompiletemplatehtml
4. parsehtml AST template Vue JS DOM

```

html: "<div id='test">texttext</div>"
// htmlast
ast: {
  //
  type: 1,
  //
  tag: "div",
  //
  attrsList: [{name: "id", value: "test"}],
  //
  attrsMap: {id: "test"},
  //
  parent: undefined,
  //
  children: [
    {
      type: 3,
      text: 'texttext'
    }
  ],
  plain: true,
  attrs: [{name: "id", value: "'test'"}]
}

```

5. optimize parse AST ()
6. generate AST render

```

<template>
  <div id="test">
    {{val}}
    
  </div>
</template>
//
// {render: "with(this){return _c('div',{attrs:{'id':'test'}},
  [_v(_s(val))),_v(" "),_m(0)]}"}

```

7. complierender new watcherrender Vnode render mount Vnode
Vnode Vnode diff DOM

vue

1

- data data gettersetter watcher
- v-if v-for
- v-for
- SPA keep-alive
- v-if v-show
- key
-
-
-

-
-

2

-
- PWAWEB
- ()gzip

3 SEO

-
- SSR

4

-
- Tree Shaking/Scope Hoisting
- cdn
- happypack
- splitChunks
- sourceMap

Vue

1. beforeCreate
2. created
3. beforeMount
4. mounted el vm.\$el
5. beforeUpdate
6. updated DOM
7. beforeDestory
8. destroyed

Vue2 \ Vue3

()

beforeCreate()	setup()
created()	setup()
beforeMount()	onBeforeMount()
mounted()	onMounted()
beforeUpdate(DOM)	onBeforeUpdate(DOM)
updated(DOM)	onUpdated(DOM)
beforeDestory()	onBeforeUnmount()

```
destroyed()          onUnmounted()
```

Vue

VUE Object.defineProperty() (get)(set)

Vue3.0 Proxy Object.defineProperty

Object.definePropertyProxy defineProperty

1. Vue Object.defineProperty
2. Object.defineProperty, Vue 2.x + data ,

Proxy:

-
- 13

ProxyProxies6vue2.xvue2.xProxy

Proxies6polyfill

Proxy

Proxy ES6 "****" Proxy

Proxy ""

Proxy

```
let p = new Proxy(target, handler);
```

- target Proxy
- handler target
- p p handler Proxy13

handler

```
get  
set  
has  
construct
```

Proxygetsetdemo

```

let obj = {};
let handler = {
  get(target, property) {
    console.log(` ${property} `);
    return property in target ? target[property] : 3;
  },
  set(target, property, value) {
    console.log(` ${property} ${value}`);
    target[property] = value;
  }
}

let p = new Proxy(obj, handler);
p.name = 'tom' //name tom
p.age; //age 3

```

p handler.get() obj

p handler.set() obj

Proxy [Proxy \(https://developer.mozilla.org/zh-CN/docs/Web/JavaScript/Reference/Global_Objects/Proxy\)](https://developer.mozilla.org/zh-CN/docs/Web/JavaScript/Reference/Global_Objects/Proxy)

v-if v-for

Vue v-for v-if v-if v-for v-if v-if v-for

1. /()
2. (vue.js.vuejs)
 - ()
- 3.

vue

- 1.
- 2..viewmodel
- 3.

1. SEO
- 2.
- 3.

\$route \$router

\$route path param hash query fullPath matched name

\$router

vue

vue

watch

watch

watch

watchwatchwatchwatch

v-el ?

v-elDOM this.\$els[elValue]DOM v-refcomponent this.\$refs[refValue]Component

vuex

State GetterMutation Action Module

vuexState

1. VuexstateVuedata
2. stateVuestorestore
3. mapState state getters computed

vuexGetter

1. getters StateStore
2. getters
3. getters

vuexMutation

1. Action mutationAction mutationAction

Vuex

Vue Component

vue-router

- : , router.beforeEach(to, from, next)

```
router.beforeEach((to, from, next) => {
  // TODO
});
```

-

```
{
  path: '/home',
  name: 'home',
  component: Home,
  beforeEnter(to, from, next) {
    // TODO
  }
}
```

-

```
beforeRouteEnter(to, from, next) {
  // do someting
  // confirm
},
beforeRouteUpdate(to, from, next) {
  // do someting
  //
},
beforeRouteLeave(to, from, next) {
  // do someting
  //
}
```

vue-router

vue3vueesimport()webpackrequire.ensure()

vue

- vue-routervue

js

```
{
  path: '/promisedemo',
  name: 'PromiseDemo',
  component: resolve => require(['../components/PromiseDemo'], resolve)
}
```

esimport()

- (webpack > 2.4)
- webpackwebpackimport()

vue <https://router.vuejs.org/zh/guide/advanced/lazy-loading.html#%E6%8A%8A%E7%BB%84%E4%BB%B6%E6%8C%89%E7%BB%84%E5%88%86>

- vue-router

```
// 2webpackChunkNamejs
const ImportFuncDemo1 = () => import('../components/ImportFuncDemo1')
const ImportFuncDemo2 = () => import('../components/ImportFuncDemo2')
// 2webpackChunkNamejs
// const ImportFuncDemo = () => import(/* webpackChunkName: 'ImportFuncDemo' */ '../components/ImportFuncDemo')
// const ImportFuncDemo2 = () => import(/* webpackChunkName: 'ImportFuncDemo' */ '../components/ImportFuncDemo2')
export default new Router({
  routes: [
    {
      path: '/importfuncdemo1',
      name: 'ImportFuncDemo1',
      component: ImportFuncDemo1
    },
    {
      path: '/importfuncdemo2',
      name: 'ImportFuncDemo2',
      component: ImportFuncDemo2
    }
  ]
})
```

webpackrequire.ensure()

- vue-routerwebpackrequire.ensure

chunkNamejs

```
{
  path: '/promisedemo',
  name: 'PromiseDemo',
  component: resolve => require.ensure([], () =>
resolve(require('../components/PromiseDemo')), 'demo')
},
{
  path: '/hello',
  name: 'Hello',
  // component: Hello
  component: resolve => require.ensure([], () =>
resolve(require('../components/Hello')), 'demo')
}
```

Vue.\$nextTick

- DOM
- nextTick
- Promise MutationObserver setImmediate

setTimeout(nextTick

Vue

- - beforeCreate->created->beforeMount->beforeCreate->created->beforeMount->mounted->mounted
- - beforeUpdate->beforeUpdate->updated->updated
- - beforeUpdate->updated
- - beforeDestroy->beforeDestroy->destroyed->destroyed

Vue

1: props

- 1.
- 2.
3. :

2: vue

1. vue, props

- : <MyComp @eventName="callback"
- (): this.\$emit("eventName", data)

2. :

3:

1. , : pubsub-js

- : PubSub.subscribe('msg', (msg, data)=>{})
- : PubSub.publish('msg', data)

2. :

4: vuex

1. : vuexvuevuevue

2. : , pubsub,

5: slot

1. :

-
-

2. :

VueMVVM

- 1. VueMVVM2

- -

- 2. :

- -

- 3. :

-

Vue.use

vue.use

- 1.
- 2. this
- 3. install install function

- - install vueVue.use args.unshift(this)
 - install typeof plugin.install === 'function'
 - plugin.apply(null, args)
 - installedPlugins.push(plugin)

```

export function toArray (list: any, start?: number): Array<any> {
  start = start || 0
  let i = list.length - start
  const ret: Array<any> = new Array(i)
  while (i--) {
    ret[i] = list[i + start]
  }
  return ret
}

export function initUse (Vue: GlobalAPI) {
  Vue.use = function (plugin: Function | Object) {
    const installedPlugins = (this._installedPlugins || (this._installedPlugins = []))
    if (installedPlugins.indexOf(plugin) > -1) {
      return this
    }

    // additional parameters
    const args = toArray(arguments, 1)
    args.unshift(this)
    if (typeof plugin.install === 'function') {
      plugin.install.apply(plugin, args)
    } else if (typeof plugin === 'function') {
      plugin.apply(null, args)
    }
    installedPlugins.push(plugin)
    return this
  }
}

```

new Vue()

1. new Vue()Vue
- 2.

\$children\$refs\$slots\$createElement

beforecreate created

3. new Vue()

Vue

1. defineReactiveObject. defineProperty() get set
2. 7 (push/pop/shift/unshift/splice/reverse/sort)

vue3 proxy

dep watcher watcher

1. defineReactive
2. depwatcher
- 3.

dep.depend() // get

dep.notify() // set

- 1.
2. data
3. object.freeze()

Vue

defineProperty 7 ob.dep.notify() Watcher

push/pop/shift/unshift/splice/reverse/sort

Vue7wacther

Vue.set() = splice

```
//  
  
const arrayProto = Array.prototype  
  
//  
  
export const arrayMethods = Object.create(arrayProto)  
  
//  
  
def(arrayMethods, method, function mutator (... args) { }  
  
ob.dep.notify() //
```

Vue.set

\$setdepwatcherssplice

Vue.set(object, key, value)

splice

target.splice(key, 1, val)

defineReactive(ob, key, val)

ob.dep.notify()

Vue3.x

Vue3.xProxyObject.definePropertyProxy13

Vue3.xProxyVue3

Reflect.getObjectreactive

Vue3.xget/set

keytargettrigger

vue2.x

- Vuedata
- api
-

Vue2.xVue3.xdiff

diff

-
- (children)
- (diff)
-
- DiffO(n^3) DOMVueDiffO(n^3) -> O(n)childrenDiff

Vue2DiffchildrenkeyReactDiff

Vue3.x ivi inferno

VNodemount/patchVNodeDiffVue2.x(Vue3.x)

Vue SSR

- SSRVueHTMLhtml
- SSRSEO
- beforeCreatecreatedNode.js
-

name

-
- name (keep-alive)
- name

```
Vue.extend = function () {
  if(name) {
    Sub.options.components[name] = Sub
  }
}
```

diffreactdiffvuediff

diff

diff



abcdeO(n^2)n

```
a->ea->da->ba->ca->a
```

O(n^3)

reactdiff

diffO(n^3) 100010 react diff O(n^3) O(n)

- web UI react diff



- DOM DOM
- key

react

dom api dom

dom js dom

```
<div className="myDiv">
  <p>1</p>
  <div>2</div>
  <span>3</span>
</div>
```

```
{
  type: 'div',
  props: {
    className: 'myDiv',
  },
  children: [
    {type: 'p', props: {value: '1'}},
    {type: 'div', props: {value: '2'}},
    {type: 'span', props: {value: '3'}}]
}
```

id



```

//  

//  

//  

//  
  

// diff
function diff (oldTree, newTree) {
  // 1
  var index = 0
  var patches = {} //
  dfsWalk(oldTree, newTree, index, patches)
  return patches
}  
  

//  

function dfsWalk (oldNode, newNode, index, patches) {
  // oldNodenewNode
  patches[index] = [...]  
  

  diffChildren(oldNode.children, newNode.children, index, patches)
}  
  

//  

function diffChildren (oldChildren, newChildren, index, patches) {
  var leftNode = null
  var currentNodeIndex = index
  oldChildren.forEach(function (child, i) {
    var newChild = newChildren[i]
    currentNodeIndex = (leftNode && leftNode.count) //
      ? currentNodeIndex + leftNode.count + 1
      : currentNodeIndex + 1
    dfsWalk(child, newChild, currentNodeIndex, patches) //
    leftNode = child
  })
}
}

```

patches

1. patches[0]: {type: 'INSERT_MARKUP', node: newNode }
2. patches[0]: {type: 'MOVE_EXISTING'}
3. patches[0]: {type: 'REMOVE_NODE'}
4. patches[0]: {type: 'TEXT_CONTENT', content: 'virtual DOM2'}
5. patches[0]: {type: 'SET_MARKUP', props: {className: ''}}

react



```
(nextChildren)inkey(name)prevChildrenundefinedprevChild ===  
nextChild lastIndex moveChild
```



```
if (child._mountIndex < lastIndex)lastIndexlastIndex  
lastIndex
```

AC



Vuediff

diffVue

- react

reactVuediffdomVue

Vue

```
// body <div id="v" class="classA"><div> oldVnode  
  
{  
  el: div //document.querySelector('#id.classA')  
  tagName: 'DIV', //  
  sel: 'div#v.classA' //  
  data: null, // el[prop]onclick , style  
  children: [], //vnode  
  text: null, //textContentnull  
}
```

patch

diffpatchpatchvnodeoldVnode

```

function patch (oldVnode, vnode) {
  if (sameVnode(oldVnode, vnode)) {
    patchVnode(oldVnode, vnode)
  } else {
    const oEl = oldVnode.el
    let parentEle = api.parentNode(oEl)
    createEle(vnode)
    if (parentEle !== null) {
      api.insertBefore(parentEle, vnode.el, api.nextSibling(oEl))
      api.removeChild(parentEle, oldVnode.el)
      oldVnode = null
    }
  }
  return vnode
}

```

patchifsameVnode(oldVnode, vnode)

```

function sameVnode(oldVnode, vnode){
  //keysel
  return vnode.key === oldVnode.key && vnode.sel === oldVnode.sel
}

```

div classNameVuereact diffreact

patchVnode

patchVnode(oldVnode, vnode):

```

patchVnode (oldVnode, vnode) {
  const el = vnode.el = oldVnode.el //vnode.eldomelvnode.el
  let i, oldCh = oldVnode.children, ch = vnode.children
  if (oldVnode === vnode) return //
  //
  if (oldVnode.text !== null && vnode.text !== null && oldVnode.text !==
vnode.text) {
    api.setTextContent(el, vnode.text)
  }else {
    updateEle(el, vnode, oldVnode)
    //()updateChildren
    if (oldCh && ch && oldCh !== ch) {
      updateChildren(el, oldCh, ch)
    }else if (ch){ //
      createEle(vnode) //create el's children dom
    }else if (oldCh){ //
      api.removeChilds(el)
    }
  }
}

```

updateChildren

patchVnodeupdateChildrenVue diff

```
updateChildren (parentElm, oldCh, newCh) {
  let oldStartIdx = 0, newStartIdx = 0
  let oldEndIdx = oldCh.length - 1
  let oldStartVnode = oldCh[0]
  let oldEndVnode = oldCh[oldEndIdx]
  let newEndIdx = newCh.length - 1
  let newStartVnode = newCh[0]
  let newEndVnode = newCh[newEndIdx]
  let oldKeyToIdx
  let idxInOld
  let elmToMove
  let before
  while (oldStartIdx <= oldEndIdx && newStartIdx <= newEndIdx) {
    if (oldStartVnode == null) { //vnode.keyoldVnode = null
      oldStartVnode = oldCh[++oldStartIdx]
    }else if (oldEndVnode == null) {
      oldEndVnode = oldCh[--oldEndIdx]
    }else if (newStartVnode == null) {
      newStartVnode = newCh[++newStartIdx]
    }else if (newEndVnode == null) {
      newEndVnode = newCh[--newEndIdx]
    }else if (sameVnode(oldStartVnode, newStartVnode)) {
      patchVnode(oldStartVnode, newStartVnode)
      oldStartVnode = oldCh[++oldStartIdx]
      newStartVnode = newCh[++newStartIdx]
    }else if (sameVnode(oldEndVnode, newEndVnode)) {
      patchVnode(oldEndVnode, newEndVnode)
      oldEndVnode = oldCh[--oldEndIdx]
      newEndVnode = newCh[--newEndIdx]
    }else if (sameVnode(oldStartVnode, newEndVnode)) {
      patchVnode(oldStartVnode, newEndVnode)
      api.insertBefore(parentElm, oldStartVnode.el,
api.nextSibling(oldEndVnode.el))
      oldStartVnode = oldCh[++oldStartIdx]
      newEndVnode = newCh[--newEndIdx]
    }else if (sameVnode(oldEndVnode, newStartVnode)) {
      patchVnode(oldEndVnode, newStartVnode)
      api.insertBefore(parentElm, oldEndVnode.el, oldStartVnode.el)
      oldEndVnode = oldCh[--oldEndIdx]
      newStartVnode = newCh[++newStartIdx]
    }else {
      // key
      if (oldKeyToIdx === undefined) {
        oldKeyToIdx = createKeyToOldIdx(oldCh, oldStartIdx,
oldEndIdx) // keyindex
      }
      idxInOld = oldKeyToIdx[newStartVnode.key]
      if (!idxInOld) {
        api.insertBefore(parentElm, createEle(newStartVnode).el,
oldStartVnode.el)
      }
    }
  }
}
```

```

        newStartVnode = newCh[++newStartIdx]
    }
    else {
        elmToMove = oldCh[idxInOld]
        if (elmToMove.sel !== newStartVnode.sel) {
            api.insertBefore(parentElm,
createEle(newStartVnode).el, oldStartVnode.el)
        }else {
            patchVnode(elmToMove, newStartVnode)
            oldCh[idxInOld] = null
            api.insertBefore(parentElm, elmToMove.el,
oldStartVnode.el)
        }
        newStartVnode = newCh[++newStartIdx]
    }
}
if (oldStartIdx > oldEndIdx) {
    before = newCh[newEndIdx + 1] == null ? null : newCh[newEndIdx +
1].el
    addVnodes(parentElm, before, newCh, newStartIdx, newEndIdx)
}else if (newStartIdx > newEndIdx) {
    removeVnodes(parentElm, oldCh, oldStartIdx, oldEndIdx)
}
}

```



oldChnewChStartIdxEndIdx244keykeyStartIdx>EndIdxoldCh
newCh

reactupdateChildren
reactreact

https://upload-images.jianshu.io/upload_images/8901652-7b346d474b799a59.png?imageMogr2/auto-orient/strip|imageView2/2/w/786/format/webp

Vue

vuediffreactdiff

vuereactdiffvue diffpatchvnodeoldVnode

1. vueclassnamesreact
2. vuereactreactvuevue

axios

1. Axios promise HTTP promiseAPI
- 2.

3. JSON
4. XSRF

axios

1. axios.get(url[, config]) //get
2. axios.delete(url[, config]) //
3. axios.post(url[, data[, config]]) //post
4. axios.put(url[, data[, config]]) //

axios

```
url URL  
method ,get  
baseURL url url URL baseURL axiosURL  
transformRequest 'PUT','POST'"PATCH'  
headers  


headers:{'X-Requested-With':'XMLHttpRequest'},

  
params URL(plainobject)URLSearchParams  


params:{  
  ID:12345  
},

  
auth HTTP  
  Authorization headers Authorization  


auth:{  
  username:'janedoe',  
  password:'s00pers3cret'  
},

  
'proxy'  
auth HTTP  
  Proxy-Authorization header Proxy-Authorization  


proxy:{  
  host: '127.0.0.1',  
  port:9000,  
  auth:{  
    username:'mikeymike',  
    password:'rapunz3l'  
  }  
},


```

1.1

- document
-
- document

```
//  
node.addEventListener('click',(event) =>{  
    console.log('')  
},false);  
node.addEventListener('click',(event) =>{  
    console.log('')  
},true)
```

1.2

- addEventListener useCapture false useCapture
- stopPropagation stopPropagation stopImmediatePropagation

```
node.addEventListener('click',(event) =>{  
    event.stopImmediatePropagation()  
    console.log('')  
},false);  
// node  
node.addEventListener('click',(event) => {  
    console.log('')  
},true)
```

1.3

```
<ul id="ul">  
    <li>1</li>  
    <li>2</li>  
    <li>3</li>  
    <li>4</li>  
    <li>5</li>  
</ul>  
<script>  
    let ul = document.querySelector('#ul')  
    ul.addEventListener('click', (event) => {  
        console.log(event.target);  
    })  
</script>
```

-
-

Ajax

2.1 JSONP

JSONP <script> <script>

```
<script src="http://domain/api?param1=a&param2=b&callback=jsonp"></script>
<script>
  function jsonp(data) {
    console.log(data)
  }
</script>
```

