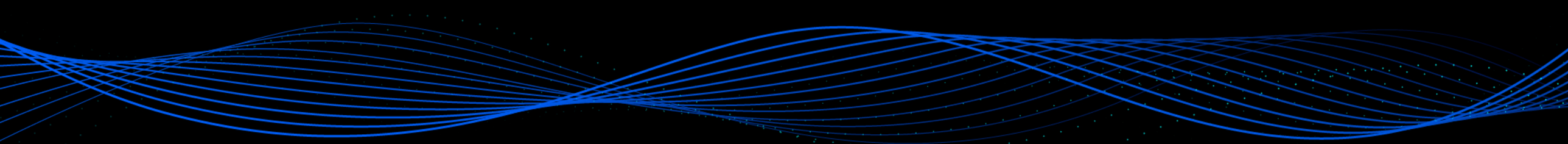
React在大型后台管理项目中的工程实践

黄健 @今日头条



自我介绍

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2015 - 至今	今日头条	效率工程和客户增长 负责业务系统的前端开发和工程化构建
2014 - 2015	搜狐新闻	客户端研发部 负责前端基础平台和Hybird混合型架构开发
2013 - 2014	高德地图	移动应用开发部 负责LBS功能组件开发和活动运营研发
2010 - 2013	东华软件	重点客户事业部 负责企业系统集成平台和通用解决方案研发

TOPIC

01 业务情况概述

02 前端工程化设计

03 Redux项目结构改进

04 异步数据流优化

05 持续构建

Part1 业务情况概述

React技术栈产品线

业务复杂

由于业务系统本身是为满足用户的工作需要，系统往往基于复杂的数据流和业务逻辑

协同开发

大型业务系统的开发流程通常是将一个大功能点会拆解成多个小的业务模块，再由多人协作，同时开发

多端并行

伴随着移动设备的普及和移动办公的效率需求，多数时候需要将大型业务中的高频功能同时拆解成PC模块和手机模块，多端同时进行开发

持续迭代

大型业务系统的由于用户的特殊性，对系统的持续迭代和功能响应都有着极高要求

诉求

更高效地
构建配置

简化项目中的
配置文件

前后端环境可
完全独立运行

更彻底的
前后分离

更高效的
结构设计

同时兼顾组件的分
离和功能的紧凑

更优雅地
处理异步

Middleware +?

更稳健地
资源发布

优化流程，减少差异

Part2 前端工程化设计

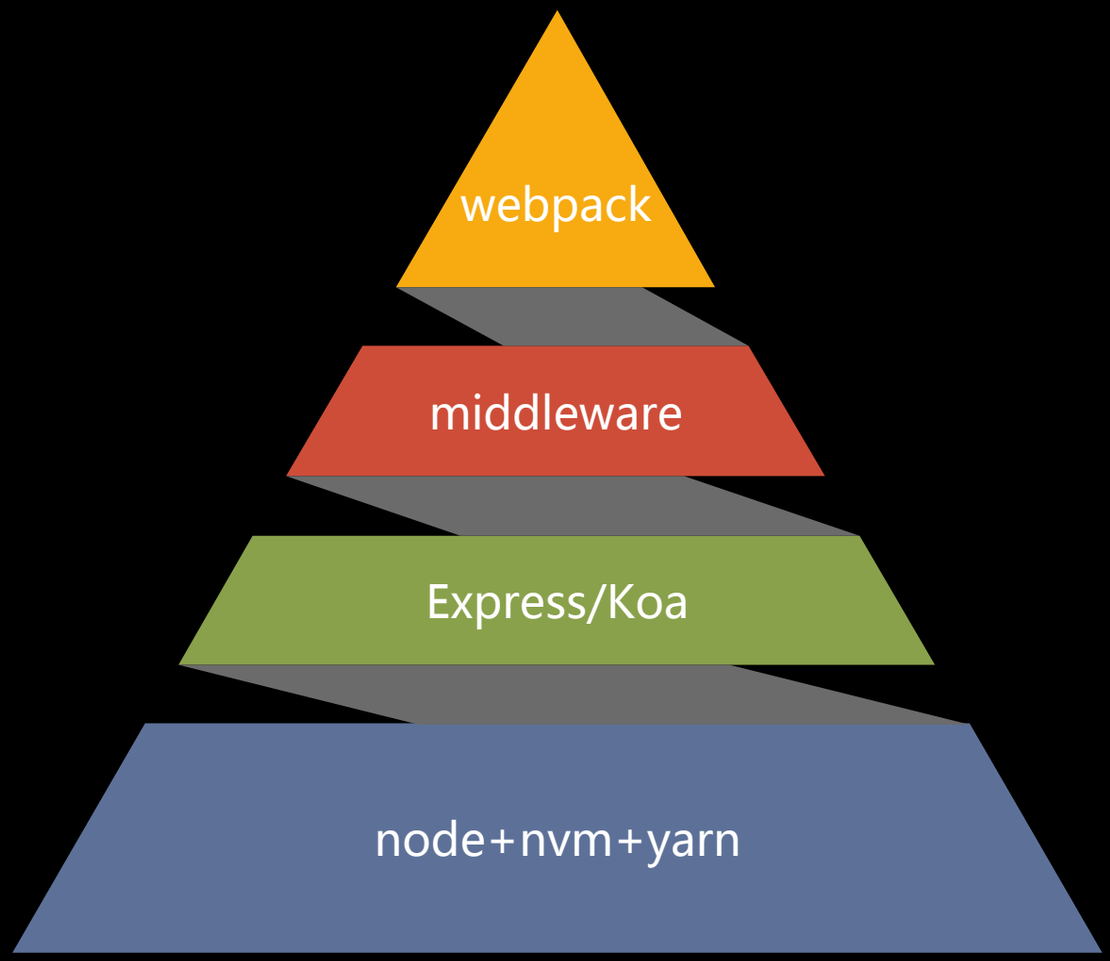
工具链

webpack: 工程中的资源依赖管理和分析编译工具

Middleware：服务框架的中间件，能非常方便的为我们的前端环境提供各种增强服务功能

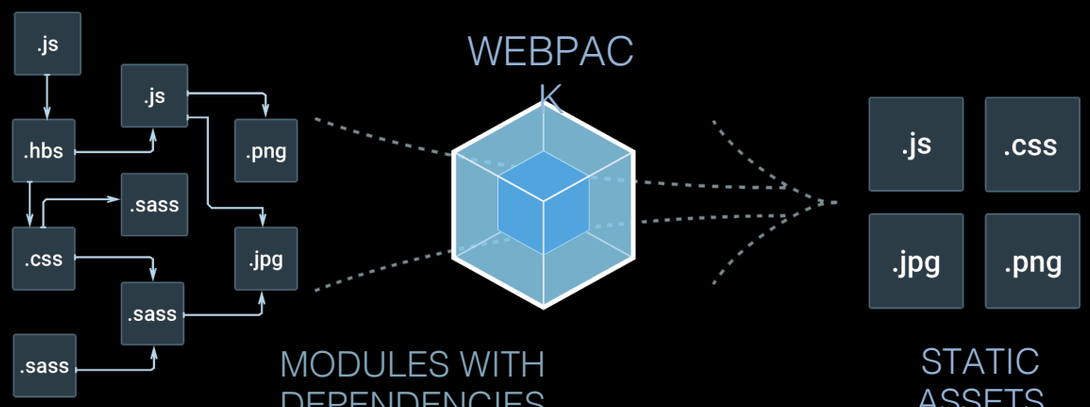
Express/Koa：基础web服务框架

node：底层依赖开发环境，yarn/npm作为资源管理工具，nvm用于管理多个node版本

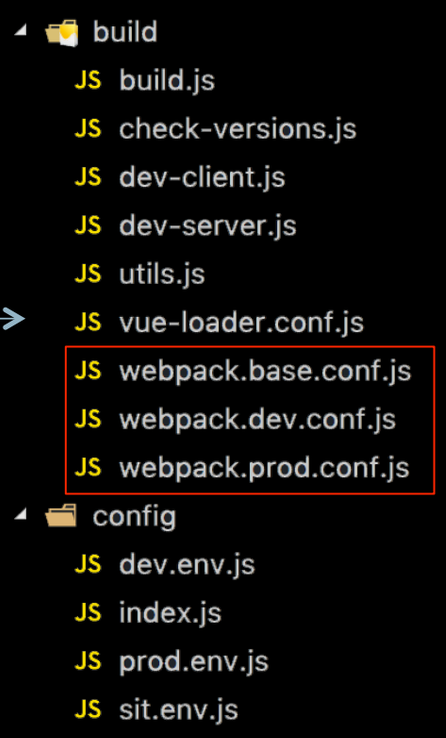


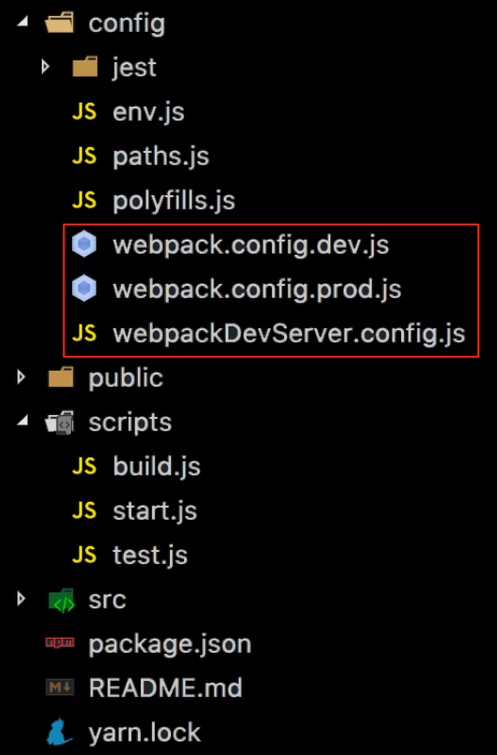
仅此而已?

