

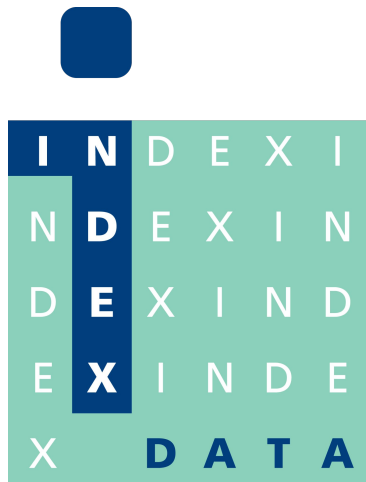
# FOLIO modularity in practice

Seamless deployment of modules from multiple sources



Mike Taylor  
Index Data

[mike@indexdata.com](mailto:mike@indexdata.com)



# Early design of FOLIO





# Early design of FOLIO



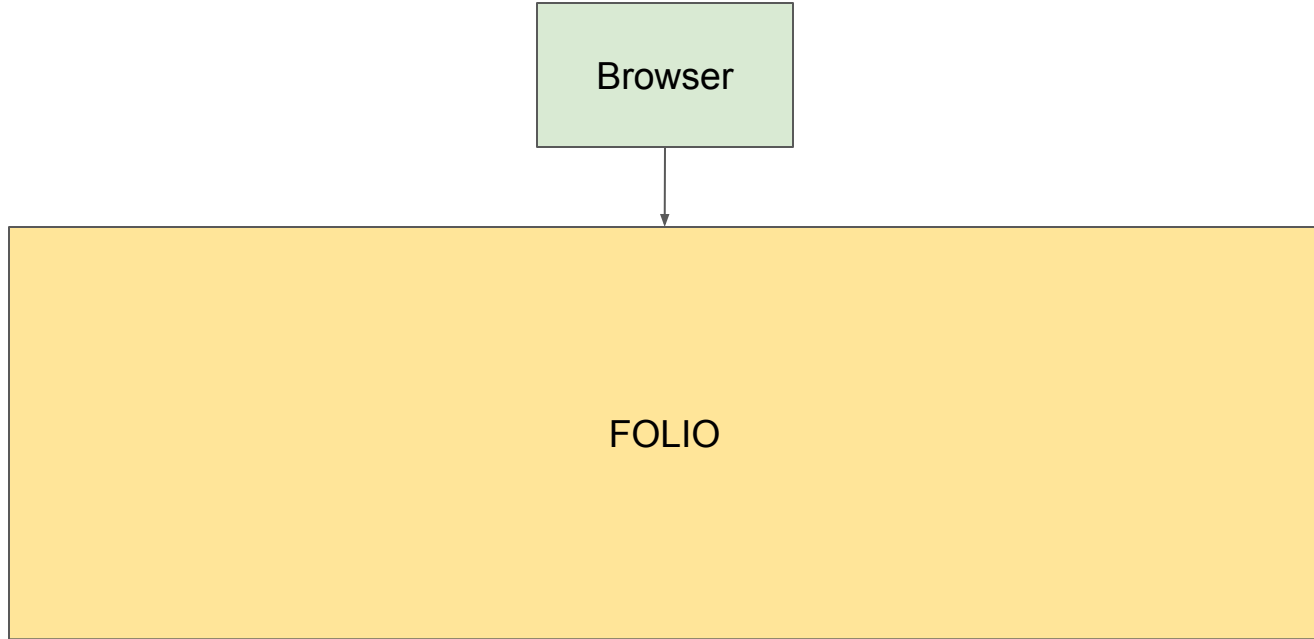
# Early design of FOLIO



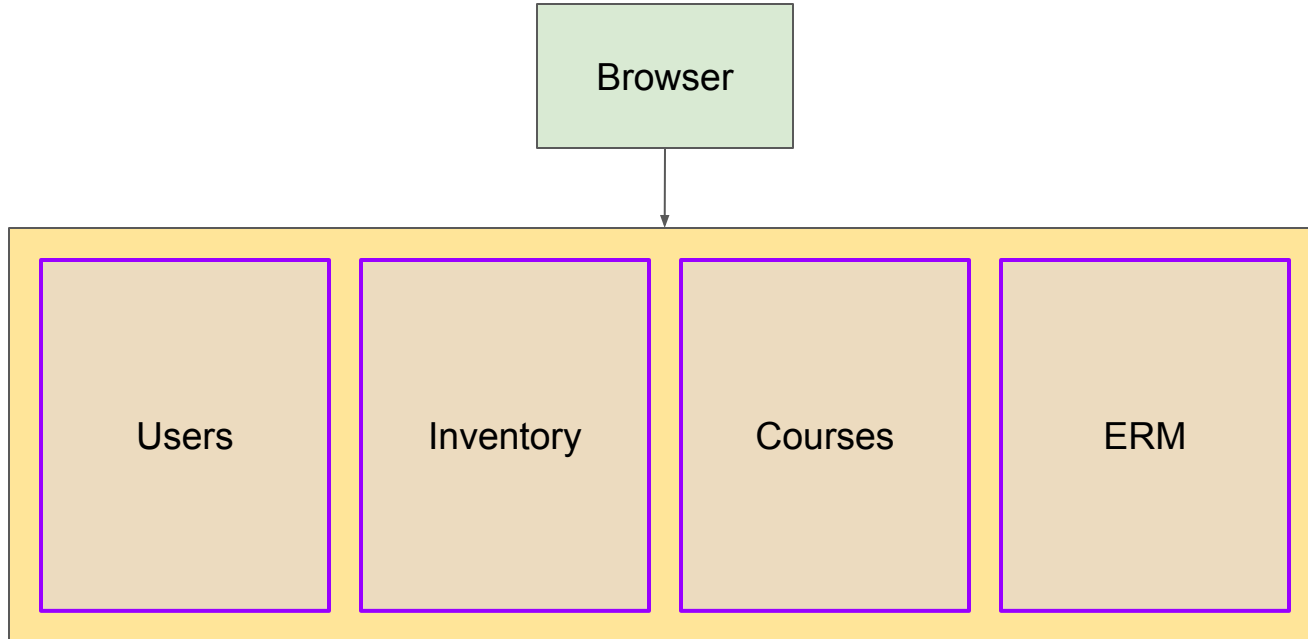
2015



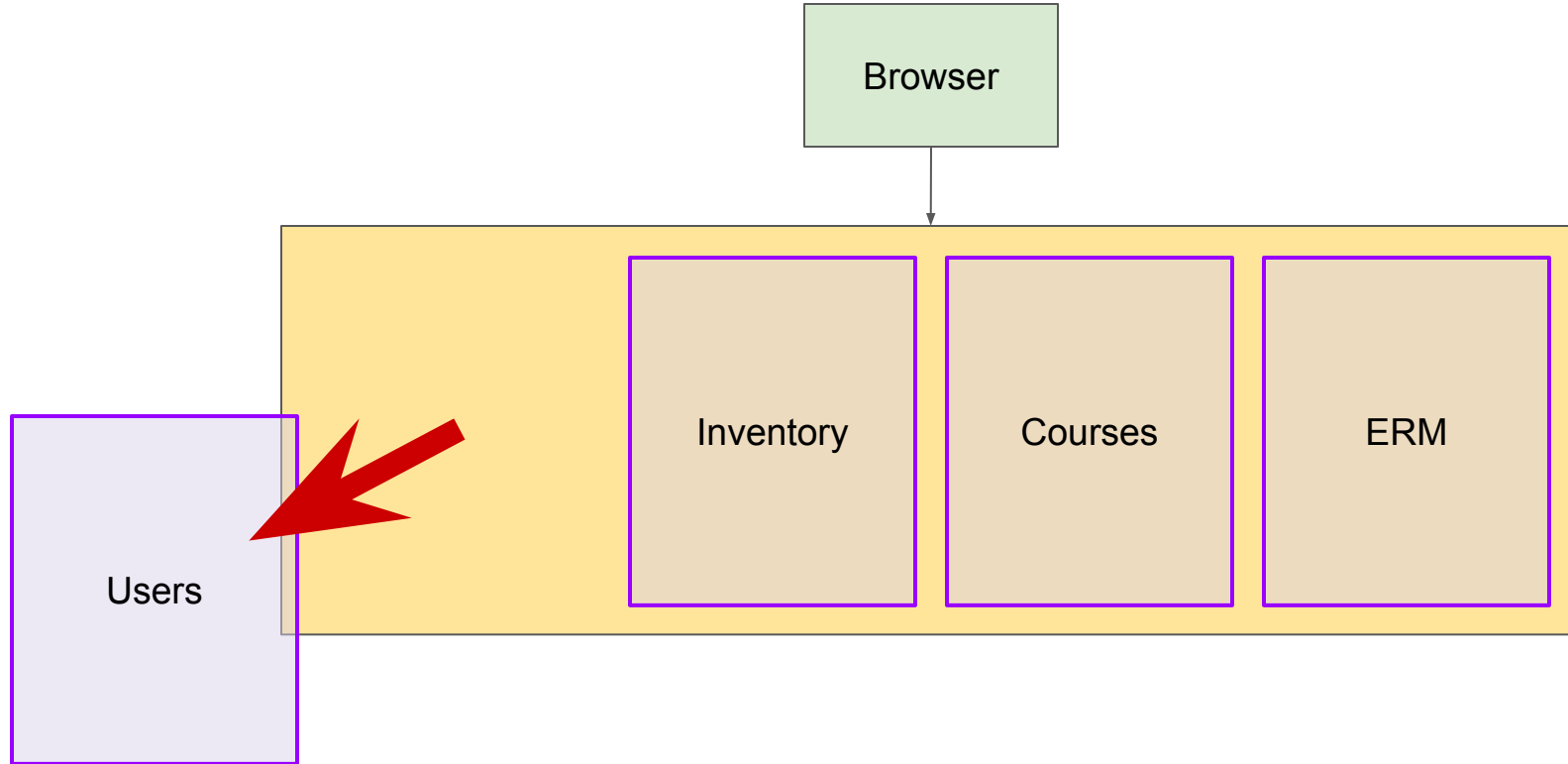
# FOLIO was designed to be modular



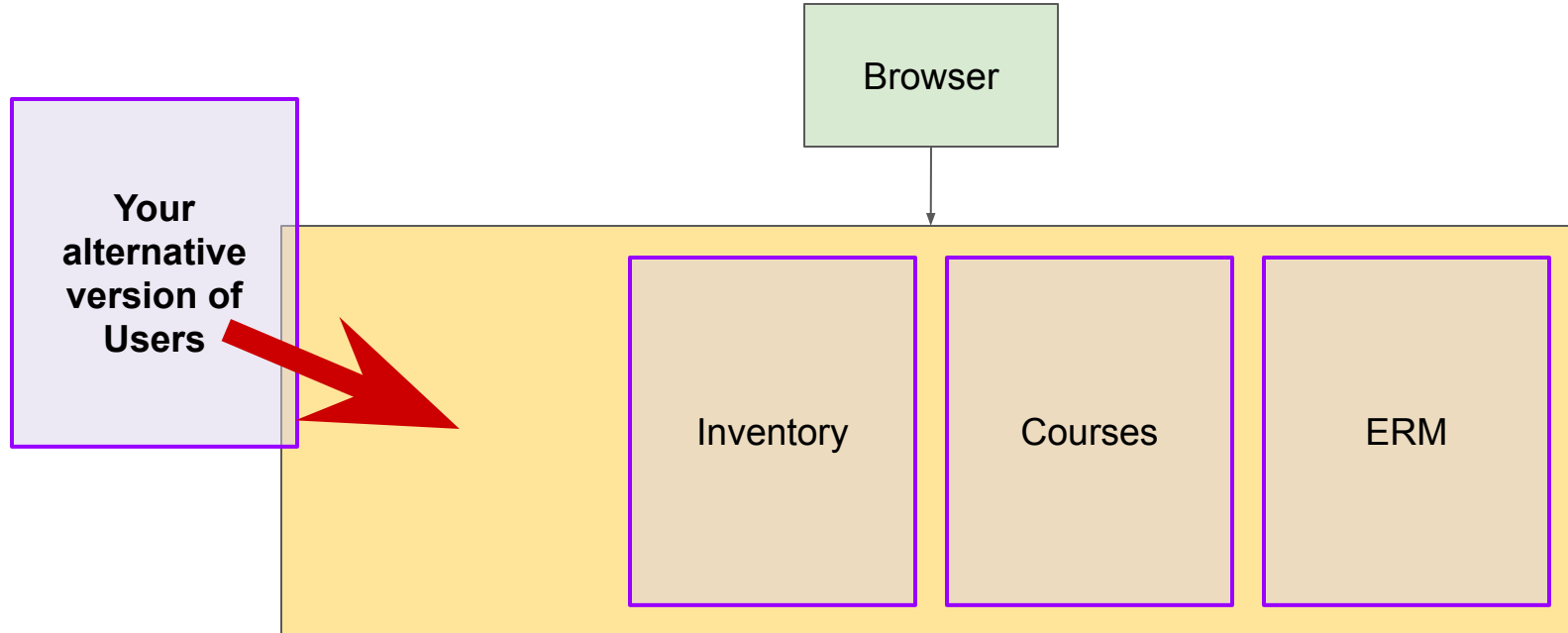
# FOLIO was designed to be modular



# Dependencies on interfaces, not implementations

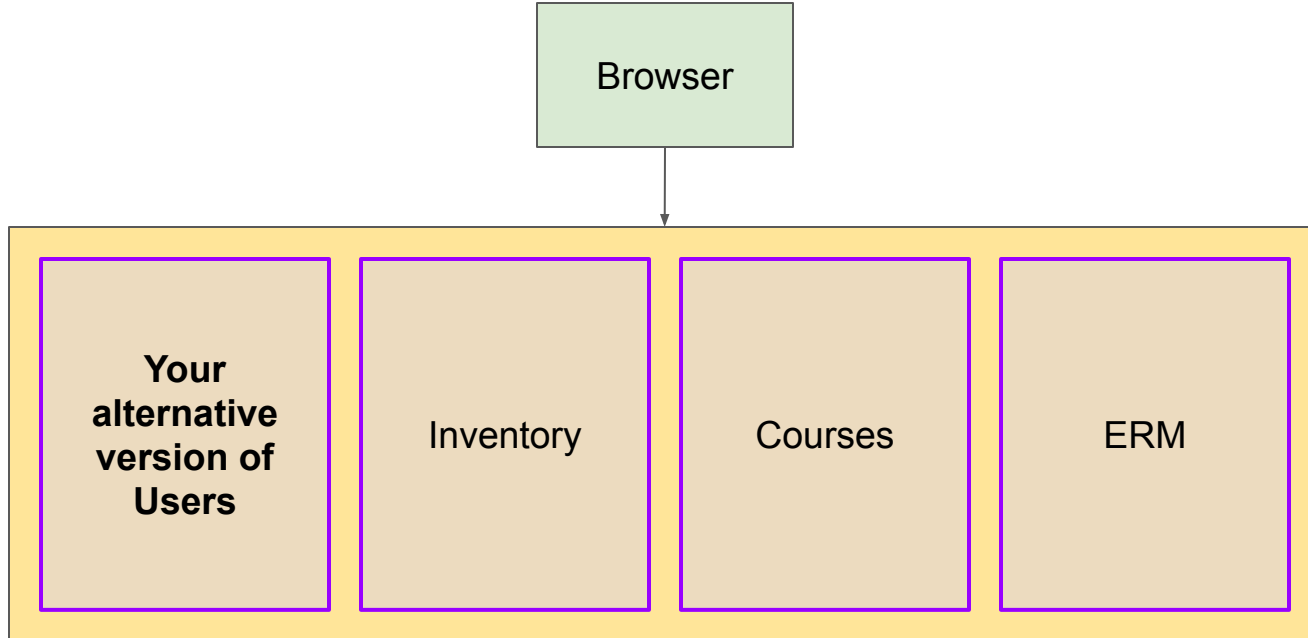