- JSONP get

2.2 CORS

- CORS
- CORS CORS CORS
- Access-Control-Allow-Origin CORS

2.3 document.domain

- a.test.com b.test.com
- document.domain = 'test.com'

2.4 postMessage

```
//  
window.parent.postMessage('message', 'http://test.com');  
  
//  
var mc = new MessageChannel();  
mc.addEventListener('message', (event) => {  
    var origin = event.origin || event.originalEvent.origin;  
    if (origin === 'http://test.com') {  
        console.log('')  
    }  
});
```

1

-
-
-

- js
-

2

-
-

3

3.1

1 try ... catch

2 window.onerror

```
window.onerror = function(msg, url, row, col, error) { ... }
```

- msg
- sourceJavascripturl
- row

```
window.onerrorDOM0DOM2    window.addEventListener("error", fn);
```

1

window.onerrorjs

```
Bb.js
```

1. b.js response header b.js response header

```
Access-Control-Allow-Origin: *
```

2. b.js <script>crossorigin

2

```
window.onerror      msg
```

3.2

```
window.onerror      object.onerror  window  window.onerror
```

- 1object.onerrorimg scriptonerror
- 2performance.getEntries

```
Console
```

```
performance.getEntries().forEach(function(item){console.log(item.name)})
```

```
performance.getEntries().forEach(item=>{console.log(item.name)})
```

```
api      forEach
```



```
Elements Network Sources Timeline Profiles Resources Audits Console
```

```
> performance.getEntries().forEach(function(item){console.log(item.name)})
```

```
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/superman/css/super_min_67699457.css VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/manocard/css/card_min_dee38e45.css VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/superman/img/logo_top_ca7a46.png VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/mantpl/css/news/init_6151c8d8.css VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=182715383,136793835&fm=173&s=e#40934678C5876544C50A80300F082&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=562198827621803098fm=173&s=e#40934678C5876544C50A80300F082&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=3585186756,421247628fm=173&s=c6658a4638f88f68567cc038200f083&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=259653062,167694221&fm=173&s=e#50799408613098FfA64C6930060f1&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=1728175140,2000684755&fm=173&s=f2783Ec669811180f0351330300C04C6e+2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=683353408,26521015338fm=173&s=d125790d627a271180d08084DA030070B3&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/60NMs1j1p01728yhnmg/it/u=65569495149191532458fm=173&s=c8020f146d842C61CD0844380300C0F2&om=2188h+1468img.JPG VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/mantpl/img/base/loading_72b1da62.gif VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/copy_right_24.png VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/neumusic/img/default_85b42b2.png VM1159:2
https://ss0.bdstatic.com/5AVibjph_Q23odCf/static/neumusic/css/neumusic_min_00488b6.css VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/superman/1s/1b/jquery-1.10.2_488366fd.js VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/superman/1s/sbase_f1d73ac3.js VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/manocard/js/config_638342b2.js VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/superman/1s/ein_super_G3b160a0.js VM1159:2
https://ss0.baidi...com/k4o2exSmIA5BphG1Ng/icom/weather/aladdin/png_18@0.png VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/manocard/img/canc_sets_fdb17359.png VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/mantpl/img/news/news_88ae6fe.png VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/mantpl/img/news/dustbin_new_41cbc37.png VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/manocard/img/topped_c53lae6.png VM1159:2
https://ss0.baidi...com/5AVibjph_Q23odCf/static/superman/img/icon-police.png?v=m4d5 VM1159:2
```

```
document.getElementsByTagName('img')img
```

```
document.getElementsByTagName('img')performance.getEntries()
```

3 Error

```
error
```

```
test1.html
```

```
1 <!DOCTYPE html>
2 <html>
3   <head>
4     <meta charset="UTF-8">
5     <title>错误监控</title>
6     <script type="text/javascript">
7       window.addEventListener('error',function(e){
8         console.log('捕获',e);
9       },true);
10    </script>
11  </head>
12  <body>
13    <!--test.js是不存在的-->
14    <script src="//123.com/test.js" charset="uft-8"></script>
15  </body>
16 </html>
17
```

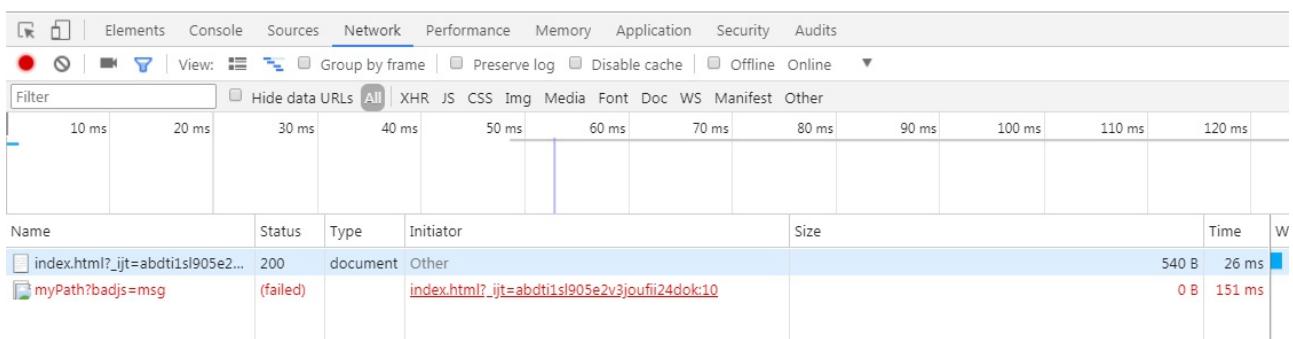
4

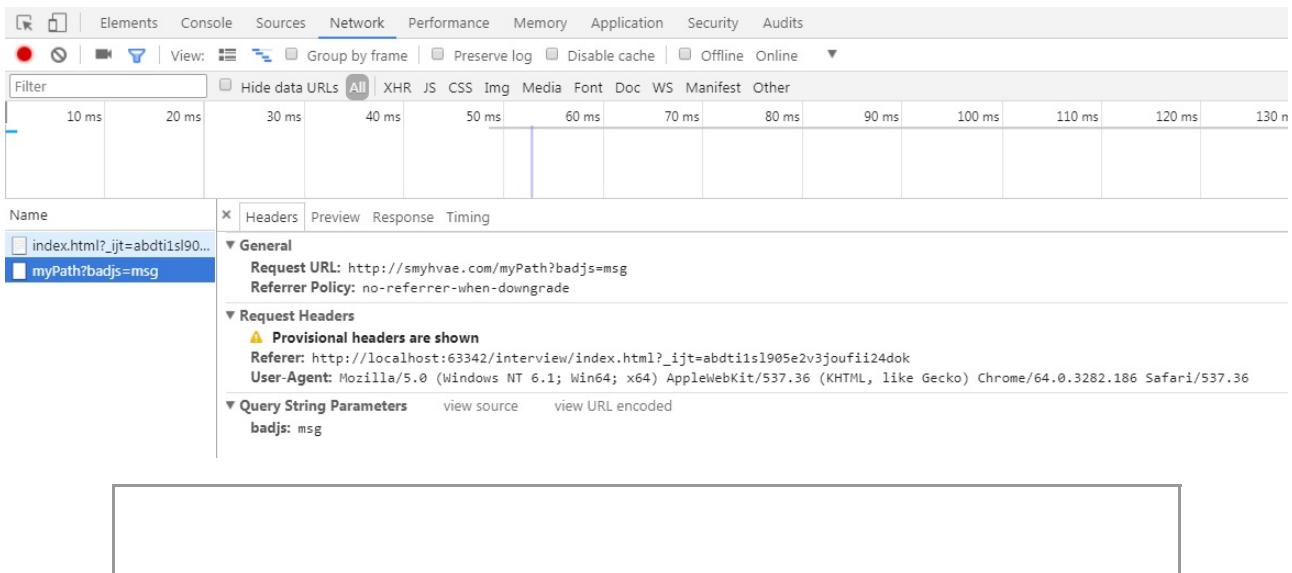
- Ajax
- Image

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Title</title>
</head>
<body>

<script>
    //Image
    (new Image()).src = 'http://smyhvae.com/myPath?badjs=msg';    // myPath

</script>
</body>
</html>
```





HTML

- HTMLh1-h6
- csshtmlclass
- -
 -
 -
 -

HTML

-
- html;
- CSS;
- HTMLSEO;
-

Doctype?

- <!DOCTYPE>HTML <html> DOCTYPE
- JS,

HTML5 <!DOCTYPE HTML>

- HTML5 SGMLDTDdoctype
- HTML4.01SGML,DTD

(void)

- a b span img input select strong
- div ul ol li dl dt dd h1 h2 h3 h4...p
- :
 <hr> <input> <link> <meta>

link@import

- linkXHTML CSS RSS,rel @importCSS CSS
- link @importCSS
- importCSS2.1 IE5 linkXHTML

- (layout engineerRendering Engine)JS
- HTMLXMLCSS
- JSjavascript
- JSJS

- Trident IE,MaxThon,TT,The World,360,[MSHTML]
- Gecko Netscape6 FF,MozillaSuite/SeaMonkey
- Presto Opera7 [OperaPresto Blink;]
- Webkit Safari,Chrome [ChromeBlinkWebKit]

html5HTML5 HTML HTML5

- HTML5 SGML
 - canvas
 - video audio
 - localStorage
 - sessionStorage
 - article footer header nav section
 - calendar date time email url search
 - web worker, websocket, Geolocation
- - base font big center font, s strikettu
 - frame frameset noframes
- HTML5
 - IE8/IE7/IE6 document.createElement
 - HTML5
 -
- html5shim

```
<!--[if lt IE 9]>
<script> src="http://html5shim.googlecode.com
/svn/trunk/html5.js"</script><![endif]-->
```

- HTML5 DOCTYPE\\

HTML5

-

- HTML5.appcache()cookie
- - manifest
 - cache.manifest
 - window.applicationCache

CACHE MANIFEST

```
#v0.11
CACHE:
js/app.js
css/style.css
NETWORK:
resource/logo.png
FALLBACK:
/ /offline.html
```

HTML5

- htmlmanifestmanifestappmanifestappmanifestmanifest
-

cookiessessionStorage localStorage

- cookieClient Side
- cookiehttp
- sessionStoragelocalStorage
- - cookie4k
 - sessionStoragelocalStoragecookie5M
- - localStorage
 - sessionStorage
 - cookie cookie

iframe

- iframeOnload
- SEO
- iframe
- iframe iframejavascriptiframesrc

Label

- label,

HTML5form

- form input autocomplete=off

? ()

- WebSocketSharedWorker
- localstorgecookies

webSocket()

- Adobe Flash Socket
- ActiveX HTMLFile (IE)
- multipart XHR
- XHR

Page Visibility API

- visibilityState ;

-

- map+areasvg
- border-radius
- js

border 1px

```
<div style="height:1px;overflow:hidden;background:red"></div>
```

-
-

titleh1bstrongiem

- titleH1
- strong
- iem

link @import

- link HTMLCSS RSS@import CSS
- link @import CSS
- @import IE5 link HTML

- (layout engineer Rendering Engine) JS
-
- JSJS
- JSJS

- Blink Chrome Opera
- WebkitSafariChrome
- GeckoFireFoxNetscape6
- TridentMSHTMLIE

- PrestoOpera7

HTML5

- document.querySelectordocument.querySelectorAll
- (Drag and drop) API
- video audio
- localStorage sessionStorage
- manifest
- Notifications
- articlefooterheadernavsection
- calendardatetimeemailurlsearch
- Geolocation
- webworker
- websocket
- history
- (CORS) Access-Control-Allow-Origin
- visibilitychange
- PostMessage
- Form Data
- canvas

HTML5

- basefontbigcenterfontsstriketu
- frameframesetnoframes

HTML5

- document.createElement
- html5shim.js

HTML HTML5

- DOCTYPE

HTML5

- HTML5
 -
- HTML5
 - html manifest manifest="/offline.appcache"
 - manifest manifest xxx.appcache
 - web MIME-type text/cache-manifest

HTML5

- html manifest manifest
- app manifest
- app manifest manifest
-

iframe

- -
 -
 -
- - iframe onload
 -
 -

label

- label
 - labellabel
- 1
 - <label for="mobile">Number:</label>
 - <input type="text" id="mobile"/>
- 2
 - <label>Date:<input type="text"/></label>

- iframe + contentWindow
- postMessage
- SharedWorker(Web Worker API)
- storage (localStorage API)
- WebSocket

webSocket

- Adobe Flash Socket
- ActiveX HTMLFile (IE)
- multipart XHR
- XHR

Page Visibility API

-
-
-

title h1 b strong i em

- title h1
- strong
- iem
- i em

- b, i, u, s, pre
- strong, em, ins, del, code
- ,

CSS

display: none; visibility: hidden;

-
-
- display:none; visibility: hidden;
- display: none; visibility:hidden; hiddenvisibility: visible;
- display visibility
- display: none; visibility: hidden

css hackhack

- CSS
- hack
 - hack
 - hack
 - IE

link @import

- link HTML @import CSS
- link @import FOUC
- link rel="alternate stylesheet"
- link@import @import
- @import css
- link@import

CSS

- - font
 - word-break
 - letter-spacing
 - text-align
 - text-rendering
 - word-spacing
 - white-space
 - text-indent
 - text-transform
 - text-shadow
 - line-height
 - color
 - visibility
 - cursor

display, float, position

- display none position float
- position absolute fixed float none display
- float none display
- display display

Specified value	Computed value
inline-table	table
inline, table-row-group, table-column, table-column-group, table-header-group, table-footer-group, table-row, table-cell, table-caption, inline-block	block
others	same as specified

(collapsing margins)

- margin margin
 - margin
 - inline-block margin margin
 - margin
 - margin-bottom margin-top

CSSIE

- IE W3C
- (content)(padding)(margin) (border)
- !E content border padding;

CSS

- id # myid
- .myclassname
- div, h1, p
- h1 + p
- ul > li
- li a
- *
- a[rel = "external"]
- a:hover, li:nth-child
- font-size font-family color, UL LI DL DD DT

- border padding margin width height

CSS

-
-
- : !important > id > class > tag important

CSS3

```
p:first-of-type <           p> <     p>
p:last-of-type  <           p> <     p>
p:only-of-type  <           p> <     p>
p:only-child    <           p>
p:nth-child(2)   <           p>

:after
:before
:enabled
:disabled
:checked
```

divdiv

- div margin:0 auto

```
div{
  width:200px;
  margin:0 auto;
}
```

-

```
// 500 300
// 

.div {
  width:500px ; height:300px;//
  margin: -150px 0 0 -250px;
  position:relative;          //
  background-color:pink;      //
  left:50%;
  top:50%;
}
```

- div

```
position: absolute;
width: 1200px;
background: none;
margin: 0 auto;
top: 0;
left: 0;
bottom: 0;
right: 0;
```

display

- block
- none
- inline-block
- list-item
- table
- inherit display

positionrelativeabsolute

- absolute
 - static
- fixed IE
 -
- relative
 -
- static
 - top, bottom, left, right - z-index
- inherit
 - position

CSS3

- CSS : not(.input) class "input"
- border-radius:8px
- multi-column layout
- Shadow\Reflect
- text-shadow
- Text-decoration
- gradient
- transform
- ...
- transform:\scale(0.85,0.90)\ translate(0px,-30px)\ skew(-9deg,0deg)\Animation:

CSS

```
//          transparent
#demo {
  width: 0;
  height: 0;
  border-width: 20px;
  border-style: solid;
  border-color: transparent transparent red transparent;
}
```

?

-

- div100%
- div50%
- floatinline

hack

- png24iE6PNG8.
- marginpadding*{margin:0;padding:0;}
- IE,,getAttribute();
- Firefox,getAttribute()
 - :getAttribute()
- IE,evenx,y,pageX,pageY
- Firefox,eventpageX,pageY,x,y

lili

- \,0

CSS

- CSS

BFC(block formatting context)

- Box , display , Box
- Box, Formatting Context,Box,BFC

css

```
// 1class10id100///

/*1*/
div{
}
/*10*/
.class1{
}
/*100*/
#id1{
}
/*100+1=101*/
#id1 div{
}
/*10+1=11*/
.class1 div{
}
/*10+10+1=21*/
.class1 .class2 div{
}

//
```

display:inline-block ()

- margin font-size: 0 letter-spacing word-spacing
-
-

CSSIE

- (content)(padding) (border)(margin)
- IE8 DOCTYPE(IE)
- (W3C) = width + padding + border + margin
- (IE) = width + margin
- css3 box-sizing: border-box ""

box-sizing

- box-sizing: content-box; // (W3C)
- box-sizing: border-box; // (IE)
- box-sizing: inherit; // box-sizing

CSS

- id #id
- .class
- div, h1, p
- h1 + p
- ul > li
- li a
- *

- a[rel='external']
- a:hover, li:nth-child

CSS

- font-sizefont-familycolorlist-stylecursor
- widthheightborderpaddingmarginbackground

CSS

- > >
-
- : [1000] > id[100] > class[10] > Tag[1]
- !important

CSS3

- :root html
- :empty
- :target
- :not(selector) selector
- :enabled
- :disabled
- :checked
- :after
- :before
- :nth-child(n) n
- :nth-last-child(n) n
- :nth-child(odd)
- :nth-child(even)
- :nth-child(3n+1)
- :first-child
- :last-child
- :only-child
- :nth-of-type(n) n
- :nth-last-of-type(n) n
- :nth-of-type(odd)
- :nth-of-type(even)

- :nth-of-type(3n+1)
- :first-of-type
- :last-of-type
- :only-of-type
- ::selection
- :first-line
- :first-letter

- visibility: hidden;
- opacity: 0; CSS30
- position: absolute; left
- display: none;
- transform: scale(0);
- <div hidden="hidden"> HTML5, display:none;
- height: 0; 0
- filter: blur(0); CSS30“”

rgba() opacity

- opacity
- rgba()

css content

- content before/after

CSS3

- p:nth-child(n){color: rgba(255, 0, 0, 0.75)}
- display: flex;
- column-count: 5;
- @media (max-width: 480px) {.box: {column-count: 1;}}
- @font-face{font-family: BorderWeb; src:url(BORDERW0.eot);}
- color: rgba(255, 0, 0, 0.75);
- border-radius: 5px;
- background: linear-gradient(red, green, blue);
- box-shadow: 3px 3px 3px rgba(0, 64, 128, 0.3);
- box-reflect: below 2px;
- text-stroke-color: red;
- text-overflow: ellipsis;
- background-size: 100px 100px;
- border-image: url(bt_blue.png) 0 10;
- - transform: rotate(20deg);
 - transform: skew(150deg, -10deg);
 - transform: translate(20px, 20px);
 - transform: scale(.5);

- transition: all .3s ease-in .1s;
- @keyframes anim-1 {50% {border-radius: 50%;}} animation: anim-1 1s;

CSS3 Flexbox

- Flexbox

JS

- getComputedStyle(el, null) VS el.currentStyle
- e VS window.event
- e.pageX, e.pageY VS window.event.x, window.event.y
- e.which VS event.keyCode
- el.textContent VS el.innerText

lli

- li(/)
- ul font-size=0, li
- margin-collapse
-
- -
 -
 -
- Y
- ie6-7
- css3 flexbox .container{display: flex; align-items: stretch;}

css

- , line-height height

```
.vertical {
  height: 100px;
  line-height: 100px;
}
```

-

```
.container {  
    position: relative;  
}  
.vertical {  
    height: 300px; /***/  
    position: absolute;  
    top: 50%; /*50%*/  
    margin-top: -150px; /***/  
}
```

- IE6/7 overflow:hidden

```
.container {  
    display: table;  
}  
.content {  
    display: table-cell;  
    vertical-align: middle;  
}
```

- inline-block vertical-align
 - IE6/7