webpack结构



cli initial





重复配置

webpack.config.dev.js

```
    // changing JS code would still trigger a refresh.
  ],
  output: {
    // Next line is not used in dev but WebpackDevServer crashes without it:
    path: paths.appBuild,
    // Add /* filename */ comments to generated require()s in the output.
    pathinfo: true,
    // This does not produce a real file. It's just the virtual path that is
    // served by WebpackDevServer in development. This is the JS bundle
    // containing code from all our entry points, and the Webpack runtime.
    filename: 'static/js/bundle.js',
    // There are also additional JS chunk files if you use code splitting.
    chunkFilename: 'static/js/[name].chunk.js',
    // This is the URL that app is served from. We use "/" in development.
    publicPath: publicPath,
    // Point sourcemap entries to original disk location
    devtoolModuleFilenameTemplate: info =>
      path.resolve(info.absoluteResourcePath),
  },
  resolve: {
    // This allows you to set a fallback for where Webpack should look for
    modules.
    // We read `NODE_PATH` environment variable in `paths.js` and pass paths
    here.
    // We placed these paths second because we want `node_modules` to "win"
    // if there are any conflicts. This matches Node resolution mechanism.
    // https://github.com/facebookincubator/create-react-app/issues/253
    modules: ['node_modules', paths.appNodeModules].concat(paths.nodePaths),
    // These are the reasonable defaults supported by the Node ecosystem.
    // We also include JSX as a common component filename extension to support
    // some tools, although we do not recommend using it, see:
    // https://github.com/facebookincubator/create-react-app/issues/290
    extensions: ['.js', '.json', '.jsx'],
    alias: {
```

webpack.config.prod.js

```
    devtool: 'source-map',
    // In production, we only want to load the polyfills and the app code.
    entry: [require.resolve('./polyfills'), paths.appIndexJs],
    output: {
      // The build folder.
      path: paths.appBuild,
      // Generated JS file names (with nested folders).
      // There will be one main bundle, and one file per asynchronous chunk.
      // We don't currently advertise code splitting but Webpack supports it.
      filename: 'static/js/[name].[chunkhash:8].js',
      chunkFilename: 'static/js/[name].[chunkhash:8].chunk.js',
      // We inferred the "public path" (such as / or /my-project) from
      homepage.
      publicPath: publicPath,
      // Point sourcemap entries to original disk location
      devtoolModuleFilenameTemplate: info =>
        path.relative(paths.appSrc, info.absoluteResourcePath),
    },
    resolve: {
      // This allows you to set a fallback for where Webpack should look for
      modules.
      // We read `NODE_PATH` environment variable in `paths.js` and pass
      paths here.
      // We placed these paths second because we want `node_modules` to "win"
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      modules: ['node_modules', paths.appNodeModules].concat(paths.nodePaths)
      ,
      // These are the reasonable defaults supported by the Node ecosystem.
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      // some tools, although we do not recommend using it, see:
      // https://github.com/facebookincubator/create-react-app/issues/290
      extensions: ['.js', '.json', '.jsx'],
      alias: {
```
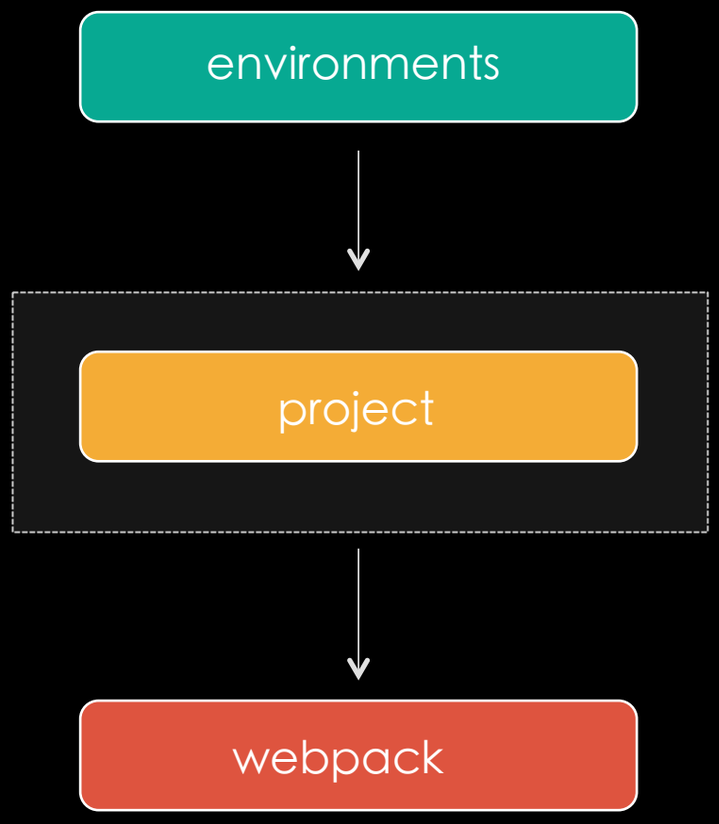

抽象配置



“抽象优于重复”

environments.config.js

存放在特定环境下的需要变化的配置参数和设置

通常包含有：publicpath、 devtools、 warnings、uglify、hash等

project.config.js

存放于项目有关信息，如：server，output，loader，externals，plugin等配置；通过overrides实现对environments中的配置信息重载

webpack.config.js

主要是读取project.config.js中的配置，再按标准的webpack字段填入project中的配置信息，原则上是该文件中的信息只与构建工具有关，而与具体的项目工程配置无关，可以做到跨项目间复用

配置重构

- config
  - environments.config.js
  - project.config.js
  - webpack.config.js

object (env) → object.assign（override） → project.conf

environments.config.js

```
module.exports = {
  // ======================================================
  // Overrides when NODE_ENV === 'development'
  // ======================================================
  // NOTE: In development, we use an explicit public path when the
  // are served webpack by to fix this issue:
  // http://stackoverflow.com/questions/34133808/webpack-ots-parsi
  development : (config) => ({
    compiler_public_path : `http://${config.server_host}:${config.

  }),

  // ======================================================
  // Overrides when NODE_ENV === 'production'
  // mersea public_path: /static/mobile/
  // express public_path: /resource/os_mobile/
  // cdn public_path: //s3a.pstatp.com/cg_growth/resource/os_mobi
  // ======================================================
  production : (config) => ({
    compiler_public_path     : '//s3a.pstatp.com/cg_growth/resourc
    compiler_base_route      : '/apps/',
    compiler_fail_on_warning : false,
    compiler_hash_type       : 'chunkhash',
    compiler_devtool         : false,
    compiler_stats           : {
      chunks       : true,
      chunkModules : true,
      colors       : true
    }
  })
}
```

project.config.js

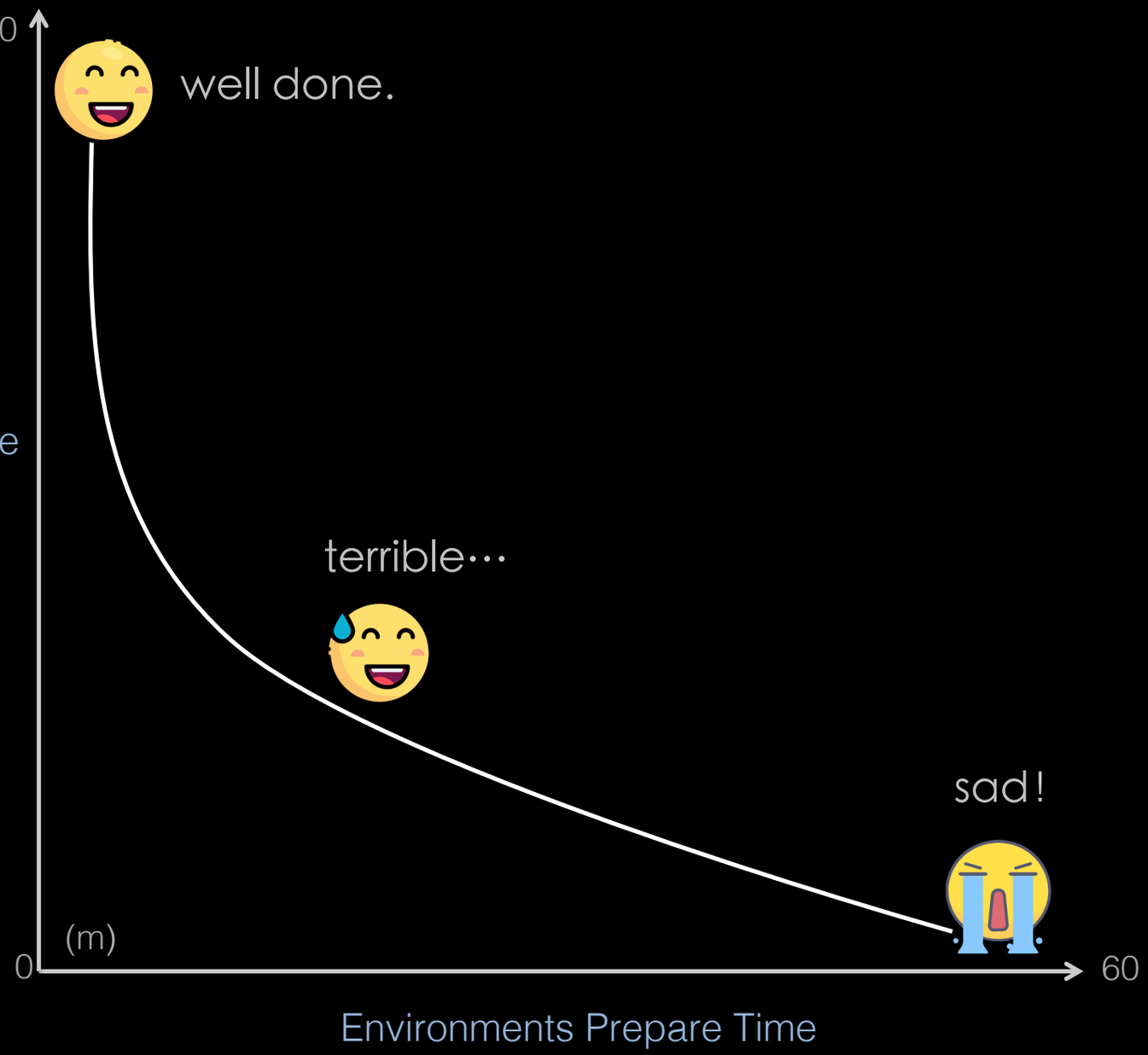
```
const path = require('path')
// ======================================================
// Default Configuration
// ======================================================
const config = {
  env : process.env.NODE_ENV || 'development',

  // ----------------------------------
  // Compiler Configuration
  // ----------------------------------
  compiler_devtool         : 'source-map',
  compiler_hash_type       : 'hash',
  compiler_fail_on_warning : false,
  compiler_quiet           : false,
  compiler_public_path     : '/',
}

// ======================================================
// Environment Configuration
// ======================================================
debug(`Looking for environment overrides for NODE_ENV "${config.env}".`
const environments = require('./environments.config')
const overrides = environments[config.env]
if (overrides) {
  debug('Found overrides, applying to default configuration.')
  Object.assign(config, overrides(config))
} else {
  debug('No environment overrides found, defaults will be used.')
}

module.exports = config
```

webpack.config.js

```
const argv = require('yargs').argv
const os = require('os')
const webpack = require('webpack')
const project = require('./project.config')
const HtmlWebpackPlugin = require('html-webpack-plugin')
const ExtractTextPlugin = require('extract-text-webpack-plugin')
const UglifyJsParallelPlugin = require('webpack-uglify-parallel')

const __DEV__ = project.globals.__DEV__
const __PROD__ = project.globals.__PROD__
const __TEST__ = project.globals.__TEST__
const FILENAME = project.globals.filename

const webpackConfig = {
  name    : 'client',
  target  : 'web',
  devtool : project.compiler_devtool,
  resolve : {
    modules: [project.paths.client(), 'node_modules'],
    extensions: ['.web.js', '.js', '.jsx', '.json']
  },
  module : {}
}
// ----------------------------------
// Entry Points
// ----------------------------------
const APP_ENTRY = project.paths.client('main.js')

webpackConfig.entry = {
  app : __DEV__
    ? [APP_ENTRY].concat(`webpack-hot-middleware/client?path=${proj
    : [APP_ENTRY],
  vendor : project.compiler_vendors
}
```

前后端分离

开发体验



- PROJECT
  - bin
  - common
  - config
  - dev
    - apps
    - images
    - less
    - index.html
    - index.js
  - node_modules
  - output
  - public
  - server
  - .babelrc
  - .editorconfig
  - .eslintignore
  - .eslintrc
  - .gitignore
  - app.json
  - package.json
  - postcss.config.js
  - README.md
  - scm_build_resource.sh
  - scm_build.sh
  - scm_resource.py
  - settings.py
  - yarn.lock