# Substituting interface-compatible modules





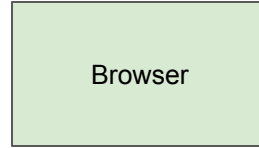
# Substituting interface-compatible modules



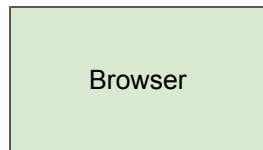
# A quick refresher on FOLIO architecture

- The user's Web browser
- Stripes – FOLIO's single page application (SPA)
- The Okapi API gateway
- The FOLIO backend
- Stripes modules
- Backend modules
- Apps

A user at a web browser ...



... running the Stripes SPA ...



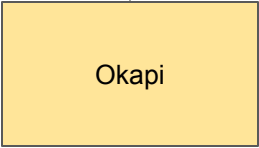
Stripes



... calling Okapi-mediated services ...



Stripes

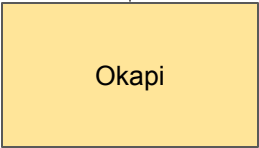




... that are provided by a backend.



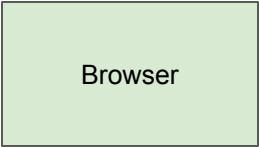
Stripes



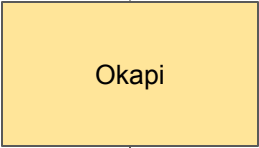
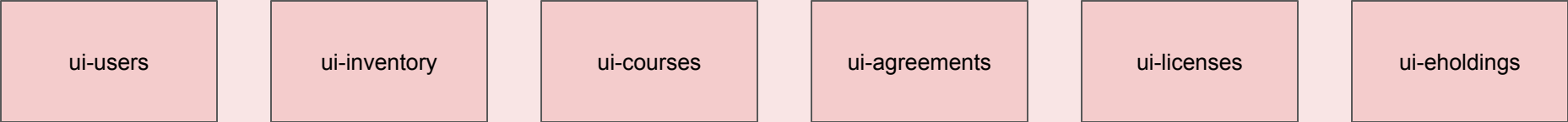
Backend



The Stripes SPA is made of UI modules



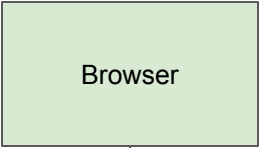
Stripes



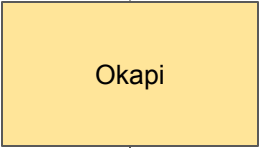
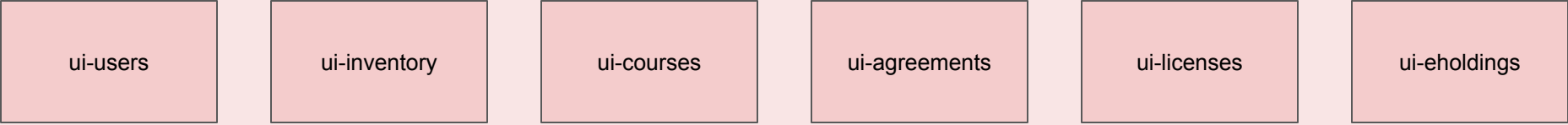
Backend



Ther backend is made of backend modules



Stripes



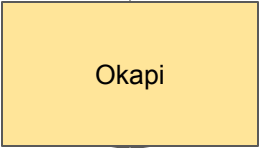
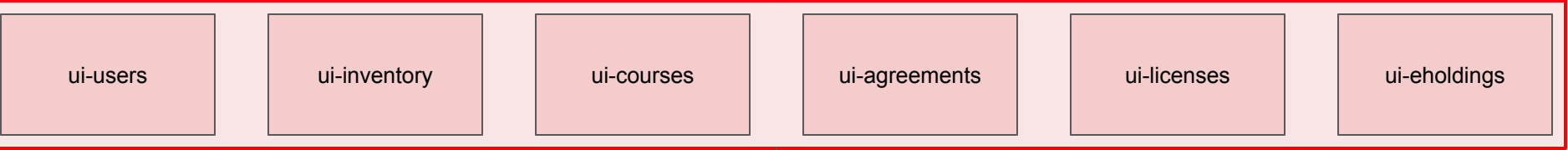
Backend