```
.container {  
    height: 100%; /***/  
}  
.extra .vertical{  
    display: inline-block; /***/  
    vertical-align: middle; /***/  
}  
.extra {  
    height: 100%; /*100%*/  
}
```

- CSS3

```
.vertical {  
    position: absolute;  
    top: 50%; /*50%*/  
    transform: translateY(-50%, -50%);  
}
```

- CSS3

```
.container {  
    display: flex;  
    justify-content: center; /***/  
    align-items: center; /***/  
}
```

•

◦
◦

```
.container {  
    padding-left: 150px;  
    padding-right: 190px;  
}  
.main {  
    float: left;  
    width: 100%;  
}  
.left {  
    float: left;  
    width: 190px;  
    margin-left: -100%;  
    position: relative;  
    left: -150px;  
}  
.right {  
    float: left;  
    width: 190px;  
    margin-left: -190px;  
    position: relative;  
    right: -190px;  
}
```

•
•

```

.container {
    /*padding-left:150px;*/
    /*padding-right:190px;*/
}
.main-wrap {
    width: 100%;
    float: left;
}
.main {
    margin-left: 150px;
    margin-right: 190px;
}
.left {
    float: left;
    width: 150px;
    margin-left: -100%;
    /*position: relative;*/
    /*left:-150px;*/
}
.right {
    float: left;
    width: 190px;
    margin-left: -190px;
    /*position: relative;*/
    /*right:-190px;*/
}

```

CSS pxem

- px
- em em = / font-size

CSS

-
- CSS
- reset.css Normalize.css CSS

- IE
- - ""
 -
-
-
- <div style="clear:both"></div>

- br clear <br clear="all" />
- overflowhidden; IE6 hasLayoutzoom1;
-
- :after IE6-7 :after zoom:1 hasLayout

after

```
.clearfix:after{
  content: "\200B";
  display: table;
  height: 0;
  clear: both;
}
.clearfix{
  *zoom: 1;
}
```

FOUC(Flash of Unstyled Content) FOUC

- @import CSS IE ""FOUC
- html
- link head

CSS

- CSS CSS
- Web CSS
- CSS CSS
- CSS SassSCSS LESS

CSS

- cssHTTP
- css
- css
- CSS
-
- CSS
-
- 0
- 10
- CSS

CSS

- CSS
- """
 - web
 -
 - 12 14

marginpadding

- border margin
- border padding

- CSS2CSS CSS

- CSSCSS
 - CSSCSS

-

CSS

-
- CSSoverflow:hidden; transform:translate(100%, 100%); display:none;

IE

-
- CSS3
- IEJSresize

```
$(window).resize(function () {
    screenRespond();
});
screenRespond();
function screenRespond(){
var screenWidth = $(window).width();
if(screenWidth <= 1800){
    $("body").attr("class", "w1800");
}
if(screenWidth <= 1400){
    $("body").attr("class", "w1400");
}
if(screenWidth > 1800){
    $("body").attr("class", "");
}
```

-
-
- - “” “”
 - “” “”
 - mousewheel “”

a

link > visited > hover > active

- L-V-H-A love hate

- --
- ""

```
p::before {content: " " ;}
p::after {content: "Hot!" ;}
p::first-line {background: red ;}
p::first-letter {font-size: 30px ;}
```

- --

```
a:hover {color: #FF00FF}
p:first-child {color: red}
```

::before :after

- CSS : :hover, :active
- CSS1 : :before :after
- CSS3 :: ::before ::after
- IE :after
- ::before CSS3 :after CSS1 IE

Chrome

- Chrome input input:-webkit-autofill
- form autocomplete="off"
- input:-webkit-autofill { background-color: transparent; }

input [type=search]

```
input[type="search"]::-webkit-search-cancel-button{
    -webkit-appearance: none;
    height: 15px;
    width: 15px;
    border-radius: 8px;
    background: url("images/searchicon.png") no-repeat 0 0;
    background-size: 15px 15px;
}
```

```
<a href="logo.jpg" download></a>
<a href="logo.jpg" download="LOGO" ></a>
```

iOS safari ""

```
$(document).ready(function(){
    var stopScrolling = function(event) {
        event.preventDefault();
    }
    document.addEventListener('touchstart', stopScrolling, false);
    document.addEventListener('touchmove', stopScrolling, false);
});
```

line-height

- line-height
- height line-height
- line-height
- line-height height
- line-height height height haslayout line-height

line-height

- px em font-size
- $1.5 \text{ em} * 18 = 27\text{px}$
-

display

- display block

Chrome12px

```
.shrink{
    -webkit-transform:scale(0.8);
    -o-transform:scale(1);
    display:inline-block;
}
```

CSSIOS

```
-webkit-font-smoothing: antialiased;
```

font-style oblique

- font-style: oblique; italic
- $16.7\text{ms} / 60\text{Hz} = 1\text{s} / 60 * 1000 = 16.7\text{ms}$

display:inline-block

- inline-block
- inline-block inline-block
- vertical-align:top;
- font-size0;
- li

overflow: scroll

- jquery animate

divdiv100px

- 1
.sub { height: calc(100%-100px); }
- 2
.container { position: relative; }
.sub { position: absolute; top: 100px; bottom: 0; }
- 3
.container { display: flex; flex-direction: column; }
.sub { flex: 1; }

JavaScript

JavaScript

- JavaScript
 - ECMAScript
 - JavaScript
 - DOM
 - HTML
 - XML
 - BOM

JS

- undefined
- null
- boolean
- number
- string
- symbol
- object
- array
- function
- navigator.userAgent // UA.toLowerCase().indexOf('chrome')
- window // 'ActiveXObject' in window

JS

- Object
- Array
- Boolean
- Number
- String
- Function
- Arguments
- Math
- Date
- RegExp
- Error
- ES6Symbol
- Map
- Set
- Promises
- Proxy
- Reflect

JavaScript

- ""
- {}
- ;
- ,
- .
- JSON
- {}[]

JavaScript

- "use strict";
- js
- js
- js

-
-
- window window
-
- DOM
- eval() Function()
- setTimeout() setInterval()
-
- (repaint)(reflow)

DOM

-
- HTML DOM(DOM) css/image/js
- CSS CSSOM(CSS)
- CSSOM DOM Render Tree()
- (Layout)
- (Painting)
- DOM
 - DOMHTMLhead
 - headcss
-
- /
- JSLayoutoffsetLeftscrollTopgetComputedStyle
-

(repaint)(reflow)

- (display:"none")
- DOMDocumentFragmentdocument
- Layoutvar left = elem.offsetLeft; left
- tabletabletable
- css(expression)
- css border border-width, border-style, border-color
- elem.className elem.style.cssText elem.style.xxx

script

- HTML DOM js DOM script script
- HTML script HTML
- script DomContentLoaded

JavaScript

- JavaScript
 - JavaCforif{}
 - JavaScript function(){}
- JavaScript

- JavaScript
-
-
-

JavaScript

- - JavaScript [__proto__]
 - JavaScript [__proto__] prototype
 - prototype [__proto__]
- - / [__proto__] prototype
 - prototype [__proto__] prototype / undefined ""
- - JavaScript

JavaScript

- UndefinedNullBooleanNumberString--
- --
-
- (stack)
- (heap)
-
-

JavaScript

- this + prototype -- new
 - this prototype

```
function Mobile(name, price){
  this.name = name;
  this.price = price;
}
Mobile.prototype.sell = function(){
  alert(this.name + " {{content}}quot; + this.price);
}
var iPhone7 = new Mobile("iPhone7", 1000);
iPhone7.sell();
```

- Object.create -- Object.create()
-

```

var Person = {
    firstname: "Mark",
    lastname: "Yun",
    age: 25,
    introduce: function(){
        alert('I am ' + Person.firstname + ' ' + Person.lastname);
    }
};

var person = Object.create(Person);
person.introduce();

// Object.create IE9+
if (!Object.create) {
    Object.create = function (o) {
        function F() {}
        F.prototype = o;
        return new F();
    };
}

```

- this prototype -- createNew()

- ""

```

var Cat = {
    age: 3, // -- createNew()
    createNew: function () {
        var cat = {};
        // var cat = Animal.createNew(); // Animal
        cat.name = "";
        var sound = ""; // -- createNew()
        cat.makeSound = function () {
            alert(sound); //
        };
        cat.changeAge = function(num){
            Cat.age = num; //
        };
        return cat; //
    }
};

var cat = Cat.createNew();
cat.makeSound();

```

- ES6 class -- new

```

class Point {
    constructor(x, y) {
        this.x = x;
        this.y = y;
    }
    toString() {
        return '(' + this.x + ', ' + this.y + ')';
    }
}

var point = new Point(2, 3);

```

Javascript

- call apply

```

function Cat(name,color){
    Animal.apply( this, arguments);
    this.name = name;
    this.color = color;
}

```

- prototype

```

Cat.prototype = new Animal();
Cat.prototype.constructor = Cat;

```

-

```

function extend(Child, Parent) {
    var p = Parent.prototype;
    var c = Child.prototype;
    for (var i in p) {
        c[i] = p[i];
    }
    c.uber = p;
}

```

- prototype prototype

```

function extend(Child, Parent) {
    var F = function(){};
    F.prototype = Parent.prototype;
    Child.prototype = new F();
    Child.prototype.constructor = Child;
    Child.uber = Parent.prototype;
}

```

- ES6 extends

```
class ColorPoint extends Point {}
```

```

class ColorPoint extends Point {
    constructor(x, y, color) {
        super(x, y); // constructor(x, y)
        this.color = color;
    }
    toString() {
        return this.color + ' ' + super.toString(); // toString()
    }
}

```

Javascript?

-
-

this

- this
- new this new
- this
- IE attachEvent thisWindow

eval

evalJS

- evaljs
- JSONJSON eval('('+ str +')');

Window ? Document ?

- Window JavaScript
- Window
- Window
- Document HTML ,
- Document HTML
- Document Window window.document

DOM

- DOMDocument Object ModelHTMLXML
- DOM0WebAPIdocument.forms['login']
- DOM1W3CDOMJavaScriptDocument
- DOM2DOMCSSgetComputedStyle(elem, pseudo)
- DOM3XPathLoad and SaveXPathEvaluator

DOM0DOM2DOM3

- DOM0
 - btn.onclick = func;
 - btn.onclick = null;
- DOM2
 - btn.addEventListener('click', func, false);

- btn.removeEventListener('click', func, false);
- btn.attachEvent("onclick", func);
- btn.detachEvent("onclick", func);

- DOM3

- eventUtil.addEventListener(input, "textInput", func);
- eventUtil textInput DOM3

-

">>>"

- W3C
- DOM2-addEventListener

- 1
- 2""

-

- W3C->->
-
- ->1->2->->->
- "

DOM

- DOM
- DOM/
- DOM

/

-

-

-

-

-

-

```
ulEl.addEventListener('click', function(e){
    var target = event.target || event.srcElement;
    if(!target && target.nodeName.toUpperCase() === "LI"){
        console.log(target.innerHTML);
    }
}, false);
```

IE

- IE

IEW3C

- - W3C: targetEl.addEventListener('click', handler, false);
 - IE: targetEl.attachEvent('onclick', handler);
- - W3C: targetEl.removeEventListener('click', handler, false);
 - IE: targetEl.detachEvent(event, handler);
- - W3C: var e = arguments.callee.caller.arguments[0]
 - IE: window.event
- - W3C: e.target
 - IE: window.event.srcElement
- - W3C: e.preventDefault()
 - IE: window.event.returnValue = false
- - W3C: e.stopPropagation()
 - IE: window.event.cancelBubble = true

W3C target currentTarget

- target
- currentTarget
-
- currentTarget ()

(dispatchEvent)

- W3C: dispatchEvent
- IE: fireEvent

```
var fireEvent = function(element, event){  
    if (document.createEventObject){  
        var mockEvent = document.createEventObject();  
        return element.fireEvent('on' + event, mockEvent)  
    }else{  
        var mockEvent = document.createEvent('HTMLEvents');  
        mockEvent.initEvent(event, true, true);  
        return !element.dispatchEvent(mockEvent);  
    }  
}
```

- (throttle)
- onresize, onscroll
- - setTimout
 - clearTimeout
 - setTimeout
-

```
function throttle(method, context) {
  clearTimeout(methor.tId);
  method.tId = setTimeout(function(){
    method.call(context);
  } 100); // 100ms
}
//
window.onresize = function(){
  throttle(myFunc, window);
}
```

- (clientX)(clientY)
- (pageX)(pageY)
- (screenX)(screenY)

DOM

- elem.offsetLeft
- elem.offsetTop
- elem.getBoundingClientRect()DOMRect

['1', '2', '3'].map(parseInt)

- :[1, NaN, NaN]
- parseInt(string, radix) 2 radix radix = 0
- map parseInt 3(elem, index, array) index
- map ["1", "2", "3"] parseInt

```
parseInt('1', 0); // 1
parseInt('2', 1); // NaN
parseInt('3', 2); // NaN
```

- parseInt radix NaN

new

- this
- this
- this this

JavaScript

- API

```
[].forEach.call($(".*"), function(el){  
    el.style.outline = "1px solid #" + (~Math.random()*(  
1<<24)).toString(16);  
})
```

- 1(outline)
 - 1. \$(sel) // \$ document.querySelectorAll(sel)
 - 2. [].forEach.call(NodeLists) // call forEach
 - 3. el.style.outline = "1px solid #333" // outline
 - 4. (1<<24) // parseInt("fffff", 16) == 16777215 == 2^24 - 1 // 1<<24 == 2^24 == 16777216
 - 5. Math.random()*(1<<24) // 0 16777216
 - 6. ~~Math.random()*(1<<24) // ~~ parseInt
 - 7. (~Math.random()*(1<<24))).toString(16) // -

** JavaScript**

-
-
- /
- Promises
- Async[ES7]

web

- cookie
- session
- url
- input
- ip

js

- UndefinedNullBooleanNumberString

js

- Object JavaScript
- ObjectArrayBooleanNumber String
- FunctionArgumentsMathDateRegExpError

JavaScript

-

- ===/!==true/false
- new Array
-
- Switchdefault
-
- If
- for-in var

JavaScript ?

- prototype()
- prototypeprototypeprototype
- instance.constructor.prototype = instance.__proto__
- - JavaScript
- Javascript
- Prototype Object

JavaScript

- UndefinedNullBooleanNumberString
-
-
- (stack)
- (heap),,
-



Javascript

-
-
-
-
-
- prototypeapplycall

```

function Parent(){
    this.name = 'wang';
}

function Child(){
    this.age = 28;
}
Child.prototype = new Parent();//Parent

var demo = new Child();
alert(demo.age);
alert(demo.name);//
}

```

javascript

javascript,JSON

-

```
person={firstname:"Mark",lastname:"Yun",age:25,eyecolor:"black"};
```

- function

```

function Person(){}
    var person=new Person();//      function      new"" ,      function      Class
        person.name="Mark";
        person.age="25";
        person.work=function(){
            alert(person.name+" hello...");}
    }
person.work();

```

- functionthis

```

function Pet(name,age,hobby){
    this.name=name;//this
    this.age=age;
    this.hobby=hobby;
    this.eat=function(){
        alert(" "+this.name+", "+this.hobby+"," );
    }
var maidou =new Pet("",25,"coding");//
maidou.eat();//eat

```

-

```

var wcDog =new Object();
wcDog.name="";
wcDog.age=3;
wcDog.work=function(){
    alert(""+wcDog.name+",.....");
}
wcDog.work();

```

-

```

function Dog(){
}

Dog.prototype.name="";
Dog.prototype.eat=function(){
    alert(this.name+"");
}
var wangcai =new Dog();
wangcai.eat();

```

-

```

function Car(name,price){
    this.name=name;
    this.price=price;
}
Car.prototype.sell=function(){
    alert(" "+this.name+" "+this.price+" ");
}
var camry =new Car(" ",27);
camry.sell();

```

Javascript?

-
-
-

This

- this
- newthisnew
- thisIEattachEventthisWindow

eval

- JS
- eval2js
- JSONJSONevalvar obj =eval('('+ str +')')

nullundefined

- undefined

- undefined :"""" undefined
- undefined
- null ""
- null :(,)
-
- null==== == null undefined

```
// event()github.com/markyun
markyun.Event = {
    //
    readyEvent : function(fn) {
        if (fn==null) {
            fn=document;
        }
        var oldonload = window.onload;
        if (typeof window.onload != 'function') {
            window.onload = fn;
        } else {
            window.onload = function() {
                oldonload();
                fn();
            };
        }
    },
    // dom0|dom2|IE
    // , ,
    addEvent : function(element, type, handler) {
        if (element.addEventListener) {
            //
            element.addEventListener(type, handler, false);
        } else if (element.attachEvent) {
            element.attachEvent('on' + type, function() {
                handler.call(element);
            });
        } else {
            element['on' + type] = handler;
        }
    },
    //
    removeEvent : function(element, type, handler) {
        if (element.removeEventListener) {
            element.removeEventListener(type, handler, false);
        } else if (element.detachEvent) {
            element.detachEvent('on' + type, handler);
        } else {
            element['on' + type] = null;
        }
    }
}
```

```

        }
    },
    // (IE)
    stopPropagation : function(ev) {
        if (ev.stopPropagation) {
            ev.stopPropagation();
        } else {
            ev.cancelBubble = true;
        }
    },
    //
    preventDefault : function(event) {
        if (event.preventDefault) {
            event.preventDefault();
        } else {
            event.returnValue = false;
        }
    },
    //
    getTarget : function(event) {
        return event.target || event.srcElement;
    },
    // event.event
    getEvent : function(e) {
        var ev = e || window.event;
        if (!ev) {
            var c = this.getEvent.caller;
            while (c) {
                ev = c.arguments[0];
                if (ev && Event == ev.constructor) {
                    break;
                }
                c = c.caller;
            }
        }
        return ev;
    }
};

```

["1", "2", "3"].map(parseInt)

- [1, NaN, NaN] parseInt (val, radix) radix
- map 3 (element, index, array) radix

IE

- JavaScript
- IEFirefox
- ev.stopPropagation();ie ev.cancelBubble = true;

closure

- ,

- -
 -
 -

javascript "use strict"; ?

- use strictECMA 5 , Javascript .JS, Javascript

```
// instanceof
if(a instanceof Person){
  alert('yes');
}
```

new?

- this
- this
- this this

```
var obj = {};
obj.__proto__ = Base.prototype;
Base.call(obj);
```

js

- deferasyncDOMjs

Ajax ? Ajax

ajaxAsynchronous Javascript And XML

- +js+xml
-
- XMLHttpRequest,
- HTTP,HTTPURL
- HTTP
- HTTP
-
- JavaScriptDOM

?

- ..
-

JS

- deferIE
- async
- scriptDOMcallBack

document.write innerHTML

- document.write
- innerHTML

DOM---?

- 1
 - createDocumentFragment() //DOM
 - createElement() //
 - createTextNode() //
- 2
 - appendChild()
 - removeChild()
 - replaceChild()
 - insertBefore() //
- 3
 - getElementsByTagName() //
 - getElementsByName() // Name(IEidname)
 - getElementById() //Id

-
- 0
- setTimeout
-

•

•

Javascript

- mark and sweep

- JavaScript“”“”
 -

(reference counting)

IE 110 0

js

- -
- - +
- -

deferasync

- deferjsscriptasyncjsscript

- - new
 - ,
 -

```
function createObject(name,age,profession){//var obj = new Object();
    obj.name = name;
    obj.age = age;
    obj.profession = profession;
    obj.move = function () {
        return this.name + ' at ' + this.age + ' engaged in ' +
this.profession;
    };
    return obj;
}
var test1 = createObject('trigkit4',22,'programmer');//var test2 =
createObject('mike',25,'engineer');//
```

- -
 - (new Object());
 - this ;
 - renturn
-
- js

- - 1.
 - 2.
 - 3.

JavaScript

- :JavascriptNetscape Navigator2.0
-
- IframeJavascriptinput
- - JS merge

cloneJavaScrip5NumberStringObjectArrayBoolean