开发诉求

开发诉求

简化开发环境搭建

能否只需掌握两个命令：npm install 和 npm dev 就能进入开发状态？

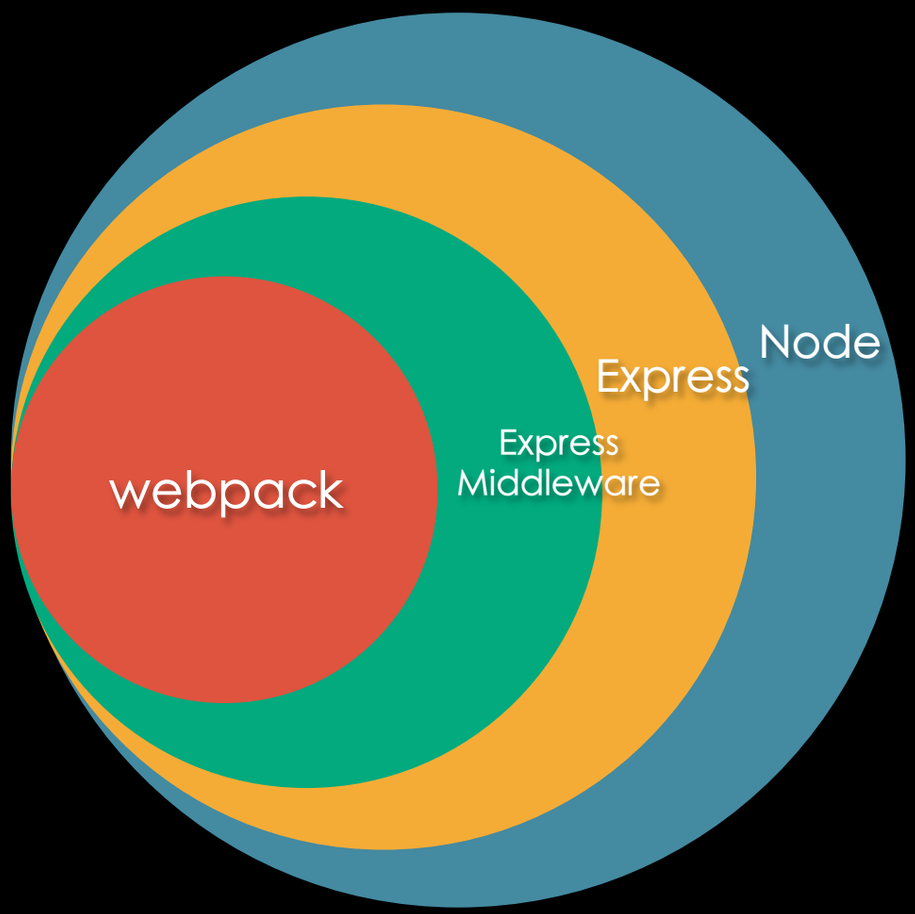
前后端开发彻底分离

不用搭服务环境, 不用配nginx和Charles, 只改配置文件, 就能和服务端联调？

代码体积和分片控制

伴随着业务复杂度和文件大小的与日剧增，如何能对所有的资源文进行更高效精细化的控制？

环境搭建



依赖安装

npm install webpack-dev-middleware --dev

npm install webpack-hot-middleware --dev

npm install http-proxy-middleware --dev

本地server （webpack-dev-server）

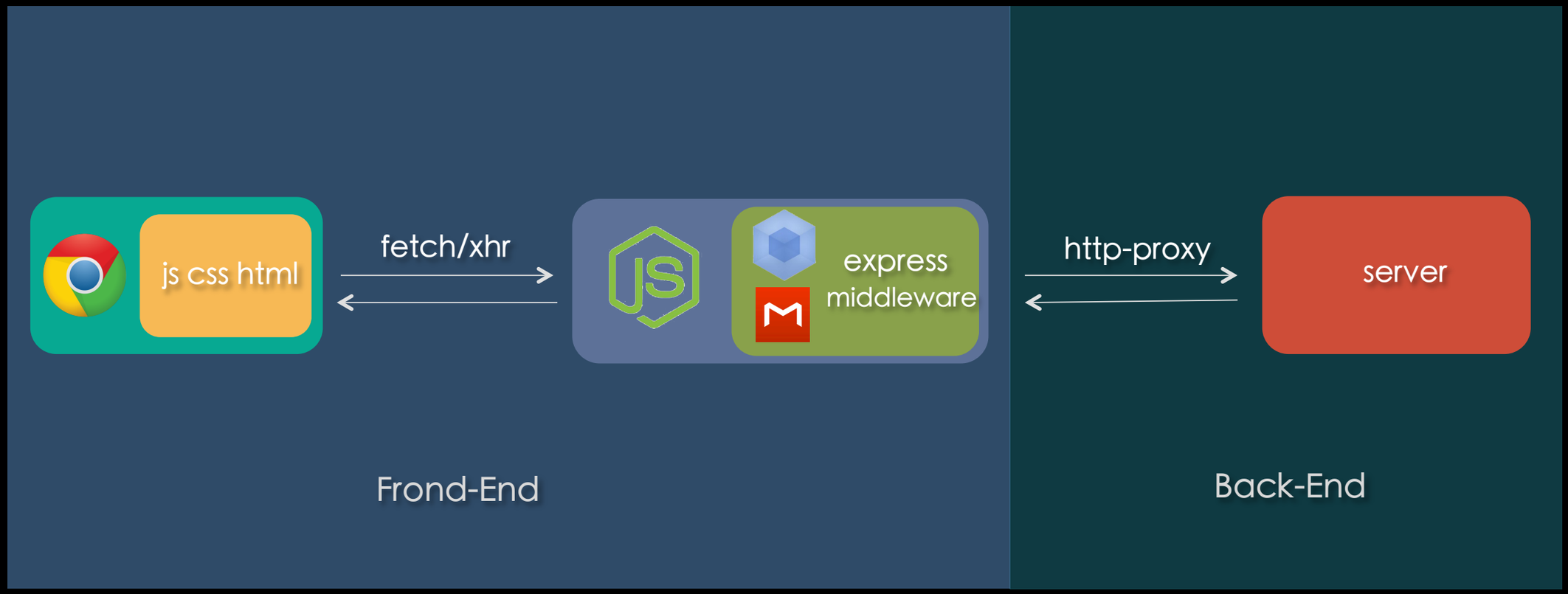
利用express搭建本地server环境，同时借用webpack-dev-middleware和webpack-hot-middleware为打包生成的资源文件提供Web(内存)服务，可将webpack和express集成到一个node进程中。

---

node-http-proxy

借用http-proxy-middleware实现跨域通信，本地的请求通过代理配置和url拦截，都可以转到本地服务器中进行请求转发

前后端通信


js css html
fetch/xhr
express
middleware
http-proxy
server
Frond-End
Back-End

资源整合

main.js

```
// Apply Webpack HMR Middleware
// ---------------------------------
if (project.env === 'development') {
  const compiler = webpack(webpackConfig)

  debug('Enabling webpack dev and HMR middleware')
  app.use(require('webpack-dev-middleware')(compiler, {
    publicPath  : webpackConfig.output.publicPath,
    contentBase : project.paths.client(),
    hot         : true,
    quiet       : project.compiler_quiet,
    noInfo      : project.compiler_quiet,
    lazy        : false,
    stats       : project.compiler_stats
  }))
  app.use(require('webpack-hot-middleware')(compiler, {
    path: '/__webpack_hmr'
  }))
```

middleware

proxy.js

```
const project = require('../config/project.config')
const express = require('express')
const app = express()

// make http proxy middleware setting
const createProxySetting = function (url) {
  return {
    target: url,
    changeOrigin: true
  }
}

if (project.env === 'development') {
  const proxyMiddleware = require('http-proxy-middleware')
  const proxyConfig = [
    {
      url: '/back_end/page/*',
      target: 'http://127.0.0.1:3000/mock'
    },
    {
      url: '/back_end/*',
      target: 'http://10.0.0.1:8351'
    }
  ]
  // proxy middlware
  proxyConfig.forEach(function (item) {
    app.use(item.url, proxyMiddleware(createProxySetting(item.target)))
  })
}
```

proxy

mock.js

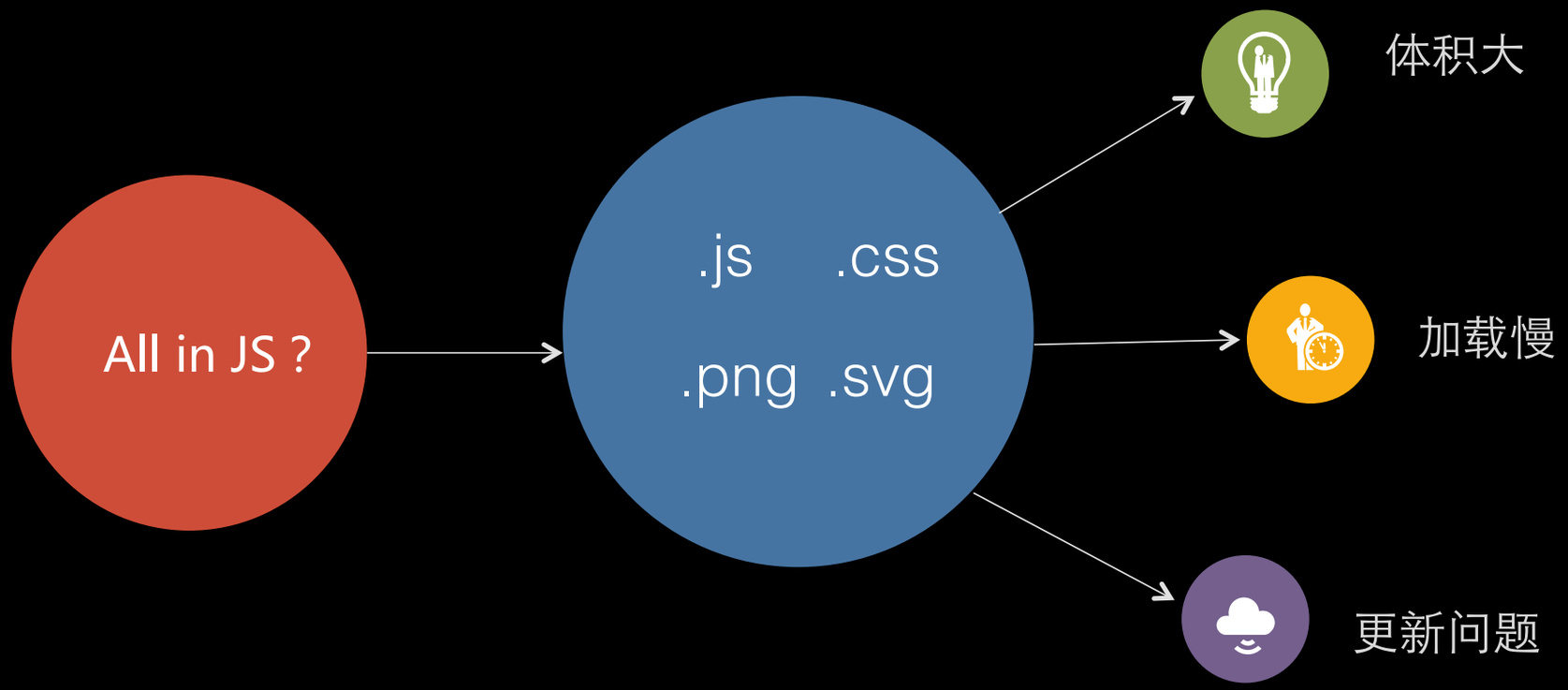
```
// const mock = require('./routes/mock')
// app.use('/mock',mock)
const express = require('express')
const router = express.Router()
const opporList = require('../mock/opporList.json')
const Mock = require('mockjs')

router.get('/back_end/page/opporList', function (req, res) {
  res.json(opporList)
})

router.get('/back_end/page/employee', function (req, res) {
  var data = Mock.mock({
    // 属性 list 的值是一个数组，其中含有 1 到 10 个元素
    'list|1-10': [{
      // 属性 id 是一个自增数，起始值为 1，每次增 1
      'id|+1': 1,
      'name': 'name'
    }]
  })
  res.json(data)
```

