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,

Event Loop:

1. Javascript(setTimeoutPromise.then)
2. Javascriptcall-stack
3. microtask queuecall-stackmicrotask queue1
4. microtask queuemicrotask queue **microtaskmicrotaskmicrotask queue**
5. microtask queuemicrotask queue
6. UI rendering
7. macrotask queue
8.
9. 3 - 8
   ...

Event Loop3:

1. macrotask queue
2.
3. UI rendering

NodeJsEvent Loop

libuv

NodeJs

NodeJsEvent Loop6

NodeEvent Loop6:

- `timers`: setTimeoutsetIntervalcallback
- `I/O callbacks`: close callbackstimerssetImmediate()
- `idle, prepare`:
- `poll`: I/O
- `check`: setImmediatecallback(setImmediate()setImmediate)
- `close callbacks`: `closecallbacksocket.on('close', fn)http.server.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 queuemacrotask queue

Microtask
Next Tick Queue
Other Micro Queue
process.nextTick的回调1
process.nextTick的回调2
process.nextTick的回调3
process.nextTick的回调4
process.nextTick的回调5
.....
Promise的回调1
Promise的回调2
其他微任务的回调3
其他微任务的回调4
Promise的回调5
.....
执行到相应队列时，
全部执行，
直到对列为空

setTimeout(fn, 0)setImmediate(fn)

1. : timersetImmediateCheck QueueTimers QueueTimer QueueCheck QueuesetImmediatetimersetTimeoutTimers QueueTimers QueueTimers QueuesetTimeouttimer **setImmediate(fn)setTimeout(fn,**
2. : timersetTimeoutTimers QueuesetImmediateCheck QueueTimers QueueTimers QueuetimerCheck QueuesetImmediate **0)setImmediate(fn)**
3. setTimeout(fn, 0)setImmediateIOreadFile('xx', function () {// ....})IOI/O Callbacks QueuesetTimeoutTimers QueuesetImmediateCheck QueueI/O Callbacks Queue Check QueueTimers QueuesetImmediatesetTimeout(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
```

:

- setImmediatesetImmediatesetImmediate check check

poll :

poll :

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

polltimers:

- pollEvent Looppoll queuepoll queuecallback
- poll:
    - setImmediateEvent LooppollcheckCheck QueuesetImmediate
    - setImmediatepollcallback

polltimers:

- poll queueEvent LoopTimers QueueEvent LooptimerTimers Queuetimers **checkI/O callbacks?**

setTimeout setImmediate

- setTimeout(fn, 0)timerspolltimer
- setImmediate(fn)check

- (main module)
- I/O CirclesetImmediateCheck

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

fetchPromisePromisePromisepolyfillfetchpolyfill

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

IEIE8/9IE8ES3IE9ES5ES5polyfill 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

fetchpromisefetchpromisehttp400500rejectresolvefetch 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.racepromisepromiseracepromise

```
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

fetchJSONPjavascriptJSON“”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)](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

<img />APIsServiceWorkerresponseCache APIscriptcssCDNCORS

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);
/*
ƒ 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');
```

person1person2[[Prototype]]ES5 **proto**ES6 **proto**API Object.setPrototypeOf()Object.getPrototypeOf()Object.create()

prototype **proto**

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

JavaScript [[Prototype]] JavaScript obj. **proto** = ... [[Prototype]] [[Prototype]] 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

6

:

```
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 Classextends

ES6class **ES5**ES5ES6

```
//
class Point {
  constructor(x, y) {
    this.x = x;
    this.y = y;
  }

  toString() {
    return '(' + this.x + ', ' + this.y + ')';
  }
}

var point = new Point(10, 10);
```

constructorthistoString()newfunctionthis

newES6 newnew.targetnewnewnew.targetundefined

static

```
class Foo {
  static classMethod() {
    return 'hello';
  }
}

Foo.classMethod() // 'hello'

var foo = new Foo();
foo.classMethod()
// TypeError: foo.classMethod is not a function
```

extendssupersupersupersuper

```
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

HTTP 28.4KB

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

13.05 / 204.16 = 6.39% 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	hot	(disk ...	3.
hm.js?98beee57fd2ef70...	200	http/1.1	script	hot	208 B	6.
push.js	200	h2	script	hot	(disk ...	6.
init.js	200	h2	script	init.js	(disk ...	1.
analytics.js	200	http/2+quic...	script	js?id=UA-1...	(disk ...	2.
zap.js	200	h2	script	main.app.7f...	(disk ...	3.
hm.gif?cc=1&ck=1&cl=...	200	http/1.1	gif	hm.js?98be...	299 B	1.
hm.gif?cc=1&ck=1&cl=...	200	http/1.1	gif	hm.js?98be...	299 B	1.
s.gif?r=https%3A%2F%...	200	http/1.1	text/...	push.js:1	116 B	1.
home.up	200	h2	fetch	init.js:1	2.1 KB	4.

https://blog.csdn.net/q411020382

h2 HTTP2 http/1.1 HTTP1.1

- HTTPHTTPSHTTP2 (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. 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)
- Vue.js (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)
- CDN (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]
```