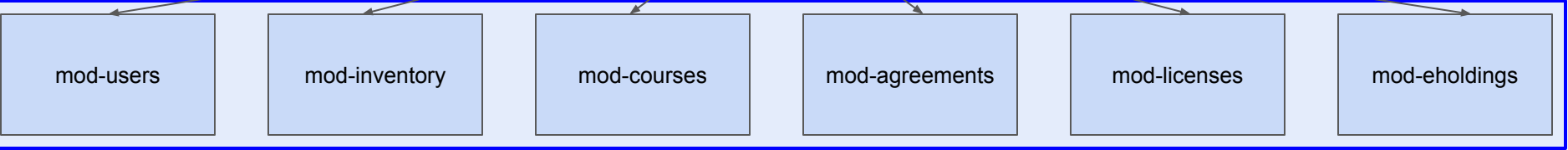
Okapi proxies to individual module



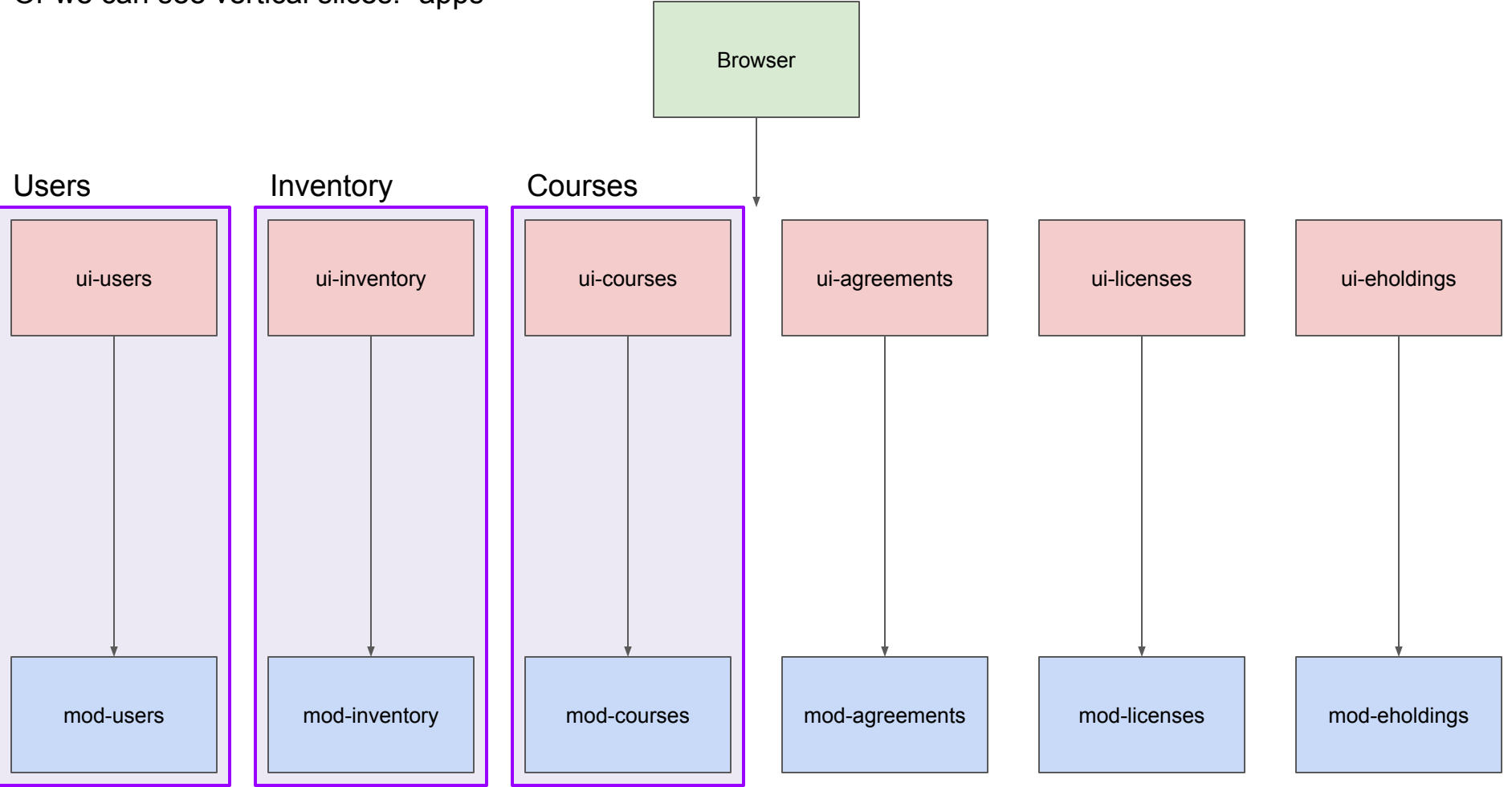
Stripes



Backend

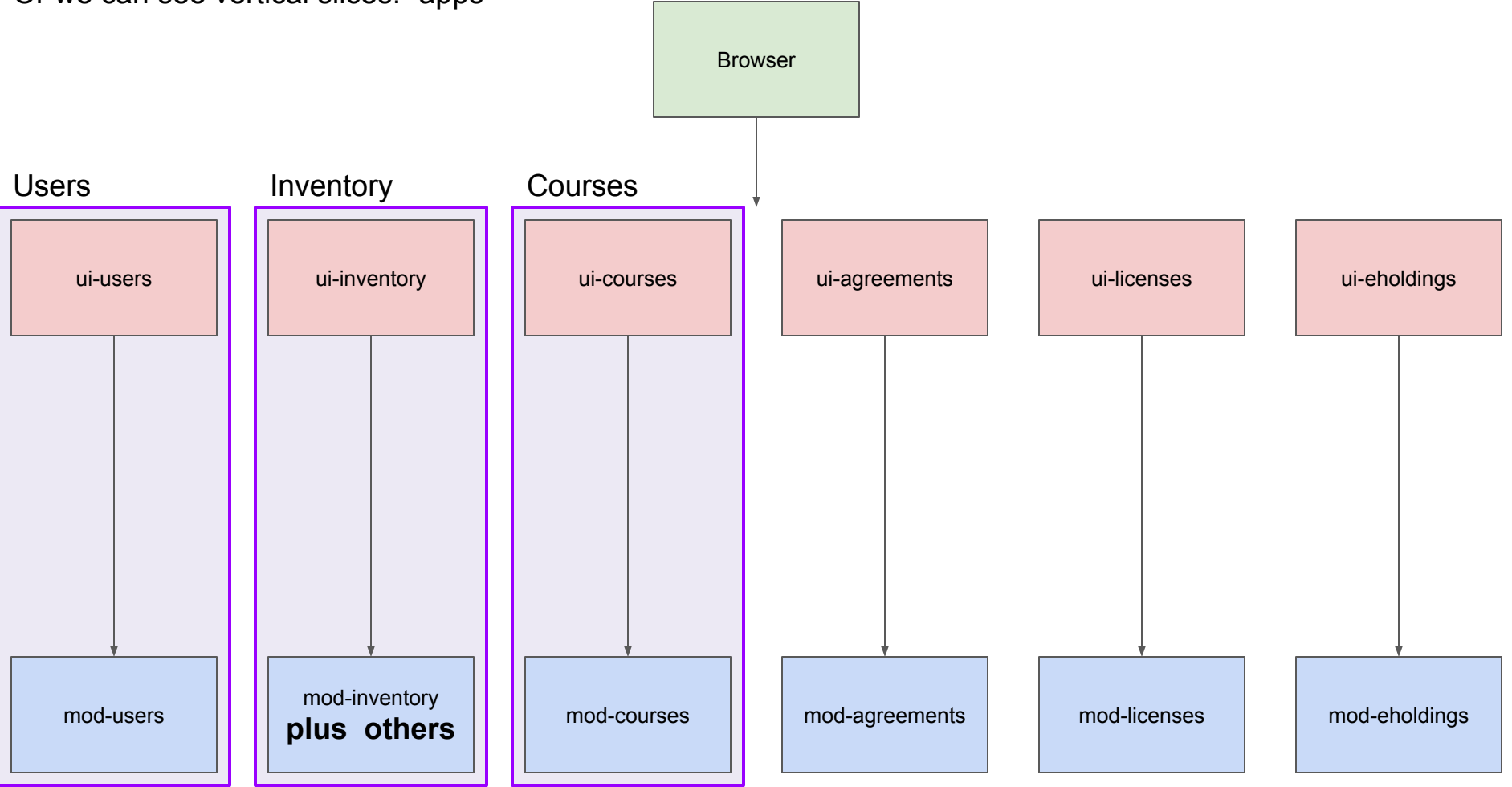


Or we can see vertical slices: “apps”