mock

{ "dev": "node ./bin/dev-server" }

代码分片

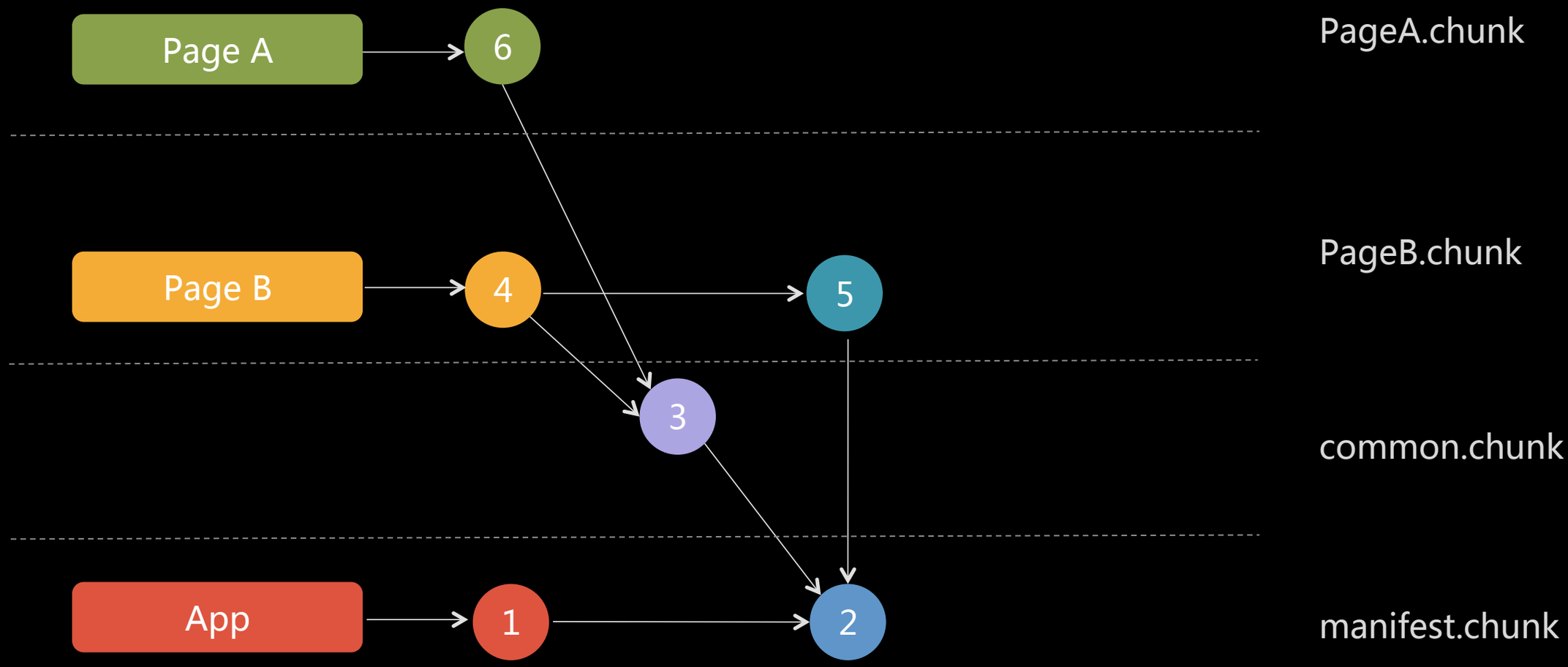
JSX的副作用




```
                                  Asset       Size  Chunks                    Chunk Names
      js/app.001564477b55231a152a.js  5.19 MB       0  [emitted]  [big]  app
   js/vendor.001564477b55231a152a.js  1.33 MB       1  [emitted]  [big]  vendor
 js/manifest.001564477b55231a152a.js  30.4 kB       2  [emitted]         manifest
    js/app.001564477b55231a152a.js.map  6.02 MB       0  [emitted]         app
 js/vendor.001564477b55231a152a.js.map  1.57 MB       1  [emitted]         vendor
js/manifest.001564477b55231a152a.js.map  32.2 kB       2  [emitted]         manifest
                           favicon.ico  1.05 kB          [emitted]
                            index.html  2.48 kB          [emitted]
```

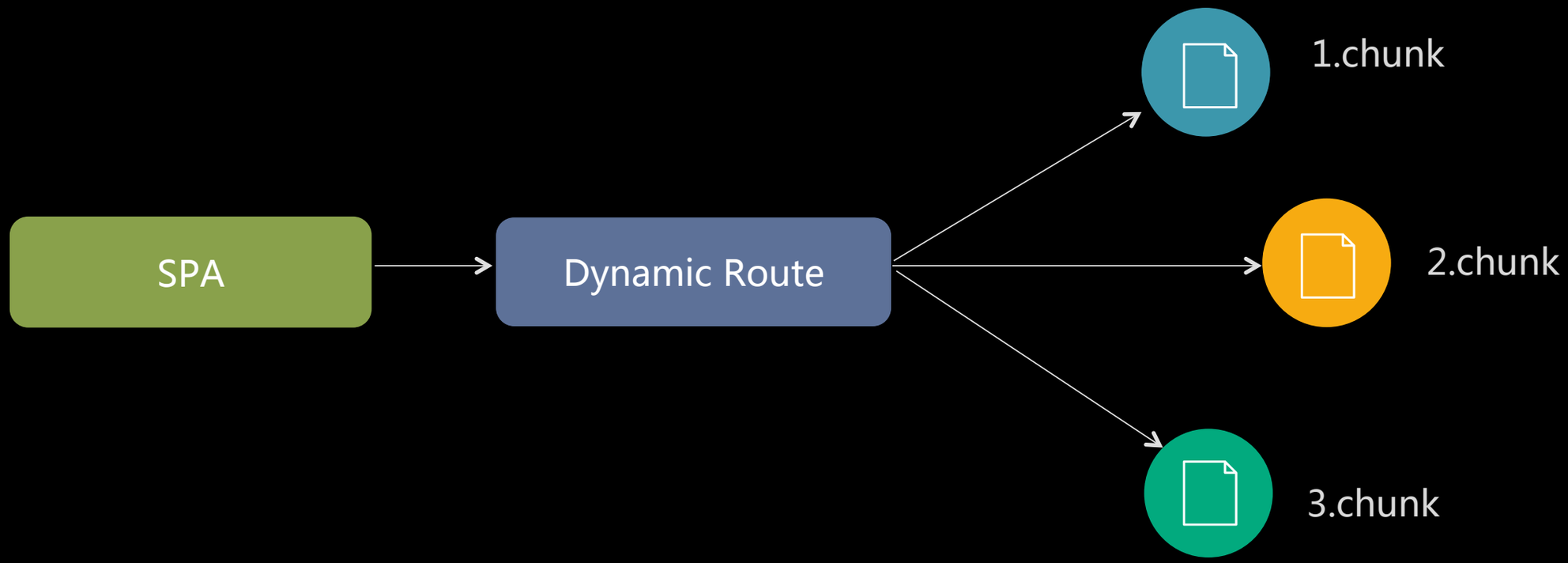
all in js ≠ all in one js

模块提取



webpack.optimize.CommonChunkPlugin

动态加载



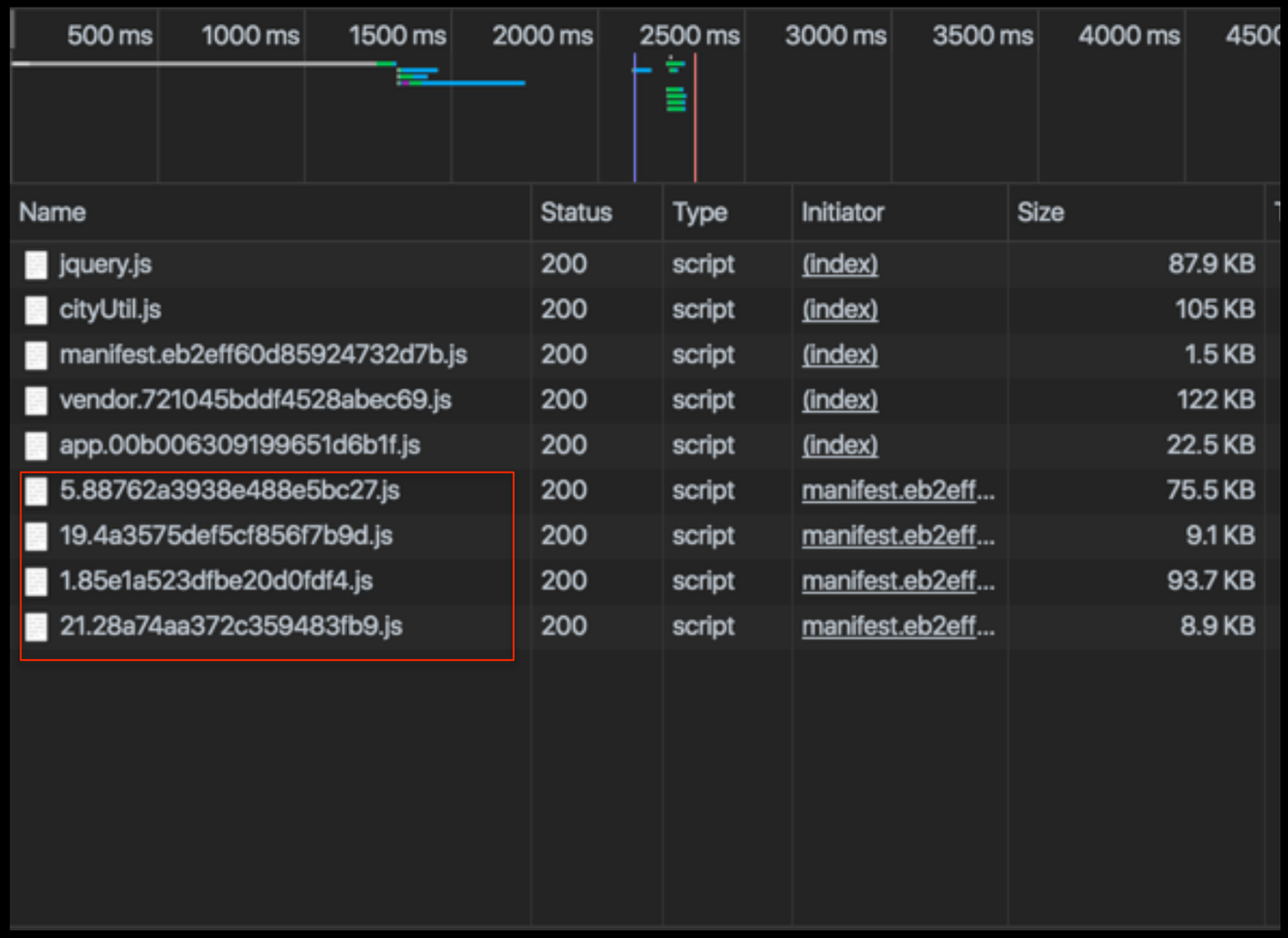
require.ensure() -> Promise.all([import(...)]).then([modules])=>{})