@掘金技术社区

- [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).

```
<img data-src="https://avatars0.githubusercontent.com/u/22117876?
s=460&u=7bd8f32788df6988833da6bd155c3cfbebc68006&v=4">
```

JS

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

- web (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)">
  <img src="banner_w800.jpg" alt="">
</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)

(5). CSS3

CSS CSS3

(6). webp

WebP Alpha JPEG PNG

- WebP PNGJPG (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): initialasyncallchunksall(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)
- webpack (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)
- webpack (https://webpack.docschina.org/guides/caching/)
- webpack4splitChunk (https://juejin.cn/post/6844903614759043079)

11.

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

DOM

JavaScript GUI

- **DOM**
-
-
-
-

- **JavaScript class**
- **DOM DOM display:noneDocumentFragment**

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/)

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 (1 / 60 = 16.66) 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

18. Web Workers

Web Worker worker JavaScript ,

Web Worker UI

worker URI worker main.js

```
var myWorker = new Worker('worker.js');
// postMessage() onmessageworker
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)

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.

JavaScript C/C++ DOM

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)

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)

-
- Web
- JavaScript
- Web (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.

,

浏览器请求
无缓存
向web服务器请求
请求响应，缓存协商
呈现
1. 是否缓存Expires、Cache-Control
2. 缓存时间
3. Etag
4. Last-Modified
等等

,,(),,

- header　　cache-controlexpiresheader

```
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-Modified304 Not ModifiedETagresponse headerETagETag

Last-ModifiedEtag

Last-ModifiedEtagHTTP1.1EtagLast-Modified

- ()GET
- (1sN)If-Modified-Sinces(UNIXMTIME)
-

EtagEtag

: Last-ModifiedETagETagLast-Modified304

Expires/Cache-Control Last-Modified/ETag

F5
Ctrl + F5

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

queryquery

HTTP

HTTP3HTTP19893

HTTP 0.9	Get HTML
HTTP 1.0	POSTDELETEPUTHEADER
HTTP 1.1	Connection ,keep-alive cache-control etag Header
HTTP 2.0	 Header , 2005

1HTTP 0.9

HTTP 0.9HTTPGETHTTP 0.9HTML

HTTP 0.9HTTP0.9HTTP 0.9WebTCPWeb

2HTTP 1.0

HTTPHTTPHTTP 0.9

-
-
-
- POSTWebGETHEADPOST
- TCP2(head of line blocking)(head of line blocking)

3HTTP 1.1

HTTPHTTP 1.1 HTTP 1.1HTTPHTTP 1.1

HTTP 1.1keepalivechunked

Persistent Connectionkeepalive

HTTPTCPHTTPHTTP1.0 `Connection: Keep-Alive`HTTP 1.1 HTTP `Connection: close` FIFORequest

chunked

0()

HTTP1.1rangeContent-Range206Partial 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

- HostHTTP1.0IPURLhostnameMulti-homed Web ServersIPHost
- Request methodHTTP1.1OPTIONS, PUT, DELETE, TRACE, CONNECT
- HTTP/1.11.0cachee-tagsCache-Control

4HTTP 2.0

HTTP 2.0HTTP

HTTP 2.0HTTP HTTP URI 2.0 HTTP 2.0 HTTP1.xHeaders
request bodyData

HTTP 2.0

HTTP2.0-

HTTPHTTP

-
- 1 IP2

HTTP2 (https://imqugu.com/post/header-compression-in-http2.html)

HTTP2

-
- Header
- uffman Coding

HTTP1.1HTTPTCPHTTP2RST_STREAM

Server PushXZZ

TCPHTTP1.1TCP

TCP

head-of-line blockingTCP

TCP3Web3

TCP

HTTP

HTTPTCPHTTPHTTPpipelining

HTTP

HTTP1.1 keep-alive

HTTP

HTTP“-”

-
-
- HTTP1.0HTTP1.0Keep-AliveHTTP1.1persistentHTTP
-
- HTTP1.1pipeliningTCPHTTP

HTTP

1. FIFOHTTP
2.
3. GETHEAD

HTTP

HTTP

HTTP

HTTP1.1/HTTP2HTTP2//

HTTP2HTTP2TCPTCP

TCP

TCPTCPTCPTCP

googleQUICTCPTCPUDPUDP

SCTPTCPUDPSCTP

TCPHTTP

1. “”TCPHTTPTCP
2. TCPHTTP

quicTCPUDPSCTP

QUIC

QUICQuick UDP Internet ConnectionUDPTCPTLSHTTP/2

QUICUDPTCP

UDPTCPTCPTCPTCPCPUUDPTCPTCP

WebTCPTCPTCPTCPTCPTCPUDP

QUICClientServerUDPQUICTCP

QUIC

1.

TCP+TLS1~2RTT+httpTCPHTTPS2 ~3RTTQUICUDP1RTT0RTT

2.