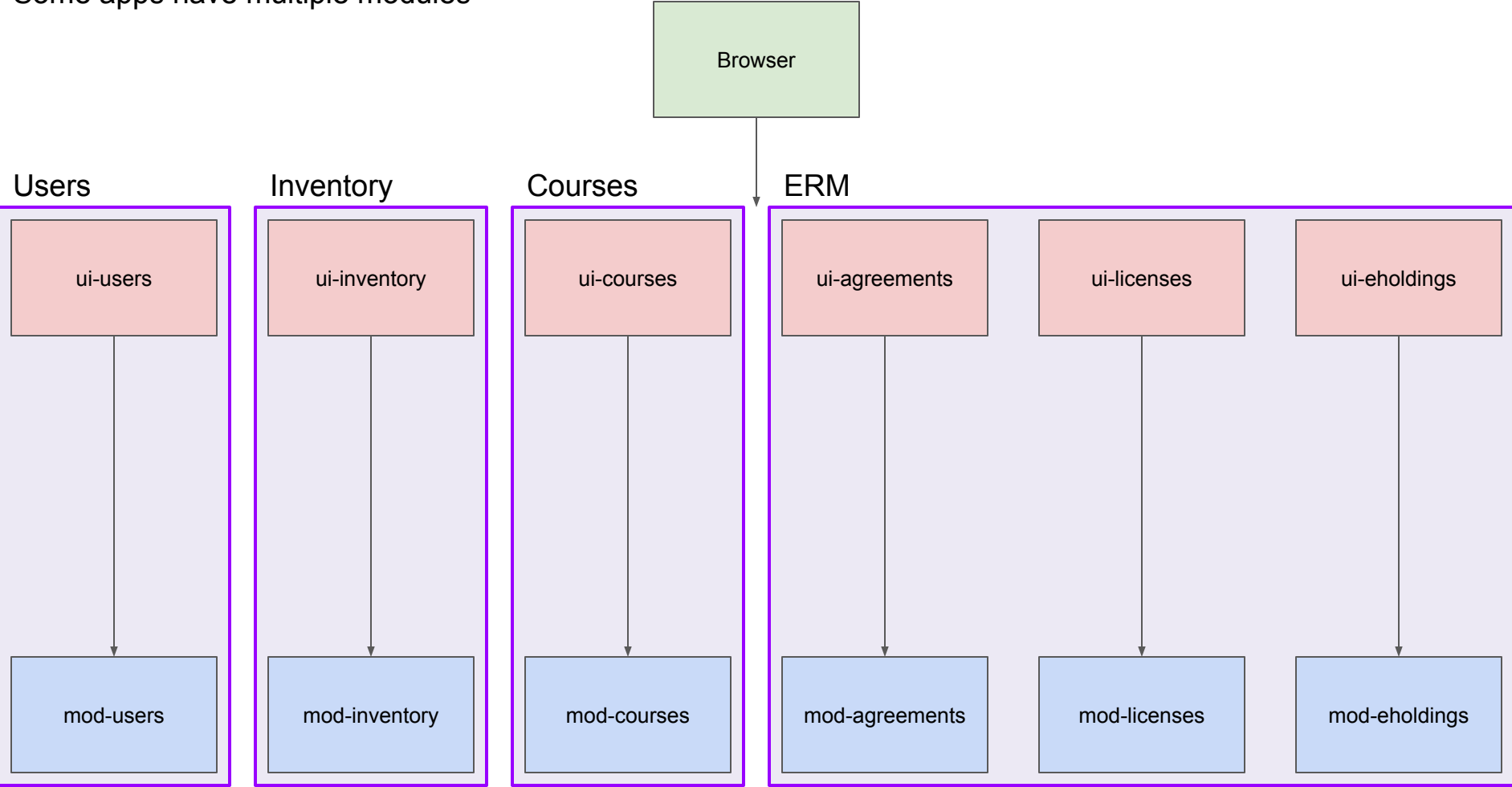




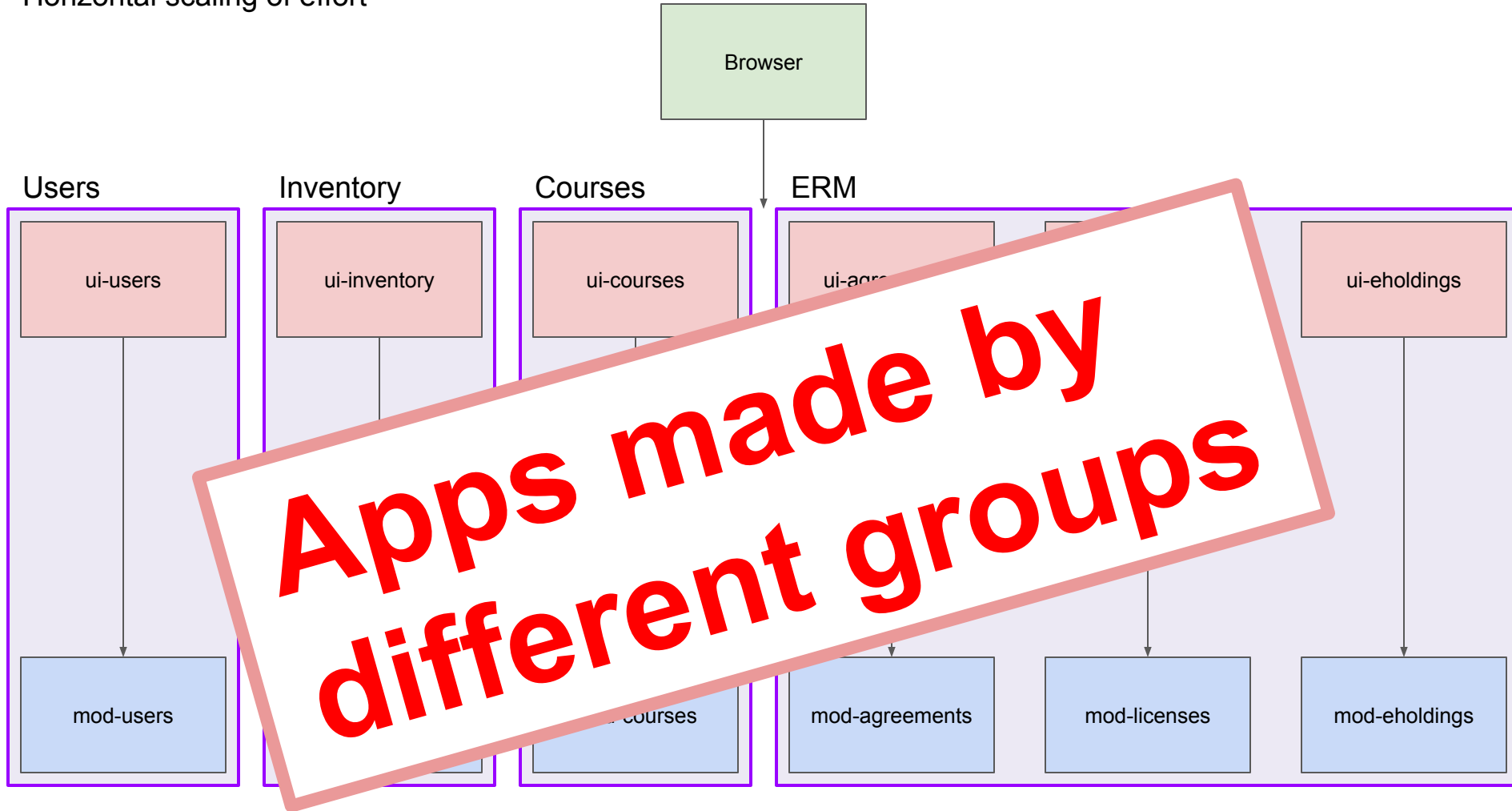
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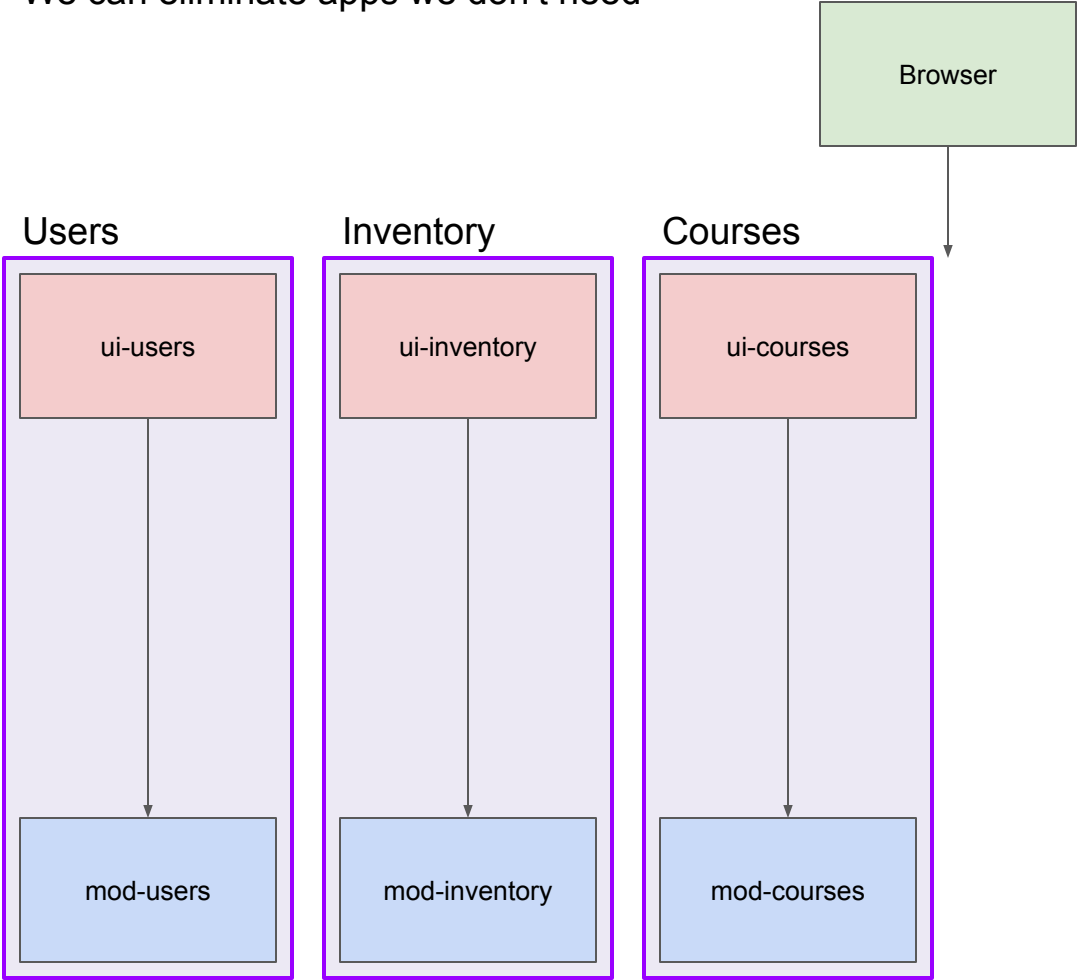
Some apps have multiple modules