// webpack 1 webpack2

代码分片

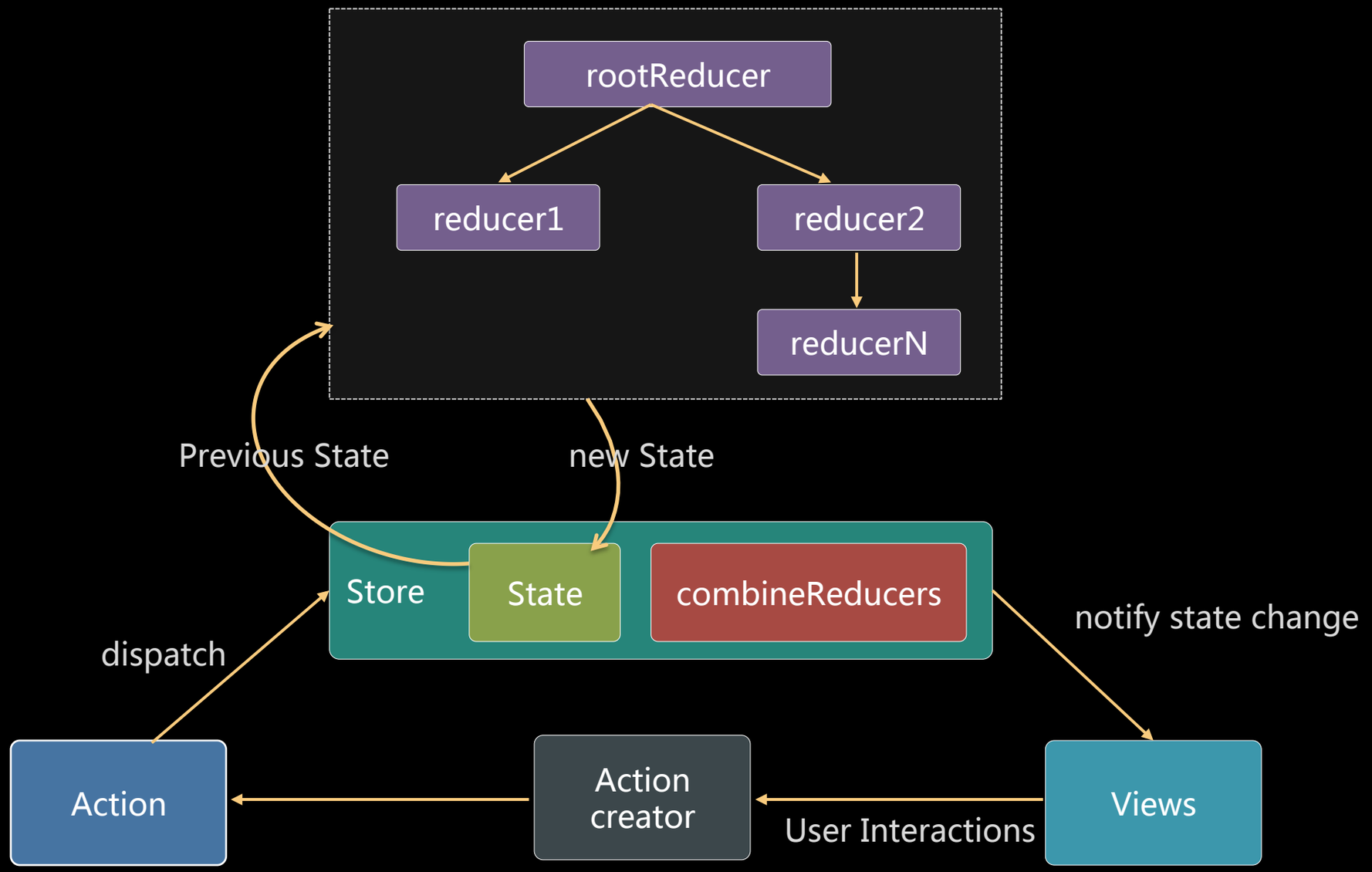
DynamicRoute.js

```
import { injectReducer } from 'store/reducers'

export default (store) => ({
  path: '/:dept/detailPage',
  /*  Async getComponent is only invoked when route matches */
  getComponent (nextState, cb) {
    /*  Webpack - use 'System.import' to create a split point
        and embed an async module loader (jsonp) when bundling */
    Promise.all([
      import('./containers/CheckLeaveContainer'),
      import('./modules')
    ]).then(([Container, modules]) => {
      const reducer = modules.default
      /*  Add the reducer to the store on key 'counter' */
      injectReducer(store, { key: 'checkleave', reducer })
      /*  Return getComponent   */
      cb(null, Container.default)
    })
  }
})
```



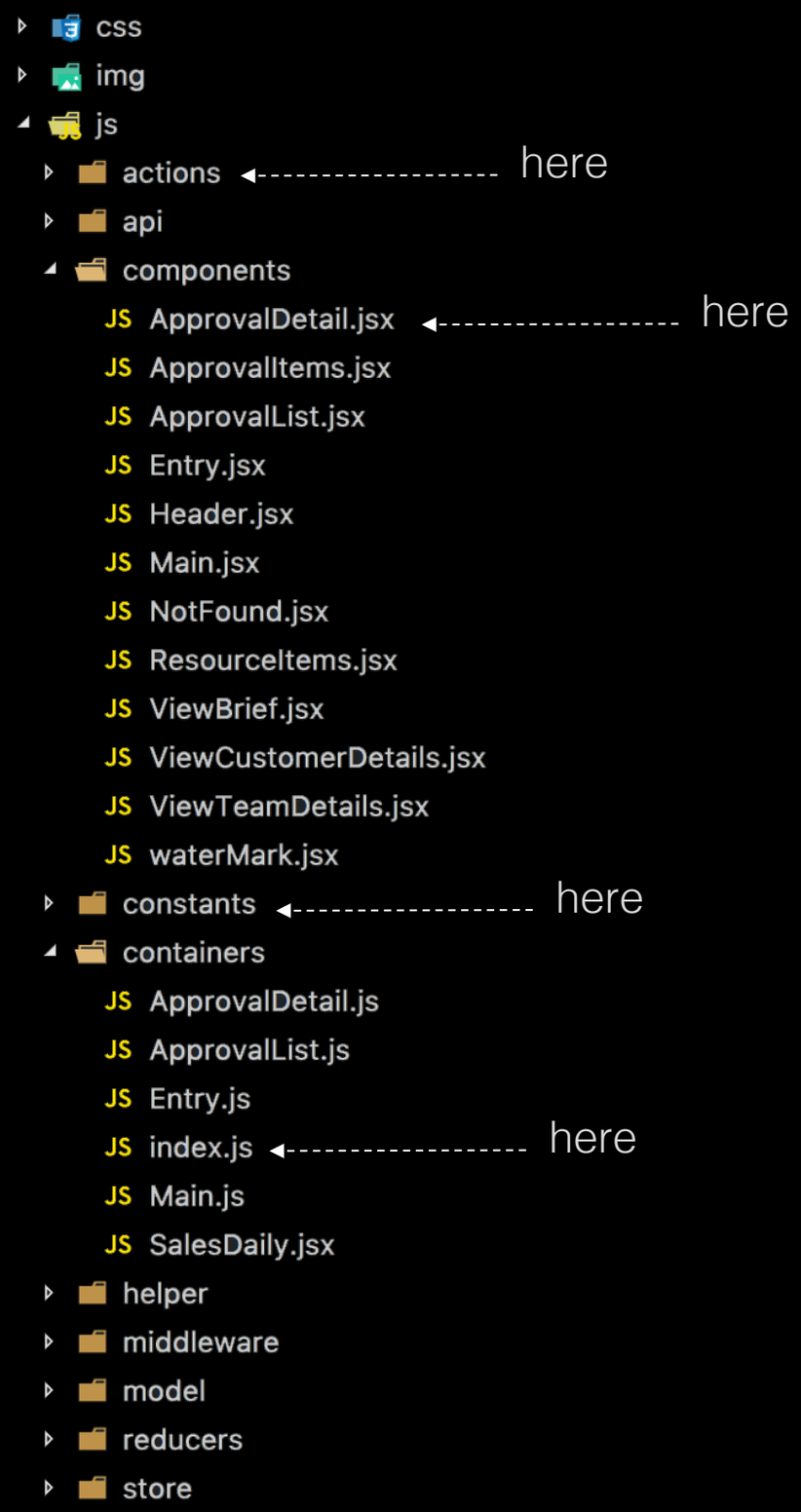
Part3 Redux项目结构改进

Redux



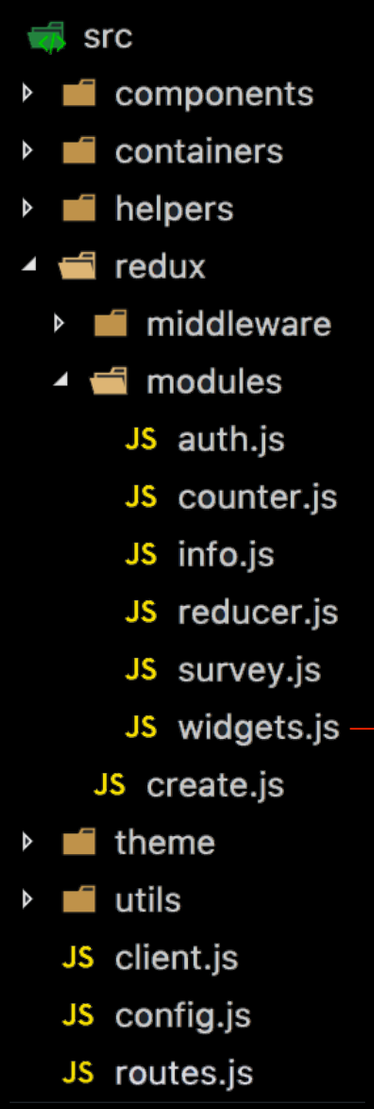
views => action => reducer => store => react-redux => virtual dom => views

Rails风格



Just one module change !