```
Object.prototype.clone = function(){
    var o = this.constructor === Array ? [] : {};
    for(var e in this){
        o[e] = typeof this[e] === "object" ? this[e].clone() :
this[e];
    }
    return o;
}
```

-
-
-
- with
-
- 0
-
- delete propdelete global[prop]
- eval

- evalarguments
- arguments
- arguments.callee
- arguments.caller
- this
- fn.callerfn.arguments
- protectedstaticinterface

cookie

-

```
var date = new Date();

date.setDate(date.getDate() - 1); //
```

setDate()

- expires

```
document.cookie = 'user=' + encodeURIComponent('name') + ';expires = ' + new
Date(0)
```

-

```
function GetBytes(str){

    var len = str.length;

    var bytes = len;

    for(var i=0; i<len; i++){

        if (str.charCodeAt(i) > 255) bytes++;

    }

    return bytes;

}

alert(GetBytes(",as" ));
```

- Event Delegation JavaScript “DOM

attributeproperty

- attributedomhtml
- propertydomjs
- htmlattributeproperty
-

- charset
- <meta> charset

<script></body>

- HTML </body><script>
- HTML </body>
- <script></body><script> body </body></html>HTML

JS

- <script> defer="defer"
- script DOMdocument.createElement('script');
- XMLHttpRequest
- LazyLoad

JS

- <script> async="async"
- script DOMdocument.createElement('script');
- XMLHttpRequest
- LABjs
- Sea.js

JavaScript

- Foo.foo(arg1, arg2);
- foo(arg1, arg2);
- (new Foo())(arg1, arg2);
- call/applay Foo.foo.call(that, arg1, arg2);
- bind Foo.foo.bind(that)(arg1, arg2)();

Function.bind

```

if (!Function.prototype.bind) {
  Function.prototype.bind = function(that) {
    var func = this, args = arguments;
    return function() {
      return func.apply(that, Array.prototype.slice.call(args, 1));
    }
  }
}
// bind
func.bind(that, arg1, arg2)();

//
func.bind(that)(arg1, arg2);

```

** JavaScript**

- - arr.concat(arr1, arr2, arrn);
 - arr.join(",");
 - arr.sort(func);
 - arr.pop();
 - arr.push(e1, e2, en);
 - arr.shift();
 - unshift(e1, e2, en);
 - arr.reverse();
 - arr.slice(start, end);
 - arr.splice(index, count, e1, e2, en);
 - arr.indexOf(el);
 - arr.includes(el); // ES6
- - object.hasOwnProperty(prop);
 - object.propertyIsEnumerable(prop);
 - object.valueOf();
 - object.toString();
 - object.toLocaleString();
 - Class.prototype.isPrototypeOf(object);

Array.slice() Array.splice()

- slice -- ""
 - arr.slice(start, end)
 - start
 - end
- splice
 - ""
 - arr.splice(index, count, [insert Elements])
 - index
 - count = 0 count > 0

- [insert Elements]

JavaScript

- JavaScript
-
- 0

- JavaScript
- var
- (Closures)
- ()
- (console.log)
- DOM(IE)

JQuery

jQueryzepto

- jquerywindowwindowjquerywindowwindowundefinedundefined

```
(function( window, undefined ) {

    //
    //var
    //
    //
    //

    window.jQuery = window.$ = jQuery;

})( window );
```

- jqueryjquery.prototypejquery.fn
- jQuery
- jquery

jQuery

- (function(window, undefined) {})(window);
- jQuery JS
- window.jQuery = window.\$ = jQuery;
- jQuery \$ window jQuery \$

jQuery.fn init this this

- jQuery.fn init this jQuery
- jQuery() \$() jQuery init

jQuery.extend jQuery.fn.extend

- \$.fn.extend() \$.extend() jQuery
- \$.extend(object); //jQuery""

```
$.extend({
  min: function(a, b) { return a < b ? a : b; },
  max: function(a, b) { return a > b ? a : b; }
});
$.min(2,3); // 2
$.max(4,5); // 5
```

- \$.extend([true,] targetObject, object1[, object2]); // targt

```
var settings = {validate:false, limit:5};
var options = {validate:true, name:"bar"};
$.extend(settings, options); // false
// settings == {validate:true, limit:5, name:"bar"}
```

- \$.fn.extend(json); //jQuery""

```
$.fn.extend({
  alertValue: function() {
    $(this).click(function(){
      alert($(this).val());
    });
  }
});

$("#email").alertValue();
```

jQuery (extend)

- var newObject = \$.extend({}, oldObject);
- var newObject = \$.extend(true, {}, oldObject);

jQuery

- jQuery queue()/dequeue()/clearQueue()
- animate() ajax

```

var func1 = function(){alert('1')};
var func2 = function(){alert('2')};
var func3 = function(){alert('3')};
var func4 = function(){alert('4')};

// 
$('#box').queue("queue1", func1); // push func1 to queue1
$('#box').queue("queue1", func2); // push func2 to queue1

// 
$('#box').queue("queue1", []); // delete queue1 with empty array
$('#box').queue("queue1", [func3, func4]); // replace queue1

// 
$('#box').queue("queue1"); // [func3(), func4()]

// 
$('#box').dequeue("queue1"); // return func3 and do func3
$('#box').dequeue("queue1"); // return func4 and do func4

// 
$('#box').clearQueue("queue1"); // delete queue1 with clearQueue

```

jQuery bind(), live(), delegate(), on()

- bind
- live document
- delegate live
- on 1.9

jQuery fire

- “/”“”“”
- JS

```

document.createEvent(type); //
event.initEvent(eventType, canBubble, prevent); //
target.addEventListener('dataavailable', handler, false); //
target.dispatchEvent(e); //

```

- jQuery fire jQuery

jQuery Sizzle

- Sizzle Right To Left
- jQuery \$(selecter).find(selecter); Sizzle

jQuery JSON

```
// JSON.stringify/JSON.parse  jQuery
$.array2json = function(array) {
    return JSON.stringify(array);
}

$.json2array = function(array) {
    // $.parseJSON(array); // 3.0
    return JSON.parse(array);
}

//  

var json = $.array2json(['a', 'b', 'c']);
var array = $.json2array(json);
```

jQuery

```
$("#btn").on("mouseover mouseout", func);

$("#btn").on({
    mouseover: func1,
    mouseout: func2,
    click: func3
});
```

jQuery

- DOM
- idclass
- #id
-
- on
- jQuerydata()
- jQuery

jQuery slideUp , ?

- JS setTimeout
- \$('.tab').stop().slideUp();

jQuery UI

- \$.widget()
- \$.widget("ns.widgetName", [baseWidget], widgetPrototype);

jQuery jQuery UIjQuery Mobile

- jQuery JS PC DOMAJAX
- jQuery UI jQuery
- jQuery Mobile jQuery “Web”

jQuery Zepto

- jQuery PC jQuery Mobile

- Zepto API jQueryPC

Ajax

- Ajax? Ajax
- AJAX(Asynchronous Javascript And XML)= JavaScript + XML
- ajax
 - 1. XMLHttpRequest
 - 2. HTTP HTTP
 - 3. HTTP
 - 4. HTTP
 - 5.
 - 6. JavaScript DOM

```
var xhr = new XMLHttpRequest();
xhr.open("POST", url, true);
xhr.setRequestHeader("Content-type", "application/x-www-form-urlencoded");
xhr.onreadystatechange = function () {
  if (xhr.readyState == 4 && (xhr.status == 200 || xhr.status == 304)) {
    fn.call(this, xhr.responseText);
  }
};
xhr.send(data);
```

HTTP

http

```
[
  100 Continue  posthttp header
  200 OK
  201 Created
  202 Accepted
  301 Moved Permanently
  302 Found
  303 See Other  GET  URI
  304 Not Modified

  400 Bad Request
  401 Unauthorized
  403 Forbidden
  404 Not Found  URI

  500 Internal Server Error
  503 Service Unavailable
]
```

URL

-
- URLHTTPDNSCDN
- CSSlayoutpaintonload/domreadyJSJS API
- - URL http Web ;
 - WebView loadUrl ;
 - DNSIP UA GET;
 - HTTP();
 - web Web Server ApacheTomcatNode.JS ;
 - PHPJavaJavaScriptPython ;
 - 304;
 - html(200);
 - MIMEcssjs,cookie;
 - DOMJSDOM APIDOM,
- - URLDNSIP
 - HTMLJSCSS
 - HTMLJSCSSHTMLDOM
 -

TCP

- TCPTCPTCP TCPSYNACK
- SYNSYN/ACK ACK"" TCP

TCP""

- FIN (finack)
- FINACK+1SYNFIN
- FIN
- FINACK+1

TCPUDP

- TCPTransmission Control ProtocolTCP""
- UDPUser Data ProtocolTCP UDP

HTTPHTTPS

- HTTPTCPHTTPPTCPSSLTLSHTTPS
- HTTP80HTTPS443

HTTPS

- HTTPShttpshttps://tlsrefer

Http 2.0

- HTTP/2 “server push”
- HTTP/2
- HTTP/2
- header compression header

GET POST

- GET URL 2000
- POST
- GETRequest.QueryString POST Request.Form
- GETPost
- - POST
 - POST GET

- HTTP FTPS MTP PDNS
- TCP UDP
- IP
-
- - , Bit Frame
 - PackeT
 - Segment
 - SPDU
 - PPDU
 - OSIAPDU

304

- ETag
- 304 HTTP
- A AAE Tag ETag AETag ETag 304 — Not Modified

HTTP/2 HTTP/1.x

-
-
-
-

URL

- 01. IP(DNS ->->->ISP DNS ->)
- 02. Web HTTP TCP

- 03. 301 http://example.com http://www.example.com
- 04. www
- 05.
- 06. HTTP Content-type 'text/html'
- 07. DOM
- 08. HTML CSSJS
- 09.
- 10.

(SPA)

- (SPA)HTML
- APP
- REST API JSON
- Web Socket API RPC()
-
- SEO

“”? “”? ?

- URL History
- “”(SPA)
-
- “”“”
- --
- (IIFE) -- JS
- -- require.js, sea.js, EC6

Javascript

- CommonJS -- node.js

```
var math = require('./math');
math.add(2,3);
```

- AMD() -- require.js

```
require(['./math'], function (math) {
    math.add(2, 3);
});
```

- CMD() -- sea.js

```
var math = require('./math');
math.add(2,3);
```

- ES6

```
import {math} from './math';
math.add(2, 3);
```

AMD CMD

- - AMD RequireJS
 - CMD SeaJS
- :
 - AMD
 - CMD
- API :
 - AMD API require require
 - CMD API require
- - AMD
- CMD

```
define(['./a', './b'], function(a, b) {
  a.doSomething();
  b.doSomething();
});
```

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

requireJS

-

Node.js Node.js

- Node.jsI/O
- Node.jsI/O
- Node.jsCPU CPU
- Node.js
 - RESTful API
 -
 - (npm, gulp)
 -

node

- Global window window

npm

- npm Node.js

WebKit

- WebKit (WebCore)JS(JSCore)
- WebKit WebKit(WebCore) HTML/CSS
- WebKit Safari Chrome() Chrome Blink

? Unit TestBDD, TDD ? (mocha, jasmin..)?

- (Unit Test)
- Unit Test
- BDD --
- TDD --
-

```
// mocha
describe('Test add', function() {
  it('1 + 2 = 3', function() {
    expect(add(1, 2)).to.be.equal(3);
  });
});

// jasmin
describe('Test add', function () {
  it('1 + 2 = 3', function () {
    expect(add(1, 2)).toEqual(3);
  });
});
```

- artTemplate, underscore, handlebars

Modernizr Modernizr

- Modernizr JavaScript HTML5 CSS3

- 44 * 44 px

- click 300ms "“”"
- - (safari)
 - (IE10+)
 - Zepto tap (BUG)

- FastClick ([8k])
- ...
- var result = subtract(multiply(add(1,2), 3), 4);
- - ...
 - ...
 - ...
 - ...
- - ...
 - ...
 - ...
 - ...

Currying)

- - ...
 - ...
 - ...
- - DOM
- IOC
-

singleton, factory, strategy, decorator

- Singleton()
- Factory ()
- Strategy()
- Observer()
- Prototype()
- Adapter()
- Proxy()
- Iterator()
- Chain of Responsibility()

-
-

- yeoman, FIS
 - bower, npm
 - npm, browserify, Webpack
 - babel, sass, less
 - (/)Gulp, Grunt
 - JSHint, ESLint
 - Mocha
- Gulp, Grunt, npm + Webpack

Yeoman

- Yeoman --
- Yeoman
 - yo --- Yeoman
 - Gruntgulp --- gruntgulp
 - Bowernpm --- bowernpm

WebPack

- WebPack [][]js/css/image
- WebPack
 - WebPack commonJS AMD/CMD
 - JS CSSImage
 - grunt/gulp base64
 - React
- WEB
- WEB

MVC/MVP/MVVM/Flux

- MVC(Model-View-Controller)
 - V->C, C->M, M->V
 - CV
 - Backbone
- MVP(Model-View-Presenter)
 - V<->P, P<->M
 - VM(P)VP
 - Riot.js
- MVVM(Model-View-ViewModel)
 - V->VM, VM<->M
 - View ViewModel
 - Angular
- Flux(Dispatcher-Store-View)
 - Action->Dispatcher->Store->View, View->Action

- Facebook MVC
-
- React(Flux View)

Backbone

- Backbone jquery underscore (MVC)

AngularJS

- AngularJS MVVM
- AngularJS Google

React

- React MV* JavaScript View
- React
 - DOM + diff -> DOM
 - Components -> Virtual DOM
 - State ->
 - React React + Redux + react-router + Fetch + webpack

react-router

- location components
- UI URL
- react-router URL Location UI react components
- react-router location components

Meteor

- Meteor Node.JS + MongoDB
- Meteor

JSONXML

XMLJSON

- - JSONXML
- - JSONJavaScript
- - JSONXML
- - JSONXML

JSON

- JSON(JavaScript Object Notation)
- JavaScript, ,
- JSONJSON:

```
var obj =eval('('+ str +')');
var obj = str.parseJSON();
var obj = JSON.parse(str);
```

- JSONJSON

```
var last=obj.toJSONString();
var last=JSON.stringify(obj);
```

localStorage

- jssessionStorageglobalStorageHTML5localStorageglobalStorage
- html5Web StoragesessionStoragelocalStorage
- sessionStoragesessionsessionStorage
- localStorage

web storagecookie

- Web StoragecookieCookieCookiecookie
- WebStoragesetItem,getItem,removeItem,clearcookiesetCookiegetCookie
- cookiecookieHTTP Web Storage“”
- IE(ieFFweb)IEIE7IE6userDatajavascriptweb storage
- localStoragesessionStoragesetItemgetItemremoveItem

cookie session

- 1cookiesession
- 2cookieCOOKIECOOKIE
 - session
- 3session
 - COOKIE
- 4cookie4K20cookie
- 5
 - SESSION
 - COOKIE

cookiessessionStorage localStorage

- - cookie

- cookie http
 - sessionStorage localStorage
 -
 - cookie 4k
 - sessionStorage localStorage cookie5M
 -
 - - localStorage
 - sessionStorage
 - cookie cookie

Android iOS?

- (X)HTML “”
 - CSS “”
 - JS “”

AMDCommonjs

- CommonJSNode.jsCommonJSAMD
 - AMDCommonJSmodule.exportsexports

```

var module1 = (function(){
    var _count = 0;
    var m1 = function(){
        //...
    };
    var m2 = function(){
        //...
    };
    return {
        m1 : m1,
        m2 : m2
    };
})();

```

AMDModules/Asynchronous-DefinitionCMDCommon Module Definition

- Asynchronous Module Definition

```

// CMD
define(function(require, exports, module) {
    var a = require('./a')
    a.doSomething()
    // 100
    var b = require('./b') //
    b.doSomething()
    // ...
})

// AMD
define(['./a', './b'], function(a, b) { //
    a.doSomething()
    // 100
    b.doSomething()
    // ...
})

```

- AMD RequireJS
- CMD SeaJS
- AMD CMD
- AMDCommonJS module.exports exports

- content

- HTTPCSSinline Image
- DNSDNSDNSDNS
-
- Ajax

- -
 - DOM
 -
 - iframe
 - 404
- Server
 - CDN
 - ExpiresCache-Control
 - Gzip
 - ETag
 - Flush Buffer Early
 - AjaxGET
 - srcimg
- Cookie
 - cookie
 - cookie
- CSS
 -
 - CSS
 - IEFilter
- Javascript
 -
 - javascriptcss
 - javascriptcss
 -
 - DOM
 -
-
- - CSS
 - HTML
 - favicon.ico
-
- 25k
 - Pack Components into a Multipart Document
-
- httpCSS Sprites, JSCSSGzipCDNdata
 - JS+HTMLAJAX
 - innerHTMLDOMDOMJavascript
 - classNamestyle
 - DOMIO

- CSS Expression
- css)Dynamic properties()
-
- tablebasediv+css

- CSS
- AjaxCDNjsCSSExpiresETagDNS
- CSS
- GZIP

- hash-table
-
- innerHTMLDOMDOMjavascript
- setTimeout
- DOM
- CSS Expression
-
- with(with)
-
- iFrameSrcSrc
- HTMLStyle

- PageSpeed YSlow
- HTTP Expires Cache-control
- Gzip
- CSS3 base64
- (defer)/(async)
- Cookie
- localStorage
- CDN
- HTTP/2
- gulp/webpack

PNG,GIF,JPG

- GIF
 - 8256
 -

-
- boolean
-
- JPEG
 - 256
 -
 -
 -
 -
- PNG
 - PNG8truecolor PNG
 - PNG8GIF256alpha
 -

SEO

SEO

- title description keyword s title 2 title description description keywords
- HTML W3C
- HTML HTML
- js js
- iframe iframe
- alt
-

SEO?

- -
- -
- - ""
- -
- - "Alt"
- -
- -
- -
- -

- - (CNZZ)SEO

ES6

1ES5ES6ES2015?

ES2015	2015JS	ES6JS	ES2015	ES2016	ES2017	ES2018	ES2015	ES6	ES5
			ES2015	ES5	ES6				

2babel?

babel	ES6	ES6	ES5	ES6
-------	-----	-----	-----	-----

3letvarlet

ES6	varvar	ES5	forvar	let	var
-----	--------	-----	--------	-----	-----

4ES6String?

ES6	()`
-----	-----

ES6String	includes()	indexOf(indexOf-1 includes false),
	startsWith(), endsWith(), padStart(), padEnd(), repeat()	

5ES6Array

- ES6let [a,b,c] = [1,2,3] let(var),
- ES6(...)(()), argumentsapply ES5 arguments let a = [2,3,4];
let b = [...a]

ES6Array	find()	indexOf, indexOfNaN bug([NaN].indexOf(NaN) === -1).
	copyWithin(), includes(), fill(), flat(),	

6ES6Number

```
ES6Number.isFinite(), isNaN()  isFinite(), isNaN()  NaNES5isFinite(),
isNaN()Number      sNaN('NaN') === true--'NaN'  isNaNNaN
Number.isFinite()Number.isnan()(Number.isnan('NaN') === false)
isFinite()
```

```
ES6MathMath.cbrt()trunc()hypot()
```

7ES6Object?()

```
ES6
```

```
let [apple, orange] = ['red appe', 'yellow orange'];
let myFruits = {apple, orange}; // let myFruits = {apple: 'red appe',
orange: 'yellow orange'};
```

```
(b.)
```

```
let {keys, values, entries} = Object;
let MyOwnMethods = {keys, values, entries}; // let MyOwnMethods = {keys: keys,
values: values, entries: entries}
```