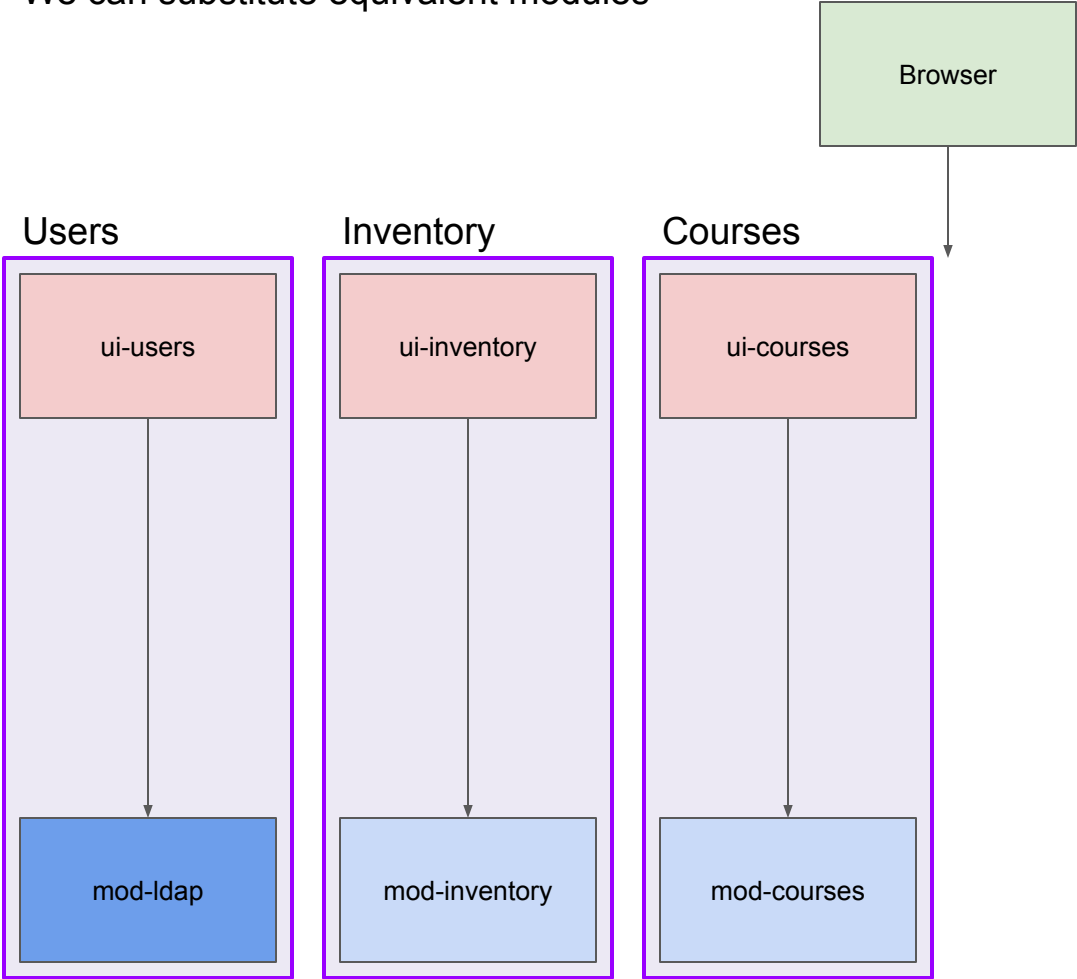
Horizontal scaling of effort



We can eliminate apps we don't need

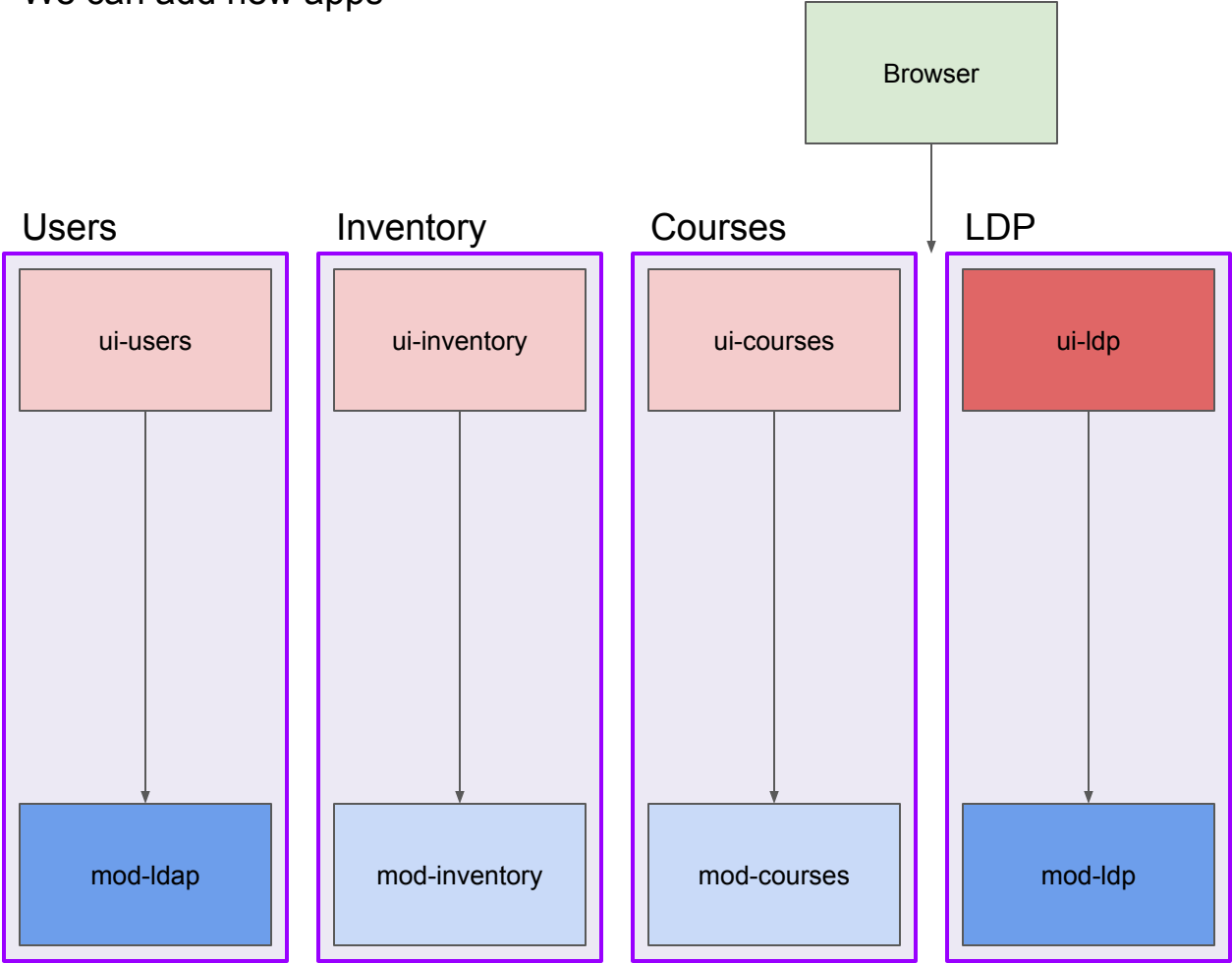