QUICTCPTLSHTTPS/2TLS

3.

QUICTCP

4.

QUICTCP Packet NumberRTT

5.

HTTP2TCPHTTPTCPHTTP2TCPHTTP2QUICconnectionstreamstreamstream stream

QUICUDPTCP

CDNCDNQUICCDNCDNQUICQUICIP

QUIC

- ChromeQUICQ43CDNQUICQ39CDNQUIC
- AppAppQUICIsquic-clientcronet

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

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了一个条件性的请求，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

- 400401, 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

WebRTCWeb Real-Time CommunicationAPI

WebRTC WebRTC

1. WebRTCWebRTCGoogleWebRTCHTMLJavaScript APIWeb/
2. WebRTC/codecGoogle
3. WebRTCSTUNICETURNRTP-over-TCPNAT

1.

2. WebRTCP2P
3. WebRTC
4.
5. NativeWebRTCWebNativeAPI

EventSource

EventSource

EventSource EventSourceHTTPtext/event-stream ,

WebSockets,. IndexedDBWebEventSource

- `EventSource`Server-sent eventsSSEhttp `text/event-stream` `EventSource.close()`
- `EvenSource`XHR-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**: EventSourceaddEventListener()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);
```

- http

- : HTTPCPU
- :

(Long Polling)

sockjs

:

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

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-WebSocketSocketTCPWebSocketWebSocketServer

HTTPWebSocket

- HTTPHTTP
- HTTPHTTP headerWebsocketrequestTCP HTTP headerHTTPHTML5 multiplexingURLWebSocketHTTP

WebSocket

httpWebSocketTCPhttpWebSocketWebSockethttp

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:AYtwtwampsFjE0lu3kFQrmOCzLQ=
```

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

-

  src src

-

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

```html
<!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>
```

3.

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

```html
<!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 300pxleftorder: -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 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.

```

```

6. BFC IFC

```
  BFC
```

CSSJSCSS

IE

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

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 pading

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;
```

```
window.getComputedStyle(element).width/height;
```

Chrome

IE

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

IEcss

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

api viewport api lefttopwidthheight

margin/margin

marginmargin (margin)

PS margin

Document
file:///Users/smyhvae/Dropbox/smyhvae.com/
20px就塌陷在了50px中
margin-bottom: 20px;
竖直方向的margin不叠加，以较大的为准，所以间距是50px
margin-bottom: 50px;

```html
<!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

```
overflow: hidden110pxBFC
```

paddingmargin

```
margin
```

divp

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

```
pmargin-top:50px;50px
```

```
divborder
```

```
bordermargin""""
```

margin marign

```
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 hiddenauto
- 2 floatnone BFC
- 3 posiiton s taticrelative absolutefixedBFC
- 4 displayinline-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

2BFCfloat

div

```html
<!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">
        smyhvaesmyhvaesmyhvaesmyhvaesmyhvaesmyhvaesmyhvaesmyhvae
smyhvaesmyhvaesmyhvaesmyhvae
    </div>
</section>

</body>
</html>
```

BFC　BFC　float boxrightoverflow

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

```
father-layout
```

3

```html
<!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>
```

0

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 **false**false

DOM3

```
element.addEventListener('keyup', function () {

}, false);
```

DOM3

PS DOM1 DOM1

“DOM”

DOM

DOM

-
-

DOM

DOM

```
window

Window
```

JS事件捕获与事件冒泡原型图
html
useCapture = true
事件捕获
事件冒泡
useCapture = false
body
ul
li
p
a
事件目标(target)
addEventListener(ev, fn, useCapture)

DOM

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

- PS1 **window** bodyhtml
- PS2 JSDOM windowdoucument

```
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 api

```
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();
```

addEventListenerABA BA B stopImmediatePropagation A

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);
```

CSStransformpositionGPUCSS

transformposition:absolute

1. position + top/left

left top css

```html
<!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

```html
<!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

DOMDOMCSSGPUGPU 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 repaintGPU repaint

GPU

GPU

CSSGPU

1. transform
2. opacity
3. filter

GPU

2D transform repaint

```
.exam1 {
  transform: translateZ(0);
}

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

3D transformGPU

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 GPUCSS

- 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)](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

`-> -> -> 10s rIC deadline`

50ms deadline 50ms

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

1 ReSpec

§ 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.

> 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.

1 ReSpec

§ 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.

§ 7. Privacy and Security

When an idle callback is scheduled the user agent provides an estimate of how long it expects to remain idle. This information can be used to estimate the time taken by other application tasks and related browser work within that frame. However, developers can already access this information via other means – e.g. mark beginning of the frame via `requestAnimationFrame`, estimate the time of the next frame, and use that information to compute "remaining time" within any callback.

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

```html
<!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 < 2000) {
          window.requestAnimationFrame(step);
        }
      }
      //
      window.requestAnimationFrame(step);