```
let es5Fun = {
  method: function(){}
};
let es6Fun = {
  method(){}
}
```

```
ES6
```

```
let {apple, orange} = {apple: 'red appe', orange: 'yellow orange'};
```

```
(...) ES6
```

```

let {apple, orange, ...otherFruits} = {apple: 'red apple', orange: 'yellow
orange', grape: 'purple grape', peach: 'sweet peach'};
// otherFruits {grape: 'purple grape', peach: 'sweet peach'}
// : (otherFruits)
let moreFruits = {watermelon: 'nice watermelon'};
let allFruits = {apple, orange, ...otherFruits, ...moreFruits};

```

super ES6Class this super this super

```

ES6Object.is()      '===' '===' NaN === NaN // false Object.is
bug(Object.is(NaN, NaN) // true)

```

ES6Object.assign()

```

const target = { a: 1 };
const source1 = { b: 2 };
const source2 = { c: 3 };
Object.assign(target, source1, source2);
target // {a:1, b:2, c:3}

```

: assign target source1 source2 source1 source2 get set
return

- ES6Object.getOwnPropertyDescriptors() ES5getOwnPropertyDescriptor()
defineProperties() get set
- ES6Object.getPrototypeOf() setPrototypeOf() prototype ES5prototype
__proto__ __proto__ ES6 prototype ES6
- ES6Object.keys() Object.values() Object.entries()

8ES6Function?

() ES6 this, JS this

- this ES5 this this this bug ES6 this, this this this this
- this
- this, arguments
- ES6 ES6

```

function es6Fuc (x, y = 'default') {
  console.log(x, y);
}
es6Fuc(4) // 4, default

```

ES6 bindcall,apply(Babel)

```
foo::bar;  
//  
bar.bind(foo);  
  
foo::bar(...arguments);  
//  
bar.apply(foo, arguments);
```

9Symbol

Symbol ES6 Object Symbol()

Symbol() for...in

10Set

Set ES6 Array Set item Set

11Map

Map ES6 Object Map Object key Object

12Proxy

Proxy ES6 JS JS get/set JS get/set key value myOwnObj key,`

```

function createMyOwnObj() {
    //keyPromise,anything
    return new Proxy({}, {
        get(target, propKey, receiver) {
            return new Promise((resolve, reject) => {
                setTimeout(() => {
                    let randomBoolean = Math.random() > 0.5;
                    let Message;
                    if (randomBoolean) {
                        Message = `${propKey}`;
                        resolve(Message);
                    } else {
                        Message = `${propKey}`;
                        reject(Message);
                    }
                }, 1000);
            });
        }
    });
}

let myOwnObj = createMyOwnObj();

myOwnObj.hahaha.then(result => {
    console.log(result) //hahaha
}).catch(error => {
    console.log(error) //hahaha
})

myOwnObj.wuwuwu.then(result => {
    console.log(result) //wuwuwu
}).catch(error => {
    console.log(error) //wuwuwu
})

```

13 Reflect

ReflectES6	ObjectFunction(applydeletegetset)	Reflect API	Proxy API
API	API	ReflectAPI	API API

14 Promise

PromiseES6JS"	API
---------------	-----

15 Iterator()

- IteratorES6 ES6SetMap ArrayObject ArrayObject SetMapfor SetMap
API SetMapArrayObject API ES6 Iterator
- JavaScriptECMAScript IteratorIterator Iterator key[Symbol.iterator]

```

[Symbol.iterator]valueIterator( Iterator:    next  next()value/done
Iterator)      next()IteratorIterator

//objIterator[Symbol.iterator]Iterator
//obj.[Symbol.iterator]() Iterator
let obj = {
  data: [ 'hello', 'world' ],
  [Symbol.iterator]() {
    const self = this;
    let index = 0;
    return {
      next() {
        if (index < self.data.length) {
          return {
            value: self.data[index++],
            done: false
          };
        } else {
          return { value: undefined, done: true };
        }
      }
    };
  }
};

```

ES6SetMapArrayString[Symbol.iterator] [Symbol.iterator]Iterator
SetMapArrayString

```

//Array
let array = ['red', 'green', 'blue'];
array[Symbol.iterator]() //Iterator
array[Symbol.iterator]().next() //{value: "red", done: false}

//String
let string = '1122334455';
string[Symbol.iterator]() //Iterator
string[Symbol.iterator]().next() //{value: "1", done: false}

//set
let set = new Set(['red', 'green', 'blue']);
set[Symbol.iterator]() //Iterator
set[Symbol.iterator]().next() //{value: "red", done: false}

//Map
let map = new Map();
let obj= {map: 'map'};
map.set(obj, 'mapValue');
map[Symbol.iterator]().next() {value: Array(2), done: false}

```

16for...in for...of

ES6 for...ofES6 Iterator() for...of for..in

- for...of for..in

17Generator

- JavaScriptECMAScript IteratorIterator GeneratorIterator
- Generator Generatoryieldnext() next(value)value,Generator
- GeneratorThunk

18async

asyncGenerator ES6Promise

19Classextends

ES6 classES5 java ClassextendsES5

```
///ES5
function ES5Fun (x, y) {
    this.x = x;
    this.y = y;
}
ES5Fun.prototype.toString = function () {
    return '(' + this.x + ', ' + this.y + ')';
}
var p = new ES5Fun(1, 3);
p.toString();
Object.keys(ES5Fun.prototype); //['toString']

//ES6
class ES6Fun {
    constructor (x, y) {
        this.x = x;
        this.y = y;
    }
    toString () {
        return '(' + this.x + ', ' + this.y + ')';
    }
}
Object.keys(ES6Fun.prototype); //[]
```

- ES6classnew ES5new
- ES6class class ES5
- ES5 thisthis ES6 this super this

20 moduleexportimport

- moduleexportimportES6 exportimport/ AMD/CMDrequireJSseaJScommonJS JS
- import
- importexport

21 ES6

- var self = this;
- letvar
- /
- •
- Class
- module importexport

22 ES6

JavaScriptInputs=>outputsfor-of—argumentsES6
promisePromiseletconstletES6varfunctionletconst
classmodule

23 Promise

- Promise/A+ Promise
 - pending: , fulfilled rejected.
 - fulfilled: .
 - rejected: .
 - settled: Promisefulfilledrejectedpending
- fulfilled rejected settled
- Promise (deferred) (asynchronous)

24 Promise

- Promise

```

var promise = new Promise(function(resolve, reject) {

    if (...) { // succeed

        resolve(result);

    } else { // fails

        reject(Error(errorMessage));

    }
});

```

- Promise then then thenenable

```
promise.then(onFulfilled, onRejected)
```

- fulfilled rejected futureonFulfilled resolve, onRejected reject

Promise

- Promise
- Promise then
- Promise ""

25ECMAScript6

- let a = 1;
- const PI = 3.141592654;
- var [a, b, c] = [1, 2, 3];
- () var sum =\${a + b};
- () Array.from(\$('li'));
- () [1, 2].push(...[3, 4, 5]);
- () Object.is(NaN, NaN);
- (Symbol) let uid = Symbol('uid');
- (Map) let set = new Set([1, 2, 2, 3]);
- for...of for(let val of arr){};
- Promise var promise = new Promise(func);
- Generator function* foo(x){yield x; return x*x;}
- Class() class Foo {}
- export default func;
- async[ES7]

```

async function asyncPrint(value, ms) {
    await timeout(ms);
    console.log(value)
}

```

26Object.is() =====

- ==
- ===

- Object.is === 0 NaN

```
+0 === -0 //true
NaN === NaN // false

Object.is(+0, -0) // false
Object.is(NaN, NaN) // true
```

27 Babel

- Babel JS ES6 JS
JS(ES6/ES7)
- Babel JS (syntax)API

JSONP

- script scriptjs jsurl json
- XMLHttpRequest script JSON
- GET
- JSONP json+padding JSON

```
function createJs(sUrl){

    var oScript = document.createElement('script');
    oScript.type = 'text/javascript';
    oScript.src = sUrl;
    document.getElementsByTagName('head')[0].appendChild(oScript);
}

createJs('jsonp.js');

box({
    'name': 'test'
});

function box(json){
    alert(json.name);
}
```

CORS

- CORS Access-Control-Allow-Origin Ajax

document.domain

- document.domain! document.domain document.domain

window.name

- window.name(window), window.name window.name window.name

HTML5 window.postMessage

- flash window.name
- ?
- jsonp iframewindow.namewindow.postMessage
 - ?
 - document.domain + iframe //
 - JSONP(JSON with Padding)`` response: callback(data)`` // GET
 - CORS(XHR2)`` Access-Control-Allow` // IE10+
 - (HTML5) postMessage + onmessage // IE8+
 - WebSocket(HTML5) new WebSocket(url) + onmessage // IE10+
 -

Cookie

Cookie

- cookie
- 20cookie
- 1.IE620cookie
- 2.IE750cookie
- 3.Firefox50cookie
- 4.chromeSafari

Cookie

- cookie
- IE Opera cookieFirefox cookie
- cookie 4096 4095
- cookie session

MVC

MVCMVVM

- MVC
 - View Controller
 - Controller Model
 - Model View

Git

git fetchgit pull

- git pullmerge
- git fetchmerge

?

-
-
-

- stack—
- heap — OS
-
-

...

- 1
- 2
- 3

```
function quickSort(arr){  
    if(arr.length<=1){  
        return arr;//  
    }  
  
    var num = Math.floor(arr.length/2);/  
  
    var numValue = arr.splice(num,1);/  
    var left = [];  
    var right = [];  
  
    for(var i=0;i<arr.length;i++){  
        if(arr[i]<numValue){  
            left.push(arr[i]);/  
        }  
        else{  
            right.push(arr[i]);/  
        }  
    }  
  
    return quickSort(left).concat([numValue],quickSort(right));//  
}  
  
alert(quickSort([32,45,37,16,2,87]));//"2,16,32,37,45,87"
```

mongoDBMySQL

- MySQLMongoDB
- mongodbBSON
- ,NoSQLMongoDB ① ②

```
var eventUtil = {
    getEvent: function(event) {
        return event || window.event;
    },

    getTarget: function(event) {
        return event.target || event.srcElement;
    },

    addListener: function(element, type, hander) {
        if (element.addEventListener) {
            element.addEventListener(type, hander, false);
        } else if (element.attachEvent) {
            element.attachEvent('on' + type, hander);
        } else {
            element['on' + type] = hander;
        }
    },

    removeListener: function(element, type, hander) {
        if (element.removeEventListener) {
            element.removeEventListener(type, hander, false);
        } else if (element.detachEvent) {
            element.detachEvent(type, hander);
        } else {
            element['on' + type] = null;
        }
    },

    preventDefault: function(event) {
        if (event.preventDefault) {
            event.preventDefault();
        } else {
            event.returnValue = false;
        }
    },

    stopPropagation: function(event) {
        if (event.stopPropagation) {
            event.stopPropagation();
        } else {
            event.cancelBubble = true;
        }
    }
};
```

```
        }
    });
}

//  

(function() {
    var btn = document.getElementById("btn");
    var link = document.getElementsByTagName("a")[0];

    eventUtil.addListener(btn, "click", function(event) {
        var event = eventUtil.getEvent(event);
        var target = eventUtil.getTarget(event);
        alert(event.type);
        alert(target);
        eventUtil.stopPropagation(event);
    });

    eventUtil.addListener(link, "click", function(event) {
        alert("prevent default event");
        var event = eventUtil.getEvent(event);
        eventUtil.preventDefault(event);
    });

    eventUtil.addListener(document.body, "click", function() {
        alert("click body");
    });
})();
```

```
var Event = (function () {
    var list = {}, bind, trigger, remove;
    bind = function (key, fn) {
        if (!list[key]) {
            list[key] = [];
        }
        list[key].push(fn);
    };
    trigger = function () {
        var key = Array.prototype.shift.call(arguments);
        var fns = list[key];
        if (!fns || fns.length === 0) {
            return false;
        }
        for (var i = 0, fn; fn = fns[i++];) {
            fn.apply(this, arguments);
        }
    };
    remove = function (key, fn) {
        var fns = list[key];
        if (!fns) {
            return false;
        }
        if (!fn) {
            fns & (fns.length = 0);
        } else {
            for (var i = fns.length - 1; i >= 0; i--) {
                var _fn = fns[i];
                if (_fn === fn) {
                    fns.splice(i, 1);
                }
            }
        }
    };
    return {
        bind: bind,
        trigger: trigger,
        remove: remove
    }
})();
// Event.bind('Hit', function(){ console.log('bind event'); });
// Event.trigger("Hit", function(){ console.log('trigger event'); });
```

```

function delegateEvent(parentEl, selector, type, fn) {
    var handler = function(e){
        var e = e || window.event;
        var target = e.target || e.srcElement;
        if (matchSelector(target, selector)) {
            if(fn) {
                fn.call(target, e);
            }
        }
    };
    if(parentEl.addEventListener){
        parentEl.addEventListener(type, handler);
    }else{
        parentEl.attachEvent("on" + type, handler);
    }
}
/** 
 * support #id, tagName, .className
 */
function matchSelector(ele, selector) {
    // if use id
    if (selector.charAt(0) === "#") {
        return ele.id === selector.slice(1);
    }
    // if use class
    if (selector.charAt(0) === ".") {
        return (" " + ele.className + " ").indexOf(" " + selector.slice(1) + " ") != -1;
    }
    // if use tagName
    return ele.tagName.toLowerCase() === selector.toLowerCase();
}

// 
var box = document.getElementById("box");
delegateEvent(box, "a", "click", function(){
    console.log(this.href);
})

```

```

var fireEvent = function(element, event){
    if (document.createEventObject){
        var mockEvent = document.createEventObject();
        return element.fireEvent('on' + event, mockEvent)
    }else{
        var mockEvent = document.createEvent('HTMLEvents');
        mockEvent.initEvent(event, true, true);
        return element.dispatchEvent(mockEvent);
    }
}

```

Function.bind

```
if (!Function.prototype.bind) {
  Function.prototype.bind = function (oThis) {
    if (typeof this !== "function") {
      throw new TypeError("'this' is not function");
    }

    // bind's default arguments, array without first element
    // first part arguments for the function
    var aBindArgs = Array.prototype.slice.call(arguments, 1);
    var fToBind = this; // the function will be binding
    var fNOP = function () {};
    var fBound = function () {
      // target this will be binding
      var oThis = this instanceof fNOP ? this : oThis || this;
      // last part arguments for the function
      var aCallArgs = Array.prototype.slice.call(arguments);
      // complete arguments for the function
      var aFuncArgs = aBindArgs.concat(aCallArgs);
      return fToBind.apply(oThis, aFuncArgs);
    };

    // fBound extends fToBind
    fNOP.prototype = this.prototype;
    fBound.prototype = new fNOP();

    return fBound;
  };
}

// 
var add = function(a, b, c){ return a + b + c;};
var newAdd = add.bind(null, 1, 2);
var result = newAdd(3);
```

```
var quickSort = function(arr) {
    if (arr.length <= 1) { return arr; }
    var pivotIndex = Math.floor(arr.length / 2);
    var pivot = arr.splice(pivotIndex, 1)[0];
    var left = [];
    var right = [];
    for (var i = 0, len = arr.length; i < len; i++){
        if (arr[i] < pivot) {
            left.push(arr[i]);
        } else {
            right.push(arr[i]);
        }
    }
    return quickSort(left).concat([pivot], quickSort(right));
};

// quickSort([9, 4, 2, 8, 1, 5, 3, 7]);
```

```
var bubble = function(arr){
    var maxIndex = arr.length - 1, temp, flag;
    for (var i = maxIndex; i > 0; i--) {
        flag = true
        for (var j = 0; j < i; j++) {
            if (arr[j] > arr[j + 1]) {
                temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
                flag = false;
            }
        }
        if(! flag){
            break;
        }
    }
    return arr;
};

// var arr = bubble([13, 69, 28, 93, 55, 75, 34]);
```

```

Array.prototype.unique = function() { return [...new Set(this)];};

// [1, 2, 3, 3, 2, 1].unique();

function unique1(arr){
    var hash = {}, result = [];
    for(var i=0, len=arr.length; i<len; i++){
        if(! hash[arr[i]]){
            result.push(arr[i]);
            hash[arr[i]] = true;
        }
    }
    return result;
}
// unique1([1, 2, 3, 3, 2, 1]);

Array.prototype.unique2 = function(){
    this.sort();
    var result = [this[0]];
    var len = this.length;
    for(var i = 0; i < len; i++){
        if(this[i] !== result[result.length - 1]){
            result.push(this[i]);
        }
    }
    return result;
}
// [1, 2, 3, 3, 2, 1].unique2();

function unique3(arr){
    var result = [];
    for(var i=0; i<arr.length; i++){
        if(result.indexOf(arr[i]) == -1){
            result.push(arr[i]);
        }
    }
    return result;
}

// unique3([1, 2, 3, 3, 2, 1]);

```

url

```

function parseQuery(url) {
  url = url == null ? window.location.href : url;
  var search = url.substring(url.lastIndexOf("?") + 1);
  var hash = {};
  var reg = /([?&=]+)=([?&=]*)/g;
  search.replace(reg, function (match, $1, $2) {
    var name = decodeURIComponent($1);
    var val = decodeURIComponent($2);
    hash[name] = String(val);
    return match;
  });
  return hash;
}

```

```

var throttle = function(fn, delay, mustRunDelay){
  var timer = null;
  var t_start;
  return function(){
    var context = this, args = arguments, t_curr = +new Date();
    clearTimeout(timer);
    if(!t_start){
      t_start = t_curr;
    }
    if(t_curr - t_start >= mustRunDelay){
      fn.apply(context, args);
      t_start = t_curr;
    } else {
      timer = setTimeout(function(){
        fn.apply(context, args);
      }, delay);
    }
  };
};

// 50ms100ms
window.onresize = throttle(myFunc, 50, 100);

```

JS

```

function test1(num){
    var str = (+ num) + '';
    var len = str.length;
    if(len <= 3) return str;
    num = '';
    while(len > 3){
        len -= 3;
        num = ',' + str.substr(len, 3) + num;
    }
    return str.substr(0, len) + num;
}

function test2(num){
    // ?= :
    // ?! :
    var str = (+num).toString();
    var reg = /(?(?!\\b)(\\d{3})+$)/g;
    return str.replace(reg, ',');
}

```

-
-
-
-

AngularJS BackboneJS

- backboneunderscore.jsBackbone + Underscore + jQuery(or Zepto)AngularJS 2 HTTP.
- BackboneModelUIViewDOMUIAngularJSModelUIModelUIdirectiveAngularJS directiveModelUIModelUI
- AngularJSdirectiveUIMVW Angular

- UI UI
 - (table)DIV+CSS
 - (CSSIE6)
 -
 - SEO
 -

-
-

webpack

WebPack WebPackWebHTMLJavascriptCSSwebpack
webpack

- UIUI
- -
 - HTML5CSS3ES6
 -
 -
 -
 - /
 -
 - CDN
 - JS DOM
 - HTTP

IE

- IE Trident W3C
- JS /
- CSS IE

-
-

WEBData

- AJAX
- html5


```
(new EventSource(SERVER_URL)).addEventListener("message", func);
```
- html5 Websocket
- (new WebSocket(SERVER_URL)).addEventListener("message", func);

Web App/hybrid App/Native App Web

- Web App(HTML5)HTML5
 -

- GPS
- Hybrid App()UI WebView
 - Native App
 -
- Native App()
 -
 -

Web

- meta viewport
- box-sizing: border-box;
- rem rem html
- css3
-

Web APP

- //
-
-
- Loading
-
- (html/js/css)
-
- Git
- (NoSQL)
- ()
-
- ES6NodeReactWebpack

- -
 -
 - Node.js
- 90 100
- 1px

- UI
-
- hack
-

- globe.css(utf-8)
-
-
-
-
- CSSHTML style.css
- JS JS
- images.png png8
-

-
-
-
-
-

-
-
-
- webkit
-

[\(https://time.geekbang.org/column/126\)](https://time.geekbang.org/column/126)

-
-

O asymptotic time complexity

1. $n \ O(n)$
2. $O(n) \ O(n^2) \ O(n^2)$
3. $T1(n) = O(n)T2(n) = O(n^2) \ T1(n) * T2(n) = O(n^3)$

1

$O(2^n) \ O(n!)$

1. $O(1)O(1)$
2. $O(\log n)O(n \log n)$ $2^x = nx = x = \log 2^n$ $O(\log 2^n)$
3. $O(m+n)O(m*n)$ $m \ n$

2

x

x

1

Array

1. Linear List
- 2.

" O(1) O(1)"

$O(1)$ $O(\log n)$

$O(1)$

2

1. ""
2. $O(1)$ $O(n)$

1. "" next
- 2.
3. next prev

- 1.
- 2.
- 3.
- 4.

5

- 1.
- 2.
- 3.
4. n
- 5.

3

aaaaa

{[] ()[{}]}{{()}{[]}}{[]()}{()}

4

“”

head tail

- 1.
- 2.
3. enqueue()dequeue()

5

Skip ListRed-black Tree

O(n) O(logn) O(n)

6

Hash Table“”Hash ” O(1)

hash(key) key hash(key)

- 1.
2. key1 = key2 hash(key1) == hash(key2)
3. key1 ≠ key2 hash(key1) ≠ hash(key2)

open addressingchaining

- 1.
2. “bucket”“slot”

7

TreeHeightDepthLevel

O(n)

- 1.
- 2.
- 3.

Binary Search TreeBST

O(n)

8

1

“Red-Black Tree” R-B Tree

- 1.
2. NIL
- 3.
- 4.

9

Heap

- 1.
- 2.

i i 2 i 2+1 2/i

heapify

Top K

10

Graph

vertexedgedegree

~~~~~In-degreeOut-degree

**11 Trie**

Trie “”

Trie

k k

Trie O(k)k

**1**

- 1.
- 2.
- 3.

