常见问题

Frequently Asked Questions

##### single-spa是什么？

What does single-spa do?

single-spa is a top level router. When a route is active, it downloads and executes the code for that route.

The code for a route is called an "application", and each can (optionally) be in its own git repository, have its own CI process, and be separately deployed. The applications can all be written in the same framework, or they can be implemented in different frameworks.

single-spa是一个顶级的路由。当路由处于活动状态时，它下载并执行该路由的代码。

一个路由的代码称为一个“应用程序”，每个路由都可以(可选地)位于自己的git存储库中，拥有自己的CI流程，并且可以单独部署。应用程序可以在同一个框架中编写，也可以在不同的框架中实现。

##### 有推荐的设置吗?

Is there a recommended setup?

Yes, here is [the documentation for our recommended setup](https://single-spa.js.org/docs/recommended-setup/).

有，这是推荐设置的文档（<https://single-spa.js.org/docs/recommended-setup/>）

##### 我需要用框架创建一个父/根APP和多个子APP吗?

Should I have a parent/root app and children apps?

No. We strongly encourage that your single-spa-config or root application does not use any javascript ui-frameworks (React, Angular, Angularjs, Vue, etc). In our experience a plain javascript module is best for the single-spa-config and only the registered applications actually use ui-frameworks (angular, react, vue, etc).

Why? You end up creating a structure that has all the disadvantages of microservices without any of the advantages: your apps are now coupled together and you have to change multiple apps at the same time in order to make updates. Good microservices are completely independent, and this pattern breaks that.

不。我们强烈建议您的single-spa配置或根APP不要使用任何javascript ui框架(React、Angular、Angularjs、Vue等)。根据我们的经验，纯javascript模块最适合single-spa配置，而且只有注册的应用程序才真正使用ui框架(angular、react、vue等)。

为什么呢?你最终创建了一个结构，它具有微服务的所有缺点，却没有任何优点:你的APP现在是耦合在一起的，为了进行更新，你必须同时更改多个APP。好的微服务是完全独立的，而这种模式打破了这一点。

微服务的优缺点（<https://docs.qq.com/doc/DVE1NSHNnV2x4RVBj>）

##### single-app对性能有什么影响吗?

What is the impact to performance?

When setup in the [recommended way](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup), your code performance and bundle size will be nearly identical to a single application that has been code-split. The major differences will be the addition of the single-spa library (and SystemJS if you chose to use it). Other differences mainly come down to the difference between one (webpack / rollup / etc.) code bundle and in-browser ES modules.

当以推荐的方式安装时，您的代码性能和包大小将几乎与一个已被代码拆分的应用程序相同。主要的区别是增加了single-spa库(如果您选择使用SystemJS)。其他的区别主要归结于一个(webpack 、rollup 等)代码包和浏览器内的ES模块之间的区别。

##### 我可以只加载(React, Vue, Angular等)中的一个固定的版本吗?

Can I have only one version of (React, Vue, Angular, etc.) loaded?

Yes, and it's highly recommended you do so! Using [the recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup), you configure your [import map](https://single-spa.js.org/docs/faq/#what-are-import-maps) so that your library is defined only once. Then, tell each application to not bundle that library; instead, the library will given to you at runtime in the browser. See [webpack’s externals](https://webpack.js.org/configuration/externals/) (and other bundlers have similar options) for how to do this.

You do have the option of not excluding those libraries (for example if you want to experiment with a newer version or a different library) but be aware of the effect that will have on user's bundle sizes and application speed.

当然可以，强烈建议您这样做!使用推荐的设置，您可以配置import-map，这样您的库只定义一次。然后，通知每个APP不要绑定该库; 取而代之的是，这个库将在运行时在浏览器中提供给您。请参阅webpack的扩展包(其他打包器也有类似的选项)了解如何做到这一点。

您可以选择不排除这些库(例如，如果您想试验一个较新的版本或不同的库)，但是要注意它对用户包大小和应用程序速度的影响。

##### 什么是import-maps?

What are import maps?

[Import-maps](https://github.com/WICG/import-maps) improve the developer experience of in-browser ES modules by allowing you to write something like `import React from "react"` instead of needing to use an absolute or relative URL for your import statement. The same is also true of importing from other single-spa applications, e.g.