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

requestIdleCallback alert('rIC')

alert left rIC

step 1000

```html
<!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

```html
<!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);
```

:

```
//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);
```

:

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 imgimageximageyimagewimageh (canvasx, canvasy, canvasw, canvash)

```
//
//imageximageyimagewimageh
//(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 documentwindowparentWorker navigatorlocation

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

OffscreenCanvascanvas

Canvas

Canvas WebGLwebweb

CanvasJavaScriptCanvasAPICanvas

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 APIDOMOffscreenCanvasCanvasDOMCanvas API

OffscreenCanvasDOMCanvasCanvasDOMCanvasWeb WorkerWeb Worker DOMCanvas

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) Web——WorkerDOMWorkerCanvas API

OffscreenCanvasDOMWorkerCanvas APIWorkerOffscreenCanvas

```
// 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

WebRTCYUV

WebRTC YUV YUV Cavans

[yuv-canvas (https://github.com/brion/yuv-canvas)](https://github.com/brion/yuv-canvas)[yuv-buffer (https://github.com/brion/yuv-buffer)](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	$O(n\log_2 n)$ ~$O(n^2)$	$O(n^{1.3})$	$O(n^2)$	$O(1)$
起泡排序	$O(n^2)$	$O(n)$	$O(n^2)$	$O(1)$
快速排序	$O(n\log_2 n)$	$O(n\log_2 n)$	$O(n^2)$	$O(\log_2 n)$ ~$O(n)$
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. titledescriptionkeywordstitle 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

`<img>titlealt`

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

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

dotype

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

- accesskey:<a href="#" accesskey="a">aaa</a> 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/Mi

-
-
-
-

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)**:

    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**301/302POSTLocationGETHTTP 1.1
  - **304 Not Modified**
  - **305 Use Proxy**LocationHTTP 1.1
  - **306 unused**
  - **307 Temporary Redirect**302 Found302POSTPOST303HTTP 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**MIMEAccpetHTTP 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 #ocho {
  color: red;
}

/* saf3+, chrome1+ */
@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 widthmargin computed valueline-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/)
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/)**

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/)

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)
    - 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)
    - 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)
    - 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)
    - 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)
    - 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)
- color (https://developer.mozilla.org/en-US/docs/Web/CSS/color)
- visibility (https://developer.mozilla.org/en-US/docs/Web/CSS/visibility)
- 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>DDDDDDDDDDDd</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. `floatnone`
3. `positionabsolutefixed`
4. `displayinline-block`,`table-cell`, `table-caption`,`flex`, `inline-flex`
5. `overflowvisible`

1.
2.
3. margin

display,float,position

1. `display` none position float
2. position absolute fixedfloat 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. `positionrelativestatic` `displayblock`,`list-item`, `table`

3. `positionfixed` viewport paged media page area

4. `positionabsolutepositionrelative`,`absolutefixed`

    - the containing block is the bounding box around the **padding boxes** of the first and the last inline boxes generated for that element.
    - **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
    </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
- <a href="../index.html">link</a> 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 <img>,<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
- symbol (https://developer.mozilla.org/en-US/docs/Glossary/Symbol)(ES6)

- 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)

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) key**

```
localStorage.setItem('x', 1); // storge 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-agepath**, **domainsecure**
- cookie **max-age=seconds** cookie
- cookie **pathdomain**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   0cookie

//cookiedocument.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 1false 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

- networkfrom memoryfrom disk
- Cache-Controlhttp1.1Expireshttp1.0
- Cache-control
- Expires
- Cache-ControlExpiresExpires
- Cache-control

3(expires)

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

4(cache-control)

- ExpiresHTTP/1.1Cache-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
        - privatedefault
        - 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`
-
  - 1. 304200
-
  - 1.
  - 2.
  - 3.
  - 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`**
-
  - 1.
  - 2.
-
  - 1. ETag
  - 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

```
//  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 StrippingHTTPSHTTP

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.protoype
    - 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: ƒ}
arrayLike2.push(2);
console.log(arrayLike2); // {2: 1, 3: 2, length: 4, push: ƒ}
```

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-promisewhatwg-fetch Polyfill.io JS

Polyfill.io UserAgent polyfills Polyfill.io polyfillsdocument.querySelector Element.classListES5 Array Date.nowES6 Object.assignPromise

`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. webpacks ASTloaderAST
4.

noParse

-
- jquery
-

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

IgnorePlugin

-
- moment ./locol
- 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-pluginissue pr
  Webpack 4.0uglifyjs-webpack-pluginparallel

```
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 externalvuebundle
- 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: ['You application is running here http://localhost:3000'],
        notes: ['Some additionnal notes to be displayed unpon 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("runnng");
});
```

promise Promise

1Promise

1. Promisepending()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()PromisethenthenPromise.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);
```

```
                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
    - 4ECMAScript 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 HTMLJavaScript CSSSPA HTML UI

SPA

-
- SPA
-

SPA

- Web JavaScriptCSS
-
- SEO SEO

Vue.jsDOM

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: workerDate ${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)mixinsloopscsscss