We can substitute equivalent modules

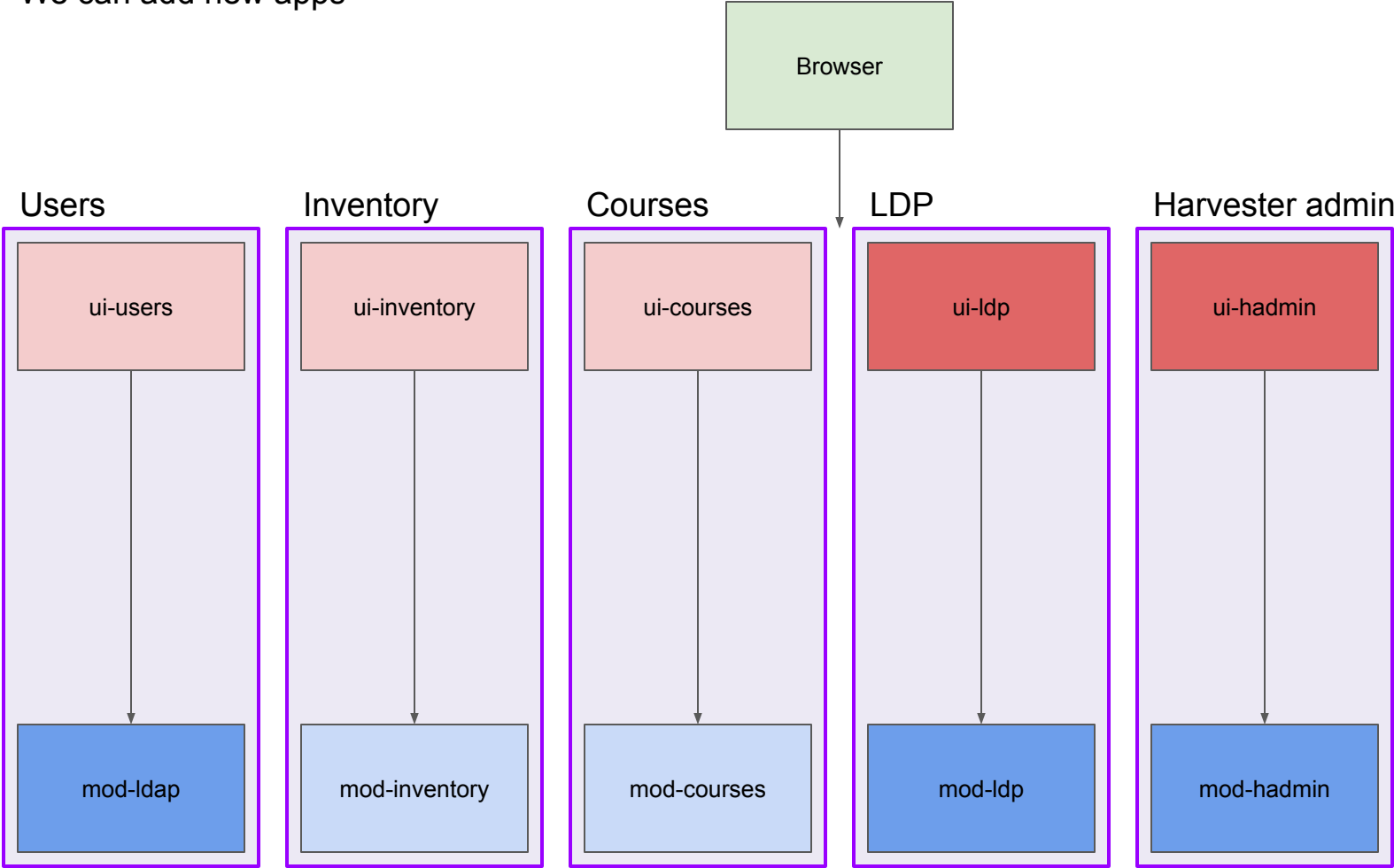




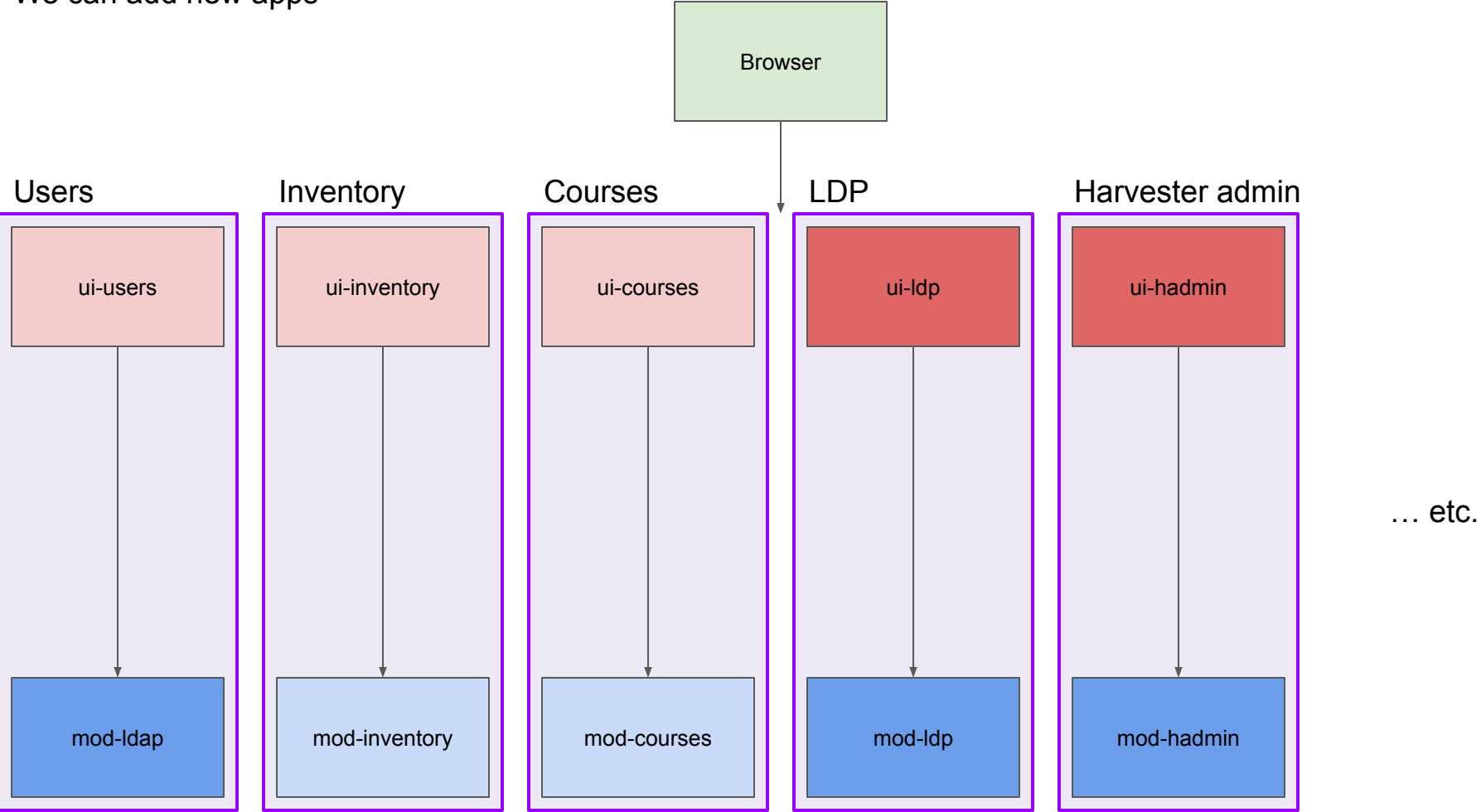
We can add new apps