**2**

- 1.
  - o
  - o
  - o
2. Sorted in place O(1)
  - 3.

1. Bubble Sort
2. Insertion Sort
3. Selection Sort
4. Merge Sort
5. Quick Sort p r p r pivot p r pivot pivot pivot

- o O(nlogn)
  - o
6. Bucket Sort
  7. Counting Sort n k k
  8. n

**3**

Binary Search 0

3

1. low<=high low
2. mid low high low + ((high - low) >> 1)
3. low high low=mid+1high=mid-1 +1 -1

O(logn)

- 1.
- 2.
- 3.
- 4.

- 1.
- 2.
- 3.
- 4.

**4**

MD5SHA

- 1.
2. Bit
- 3.
- 4.

**5**

1. BF Brute Force A B A B n m
2. RK Rabin-Karp n-m+1
3. BM Boyer-Moore KMP 3 4
4. KMP BM a b
5. Trie AC

**6**

greedy algorithm Huffman Coding Prim Kruskal Dijkstra

- 1.
- 2.
- 3.

**7**

divide and conquer n

- 1.
- 2.
- 3.

- 1.
- 2.
- 3.
- 4.

**8**

0-1

**9**

## Dynamic Programming

.....

- 1.
- 2.
- 3.

- 1.
- 2.

## TSESTS

SPA

- TSVSCodeWebStormIDEbugTSTSKOP(dva)
- IDE
- SPAbugTSbugIDEbug

TSJavaScriptJavaScript that scalesTSbug

- IDEbug
- ++/bug
- VSCodeIDE
- 

## TypeScript

TypeScript JavaScript ES6 JavaScriptTS

- 1
- 2js ts ts js ts
- 3 ts es6

- 1InterfacesGenericsclassEnums
- 2
- 3ts
- 4

## TypeScriptvoidnullundefined

tsnullundefined

```
// 1
let a: number = null;
// 2
let a: number = undefind;
// 3
let a: null;
let b: number = a;
//4
let a: undefined;
let b: number = a;
```

void:

```
let a: void;
//
let b: number = a;
```

tsconfig.json

```
{
  "compilerOptions": { // ,
    "strictNullChecks": true, // nullnullundefinedvoid
  }
}
```

undefinednull

```
let a: null = null;
let b: undefined = undefined;
```

undefinedvoid

```
let c: void = undefined;
```

## TypeScript

TypeScript Type Inference

```
let myFavoriteNumber = 'seven';
myFavoriteNumber = 7;

// index.ts(2,1): error TS2322: Type 'number' is not assignable to type
'string'.
```

```
let myFavoriteNumber: string = 'seven';
myFavoriteNumber = 7;

// index.ts(2,1): error TS2322: Type 'number' is not assignable to type
'string'.
```

TypeScript

any

```
let myFavoriteNumber;
myFavoriteNumber = 'seven';
myFavoriteNumber = 7;
```

## TypeScript readonlyconst

readonlyconst

1. constreadonly
2. conststaticstatic constreadonlystaticstatic readonly
3. constreadonly
4. constreadonly

```
function send<T>(data: T): T {
  return data;
}
```

TTTKey TValue

```
send<number>(10);           //
send(10);                  //
```

T

```
function send<T>(data: T[]): T[] {
  return data;
}

send<number>([1, 2, 3]);
```

```
let func: (<U>(data: U) => U) = send;
```

TU

```
function send<T, U>(data: [T, U]): [T, U] {
  return data;
}
send<number, string>([1, "a"]);
```

```
interface Func {
  <T>(str: T): T;
}
function send<T>(str: T): T {
  return str;
}
let fn: Func = send;
```

```
interface Func<T> {
  (str: T): T;
}
function send<T>(str: T): T {
  return str;
}
let fn: Func<string> = send;
```

Funcstring

send“=>”

```
class Person<T> {
  name: T;
  send: (data: T) => T;
}
```

```
let person = new Person<string>();
person.send = function(data) {
  return data;
}
```

data.length

```
function send<T>(data: T) {
    console.log(data.length);
    return data;
}
```

TypeScript extends T

```
function send<T extends string>(data: T) {
    console.log(data.length);
    return data;
}
```

send()

```
send("10");           //
send(10);            //
```

1

T

```
class Programmer {}
function create<T>(ctor: {new(): T}): T {
    return new ctor();
}
create(Programmer);
```

"{new(): T}" new T

```
function create<T>(ctor: new()=>T): T {
    return new ctor();
}
```

2

TypeScript Person Programmer create() TU

```
class Person {}
class Programmer extends Person {}
function create<T extends U, U>(target: T, source: U): T {
    return target;
}
```

create()

```
create(Programmer, Person);      //
create(Programmer, 10);          //
```

## TypeScript

TypeScript

(nominal)

TypeScriptJavaScriptJavaScript

1.

```
//  
//  
// TypeScript undefined  
// undefined js  
interface Named {  
    name: string;  
}  
class Person {  
    name: string;  
    age: number;  
}  
let p: Named;  
// PersonNamed  
//  
p = new Person();  
p.name = '' ;  
console.info(p);
```

1.

```
//  
//  
// 12  
let x = (a: number) => 0;  
let y = (b: number, s: string) => 0;  
x = y; // xs  
y = x;
```

2.

```
//  
// 1,2  
let x = () => ({name:'Alice'});  
let y = () => ({name:'Alice',location:'Seattle'});  
y = x; // x.location  
x = y;
```

3.

undefined

```
//  
// .  
enum Status {  
    Ready,  
    Warting  
}  
enum Color {  
    Red,  
    Blue,  
    Green  
}  
console.log(Status.Ready == 0); // true  
let status = Status.Ready; // 0  
console.log(status);  
status = 2;  
console.log(status); // 2  
//status = Color.Blue; / /
```

```
class Animal {  
    feet: number;  
    constructor(name: string, numFeet: number) { }  
}  
  
class Size {  
    feet: number;  
    constructor(numFeet: number) { }  
}  
  
let a: Animal;  
let s: Size;  
  
a = s; // OK  
s = a; // OK
```

TypeScript

```
interface Empty<T> {
}
let x: Empty<number>;
let y: Empty<string>;

x = y; // okay, y matches structure of x
```

TypeScript                   **any any**

implements   extends

## interfacetype

interfacetype

```
interface IPerson<T> {
  age: T;
  name: string
};

const hank1: IPerson<number> = {
  age: 18,
  name: 'hank',
};

type TPerson<T> = {
  age: T;
  name: string
};

const hank2: TPerson<number> = {
  age: 18,
  name: 'hank',
};
```

()

typeinterface

```
type Name = string | number;

const name = 'hank';
```

interfacetype

```
interface ISetPerson {
  (age: number, name: string) => void;
}

const setPerson1: ISetPerson = (age: number, name: string): void => {};
type TSetPerson = (age: number, name: string) => void;

const setPerson2: TSetPerson = (age: number, name: string): void => {};
```

interface(implements)

```
interface ISetPerson {
  setPerson(age: number, name: string) => void;
}

class Person implements ISetPerson {
  setPerson(age: number, name: string): void => {
    }
}
```

**(extends)**

interface(extends)(extends)extends

```
interface ICommon {
  sex: string
};

interface IPerson<T> extends ICommon {
  age: T;
  name: string
};

const hank1: IPerson<number> = {
  sex: 'Man',
  age: 18,
  name: 'hank',
};

type TCommon = {
  sex: string,
};

type TPerso<T> = {
  age: T;
  name: string
} & TCommon; //

const hank2: TPerso<number> = {
  sex: 'Man',
  age: 18,
  name: 'hank',
};
```

type

```
interface ICommon {
    sex: string
};

interface IPerson<T> extends ICommon {
    age: T;
    name: string
};

type TCommon = {
    sex: string,
};

type TPerso<T> = {
    age: T;
    name: string
} & TCommon; // 

// 
type P1 = IPerson<number> | TPerso<number>;
// 
type P2 = [IPerson<number>, TPerso<number>];
```

## **typeof**

`typeof`

```
class Person {
    setPerson(age: number, name: string) {}

}

type TPerson = typeof Person;

const CPerson: TPerson = class {
    setPerson(age: number, name: string) {}

}
```

## TypeScript d.ts

TypeScript JavaScript

d.ts

# TypeScript

TypeScript 1.5

\*\*\*\*\*

"\*\*\*\*\*ECMAScript 2015module X {namespace X {

JavaScript

--outFile  
WebHTML<script>

CommonJs/Require.js  
JS

Node.js

ECMAScript 2015

/// <reference>-ing a module

/// <reference ... />import  
...,import x from "...";const x = require("...");

.ts.tsx.d.ts

.d.ts

myModules.d.ts

// In a .d.ts file or .ts file that is not a module:  
**declare module "SomeModule" {**  
  **export function fn(): string;**  
**}**

myOtherModule.ts

/// <reference path="myModules.d.ts" />  
**import \* as m from "SomeModule";**

TypeScriptnode.d.ts

shapes.ts

```
export namespace Shapes {  
    export class Triangle { /* ... */ }  
    export class Square { /* ... */ }  
}
```

ShapesTriangleSquare

shapeConsumer.ts

```
import * as shapes from "./shapes";  
let t = new shapes.Shapes.Triangle(); // shapes.Shapes?
```

TypeScript

shapes.ts

```
export class Triangle { /* ... */ }  
export class Square { /* ... */ }
```

shapeConsumer.ts

```
import * as shapes from "./shapes";  
let t = new shapes.Triangle();
```

JSTypeScriptJS

commonjsumdoutFileTypeScript 1.8amdsystemoutFile

## TypeScript

- 1.
2. ...
3. ()()
4. ES7JS
- 5.

```
"compilerOptions": {  
    "experimentalDecorators": true  
}
```

```

function logClz(params: Function) {
  console.log(params) // class HttpClient
}

@logClz
class HttpClient {
  constructor() {}
}

// logClz() paramsHttpClient
// HttpClient

function logClz(params: Function) {
  params.prototype.url = 'xxxx';
  params.prototype.run = function() {
    console.log('run...');
  };
}
var http: HttpClient = new HttpClient();
http.run(); // run...

```

```

function logClz(params: string) {
  console.log('params:', params); //params: hello
  return function(target: Function) {
    console.log('target:', target); //target: class HttpClient
    target.prototype.url = params; //url
  }
}

@logClz('hello')
class HttpClient {
  constructor() {}
}
var http: HttpClient = new HttpClient();
console.log(http.url); //hello

```

- 1.
- 2.

```

function logClz(target:any) {
  return class extends target {
    url = 'change url'
    getData() {
      console.log('getData:', this.url);
    }
  }
}
@logClz
class HttpClient {
  public url:string|undefined;
  constructor() {
    this.url = 'init url'
  }
  getData() {
    console.log(this.url);
  }
}
var http: HttpClient = new HttpClient(); //HttpClientTS http
http.getData(); //getData: change url

```

```

function fn(v: number) {
  return function<T extends {new(...args: any[]): {}}>(cst: T): T {
    class Ps extends cst {
      age: number = v;
    }
  }
}
@fn(10)
class Person {} //age:number = 10
@fn(20)
class Cat {} //age:number = 20
let p: Person = new Person(); //PersonPs
console.log(p.age) //10

let c: Cat = new Cat();
console.log(c.age) //20

```

T extends {new(...args: any[]): {}}{new(...args: any[]): {}} new(...args:  
any[]) => {} new {}

```

function identity<T>(arg: T): T {
    return arg;
}
let myIdentity: <U>(arg: U) => U = identity;
// :
let myIdentity: {<T>(arg: T): T} = identity;

// :
interface GenericIdentityFn {
    <T>(arg: T): T;
}
let myIdentity: GenericIdentityFn = identity;

```

1.

2.

```

function logProp(params: string) {
    return function(target: any, key: string) {
        console.log(target) // { constructor:f, getData:f }
        console.log(key) // url
        target[key] = params; // =
        target.api = 'xxxxx'; //
        target.run = function() { //
            console.log('run...');

        }
    }
}

class HttpClient {
    @logProp('http://baidu.com')
    public url: any|undefined;
    constructor() { }
    getData() {
        console.log(this.url);
    }
}
var http: HttpClient = new HttpClient();
http.getData(); // http://baidu.com
console.log(http.api); // xxxxx
http.run(); // run...

```

- 1.
- 2. 3
  - 
  -

◦

```
function get(params: string) {
    console.log(params) // http://baidu.com
    return function(target: any, key: string, descriptor: PropertyDescriptor) {
        console.log(target) // { constructor:f, getData:f }
        console.log(key) // getData
        console.log(descriptor) // {value: f, writable: true, enumerable: false,
configurable: true} value
        /* */
        //1.
        var oldMethod = descriptor.value;
        //2.
        descriptor.value = function(...args: any[]) {
            //3.
            let newArgs = args.map((item)=>{
                return String(item);
            });
            //4.
            oldMethod.apply(this, newArgs);
            // oldMethod.call(this, ...newArgs);
        }
    }
}

class HttpClient {
    constructor() { }
    @get('http://baidu.com')
    getData(...args: any[]) {
        console.log('getData: ', args);
    }
}

var http = new HttpClient();
http.getData(1, 2, true); // getData: ["1", "2", "true"]
```

• 1. 3

- 
- undefined
-

```

function logParams(params:any) {
  console.log(params) // uuid
  return function(target:any, methodName:any, paramIndex:any) {
    console.log(target) // { constructor:f, getData:f }
    console.log(methodName) // getData
    console.log(paramIndex) // 0
  }
}

class HttpClient {
  constructor() { }
  getData(@logParams('uuid') uuid:any) {
    console.log(uuid);
  }
}

```

- 2.
- 3. Angular,reflect-metadata API
- 4.

- TS

```

@f @g x

@f
@g
x

```

- TypeScript
  - ;
  - .
- > > >

```
function logClz11(params:string) {
  return function(target: any) {
    console.log('logClz11')
  }
}

function logClz22(params?:string) {
  return function(target:any) {
    console.log('logClz22')
  }
}

function logAttr(params?:string) {
  return function(target:any, attrName:any) {
    console.log('logAttr')
  }
}

function logMethod(params?:string) {
  return function(target:any, methodName:any, desc:any) {
    console.log('logMethod')
  }
}

function logParam11(params?:any) {
  return function(target:any, methodName:any, paramIndex:any) {
    console.log('logParam11')
  }
}

function logParam22(params?:any) {
  return function(target:any, methodName:any, paramIndex:any) {
    console.log('logParam22')
  }
}

@logClz11('http://baidu.com')
@logClz22()
class HttpClient {
  @logAttr()
  public url:string|undefined;

  constructor() { }

  @logMethod()
  getData() {
    console.log('get data');
  }

  setData(@logParam11() param1:any, @logParam22() param2:any) {
    console.log('set data');
  }
}

// logAttr --> logMethod --> logParam22 --> logParam11 --> logClz22 -->
logClz11
```

- 1. WXML WeiXin Markup Language.
- 2. WXSS (WeiXin Style Sheets) WXML
- 3. js
- 4. json tabBar

- 1. js
- 2. app.js
- 3.

- 1. HTMLdata-\*e. currentTarget. datasetonloadparamdata-
- 2. id e. currentTarget. idid,
- 3. navigator

- 1.
- 2.
- 3. data
- 4.

## App

JavaScript. WXML. WXSS

JavaScriptJavaScriptAppH5AppAPIH5H5H5APIH5

WXMLWXMLXMLHTML

WXSSWXSSCSS

UI

webviewappServicewebViewUlappService. JSBridgeUI.

- 1.
- 2.
3. App
4. App
- 5.

1. 1M5
2. .
- 3.
- 4.

## H5

- 1.

HTML5webview

- 2.

BUG

- 3.

- 4.

HTML5

app.js

```
success: function(info) {  
    that.apirtnCallback(info)  
}
```

index.js

```
onLoad: function() {
  app.apirtnCallback = res => {
    console.log(res)
  }
}
```

## vue

this. data

```
this.setData({
  noBind: true
})
```

## WXSSCSS

1. wxss
2. Body, import

## webview

jweixin-1.3.2.js

```
wx.miniProgram.navigateTo({
  url: '/pages/login/login' + '$params'
})
```

wx.getUserInfoWithCredentials true encryptedData union\_id

view scroll-view, , onPullDownRefresh

## webview

- 1.
2. h5jweixin-1.3.2.js
3. 1.7.1
4. h5appidappidopenid

- 1.
2. html html lpdiv view

## webview

switchTab success

```
success: function(e) {
  var page = getCurrentPages().pop();
  if (page == undefined || page == null) return;
  page.onLoad();
}
```

webview

```
wx.miniProgram.switchTab({
  url: '/pages/index/index'
})
```

## Vue

1. wx:for="list" v-for="(item, index) in list"
2. data this.data.uinfoVuethis.uinfothis.setData({uinfo:1})Vuethis.uinfo=1

```
// app.js
App({
  onLaunch(options) {
    // Do something initial when launch.
  },
  onShow(options) {
    // Do something when show.
  },
  onHide() {
    // Do something when hide.
  },
  onError(msg) {
    console.log(msg)
  },
  globalData: 'I am global data'
})
```

```
//index.js
Page({
  data: {
    text: "This is page data."
  },
  onLoad: function(options) {
    //
  },
  onShow: function() {
    //
  }
})
```

```
},
onReady: function() {
    //
},
onHide: function() {
    //
},
onUnload: function() {
    //
},
onPullDownRefresh: function() {
    //
},
onReachBottom: function() {
    //
},
onShareAppMessage: function () {
    //
},
onPageScroll: function() {
    //
},
onResize: function() {
    //
},
onTabItemTap(item) {
    // tab
    console.log(item.index)
    console.log(item.pagePath)
    console.log(item.text)
},
//  

viewTap: function() {
    this.setData({
        text: 'Set some data for updating view.'
    }, function() {
        // this is setData callback
    })
},
//  

customData: {
    hi: 'MINA'
}
})
```

## url

- protocol http
- hostname IP
- port http80:80
- path

- parameter
- query
- fragment

## hashhistory

### hash

http://xxx.abc.com/#/xx #hashhashhash hashchangehash

### history

HTML5History API history window.onpopstate

- history.go(-1); //
- history.back(); //
- history.forward(); //
- history.pushState(data[,title][,url]); //
- history.replaceState(data[,title][,url]); //

## vue3/

- Performance
- Proxy
- tree sharking
- composition api  
defineComponent, onMounted, onUnmounted, ref, setup react hocksmixin
- Fragment, Teleport, Suspense  
ReactFragmentPortalSuspense
- Typescript
- Custom Render API  
apiDOMAPI

```
function factorial(n)
{
  if (n === 1) {
    return 1;
  }

  return n * factorial(n - 1);
}
```

```
function factorialTailRecursion(n, acc)
{
    if (n === 1) {
        return acc;
    }

    return factorialTailRecursion(n - 1, acc * n);
}
```

## React

React(SyntheticEvent)

1.

null

1.1

```
function onClick(event) {
    console.log(event); // => nullified object.
    console.log(event.type); // => "click"
    const eventType = event.type; // => "click"

    setTimeout(function() {
        console.log(event.type); // => null
        console.log(eventType); // => "click"
    }, 0);
}
```

1.2 e.persist()

e.persist()

2.