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
    -
    -
    - classthis
    -
- hookshooks
    - useState
    - useEffect
    - useContext React.createContext
    - useReducer useState(stateaction) => newStatereducerdispatch
    - 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_createPortalcreatePortal
- 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

Reactthis.statethis.setState

- setStatesetStatesetState
- shouldComponentUpdate===

/

1. slice
2. Object.assign
3. ES6Spread 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

```html
<!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

```html
<!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
-
    -
    -
    -
    -

childsiblingparent DOM DOM

```
// Fiber
{
  type //
  props // propschildren 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

ReactclickdivDOMdocumentdocumentReact
 document React SyntheticEvent event.stopPropagation
event.preventDefault

DOM
document
事件冒泡至顶层
div
合成事件层
实例化成统一的react event
Synthetic Event
Event
事件处理函数
handler1
event对象交由对应的处理器执行
handler2

1

_updateDOMPropertie s
通过lastProps、nextProps判断是否新增 / 删除事件
删除事件
新增事件
enqueuePutListener
获取document对象
listenTo

- /
- 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

extractEvents
循环plugins
SimpleEventPlugin
SelectEventPlugin
ChangeEventPlugin
...
switch
Focus
Blur
MouseDown
...
使用不同的plugin根据envenType获取不同的事件池
事件池 EventConstructor
getPooled
事件池为空？
是
否
SyntheticEvent
创建一个新的

- EventPluginHubextractEvents
- EventPlugin
- EventPlugin
-
- nodeid(key)listenerBink
-

5

函数内部
nextProps判断是否新增 / 删除事件
删除事件
deleteListener
getListener
新增事件
enqueuePutListener
获取document对象
listenTo
判断捕获/冒泡
捕获
冒泡
trapCapturedEvent
trapBubbledEvent
capture
listen
document.addEventListener存在?
document.addEventListener
document.attachEvent
监听事件
dispatchEvent
监听事件
存储事件进入transaction队列
putListener
EventPluginHub
获取绑定事件的元素的唯一标识key
listenerBank[registrationName][key]=listener
ReactUpdates.batchedUpdates
批处理
handleTopLevelImpl
获取eventTarget（真正触发事件的元素）
向上遍历父元素，将每一级的组件存入ancestors数组
遍历ancestors依次执行_handleTopLevel（react自己实现的冒泡过程）
_handleTopLevel
构造合成事件event对象
runEventQueueInBatch
enqueueEvents将事件放在队列中
executeDispatchesAndRelease
executeDispatchesInOrder
遍历eventQueue（存储了所有层级的事件）
isPropagationStopped ?
false
true
break;
executeDispatch
执行合成事件
遍历完成
release释放处理完的事件
extractEvents
循环plugins
SimpleEventPlugin
SelectEventPlugin
ChangeEventPlugin
...
switch
Focus
Blur
MouseDown
...
使用不同的plugin根据envenType获取不同的事件池
事件池EventConstructor
getPooled
事件池为空？
是
否
SyntheticEvent
创建一个新的

hooks?

Hooks React

Hooks ?

hooks

1. React hooks 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

MVW ?

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-nativereact-artreact-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

        - ReactpropspropsrenderReactPureComponentReact.memo ShouldComponentUpdate
        - renderReact.useMemoReact.useCallback
        - reduxcontextrender
        - 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. getter 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**: shouldComponentUpdatetruethis.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 ComponentReact
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,propsprops
- contextcontextcontext

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. actionstatereducers

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 = (renducers) => {
    //renducersrenducer
    return function(state = {}, action = {}) {
        let newState = {};
        for (var attr in renducers) {
            newState[attr] = renducers[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, it 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 takeEverytakeLastrace
- 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,ReactReact Native,VueWeex

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

- MVVMView Model ViewModelModel ViewModel View ModelModel View
- ViewModel View Model View Model DOM, MVVM

MVCMVP MVVM

MVC

View Controller

Controller Model

Model View

MVP

View Model Presenter

View ""Passive View Presenter

MVVM

MVVM Presenter ViewModel MVP

data-bindingView ViewModel

MVVM

MVVM

- View
- Model
- ViewModel View Model

> - JQuery UI DOM UI
> - MVVM UI UIUI ViewModel View View Model ViewModel View ViewModel

- MVVM Angluar Vue

- $digest $watch $digest
- UI DOM

- Vue Obeject.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}}
    <img src="http://xx.jpg">
  </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

- datadatagettersetterwatcher
- v-ifv-for
- v-for
- SPA keep-alive
- v-ifv-show
- key
-
-
-

-
-

2

-
- PWAWEB
- ()gzip

3SEO

-
- 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)
beforeDestroy()	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

ProxyProxyes6vue2.xvue2.xProxy

Proxyes6polyfill

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 pathparamshashqueryfullPathmatchedname

$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 [(import()) (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%](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')
}
```

nextTick

- DOM
- nextTick
- Promise MutationObserver setImmediate

setTimeoutnextTick

Vue

-
  - beforeCreate->created->beforeMount->beforeCreate->created->beforeMount->mounted->mounted
-
  - beforeUpdate->beforeUpdate->updated->updated
-
  - beforeUpdate->updated
-
  - beforeDestroy->beforeDestroy->destroyed->destroyed