解耦&紧凑




```
// const
const SAVE_SUCCESS = 'redux-example/widgets/SAVE_SUCCESS';
const SAVE_FAIL = 'redux-example/widgets/SAVE_FAIL';

const initialState = {
  loaded: false,
  editing: {},
  saveError: {}
};

// reducer
export default function reducer(state = initialState, action = {
  switch (action.type) {
    case LOAD:
      return {
        ...state,
        loading: true
      };
    case LOAD_SUCCESS:
      return {
        ...state,
        loading: false,
        loaded: true,
        data: action.result,
        error: null
      };
}

// action
export function isLoaded(globalState) {
  return globalState.widgets && globalState.widgets.loaded;
}
```

https://github.com/erikras/ducks-modular-redux

Ducks: Redux Reducer Bundles

特点概述

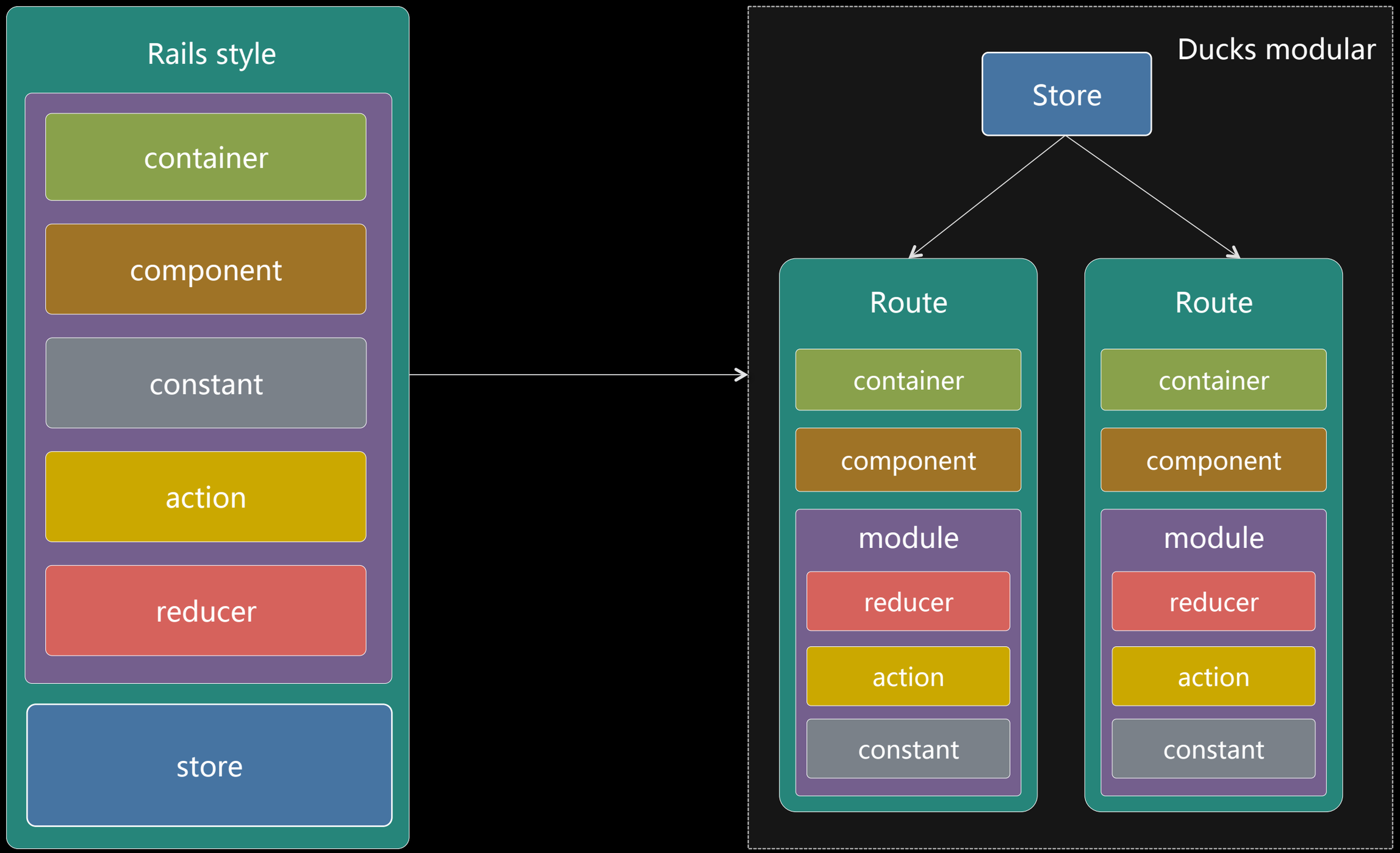
1、业务代码可集中归类

2、少冲突，方便多人协作开发

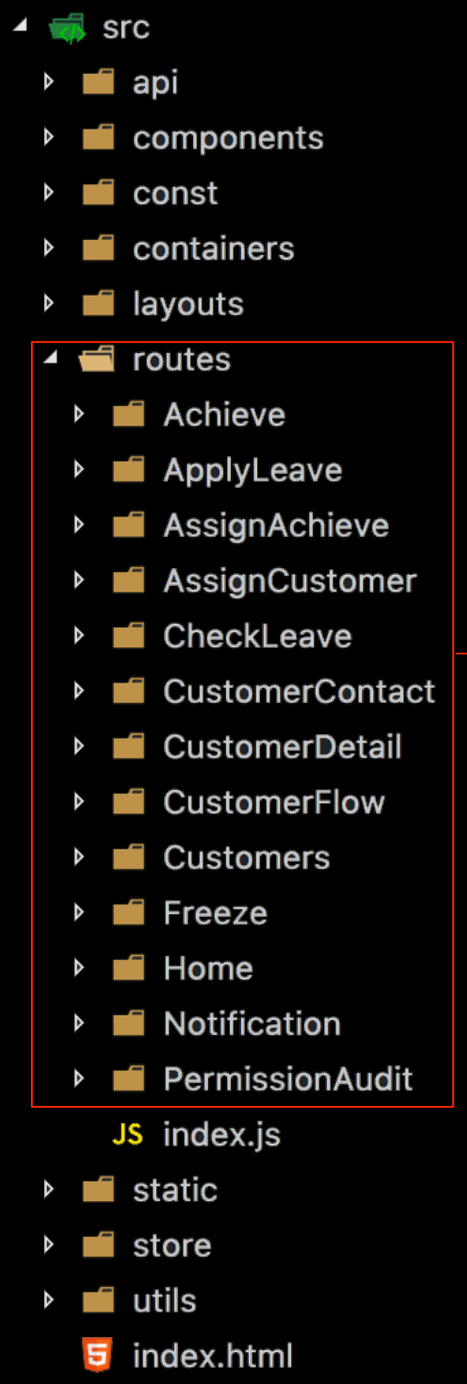
3、易于业务功能的横向扩展

4、模块化，可插拔式管理

modules



业务组合

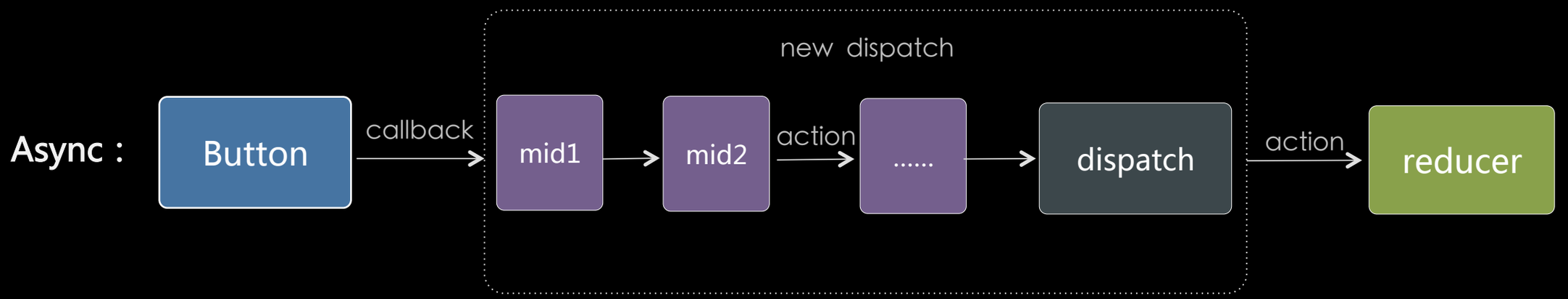


JS index.js

```
8   import CheckLeave from './CheckLeave'
9   import AssignAchieve from './AssignAchieve'
10  import AssignAchieveExt from './AssignAchieve/ext'
11  import AssignCustomer from './AssignCustomer'
12  import CustomerContact from './CustomerContact'
13  import CustomerDetail from './CustomerDetail'
14  import CustomerFlow from './CustomerFlow'
15  import Freeze from './Freeze'
16  import Achieve from './Achieve'
17  import Notification from './Notification'
18
19  /*  Note: Instead of using JSX, we recommend using react-router
20      PlainRoute objects to build route definitions.   */
21
22  export const createRoutes = (store) => ({
23    path        : '/',
24    component   : CoreLayout,
25    indexRoute  : Home,
26    childRoutes : [
27      PermissionAudit(store),
28      Customers(store),
29      OtherCustomers(store),
30      ApplyLeave(store),
31      CheckLeave(store),
32      AssignAchieve(store),
33      AssignAchieveExt(store),
34      CustomerContact(store),
35      AssignCustomer(store),
36      CustomerDetail(store),
37      CustomerFlow(store),
38      Freeze(store),
```

Part4 异步数据流优化

Data in Redux



Redux thunk

```
function createThunkMiddleware(extraArgument) {
  return ({ dispatch, getState }) => next => action => {
    if (typeof action === 'function') {
      return action(dispatch, getState, extraArgument);
    }
    return next(action);
  };
}
```

副作用

1、dispatch使用泛滥成灾

2、重复代码多，处理流程抽象度低

3、多请求间的衔接处理无规范

4、取消，超时，队列等复杂情况未考虑。

```
function upload(data){
    return dispatch => {
      // 显示出加载效果
      dispatch({ type: 'SHOW_WAITING_MODAL' });
      // 开始上传
      api.upload(data)
          .then(res => {
        // 成功，隐藏加载效果，并显示出预览图
        dispatch({ type: 'PRELOAD_IMAGES', data: res.images });
        dispatch({ type: 'HIDE_WAITING_MODAL' });
        })
      .catch(err => {
        // 错误，隐藏加载效果，显示出错误信息，2秒后消失
        dispatch({ type: 'SHOW_ERROR', data: err });
        dispatch({ type: 'HIDE_WAITING_MODAL' });
        setTimeout(_ => dispatch({ type: 'HIDE_ERROR' }), 2000);
      })
    }
}
```