2.1 e.stopPropagation

documentdocumentwindow

2.2 e.nativeEvent.stopImmediatePropagation

document

- document
- 
- document
- document

windowdocument

## **px rem em vh vw**

pxpx

emfont-size

1em2em

remcss3remHTMLfont-size

HTML16px

emremremhtmlem

1font-sizeem

2rem .

vwvhvmaxvmin

vwviewport1/100

200px1vw2px200px/100

vhviewport

vminvmax

## **LRU**

LRULRU

## **keep-alive**

keep-aliveVue.jsDOM

includeexclude

## **keep-alive**

keep-alivekeep-alive

createddestroyed

createdcachevnode

```
created () {
  /* */
  this.cache = Object.create(null)
  // vnode
  this.keys = []
},
```

destroyedcache

```
/* destroyedcache */
destroyed () {
  for (const key in this.cache) {
    pruneCacheEntry(this.cache, key, this.keys)
  }
},
```

**render**

```

render () {
  const vnode: VNode = getFirstComponentChild(this.$slots.default)
  const componentOptions: ?VNodeComponentOptions = vnode &&
vnode.componentOptions
  if (componentOptions) {
    // check pattern
    const name: ?string = getComponentName(componentOptions)
    if (name && (
      (this.include && !matches(this.include, name)) ||
      (this.exclude && matches(this.exclude, name))
    )) {
      return vnode
    }

    const { cache, keys } = this
    const key: ?string = vnode.key == null
      // same constructor may get registered as different local components
      // so cid alone is not enough (#3269)
      ? componentOptions.Ctor.cid + (componentOptions.tag ?
`::${componentOptions.tag}` : '')
      : vnode.key
    if (cache[key]) {
      vnode.componentInstance = cache[key].componentInstance
      // make current key freshest
      remove(keys, key)
      keys.push(key)
    } else {
      cache[key] = vnode
      keys.push(key)
      // prune oldest entry
      if (this.max && keys.length > parseInt(this.max)) {
        pruneCacheEntry(cache, keys[0], keys, this._vnode)
      }
    }
    vnode.data.keepAlive = true
  }
  return vnode
}

```

## watch

watchincludeexcludecache

```

watch: {
    /* includeExcludeCache */
    include (val: string | RegExp) {
        pruneCache(this.cache, this._vnode, name => matches(val, name))
    },
    exclude (val: string | RegExp) {
        pruneCache(this.cache, this._vnode, name => !matches(val, name))
    }
},

```

## JSBridge

// WebViewJavascriptBridgejavascriptrnative

This lib will inject a WebViewJavascriptBridge Object to window object. You can listen to WebViewJavascriptBridgeReady event to ensure window.WebViewJavascriptBridge is exist, as the blow code shows:

```

if (window.WebViewJavascriptBridge) {
    //do your work here
} else {
    document.addEventListener(
        'WebViewJavascriptBridgeReady',
        function() {
            //do your work here
        },
        false
    );
}

```

Or put all JsBridge function call into window.WVJBCallbacks array if window.WebViewJavascriptBridge is undefined, this taks queue will be flushed when WebViewJavascriptBridgeReady event triggered.

Copy and paste setupWebViewJavascriptBridge into your JS:

```

function setupWebViewJavascriptBridge(callback) {
    if (window.WebViewJavascriptBridge) {
        return callback(WebViewJavascriptBridge);
    }
    if (window.WVJBCallbacks) {
        return window.WVJBCallbacks.push(callback);
    }
    window.WVJBCallbacks = [callback];
}

```

Call setupWebViewJavascriptBridge and then use the bridge to register handlers or call Java handlers:

```

setupWebViewJavascriptBridge(function(bridge) {
    bridge.registerHandler('JS Echo', function(data, responseCallback) {
        console.log("JS Echo called with:", data);
        responseCallback(data);
    });
    bridge.callHandler('ObjC Echo', {'key':'value'}, function(responseData) {
        console.log("JS received response:", responseData);
    });
});

```

It's the same with <https://github.com/marcuswestin/WebViewJavascriptBridge>, that would be easier for you to define same behavior in different platform between Android and iOS. Meanwhile, writing concise code.

js

```

/*js*/
function setupWebViewJavascriptBridge(callback) {
    // Android
    if (window.WebViewJavascriptBridge) {
        callback(WebViewJavascriptBridge)
    } else {
        document.addEventListener(
            'WebViewJavascriptBridgeReady',
            function() {
                callback(WebViewJavascriptBridge)
            },
            false
        );
    }
    //iOS
    if (window.WebViewJavascriptBridge) {
        return callback(WebViewJavascriptBridge);
    } if (window.WVJBCallbacks) {
        return window.WVJBCallbacks.push(callback);
    }

    window.WVJBCallbacks = [callback];
    var WVJBIframe = document.createElement('iframe');
    WVJBIframe.style.display = 'none';
    WVJBIframe.src = 'wvjbscheme://__BRIDGE_LOADED__';
    document.documentElement.appendChild(WVJBIframe);
    setTimeout(function() {
        document.documentElement.removeChild(WVJBIframe)
    }, 0);
}

```

js

setupWebViewJavascriptBridge.js

```
//function js
setupWebViewJavascriptBridge(function(bridge) {
  //
  //1 buttonjs flag
  //2 data  js
  //3 responseCallback js
  bridge.registerHandler("buttonjs", function(data, responseCallback) {
    document.getElementById("show").innerHTML = "button js" + data;
    responseCallback("button js callback");
  });
});
```

## js

```
setupWebViewJavascriptBridge(function(bridge) {
  document.getElementById('enter3').onclick = function (e) {
    var data = "good hello"
    //1 pay flag
    //2
    //3
    bridge.callHandler('getBlogNameFromObjC', data, function(resp) {
      document.getElementById("show").innerHTML = "payInterface" + resp;
    });
});
```

## scriptDOM

htmlDOMscriptDOMjsDOM

1. scripthtmlDOM
- 2.

scriptdefer

```
<script type="text/javascript" defer src="1.js"></script>
```

html

- 3.

```
<script type="text/javascript" async src="1.js"></script>
<script type="text/javascript" async src="2.js"></script>
```

deferscript2onload DOMContentLoaded

deferasync

## babel

- babel-corebabelbabelAPIbabel.transformwebpackbabel-loader API
- babylonjs
- babel-traverseASTplugin
- babel-generatorAST

1babelparsingtransforminggeneratingES6ES5babel

- ES6
- babylonAST
- pluginbabel-traverseAST,AST
- babel-generatorASTES5

ES6 == babylon == AST  
 == pluginbabel-traverseAST == AST  
 == babel-generatorASTES5

babelES6ES5APIProxySetbabelpolyfill

## git rebase git merge

rebase commit ,

merge commit commit

## IntersectionObserver

IntersectionObserver(Intersection Observer API)(viewport)(viewport)(root)

### API

```
var io = new IntersectionObserver(callback, options)

io.observe(document.querySelector('img')) // DOM
io.unobserve(element) // element
io.disconnect() //
```

### options

- root
- threshold

[0]

```

const options = {
  root: null,
  threshold: [0, 0.5, 1] // 00.51img0%50%100%
}
var io = new IntersectionObserver(callback, options)
io.observe(document.querySelector('img'))

```

- rootMargin

css10px 10px 30px 20pxtoprightbottom left

## callback

callback

```
callback: (entries: IntersectionObserverEntry[]) => void;
```

## IntersectionObserverEntry

IntersectionObserverEntry

- boundingClientRect
- intersectionRatio intersectionRect/boundingClientRect 0
- intersectionRect
- isIntersecting Boolean true
- rootBounds
- target
- time IntersectionObserver

```

let io;

function callback(entries) {
  entries.forEach((item) => { // entries
    if(item.isIntersecting) { //
      item.target.src = item.target.dataset.src // src
      io.unobserve(item.target) // callback
    }
  })
}

io = new IntersectionObserver(callback)

let imgs = document.querySelectorAll('[data-src]') // urldata-src src src

imgs.forEach((item) => { // io.observeDOM forEach
  io.observe(item)
})

```

- google
- 
- 
- 

Reverse Proxy internet internet

:

- web Web
- 

...  
..

## Chrome

Chrome 1 Browser 1 GPU Network

- 
- HTML CSS JavaScript V8 Chrome Ta
- GPU Chrome GPU 3D CSS Chrome UI GPU Chrome GPU
- 
- 

## E2E

E2E End To End

E2E

```
| | | | | | |
| ---- | ---- | ---- | ---- |
| nightwatch | assert Chai Expect | | selenium | http://nightwatchjs.org/ | |
```

| cypress | ChaiChai-jQuery | | Chrome | <https://www.cypress.io/> | |  
| testcafe | | | selenium | <https://DevExpress.github.io/testcafe/> | |  
| katalon | TDD/BDD | | | <https://www.katalon.com/katalon-studio/> | |

## REST

RESTURLHTTP

URI

BAD

- /getProducts
- /listOrders
- /retrieveClientByOrder?orderId=1

GOOD

- GET /products : will return the list of all products
- POST /products : will add a product to the collection
- GET /products/4 : will retrieve product #4
- PATCH/PUT /products/4 : will update product #4

## PromiseGeneratorAsync

### Promise

Promisepending()resolved()rejected()

- Promise
- Promise
- Pending
- Promise Promise Promise

### Generator

Generator ES6Generator

Iterator

Generator yield

yieldundefined

nextyield

```

function * foo(x) {

  var y = 2 * (yield (x + 1));

  var z = yield (y / 3);

  return (x + y + z);

}

var b = foo(5);

b.next() // { value:6, done:false }

b.next(12) // { value:8, done:false }

b.next(13) // { value:42, done:true }

```

## Async()

Async Generator

async \*

await yield

async/await Generator

```

async function fetchUser() {

  const user = await ajax()

  console.log(user)
}

```

- asynccabelasynccpromise

## webpack hash chunkhash contenthash

Webpackhashhash, chunkhash, contenthash

hash

### hash

hashhash

hashhashhashchunkhash

### chunkhash

chunkhash(Entry)chunkhashchunkhashhashhash

csscssjshashcsscsshash

## contenthash

contenthash

contenthashhashcontenthashcsscss

ABBAAAA

## devicePixelRatio

css

## vue

- .capture
- .passive

```
<!-- () -->
<!-- `onScroll` -->
<!-- `event.preventDefault()` -->
<div v-on:scroll.passive="onScroll">...</div>
```

- .self

## v-model

v-model <input><textarea> <select> v-model

v-model property

- text textarea value property input
- checkbox radio checked property change
- select value property change

```
<input v-model="msg" />  
//  
<input v-bind:value="msg" @input="msg=$event.target.value" />
```

## vm.\$isServer, vm.\$attrs vm.\$listeners

### vm.\$isServer

Vue

### vm.\$attrs

prop () attribute (class style ) prop (class style ) v-bind="\$attrs"

---

### vm.\$listeners

( .native ) v-on v-on="\$listeners" ---

## WeakSet WeakMap

### WeakSet

, WeakSet

Set :

- SetWeakSet
- WeakSet WeakSet WeakSet WeakSet

### WeakMap

/

Map :

- WeakMap "" WeakMap key
- WeakMap key ( key)key key Map

## react-router

react-router history

```
//  
import { withRouter } from "react-router-dom";  
  
// EggRid  
export default withRouter(EggRid);  
//this.props.history
```

## history

- history.length -
- history.location - location
- history.action -

history.listen

```
const unlisten = history.listen((location, action) => {  
  console.log(  
    `The current URL is ${location.pathname}${location.search}${location.hash}`  
  );  
  console.log(`The last navigation action was ${action}`);  
});  
  
//  
unlisten();
```

location window.location

- location.pathname - The path of the URL
- location.search - The URL query string
- location.hash - The URL hash fragment

Location

- location.state - locationURL (createBrowserHistorycreateMemoryHistory)
- location.key - loaction (createBrowserHistorycreateMemoryHistory)

history

- history.push(path, [state])
- history.replace(path, [state])
- history.go(n)
- history.goBack()
- history.goForward()

pushreplaceurlobject

- url
- { pathname, search, hash, state }

```

// Push a new entry onto the history stack.
history.push('/home');

// Push a new entry onto the history stack with a query string
// and some state. Location state does not appear in the URL.
history.push('/home?the=query', { some: 'state' });

// If you prefer, use a single location-like object to specify both
// the URL and state. This is equivalent to the example above.
history.push({
  pathname: '/home',
  search: '?the=query',
  state: { some: 'state' }
});

// Go back to the previous history entry. The following
// two lines are synonymous.
history.go(-1);
history.goBack();

```

### 1. basename

URL“base”URL basename URL

```

const history = createHistory({
  basename: '/the/base'
});

history.listen(location => {
  console.log(location.pathname); // /home
});

history.push('/home'); // URL is now /the/base/home

```

createMemoryHistorybasename

### 2. CreateBrowserHistory

createBrowserHistoryHTML5 pushStatereplaceStateurlforceRefresh

```

const history = createBrowserHistory({
  forceRefresh: true
});

```

### 3. createHashHistoryhash

createHashHistoryhashURL'/hashTypehash

```

const history = createHashHistory({
  hashType: 'slash' // the default
});

history.push('/home'); // window.location.hash is #/home

const history = createHashHistory({
  hashType: 'noslash' // Omit the leading slash
});

history.push('/home'); // window.location.hash is #home

const history = createHashHistory({
  hashType: 'hashbang' // Google's legacy AJAX URL format
});

history.push('/home'); // window.location.hash is #!/home

```

## **tcp http**

HTTP 1.0 TCP TCP HTTP TCP Connection Keep-Alive  
 Connection: Keep-Alive Keep-Alive keep-alive HTTP 4.5.5 Keep-Alive

HTTP 1.1 TCP HTTP  
 HTTP 2.0 TCP HTTP TCP HTTP

## **Virtual Dom**

VDOM DOM

- DOM
- DOM DOM DOM DOM
- DOM DOM DOM

## **png, webp**

|      |  |  |  |         |         |                |
|------|--|--|--|---------|---------|----------------|
| JPEG |  |  |  |         |         |                |
| GIF  |  |  |  |         |         |                |
| PNG  |  |  |  |         |         |                |
| APNG |  |  |  | Firefox | Safari  | iOS Safari     |
| WebP |  |  |  | Chrome  | Opera   | Android Chrome |
| SVG  |  |  |  | Android | Browser | IE8            |

## **0.1 + 0.2 0.3**

- ECMAScript
- IEEE754 64 11
-

## v8js

JS

```
JSpush, JSundefinedJSJS()  
function JSpush JSpush  
return JSJS/JS  
JSJSsetTimeout fetch non-blocking JSJSpush() JSpush
```

## common.js es6

CommonJS Nodejs Nodejs JavaScript ES6 (: AMD) ES6 ES6 Module ES6 Module Webpack export import Babel CommonJS

1. CommonJS ES6
2. CommonJS ES6
3. CommonJs ES6 Module
4. CommonJs ES6 Module
5. CommonJs this ES6 Module this undefined

## Tree-Shaking

Tree-shaking Rollup webpack 2 tree-shaking  
tree-shaking modules ES6 CommonJS require()  
CommonJS CommonJS tree-shaking  
JavaScript ES6 import()  
Tree-shaking

## ES6

- 1.
2. import
- 3.

uglify

1. ES6 Module
  - 2.
- :
- Tree-shaking export default export default { A, B, C } export { A, B, C }

## **WebSDK**

- - API
  - APIAPI
- 
- 
- 
- - SDK
  - SDK
  -
- Demo
  - DemoSDK
  - DemoSDK

## **webpack**

1. JavaScript
2. apply
3. webpack
4. webpack
5. webpack

## **webpack**

Compilerwebpack

### **Compiler**

- entryOption: entry
- afterPlugins: compiler
- afterResolvers: resolver compiler
- environment: environment
- afterEnvironment: environment
- beforeRun: compiler.run() compiler
- run: records (hook into) compilercompiler
- watchRun: (compilation)compiler
- watchRun: (compilation)compiler

- normalModuleFactory: NormalModuleFactory normalModuleFactory
- contextModuleFactory: ContextModuleFactory contextModuleFactory
- beforeCompile: (compilation)compilationParams
- compile: (compilation)(hook into) compilercompilationParams
- thisCompilation: compilation compilationcompilation
- compilation: (compilation)compilation
- make: compilation
- afterCompile:
- shouldEmit: true/falsecompilation
- needAdditionalPass:
- emit: output compilation
- afterEmit: output compilation
- done: (compilation)stats
- failed: (compilation)error
- invalid: fileName, changeTime
- watchClose:

## **Compilation**

Compilation

(loaded)(sealed)(optimized)(chunked)(hashed)(restored)

compilationCompilercompilation:

- buildModule: module
- rebuildModule: module

...

- seal: (compilation)
- unseal: (compilation)

...