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()

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

$setdepwatchersplice

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)

SSR

- SSRVueHTMLhtml
- SSRSEO
- beforeCreatecreatedNode.js
-

name

-
- name (keep-alive)
- name

```
Vue.extend = function () {
    if(name) {
        Sub.options.componentd[name] = Sub
    }
}
```

diffreactdiffvuediff

diff

diff

abcdeO(n^2)n

```
a->ea->da->ba->ca->a
```

O(n^3)

reactdiff

diffO(n^3)100010reactdiffO(n^3)O(n)

- web UIreactdiff

- DOMDOM
- key

react

domapidom

domjsdom

```
<div className="myDiv">
  <p>1</p>
  <div>2</div>
  <span>3</span>
</div>
```

```
{
  type: 'div',
  props: {
      className: 'myDiv',
  },
  chidren: [
      {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.removeChildren(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. vueclassnamereact
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
```

- **1**object.onerrorimg scriptonerror
- **2**performance.getEntries

```
 Console
```

```
performance.getEntries().forEach(function(item){console.log(item.name)})
```

```
performance.getEntries().forEach(item=>{console.log(item.name)})
```

```
api    forEach
```

```
document.getElementsByTagName('img')img
```

```
document.getElementsByTagName('img')performance.getEntries()
```

3 Error

```
error
```

test1.html

```html
<!DOCTYPE html>
<html>
    <head>
        <meta charset="UTF-8">
        <title>错误监控</title>
        <script type="text/javascript">
            window.addEventListener('error',function(e){
                console.log('捕获',e);
            },true);
        </script>
    </head>
    <body>
        <!--test.js是不存在的-->
        <script src="//123.com/test.js" charset="uft-8"></script>
    </body>
</html>
```

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> <img> <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
  - articlefooterheadernavsection
  - calendardatetimeemailurlsearch
  - webworker, websocket, Geolocation
-
  - basefontbigcenterfont, sstrikettu
  - frameframesetnoframes
- HTML5
  - IE8/IE7/IE6document.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:
    resourse/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 <B>
- 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

- basefontbigcenterfontsstrikettu
- 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 (localStorge API)
- WebSocket

webSocket

- Adobe Flash Socket
- ActiveX HTMLFile (IE)
- multipart XHR
- XHR

Page Visibility API

-
-
-

title h1 b strong i em

- title h1
- `strong` `<strong>` `<B>`
- 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 nonepositionfloat
- positionabsolutefixed floatnonedisplay
- floatnone display
- 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-blockmarginmargin
  - margin
  - margin-bottommargin-top

CSSIE

- IE W3C
- (content)(padding)(margin) (border)
- IEcontent 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 ()

- marginfont-size:0letter-spacingword-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);
- 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

lili

- li(/)
- ulfont-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; /**/
}
```

-
- IE67 overflowhidden

```
.container {
      display: table;
    }
    .content {
      display: table-cell;
      vertical-align: middle;
    }
```

- inline-block vertical-align
    - IE67

```
.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

-
  - “”
  -

-
-

-

- 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

- Chromeinput input:-webkit-autofill
- 1formautocomplete="off"
- 2input:-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 18px 1.5 * 18 = 27px
-

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

- 16.7ms 60Hz160: 1s / 60 * 1000 16.7ms

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
  - ECMAScriptJavaScript
  - DOMHTMLXML
  - BOM

JS

- undefinednullbooleannumberstringsymbol
- objectarrayfunction

- navigator.userAgent // UA.toLowerCase().indexOf('chrome')
- window // 'ActiveXObject' in window

JS

- ObjectArrayBooleanNumberString
- FunctionArgumentsMathDateRegExpError
- ES6SymbolMapSetPromisesProxyReflect

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 DomContentLoad

JavaScript

- JavaScript
    - JavaCforif{}
    - JavaScript function(){}
- JavaScript

    - JavaScriptJavaScript
    -
    -
    -

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 extendsclass 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.addListener(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 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("ffffff", 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.datachEvent) {
               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;
        },
        // eventevent
        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 strictECMAscript 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

documen.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

cloneJavaScript5NumberStringObjectArrayBoolean

```
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.isPropertyOf(object);

Array.splice() 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

- HTTPTCPHTTPTCPSSLTSLHTTPS
- HTTP80HTTPS443

HTTPS

- HTTPShttpshttpssl/tlsrefer

Http 2.0

- HTTP/2“server push”
- HTTP/2
- HTTP/2
- header compressionheader

GETPOSTPOST

- GETURL2000
- POST
- GETRequest.QueryStringPOSTRequest.FormGetPost
- POST
    -
    - POST
    - POST GET

- HTTPFTPSMTPDNS
- TCPUDP
- IP
-
-
    - ,Bit
      Frame
    - PackeT
    - Segment
    - SPDU
    - PPDU
    - OSIAPDU

304

- ETag
- 304HTTP
- A AAETag ETag AETag ETag304——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

```
define(['./a', './b'], function(a, b) {
    a.doSomething();
    b.doSomething();
});
```

- CMD

```
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.jsCPUCPU
- 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)
    - (IEIE10+)
    - 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

AndroidIOS?