`import {MyButton} from "styleguide"` .The import-map spec is currently in the process of being accepted as a web standard and at the time of writing has been [implemented in Chrome](https://developers.google.com/web/updates/2019/03/kv-storage#import_maps), and a polyfill for browsers >= IE11 has been implemented by [SystemJS >= 3.0](https://github.com/systemjs/systemjs). Also see [the recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup)

[Import-maps](https://github.com/WICG/import-maps)允许您从“React”中编写类似`Import React`的内容，而不必为Import语句使用绝对或相对URL，从而改进了浏览器内ES模块的开发体验。从其他single-spa应用程序导入也是如此，例如从“styleguide” import {MyButton}。*import-map规范目前正在被接受为web标准，在撰写本文时已经在*[*Chrome中实现*](https://developers.google.com/web/updates/2019/03/kv-storage#import_maps)*了*，[SystemJS >= 3.0](https://github.com/systemjs/systemjs)已经实现了浏览器>= IE11的polyfill。请参阅[推荐的设置](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup)

##### 如何在应用程序之间共享应用程序状态?

How can I share application state between applications?

In general, we recommend trying to avoid this — it couples those apps together. If you find yourself doing this frequently between apps, you may want to consider that those separate apps should actually just be one app.

Generally, it’s better to just make an API request for the data that each app needs, even if parts of it have been requested by other apps. In practice, if you’ve designed your application boundaries correctly, there will end up being very little application state that is truly shared — for example, your friends list has different data requirements than your social feed.

However, that doesn’t mean it can’t be done. Here are several ways: 1. Create a shared API request library that can cache requests and their responses. If somone hits an API, and then that API is hit again by another application, it just uses the cache 1. Expose the shared state as an export, and other libraries can import it. Observables (like [RxJS](https://rxjs-dev.firebaseapp.com/)) are useful here since they can stream new values to subscribers 1. Use [custom browser events](https://developer.mozilla.org/en-US/docs/Web/Guide/Events/Creating_and_triggering_events#Creating_custom_events) to communicate 1. Use [cookies](https://developer.mozilla.org/en-US/docs/Web/HTTP/Cookies), [local/session storage](https://developer.mozilla.org/en-US/docs/Web/API/Window/localStorage), or other similar methods for storing and reading that state. These methods work best with things that don't change often, e.g. logged-in user info.

Please note that this is just talking about sharing application state: sharing functions, components, etc. is as easy as an `export`  in one project and an `import` in the other. See [import map](https://single-spa.js.org/docs/faq/#what-are-import-maps) documentation for more details

一般来说，我们建议尽量避免这种情况——它会将这些应用程序结合在一起。如果你发现自己经常在应用程序之间这样做，你可能想要考虑这些单独的应用程序实际上应该只是一个应用程序。

通常，最好是对每个应用程序需要的数据发出API请求，即使其他应用程序已经请求了其中的一部分。在实践中，如果你正确地设计了你的应用程序边界，最终会有非常少的应用程序状态是真正共享的——例如，你的好友列表与你的社交feed有不同的数据需求。

然而，这并不意味着这是不可能的。以下是几种方法:创建一个可以缓存请求及其响应的共享API请求库。如果有人访问了某个API，然后该API又被另一个应用程序访问，那么它只使用缓存1。将共享状态作为导出公开，其他库可以导入它。*可观察对象(如RxJS)*在这里很有用，因为它们可以向订阅者1传输新值。使用[自定义浏览器事件](https://developer.mozilla.org/en-US/docs/Web/Guide/Events/Creating_and_triggering_events#Creating_custom_events)进行通信1。使用[cookie](https://developer.mozilla.org/en-US/docs/Web/HTTP/Cookies)、[local/session storage](https://developer.mozilla.org/en-US/docs/Web/API/Window/localStorage) 或其他类似的方法来存储和读取状态。这些方法在不经常改变的情况下效果最好，比如登录用户信息。

请注意，这只是在讨论共享应用程序状态:共享函数、组件等与在一个项目中导出和在另一个项目中导入一样简单。有关详细信息，请参阅[import map](https://single-spa.js.org/docs/faq/#what-are-import-maps)文档

##### 我可以使用前端微服务吗?

Should I use frontend microservices?