Redux saga

```
import { take, put, call, delay } from 'redux-saga/effects'
/*
* put  (产生一个 action)
* call  (阻塞地调用一个函数)
* fork  (非阻塞地调用一个函数)
* take  (监听且只监听一次 action)
* delay  (延迟)
* race  (只处理最先完成的任务)
*/
function *uploadFlow(action) {
  // 显示出加载效果
    yield put({ type: 'SHOW_WAITING_MODAL' });
    // 简单的 try-catch
    try{
        const response = yield call(api.upload, action.data);
      yield put({ type: 'PRELOAD_IMAGES', data: response.images });
      yield put({ type: 'HIDE_WAITING_MODAL' });
    }catch(err){
        yield put({ type: 'SHOW_ERROR', data: err });
      yield put({ type: 'HIDE_WAITING_MODAL' });
      yield delay(2000);
      yield put({ type: 'HIDE_ERROR' });
    }
}

function* watchUpload() {
  yield* takeEvery('BEGIN_REQUEST', uploadFlow)
}
```

https://github.com/redux-saga/redux-saga

An alternative side effect model for Redux apps

优点概述

1、集中处理 redux 副作用问题

2、异步处理实现为 generator

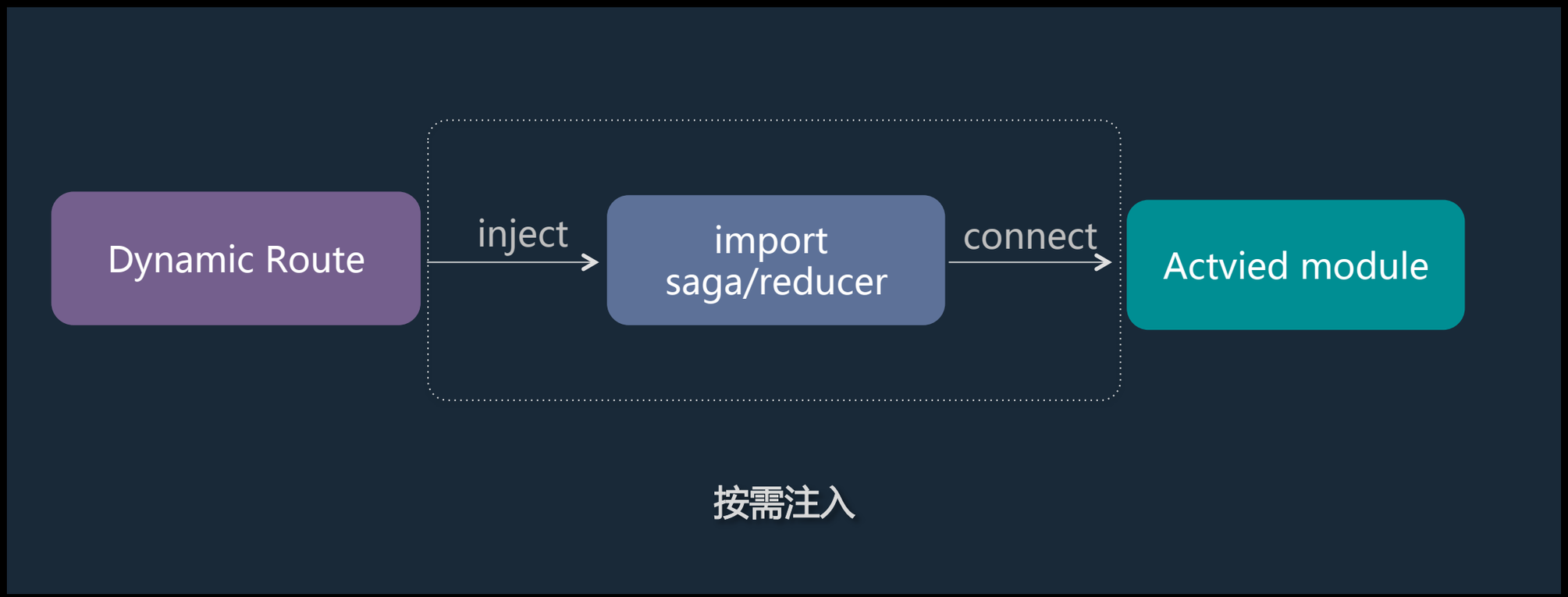
3、类redux-thunk中间件。

4、watch/worker(监听->执行) 的 工作形式。

Saga请求事件队列

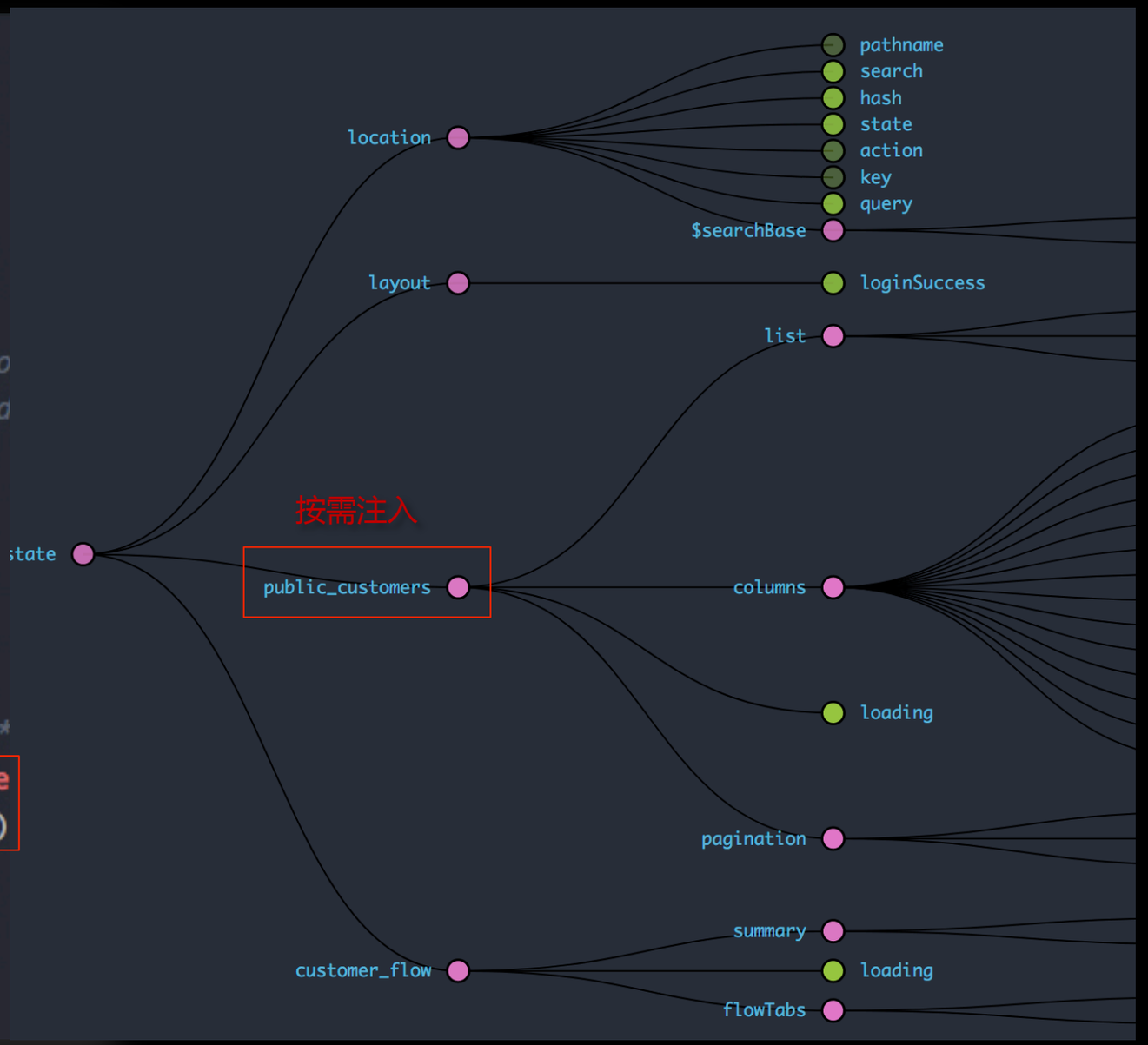
```
// ------------------------------------
// Sagas请求队列
// ------------------------------------
export function* fetchOpportunityDeatil(type, body) {
    while (true) {
        // 1- 创建一个针对请求事件的 channel
        const { payload } = yield take(REQUEST_OPPOR_PAGE_DATA)
        // 2- 从 channel 中拿出多个事件，注意这里我们使用的是阻塞的函数调用
        const [detail, contacts, trackTypes, isList, osList, remark, visit, industry] = yield [
            call(fetchAPI, types.getOpporDetail, payload.id),
            call(fetchAPI, types.getContacts, payload.id),
            call(fetchAPI, types.getTrackType),
            call(fetchAPI, types.getTrackList, payload.list + `&sale_type=${SALE_TYPE.IS}`),
            call(fetchAPI, types.getTrackList, payload.list + `&sale_type=${SALE_TYPE.OS}`),
            call(fetchAPI, types.getRemarkInfo, payload.first + `&type=${REMARK_TYPE.FOLLOW}`),
            call(fetchAPI, types.getVisitList, payload.first + `&status=${VISIT_STATUS.UNVISIT}`),
            call(fetchAPI, types.getIndustry),
            call(fetchAPI, types.getPhoneRecord, payload.list)
        ]
        // 3- 请求完成后再对reducer进行修改
        yield put(addInitData({ detail, contacts, trackTypes, isList, osList, remark, visit,
          industry }))
    }
}
```

进一步优化



按需注入

```
import { injectReducer } from 'store/reducers'
import { injectSagas } from 'store/sagas'

export default (store) => ({
    path: 'opporAudio',
    /*  Async getComponent is only invoked when route matches
    getComponent(nextState, cb) {
        /*  Webpack - use 'System.import' to create a split po
            and embed an async module loader (jsonp) when bund
        Promise.all([
          import ('./containers/OpporAudioContainer'),
          import ('./modules/')
        ]).then(([OpporAudioContainer, modules]) => {
          const reducer = modules.default
          const sagas = modules.sagas
          /*  Add the reducer to the store on key 'counter'  *
          injectReducer(store, { key: 'opporAudioList', reduce
          injectSagas(store, { key: 'opporAudioList', sagas })
          /*  Return getComponent    */
          cb(null, OpporAudioContainer.default)
    }
})
```



没有银弹

名称	特点	地址
redux-thunk	原始方案，使用简单	https://github.com/gaearon/redux-thunk
redux-saga	方案完善，颗粒级控制	https://github.com/redux-saga/redux-saga
redux-observable	观察者模式，自动响应	https://redux-observable.js.org/
redux-promise-middleare	保留thunk，promise优化	https://github.com/pburtchaell/redux-promise-middleware
redux-loop	类Elm模式	https://github.com/redux-loop/redux-loop
redux-action-tools	抽象合理，上手简单	https://github.com/kpaxqin/redux-action-tools

Part5 持续构建

风格约束

npm install husky --save-dev

package.json:

```
 "scripts": {
   "precommit": "npm lint",
   "prepush": "npm lint",
   "...": "..."
 }
```

git commit –m “ Keep calm and commit” (githook)

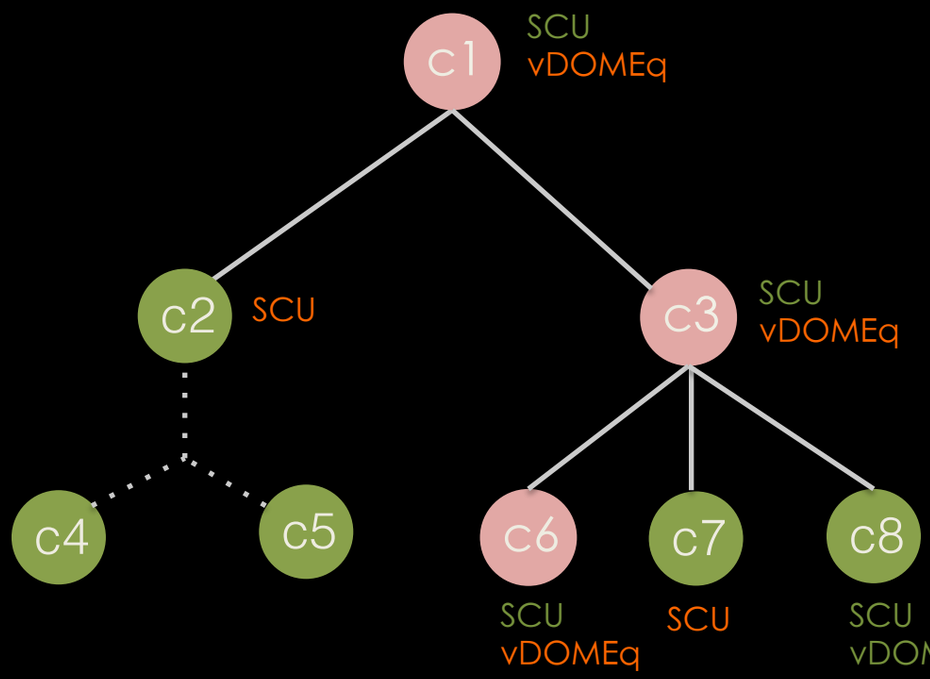
https://github.com/typicode/husky

Husky can prevent bad commit, push and more 🐶 woof!