-
-
-
-
-
-

- (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
- AMDCommonJSmodule.exportsexports

- 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 Expressioncss)Dynamic properties()
-
- tabletablediv+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

- titledescriptionkeywordstitle2titledescriptiondescription keywords
- HTMLW3C
- HTMLHTML
- jsjs
- iframeiframe
- alt
-

SEO?

-
        -
-
        - “”
-
        - "Alt"
-
        -
-
        -
-
        -

-
    - (CNZZ)SEO

ES6

1ES5ES6ES2015?

```
ES20152015JS  ES6JS  ES2015ES2016ES2017ES2018    ES2015ES6ES5
  ES2015ES5ES6
```

2babel?

```
babel  ES6    ES6  ES5   ES6
```

3letvarlet

```
ES6  varvar    ES5    forvar    let  var
```

4ES6String?

```
ES6    ()`
```

```
ES6Stringincludes()  indexOf(indexOf-1includesfalse),
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]

```
ES6Arrayfind()  indexOf, indexOfNaNbug([NaN].indexOf(NaN) === -1).
copyWithin(),includes(), fill(),flat(),
```

6ES6Number

```
ES6NumberisFinite(),isNaN()  isFinite(),isNaN()  NaNES5isFinite(),
isNaN()Numberi    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   ES6Classthissuperthis  super
```

```
ES6Objectis()    '==='  '==='NaN === NaN //false  Object.is
bug(Object.is(NaN, NaN) // true)
```

```
ES6Objectassign()
```

```
const target = { a: 1 };
const source1 = { b: 2 };
const source2 = { c: 3 };
Object.assign(target, source1, source2);
target // {a:1, b:2, c:3}
```

```
: assigntargetsource1source2  source1source2getset      get/set
return
```

- ES6ObjectgetOwnPropertyDescriptors() ES5getOwnPropertyDescriptor()
  defineProperties()   getset
- ES6ObjectgetPrototypeOf()setPrototypeOf() prototype   ES5prototype
  __proto__   __proto__ES“”   prototypeES6
- ES6ObjectObject.keys()Object.values()Object.entries()

8ES6Function?

```
()ES6this,JSthis
```

- thisES5this   this   thisbugES6   this,thisthis   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

```
SymbolES6ObjectSymbol()               Symbol()for...in
```

10Set

```
SetES6Array  Setitem  Set
```

11Map

```
MapES6Object  MapObject    key  Object
```

12Proxy

```
ProxyES6JSJS      get/setJS      get/set  keyvalue  myOwnObjkey,`
```

```
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
})
```

13Reflect

```
ReflectES6    ObjectFunction( applydeletegetset)  Reflect  APIProxy
API       API  ReflectAPI  API  APIAPI
```

14Promise

```
PromiseES6JS“”        API
```

15Iterator()

- IteratorES6   ES6SetMap ArrayObject ArrayObject SetMapfor   SetMap APISetMapArrayObjectAPI   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

20moduleexportimport

- moduleexportimportES6 exportimport/ AMD/CMDrequireJSseaJScommondJS JS
- import
- importexport

21ES6

- var self = this;
- letvar
- /
-
- Class
- module importexport

22ES6

JavaScriptInputs=>outputsfor-of—argumentsES6 promisePromiseletconstletES6varfunctionletconst classmodule

23Promise

- Promise/A+ Promise
  - pending: , fulfilled rejected.
  - fulfilled: .
  - rejected: .
  - settled: Promisefulfilledrejectedpending
- fulfilled rejected settled
- Promise (deferred) (asynchronous)

24Promise

- Promise

```
var promise = new Promise(function(resolve, reject) {

        if (...) {  // succeed

            resolve(result);

        } else {   // fails

            reject(Error(errMessage));

        }
    });
```

- Promise then then thenable

```
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
- JSONPjson+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

- windowname(window), window.namewindow.name window.name

HTML5window.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.deattachEvent) {
          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, ',');
}
```

-
-
-
-

AngularJSBackboneJS

- 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)

-
-

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(logn)O(nlogn)2^x=nx=x=log2^n O(log2^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(logn)

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

“”“”

{[] ()[{}]}[{()}([])]{[}()][({)]

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

11Trie

Trie “”

Trie

k k

Trie O(k)k

1

1.
2.
3.

2

1.
    -
    -
    -
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(nlogn)
    -
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 algorithmHuffman CodingPrim 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;
```

TypeScriptreadonlyconst

readonlyconst

1. constreadonly
2. conststaticstatic constreadonlystaticstatic readonly
3. constreadonly
4. constreadonly

```
function send<T>(data: T): T {
  return data;
}
```

TTTKeyTValue

```
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;
}
```

datalength

```
function send<T>(data: T): T {
  console.log(data.length);
  return data;
}
```

TypeScriptextendsTstring

```
function send<T extends string>(data: T): 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}”newT

```
function create<T>(ctor: new()=>T): T {
  return new ctor();
}
```

2

TypeScriptPersonProgrammercreate()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.