If you’ve ran into some of the headaches a monolithic repo has, then you should really consider it.

In addition, if your organization is setup in a Spotify-type model (e.g. where there are autonomous squads that own full-stack features) then microservices on the frontend will fit very well into your setup.

However, if you’re just starting off and have a small project or a small team, we would recommend you stick with a monolith (i.e. not microservices) until you get to the point that scaling (e.g. organizational scaling, feature scaling, etc.) is getting hard. Don’t worry, we’ll be here to help you migrate when you get there.

如果您遇到了单块repo所具有的一些令人头痛的问题，那么您应该认真考虑一下。

此外，如果你的组织是建立在一个Spotify类型的模型(例如，在那里有拥有完整模块功能的自治小组)，那么前端的微服务将非常适合你的设置。

然而，如果你刚刚起步，并且有一个小项目或小团队，我们建议你坚持使用一个整体(也就是说，不要使用微服务)，直到你发现扩展(如组织扩展、功能扩展等)变得越来越困难。别担心，我们会在这里帮你迁移。

##### 我可以使用多个框架吗?

Can I use more than one framework?

Yes. However, it’s something you’ll want to consider hard because it splits your front-end organization into specialities that aren’t compatible (e.g. a React specialist may have problems working in an Angular app), and also causes more code to be shipped to your users.

However, it is great for migrations away from an older or unwanted library, which allows you to slowly rip out the code in the old application and replace it with new code in the new library (see Google results for [the strangler pattern](https://www.google.com/search?q=the+strangler+pattern&oq=the+strangler+pattern)).

It also is a way to allow large organizations to experiment on different libraries without a strong commitment to them.

Just be conscious of the effect it has on your users and their experience using your app.

可以。然而，这是你需要认真考虑的事情，因为它将你的前端组织分割成不兼容的方向(例如，React模块可能在Angular应用程序中工作有问题)，也会导致更多的代码被发送给你的用户。

但是，它非常适合从旧的或不需要的库迁移出来，这允许您慢慢地从旧的应用程序中取出代码，然后用新库中的新代码替换它(有关strangler模式，请参阅谷歌结果)。

这也是一种允许大型组织在不同的库上进行试验的方法，而不必对它们做出强烈的承诺。

只要意识到它对你的用户和他们使用你的应用程序的体验的影响。

##### 开发者体验(DX)怎么样呢?

What is the developer experience (DX) like?

If you're using the [recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup) for single-spa, you'll simply be able to go to your development website, add an import map that points to your locally-running code, and refresh the page.

There's a [library](https://github.com/joeldenning/import-map-overrides) that you can use, or you can even just do it yourself - you'll note that the source code is pretty simple. The main takeaway is that you can have multiple [import maps](https://single-spa.js.org/docs/faq/#what-are-import-maps) and the latest one wins - you add an import map that overrides the default URL for an application to point to your localhost.

We're also looking at providing this functionality as part of the [Chrome/Firefox browser extension](https://github.com/single-spa/single-spa-inspector).

Finally, this setup also enables you to do overrides in your production environment. It obviously should be used with caution, but it does enable a powerful way of debugging problems and validating solutions.

As a point of reference, nearly all developers we've worked with prefer the developer experience of microservices + single-spa over a monolithic setup.

如果您正在使用single-spa的推荐设置，那么您只需进入您的开发网站，添加一个指向本地运行代码的import-maps，然后刷新页面。

有一个库你可以使用，或者你甚至可以自己做-你会注意到源代码是非常简单的。最重要的是，您可以有多个import-maps，最新的一个成果—您可以添加一个import-maps，它覆盖应用程序指向本地主机的默认URL。

我们也在考虑将此功能作为Chrome/Firefox浏览器扩展的一部分。

最后，此设置还允许您在生产环境中进行覆盖。显然应该谨慎使用它，但它确实提供了一种调试问题和验证解决方案的强大方法。

作为参考，几乎所有与我们合作过的开发人员都更喜欢微服务+single-spa的开发体验，而不是单块设置。

##### 每个单spa应用程序可以有自己的git repo吗?

Can each single-spa application have its own git repo?