“将可预见问题控制在提交前”

```
> husky - npm run -s precommit


/Users/huangjian/docker/react/webpack-develop-startkit/src/routes/Home/containers/HomeContainer.js
   3:38  error  Extra semicolon                                       semi
  15:1   error  Too many blank lines at the end of file. Max of 1 allowed  no-multiple-empty-lines

✖ 2 problems (2 errors, 0 warnings)


> husky - pre-commit hook failed (add --no-verify to bypass)
> husky - to debug, use 'npm run precommit'
```

组件优化



No Reconciliation needed

Reconciliation needed

SCU
SCU
ShouldComponentUpdate?

vDomEq
vDomeq
Are virtual DOMS equivalent?

单组件优化

shouldComponentUpdate：PureRender -> Immutable.js

多组件优化

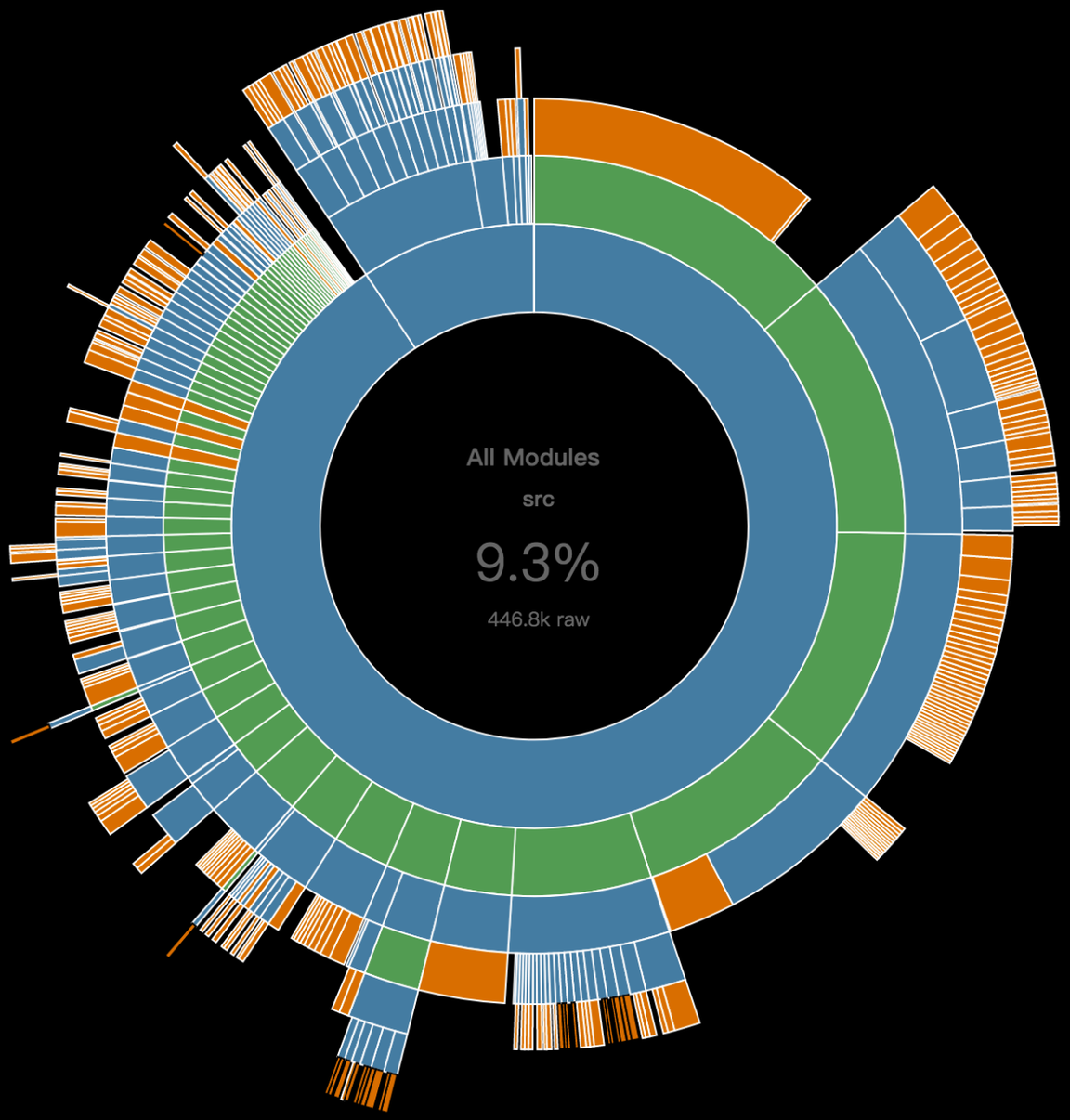
Reconciliation： key (use id instead index)

Redux优化

Store：Reselect、Normalizr

“react-addons-perf”

构建优化



Tree shaking

DllPlugin

体积优化

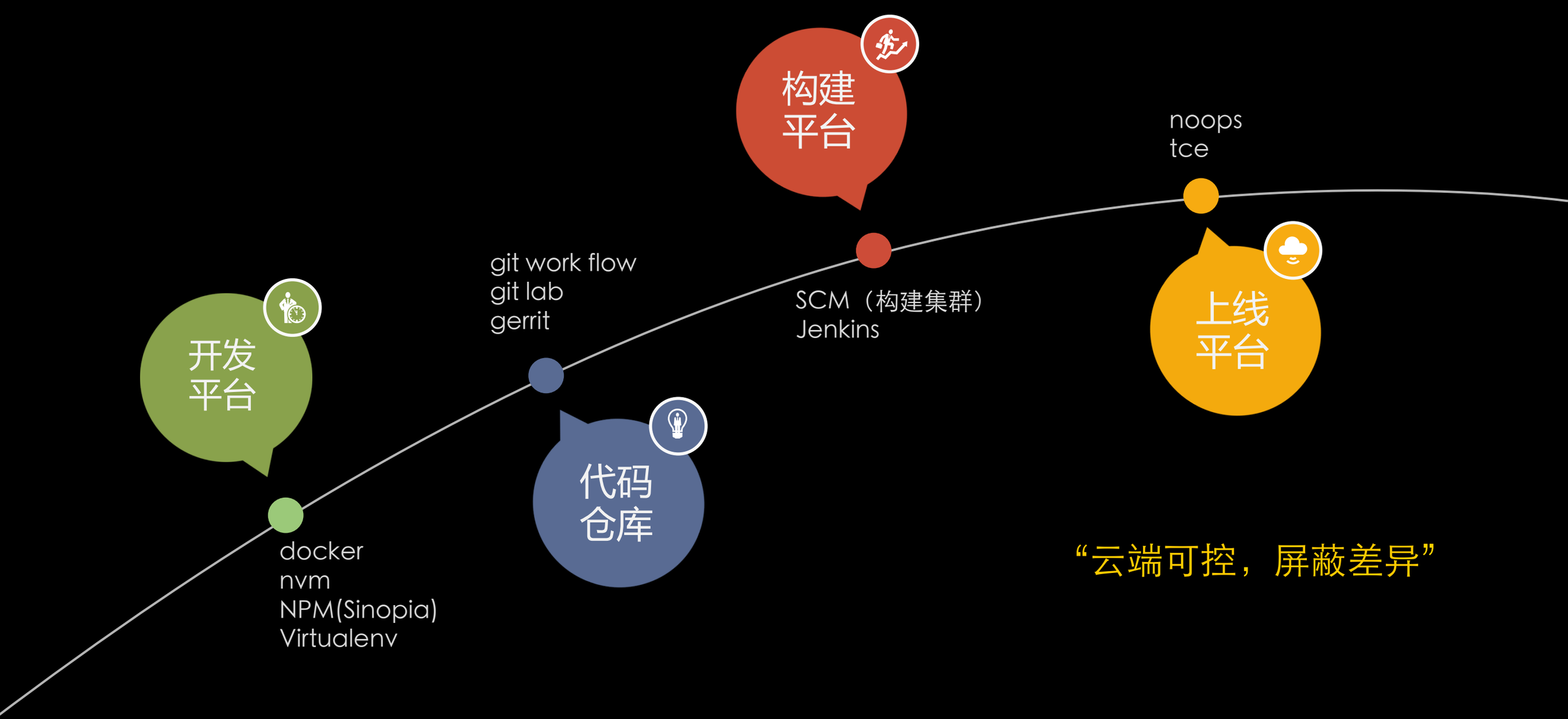
速度优化

uglify parallel

happy Pack

https://techblog.toutiao.com

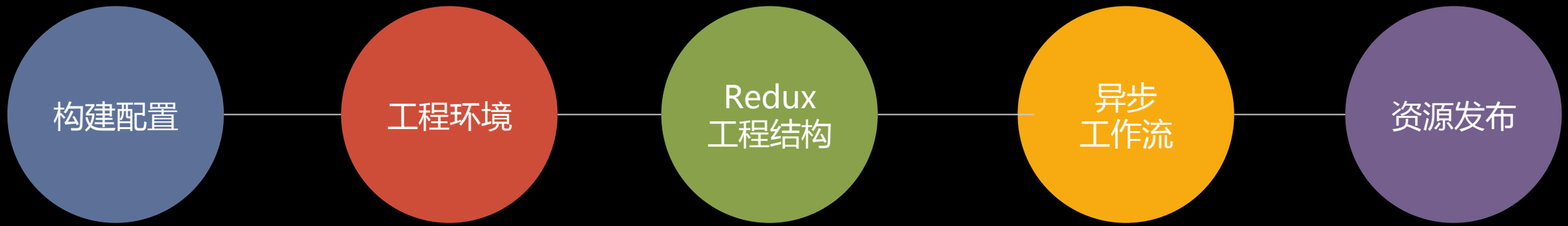
工作流



“云端可控，屏蔽差异”

总结

总结



抽象　　灵活　　紧凑　　中间件　　稳健

Q&A

THANKS!