```
//
//
// TypeScriptundefined
// undefinedjs
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; // xlocation
x = y;
```

3.

undefinded

```
//
// .
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 TPerson<T> = {
  age: T;
  name: string
} & TCommon; //

const hank2: TPerson<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 TPerson<T> = {
  age: T;
  name: string
} & TCommon; //

//
type P1 = IPerson<number> | TPerson<number>;
//
type P2 = [IPerson<number>, TPerson<number>];
```

typeof

typetypeof

```
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: ƒ, 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-metadataMetadata 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

webviewappServicewebviewUIappService. 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

viewscroll-view, , onPullDownRefresh

webview

1.
2. h5jweixin-1.3.2.js
3. 1.7.1
4. h5appidappidopenid

1.
2. htmlhtmlpdivview

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"Vuev-for="(item, index) in list"
2. datathis.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 APIhistorywindowonpopstate

- 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

// WebViewJavascriptBridgejavascriptnative

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 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 = "buuton 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>
```

deferscript21onload 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 ings = document.querySelectorAll('[data-src]') // urldata-src src src

imgs.forEach((item) => {  // io.observeDOM forEach
  io.observe(item)
})
```

- google
-
-
-

Reverse Proxyinternetinternet

:

- webWeb
-

, , .

, ,

Chrome

Chrome1Browser1GPUNetWork

-
- HTMLCSSJavaScriptV8ChromeTa
- GPUChromeGPUGPU3DCSSChromeUIGPUGPUChromeGPU
-
-

E2E

E2EEnd 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 profduct #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)
}
```

- asyncbabelasyncpromise

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

Vue

vm.$attrs

prop () attribute (class style) prop (class style) v-bind="$attrs"
——

vm.$listeners

(.native) v-on v-on="$listeners" ——

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 SafariIOS Safari	
WebP				Chrome OperaAndroid ChromeAndroid Browser	
SVG				IE8	

0.1 + 0.2 0.3

- ECMAScript
- IEEE754 64 11
-

v8js

JS

JSpush, JSundefinedJSJS()

functionJSpushJSpush

returnJSJS/JS

JSJSsetTimeoutfetchnon-blockingJSJSpush()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 Rollupwebpack2tree-shaking

tree-shaking modulesES6CommonJSrequire()

CommonJSCommonJStree-shaking

JavaScriptES6import()

Tree-shaking

ES6

1.
2. import
3.

uglify

1. ES6 Module
2.

:

- Tree-shakingexport defaultexport 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

ISPDNSTTLTTLDNSIP

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-loadercss-loadermodules 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="_3zyde4l1yATCOkgn-DBWEL">
  Hello World
</h1>

<style>
  ._3zyde4l1yATCOkgn-DBWEL {
    color: red;
  }
</style>
```

CSS Modules `:global(.className)`class

CSS Modules `:local(.className).className`

`css-loader[hash:base64].title ._3zyde4l1yATCOkgn-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;
}
```

```
._2DHwuiHWMnKTOYG45T0x34 {
  color: red;
}

._10B-buq6_BEOTOl9urIjf8 {
  background-color: blue;
}
```

```
<h1 class="_2DHwuiHWMnKTOYG45T0x34 _10B-buq6_BEOTOl9urIjf8">
  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-middlewarewebpack-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

storedispatchstateactionstorestoresubscribestaterender

3. Redux

- Reduxstore“”
- State ReactsetStatestaterenderReduxstateactionaction“”actionstatereducer reduceractionstateRedux
- Reducer ReduceractionstatestateactionstateReducerstatestateReduxRedux (combineReducers)Reduxstate==statestate“==”Redux

4.

4.1 createStore

```
export default function createStore(reducer, initialState) {
    let state = initialState //
    let listeners = []
    //
    function getState() {
      return state
    }
    //reducer
    function dispatch(action) {
      //reducerstate
      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 combineReducer

```
/**
 * 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(mapDispatchToProps,context.store.dispatch))
            //
            useEffect(() => {
                return context.store.subscribe(() => {
                    setState(mapStateToProps(context.store.getState()))
                })
            },[])
            // render
            // let boundActions =
bindActionCreators(mapDispatchToProps,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

applyMiddlewareapplyMiddleware

```
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

setStatecomponentdirtyComponents = [], batchUpdateTransactionclose dirtyComponentsComponentupdateComponentrenderrenderedElementrenderedElement updatere-renderpropsmarkupDOM

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