Yes! You can even give them their own package.json, webpack config, and CI/CD process, using SystemJS to bring them all together in the browser.

是的!你甚至可以给他们自己的package.json, webpack配置，和 CI/CD流程，使用SystemJS将它们放在浏览器中。

##### single-spa 应用程序可以独立部署吗?

Can single-spa applications be deployed independently?

Yes! See next section about CI/CD.

是的!请参阅有关CI/CD的下一节

##### CI/CD流程是什么样的?

What does the CI/CD process look like?

In other words, how do I build and deploy a single-spa application?

With the [recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup), the process generally flows like this: 1. Bundle your code and upload it to a CDN. 1. Update your dev environment's import map to point to the that new URL. In other words, your import map used to say "styleguide": "cdn.com/styleguide/v1.js" and now it should say  "styleguide": "cdn.com/styleguide/v2.js"

Some options on how to update your import map include:

* Server render your `index.html

with the import map inlined. This does not mean that your DOM elements need to all be server rendered, but just the  <script type="systemjs-importmap>

 element. Provide an API that either updates a database table or a file local to the server.

* Have your import map itself on a CDN, and use [import-map-deployer](https://github.com/single-spa/import-map-deployer) or similar to update the import map during your CI process. This method has a small impact on performance, but is generally easier to setup if you don't have a server-rendered setup already. (You can also [preload](https://developer.mozilla.org/en-US/docs/Web/HTML/Preloading_content) the import map file to help provide a small speed boost). See [example travis.yml](https://github.com/openmrs/openmrs-esm-root-config/blob/master/.travis.yml). Other CI tools work, too.

换句话说，如何构建和部署一个single-spa应用程序?

使用推荐的设置，流程通常如下所示:

1. 将您的代码打包并上传到CDN。
2. 更新您的dev环境的import map以指向新的URL。换句话说，您的import map过去是“styleguide”:“cdn.com/styleguide/v1.js”，现在它应该是“styleguide”:“cdn.com/styleguide/v2.js”

如何更新你的`import map`的一些选项包括:

1、服务器使用内联的`import map`呈现index.html。这并不意味着您的DOM元素需要全部由服务器呈现，而只是<script type="systemjs-importmap>元素。提供一个API来更新数据库表或服务器本地的文件。

2、将`import map`本身放在CDN上，并使用import-map-deployer或类似的工具在CI过程中更新导入映射。此方法对性能影响不大，但如果您没有服务器呈现的设置，通常更容易安装。(您还可以预加载`import map`文件来帮助提供一个小的速度提升)。看到travis.yml示例。其他CI工具也可以。

##### 创建react应用程序

Create React App

Currently Create React App (CRA) requires [ejecting](https://github.com/facebook/create-react-app/blob/master/packages/react-scripts/template/README.md#npm-run-eject) or [using a tool](https://github.com/timarney/react-app-rewired/blob/master/README.md) to modify the webpack config. You can also consider some of the [popular alternatives to CRA](https://github.com/facebook/create-react-app#popular-alternatives).

When you use the [recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup) the following things need to change (as of CRA v3.0.1):

1. Remove Webpack optimizations block, because they add multiple webpack chunks that don't load each other
2. Remove html-webpack plugin

Change`output.libraryTarget` to `System`、`UMD` or `AMD`

CRA does not allow you to change those items without ejecting or using another tool.

目前Create React App (CRA)需要弹出或使用工具修改webpack配置。您还可以考虑一些流行的CRA替代品。

当您使用推荐的设置时，需要更改以下内容(从CRA v3.0.1开始):

1、删除Webpack优化块，因为它们添加了多个互不加载的Webpack块

2、删除html-webpack插件

改变`output.libraryTarget` to `System`、`UMD` or `AMD`。

CRA不允许您在不弹出或使用其他工具的情况下更改这些项。

##### 代码块拆分

Code splits

1. Single spa supports code splits. There are so many ways to code split we won't be able to cover them all, but if you're using the [recommended setup](https://single-spa.js.org/docs/faq/#is-there-a-recommended-setup) with webpack you'll need to do at least two things:

Set the  `\_\_webpack\_public\_path\_\_` dynamically so webpack knows where to fetch your code splits (webpack assumes they are located at the root of the server and that isn't always true in a single-spa application). Both solutions below should be the very first import of your application in order to work.