- optimize:

## **CDN**

httpcdn

CDNCDNhttpCDNback to the source request,

## DNS

### DNS

DNSDNSTTL

IPIPDNSChrome1DNSChromeDNS

```
chrome://net-internals/#dns
```

## DNS

DNSTTLTTL

### ISP DNS

ISPDNSTLTTLDNSIP

## vuemethodscomputedfilterswatch

### methods

methods

### computed

computeddatakeykeyreturnvaluecomputed

### filters

filtersvue2.0vue

### watch

watchdata

## scoped style

<style> scoped attribute CSS Shadow DOM

```
/deep/ .abc {  
}
```

## CSS Modules

CSS Modules Webpack css-loader css-loader modules CSS Modules

```
module: {
  rules: [
    // ...
    {
      test: /\.css$/,
      loader: "css-loader?modules"
    },
  ]
}
```

CSS

class CSS Modules

```
import React from 'react';
import style from './App.css';

export default () => {
  return (
    <h1 className={style.title}>
      Hello World
    </h1>
  );
};
```

```
/* App.css */
.title {
  color: red;
}
```

```
<h1 class="_3zyde4l1yATC0kgn-DBWEL">
  Hello World
</h1>

<style>
  ._3zyde4l1yATC0kgn-DBWEL {
    color: red;
  }
</style>
```

CSS Modules :global(.className) class

CSS Modules :local(.className).className

```
css-loader[hash:base64].title ._3zyde4l1yATC0kgn-DBWEL
```

```
webpack.config.js
```

```
module: {
  loaders: [
    // ...
    {
      test: /\.css$/,
      loader: "style-loader!css-loader?modules&localIdentName=[path][name]---[local]---[hash:base64:5]"
    },
  ]
}
```

## Class

```
.className {
  background-color: blue;
}

.title {
  composes: className;
  color: red;
}
```

```
._2DHwuiHWMnKT0YG45T0x34 {
  color: red;
}

._10B-buq6_BE0T0l9urIjf8 {
  background-color: blue;
}
```

```
<h1 class="_2DHwuiHWMnKT0YG45T0x34 _10B-buq6_BE0T0l9urIjf8">
  Hello World
</h1>
```

```
/* another.css */
.className {
  background-color: blue;
}
```

```
.title {
  composes: className from './another.css';
  color: red;
}
```

CSS Modules PostCSS postcss-modules-values

webpack.config.js

```
var values = require('postcss-modules-values');

module.exports = {
  entry: __dirname + '/index.js',
  output: {
    publicPath: '/',
    filename: './bundle.js'
  },
  module: {
    rules: [
      {
        test: /\.jsx?$/,
        exclude: /node_modules/,
        use: [
          'babel-loader'
        ],
        query: {
          presets: ['es2015', 'stage-0', 'react']
        }
      },
      {
        test: /\.css$/,
        use: [
          'style-loader',
          {
            loader: 'css-loader',
            options: {
              modules: true,
            }
          },
          'postcss-loader'
        ]
      },
    ],
    postcss: [
      values
    ]
};
```

```
/* color.css */

@value blue: #0c77f8;
@value red: #ff0000;
@value green: #aaf200;
```

```
@value colors: "./colors.css";
@value blue, red, green from colors;

.title {
  color: red;
  background-color: blue;
}
```

## Vuevuex

### eventBus

Vue eventBus ,

### Vue.observable

Vue data

## PerformanceObserver

```
const performanceMetrics = {};
function perfObserver(list, observer) {
  // "measure"
  var entries = list.getEntries();
  for (const entry of entries) {
    // `entry` is a PerformanceEntry instance.
    // `name` will be either 'first-paint' or 'first-contentful-paint'.
    const metricName = entry.name;
    const time = Math.round(entry.startTime + entry.duration);
    // FP
    if (metricName === 'first-paint') {
      performanceMetrics.fp = time;
    }
    // FCP
    if (metricName === 'first-contentful-paint') {
      performanceMetrics.fcp = time;
    }
  }
}
var observer2 = new PerformanceObserver(perfObserver);
observer2.observe({entryTypes: ["paint"]});
```

## vConsole

vconsole

```
<script src="path/to/vconsole.min.js"></script>
<script>
// init vConsole
var vConsole = new VConsole();
console.log('Hello world');
</script>
```

import

```
import VConsole from 'vconsole/dist/vconsole.min.js' //import vconsole
let vConsole = new VConsole() //
```

vconsoledebug

network

## AlloyLever

AlloyLeverAlloyTeamWeb vConsole

npm

```
npm install alloylever
```

js

```
<script src="alloylever.js"></script>
```

js

## Eruda

Eruda

```
<script src="//cdn.jsdelivr.net/npm/eruda"></script>
<script>
eruda.init();
console.log(' ');
</script>
```

psiph5

## spy-debugger

spy-debugger webviewHybridAppHTTP/HTTPSUSB

- 1.
2. USB
3. HTTPS
4. spy-debuggerweinrenode-mitmproxyAnyProxy
5. ApphttpswebviewhttpsSSL pinningApp
6. (AnyProxy) ()

## **DevTools**

android&Html5WebViewDevToolschromeWebView

DevToolswebview!

:

1. USB
2. webview
3. USB
4. chrome:chrome://inspect/#devices
5. inspect

DevTools

## **dev-server**

webpack-dev-server webpack webpack-dev-middleware webpack-dev-server express  
webpack compiler webpack websocket bundle.js websocket webpack-dev-middleware webpack compiler outputFileSystem in-memory fileSystem webpack watch webpack

webpack ok hot liveReload hotReload hotReload

hot HMR hot accepted accepted accept

<https://blog.csdn.net/LuckyWinty/article/details/109507412>

## **webpackpluginloader**

## **webpackloaderplugin**

Loader""

Plugin""webpackwebpackapplycompilewebpack

## **Loader**

- module.exports
- source()
- (loaderloader)
- return()

## **Plugin**

- 
- apply
- webpackAPI

- webpack

## webpack

- webpack.config.js
- compiler plugins webpack
- webpack.config.js entry AST
- loader loader
- UglifyPlugin loader UglifyJs clean-webpack-plugin dist
- entry output chunk
- output chunk

## CSSWebpack

### jscsshtml

### webpackgulp

#### gulp webpack

```
,    ,,SPA  
    ,,babeljs
```

## webpack

## webpack

### loadercss-loaderstyle-loader

1. css-loader css @import url
2. style-loader DOMheadstyle innerHTML

loader

loaderloaderscss:

- sass-loaderscsscss
- css-loadercss
- style-loadercssJavaScript

## Redux

### 1. Redux

reactpropsreduxstore

### 2. Redux

store dispatch state action store restore subscribe state render

### 3. Redux

- Redux store
- State  
React set state render Redux state action action state reducer  
reducer action state Redux
- Reducer  
Reducer action state state action state Reducer state state Redux Redux  
(combineReducers) Redux state == state state == Redux

### 4.

#### 4.1 createStore

```
export default function createStore(reducer, initialState) {
  let state = initialState // 
  let listeners = [] 
  // 
  function getState() { 
    return state 
  } 
  //reducer 
  function dispatch(action) { 
    //reducer state 
    state = reducer(state,action) 
    // 
    listeners.forEach(listener => listener()) 
  } 

  // state 
  function subscribe(listener) { 
    listeners.push(listener) // 
    return function () { 
      let index = listeners.indexOf(listener) 
      listeners.splice(index,1) 
    } 
  } 
  // 
  dispatch({type: '@@REDUX_INIT'}) 
  return { 
    getState, 
    dispatch, 
    subscribe 
  } 
}
```

action\_type.js

```
export const ADD = 'ADD'
export const MINUS = 'MINUS'
```

reducer.js

```
import * as TYPES from './actions_type'
let initialState = {number: 0}
export default function reducer (state = initialState, action) {
    switch (action.type) {
        case TYPES.ADD:
            return {number: state.number + 1}
        case TYPES_MINUS:
            return {number: state.number - 1}
        default:
            return state
    }
}
```

store.js

```
import {createStore} from 'redux'
import reducer from './reducer'
const store = createStore(reducer)
export default store
```

Counter.js

```
import React, {useState, useEffect} from 'react'
import store from '../store'
import * as TYPES from '../store/actions_type'
//  

export default class Counter extends React.Component {
    state = {number: store.getState().number}
    componentDidMount() {
        //  

        this.unSubscribe = store.subscribe( () => {
            this.setState({number: store.getState().number})
        })
    }
    //  

    componentWillUnmount() {
        this.unSubscribe()
    }
    render() {
        return (
            <div>
                <p>{this.state.number}</p>
                <button onClick={()=> store.dispatch({type:TYPES.ADD})}>+</button>
                <button onClick={()=> store.dispatch({type:TYPES_MINUS})}>-</button>
            </div>
        )
    }
}
```

```

        }
    }

// 
export default function Counter (props) {
    let [number, setNumber] = useState(store.getState().number)
    //
    useEffect(() => {
        return store.subscribe(() => { //
            setNumber(store.getState().number)
        })
    },[]) // useEffect
    //
    return (
        <div>
            <p>{store.getState().number}</p>
            <button onClick={()=> store.dispatch({type:TYPEs.ADD})}>+</button>
            <button onClick={()=> store.dispatch({type:TYPEs_MINUS})}>-</button>
        </div>
    )
}
/***
 *
 * 1.
 * 2.
 * 3.
 */

```

## 4.2 bindActionCreators

```

export default function (actionCreators, dispatch) {
    let boundActionsCreators = {}
    //action
    for(let key in actionCreators) {
        boundActionsCreators[key] = function(...args) {
            //dispatchaction
            return dispatch(actionCreators[key](...args))
        }
    }
    return boundActionsCreators
}

```

```

function bindActionCreator(actionCreator, dispatch) {
  return function () {
    return dispatch(actionCreator.apply(this, arguments))
  }
}

/**/
  actionCreators: action createaction create
  dispatch: store.dispatch
*/
export default function bindActionCreators(actionCreators, dispatch) {
  // actionCreatorsbindActionCreatoraction createdispatch
  if (typeof actionCreators === 'function') {
    return bindActionCreator(actionCreators, dispatch)
  }
  // actionCreatorsnull
  if (typeof actionCreators !== 'object' || actionCreators === null) {
    throw new Error(
      `bindActionCreators expected an object or a function, instead received
${actionCreators === null ? 'null' : typeof actionCreators}. ` +
      `Did you write "import ActionCreators from" instead of "import * as
ActionCreators from"?`
    )
  }

  // action create
  const keys = Object.keys(actionCreators)
  // dispatchaction create
  const boundActionCreators = {}
  for (let i = 0; i < keys.length; i++) {
    const key = keys[i]
    const actionCreator = actionCreators[key]
    // action create
    if (typeof actionCreator === 'function') {
      //
      boundActionCreators[key] = bindActionCreator(actionCreator, dispatch)
    }
  }
  //
  /**
   boundActionCreators
   {
     actionCreator: function() {dispatch(actionCreator.apply(this,
arguments))}
   }
  */
  return boundActionCreators
}

```

Counter.js

```
import React, {useState, useEffect} from 'react'
import store from '../store'
import actions from '../store/actions_type'
import { bindActionCreators } from 'redux'

let boundActions = bindActionCreators(actions, store.dispatch)
// 

export default class Counter extends React.Component {
    state = {number: store.getState().number}
    componentDidMount() {
        //
        this.unSubscribe = store.subscribe( () => {
            this.setState({number: store.getState().number})
        })
    }
    //
    componentWillUnmount() {
        this.unSubscribe()
    }
    render() {
        return (
            <div>
                <p>{this.state.number}</p>
                <button onClick={boundActions.add}>+</button>
                <button onClick={boundActions.minus}>-</button>
            </div>
        )
    }
}
```

#### 4.3 combineReducers

```

/** 
 * reducer
 * 1. reducerreducer
 * @param {*} state
 * @param {*} action
 */
export default function combineReducers(reducers) {
    //statestate = {counter1:{number:0},counter2:{number:0}}
    return function (state={}, action) {
        let nextState = {}
        // debugger
        for(let key in reducers) {
            let reducerForKey = reducers[key] //key = counter1,
            //
            let previousStateForKey = state[key] //{number:0}
            let nextStateForKey = reducerForKey(previousStateForKey,action) //reducer
            nextState[key] = nextStateForKey //{number: 1}
        }
        return nextState
    }
}

```

## react-redux Providerconnect

Provider.js

```

import React from 'react'
import ReactReduxContext from './context'
/** 
 * Provider store
 * @param {*} props
 */
export default function (props) {
    return (
        <ReactReduxContext.Provider value={{store:props.store}}>
            {props.children}
        </ReactReduxContext.Provider>
    )
}

```

connect.js

```

import React, {useContext, useState, useEffect} from 'react'
import ReactReduxContext from './context'
import { bindActionCreators } from 'redux'

export default function (mapStateToProps,mapDispatchToProps) {
    return function(OldComponent){
        //
        return function(props) {
            //state
            let context = useContext(ReactReduxContext) //context.store
            let [state,setState] =
            useState(mapStateToProps(context.store.getState()))
            //useState
            let [boundActions] = useState(() =>
            bindActionCreators(mapStateToProps,context.store.dispatch))
            //
            useEffect(() => {
                return context.store.subscribe(() => {
                    setState(mapStateToProps(context.store.getState()))
                })
            },[])
            // render
            // let boundActions =
            bindActionCreators(mapStateToProps,context.store.dispatch)
            //
            return <OldComponent {...props} {...state} {...boundActions} />
        }
    }
}

```

## 4.5 redux middlewares

reduxaction -> reducer dispatchactionreducer -> ->reduxreduxaction ->  
-> reducer dispatch actionmiddlewaresreducer

action

### 4.5.1

```

import {createStore} from 'redux'
import reducer from './reducers/Counter'
const store = createStore(reducer)
//1.dispatch
// let dispatch = store.dispatch
// //2.dispatch
// store.dispatch = function (action) {
//   console.log('',store.getState())
//   //dispatch
//   dispatch(action)
//   console.log('', store.getState())
// }

function logger ({dispatch, getState}) { //dispatchdispatch
  return function (next) { //nextdispatchstore.dispatch
    //dispatch
    return function (action) {
      console.log('' , getState())
      next(action) //store.dispatch(action)
      console.log('' , getState())
      // dispatch(action) //dispatchdispatch
    }
  }
}

function applyMiddleware(middleware) { //middleware = logger
  return function(createStore) {
    return function (reducer) {
      let store = createStore(reducer) // store
      let dispatch
      middleware = middleware({ //logger getState dispatch
        middleware = function(next)
          getState: store.getState,
          dispatch: action => dispatch(action) //dispatch store.dispatch
        })
        dispatch = middleware(store.dispatch) //middleware store.dispatch
      next
        return {
          ...store,
          dispatch
        }
      }
    }
  }
let store = applyMiddleware(logger)(createStore)(reducer)
export default store

```

#### 4.5.2 thunk

```

function thunk ({dispatch, getState}) {
  return function (next) {
    return function (action) {
      if(typeof action === 'function') {
        action(dispatch, getState)
      }else {
        next(action)
      }
    }
  }
}

function applyMiddleware(middleware) { //middleware = logger
  return function(createStore) {
    return function (reducer) {
      let store = createStore(reducer) // store
      let dispatch
      middleware = middleware({ //logger getState dispatch
middleware = function(next)
      getState: store.getState,
      dispatch: action => dispatch(action) //dispatch store.dispatch
    })
      dispatch = middleware(store.dispatch) //middleware store.dispatch
next
      return {
        ...store,
        dispatch
      }
    }
  }
}
let store = applyMiddleware(thunk)(createStore)(reducer)
export default store

```

#### 4.5.3

applyMiddleware

```

function compose(...funcs) {
  if (funcs.length === 0) {
    return (arg) => arg
  }

  if (funcs.length === 1) {
    return funcs[0]
  }

  return funcs.reduce((a, b) => (...args) => a(b(...args)))
}

function applyMiddleware(...middlewares) { //middleware = logger
  return function(createStore) {
    return function (reducer) {
      let store = createStore(reducer) // store
      let dispatch = () => {
        throw new Error(
          'Dispatching while constructing your middleware is not allowed.
          +
          'Other middleware would not be applied to this dispatch.'
        )
      }
      let middlewareAPI = {
        getState: store.getState,
        dispatch: action => dispatch(action) //dispatch store.dispatch
      }
      chain= middlewares.map(middleware => middleware(middlewareAPI))
      dispatch = compose(...chain)(store.dispatch)
      // dispatch = middleware(store.dispatch) //middleware
      store.dispatch next
      return {
        ...store,
        dispatch
      }
    }
  }
}
let store = applyMiddleware(promise,thunk, logger)(createStore)(reducer)

```

## React

setState  
 componentdirtyComponents = [], batchUpdate  
 transactionclose  
 dirtyComponents  
 ComponentupdateComponent  
 renderrenderedElement  
 renderedElement  
 update  
 re-render  
 propsmarkupDOM

## TLS

Transport Layer Security (TLS) TLS

## TLS

- Client hello (random\_C)
- Server hello(random\_S)
- 
- Server hello done
- 
- Pre-Master Pre-Master
- Pre-Master Pre-Master random\_C random\_S pre-master  
enc\_key=Fuc(random\_C, random\_S, pre-master)
- Change cipher spec
- Client finished
- Change cipher spec
- Server finished
- 

## **WeakRef FinalizationRegistry**

WeakRefAPI

WeakRef FinalizationRegistry ApiChrome v84 Node.js 13.0.0

## **post**

JavaScript

- XSS
- SQL
- OS
- HTTP
- CSRF
- .....

URL URL

- HTTPHTTPS
- TCP/IP IP
- 

URL http://store.company.com:80/dir/page.html

**URL**

http://store.company.com:80/dir2/page.html  
http://store.company.com:80/dir/inner/another.html  
https://store.company.com:443/secure.html              HTTP HTTPS  
http://store.company.com:81/dir/etc.html  
http://news.company.com:80/dir/other.html

DOMWeb

- DOM JavaScript DOM DOM
- Web Web XMLHttpRequest Fetch API XMLHttpRequest Fetch CSRF
- 

HTTP XMLHttpRequest Fetch API HTTP CORS

## CORS

CORB

CORB CORB

AJAX

Cross-Origin Resource Sharing CORS CORS Web

CORS HTTP OPTIONS CORS

CORS

1. HTTP GET HEAD POST HTTP HTTP
2. HTTP AcceptAccept-LanguageContent-LanguageLast-Event-IDContent-Type application/x-www-form-urlencodedmultipart/form-data text/plain HTML header field DPRDownloadSave-DataViewport-WidthWidth
3. ReadableStream
- 4.
5. XMLHttpRequestUpload XMLHttpRequestUpload XMLHttpRequest.upload

CORS HTTP

OPTIONS

:

Request URL: [https://api.juejin.cn/content\\_api/v1/short\\_msg/query\\_list?aid=2608&uid=7185916214240413224&spider=0](https://api.juejin.cn/content_api/v1/short_msg/query_list?aid=2608&uid=7185916214240413224&spider=0)

Request Method: OPTIONS

Status Code: 204

Remote Address: 127.0.0.1:10809

Referrer Policy: strict-origin-when-cross-origin

Response Headers

- access-control-allow-credentials: true
- access-control-allow-headers: content-type,x-secsdk-csrf-token
- access-control-allow-methods: POST
- access-control-allow-origin: <https://juejin.cn>
- access-control-max-age: 86400
- date: Tue, 22 Aug 2023 01:35:87 GMT
- eagleid: 7908029a16926681079485916
- server: Tengine
- server-timing: inner; dur=6, tt\_awg; dur=1
- server-timing: cdo-cache-desc,MSS,edge,dur=10,pcln,dur=45

- Access-Control-Request-Method CORS HTTP POST
- Access-Control-Request-Headers CORS content-type,x-secsdk-csrf-token
- Access-Control-Allow-Origin <https://juejin.cn>\*
- Access-Control-Max-Age 1 86408 1 86408

## CORS Origin Access-Control-Allow-Origin

Request URL: [https://api.juejin.cn/content\\_api/v1/short\\_msg/delete?aid=2608&uid=7185916214240413224&spider=0](https://api.juejin.cn/content_api/v1/short_msg/delete?aid=2608&uid=7185916214240413224&spider=0)

Request Method: POST

Status Code: 200

Remote Address: 127.0.0.1:10809

Referrer Policy: strict-origin-when-cross-origin

Response Headers

- access-control-allow-credentials: true
- access-control-allow-origin: <https://juejin.cn>
- access-control-expose-headers: X-Ware-Csrf-Token,X-Tt-LogId
- all-cdn-origin-error-code: end05\_200\_0
- content-length: 44
- content-type: application/json; charset=utf-8
- date: Tue, 22 Aug 2023 04:06:08 GMT
- eagleid: 0ed7ac9e169267716830a2995e
- server: Tengine
- server-timing: inner; dur=93, tt\_awg; dur=76

## Access-Control-Allow-Origin

- Access-Control-Allow-Origin \*Access-Control-Allow-Origin: <https://juejin.cn> Access-Control-Allow-Origin
- Access-Control-Allow-Headers \*Access-Control-Allow-Headers: X-PINGOTHER, Content-Type Access-Control-Allow-Headers
- Access-Control-Allow-Methods \* HTTP Access-Control-Allow-Methods: POST, GET Access-Control-Allow-Methods
- Cookie

Cookie Access-Control-Allow-Origin \* Access-Control-Allow-Origin  
<https://juejin.cn>

Set-Cookie Cookie

## **webpack dev cors**

Ajax

Webpack Dev Server Webpack Dev Server Webpack Dev Server