* + For SystemJS >= 6, use [systemjs-webpack-interop](https://github.com/joeldenning/systemjs-webpack-interop):

import { setPublicPath } from 'systemjs-webpack-interop';

setPublicPath('name-of-module-in-import-map');

* + For SystemJS 2-5: Find a code example [here](https://gitlab.com/TheMcMurder/single-spa-portal-example/blob/master/people/src/set-public-path.js#L3)

Set either `output.jsonpFunction `  or `output.library` to ensure that each app's webpack doesn't collide with other apps' webpack. `jsonpFunction`  is preferred.

For more information about webpack configuration and single-spa, see [the recommended setup](https://single-spa.js.org/docs/recommended-setup#build-tools-webpack--rollup).

Single spa支持代码分割。有很多方式来进行代码分割，我们不能涵盖所有，但如果你使用的是推荐的设置与webpack，你需要做至少两件事:

1、动态地设置\_webpack\_public\_path\_\_，以便webpack知道在哪里获取代码片段(webpack假设它们位于服务器的根目录，但在single-spa应用程序中并不总是如此)。为了使应用程序正常工作，下面的两个解决方案都应该是应用程序的第一个导入。

对于SystemJS >= 6，使用SystemJS -webpack-interop:

import { setPublicPath } from 'systemjs-webpack-interop';

setPublicPath('name-of-module-in-import-map');

SystemJS 2-5:在这里找到一个代码示例

设置 `output.jsonpFunction `  或 `output.library`，以确保每个应用程序的webpack不会与其他应用程序的webpack发生冲突。jsonpFunction优先。

有关webpack配置和single-spa的更多信息，请参阅推荐设置。

##### single-spa是否需要额外的安全考虑?

Does single-spa require additional security considerations?

No. single-spa does not add, deviate, or attempt to bypass any browser JavaScript security measures. The security needs of your applications are the same as if you did not use single-spa.

Outside of that, web applications may use the following resources that have their own security considerations that you may need to become familiar with:

* [ES6 module dynamic imports](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/import)Webpack-based applications use [Webpack's implementation of dynamic imports](https://webpack.js.org/guides/code-splitting/#dynamic-imports)
* [Cross-Origin Resource Sharing (CORS)](https://developer.mozilla.org/en-US/docs/Web/HTTP/CORS)
  + [Content Security Policy (CSP)](https://developer.mozilla.org/en-US/docs/Web/HTTP/CSP#Threats)module imports specifically relate to

[CSP](https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Content-Security-Policy/script-src)`script-src`

* [Subresource Integrity (SRI)](https://developer.mozilla.org/en-US/docs/Web/Security/Subresource_Integrity#How_Subresource_Integrity_helps)See also [import-maps script “integrity” attribute](https://github.com/WICG/import-maps/issues/174)
* Import-maps are also governed by CSP
  + See also ["Supplying out-of-band metadata for each module"](https://github.com/WICG/import-maps/blb/master/README.md#supplying-out-of-band-metadata-for-each-module)

不需要。single-spa不会添加、偏离或试图绕过任何浏览器JavaScript安全措施。您的应用程序的安全需求与您不使用single-spa是一样的。

除此之外，web应用程序可能会使用以下资源，这些资源有自己的安全注意事项，您可能需要熟悉这些注意事项:

1、ES6模块动态导入基于Webpack的应用程序使用Webpack的动态导入实现

2、跨源资源共享(CORS)、内容安全策略(CSP)，模块导入特别与CSP `script-src`相关

3、子资源完整性(SRI)，请[import-maps](https://github.com/WICG/import-maps/issues/174)导入映射脚本的“完整性”属性

4、[import-maps](https://github.com/WICG/import-maps/issues/174)也由CSP管理，参见“为每个模块提供带外元数据”