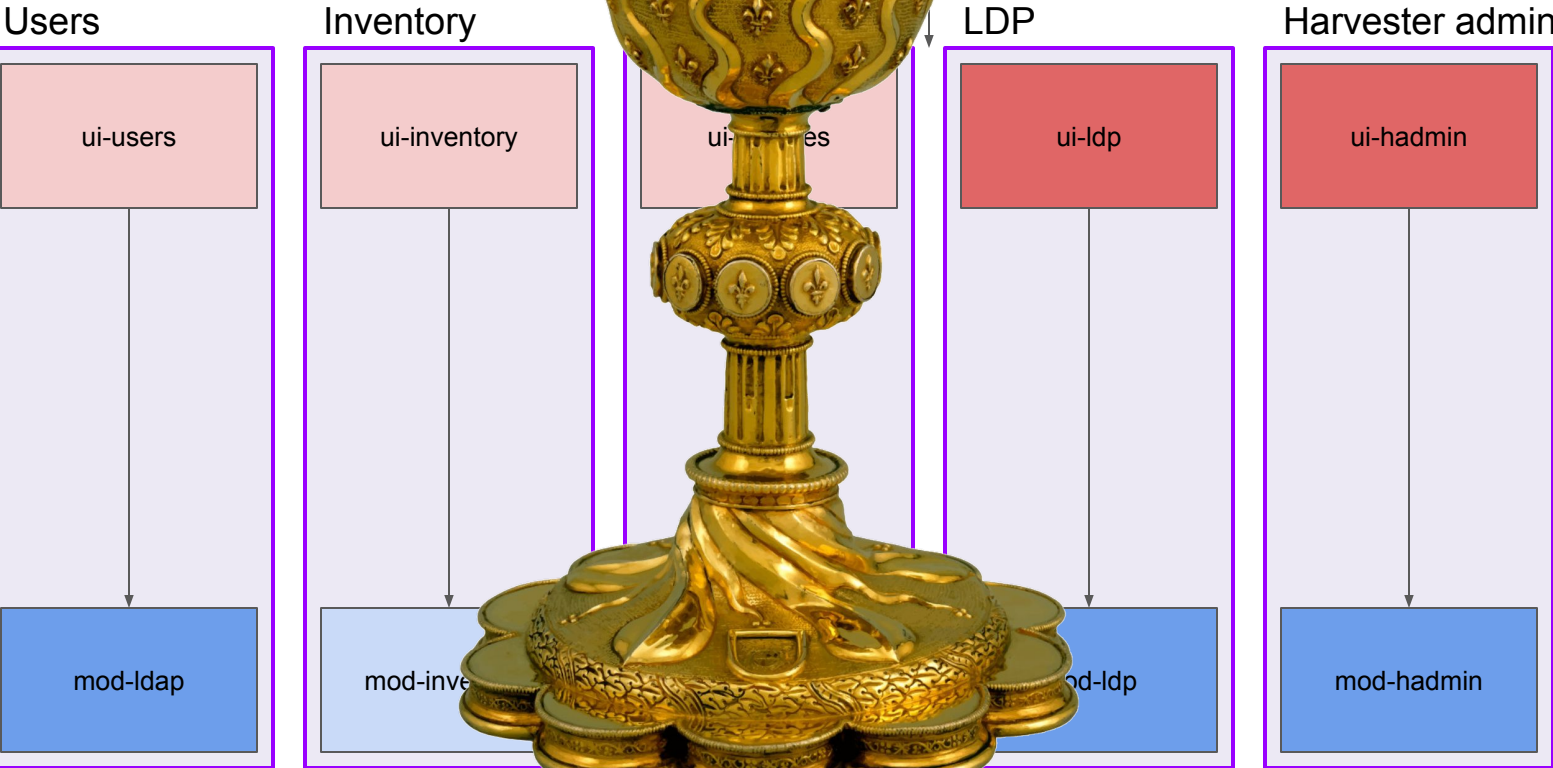
We can add new apps



We can add new apps

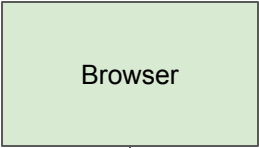


We can add new apps

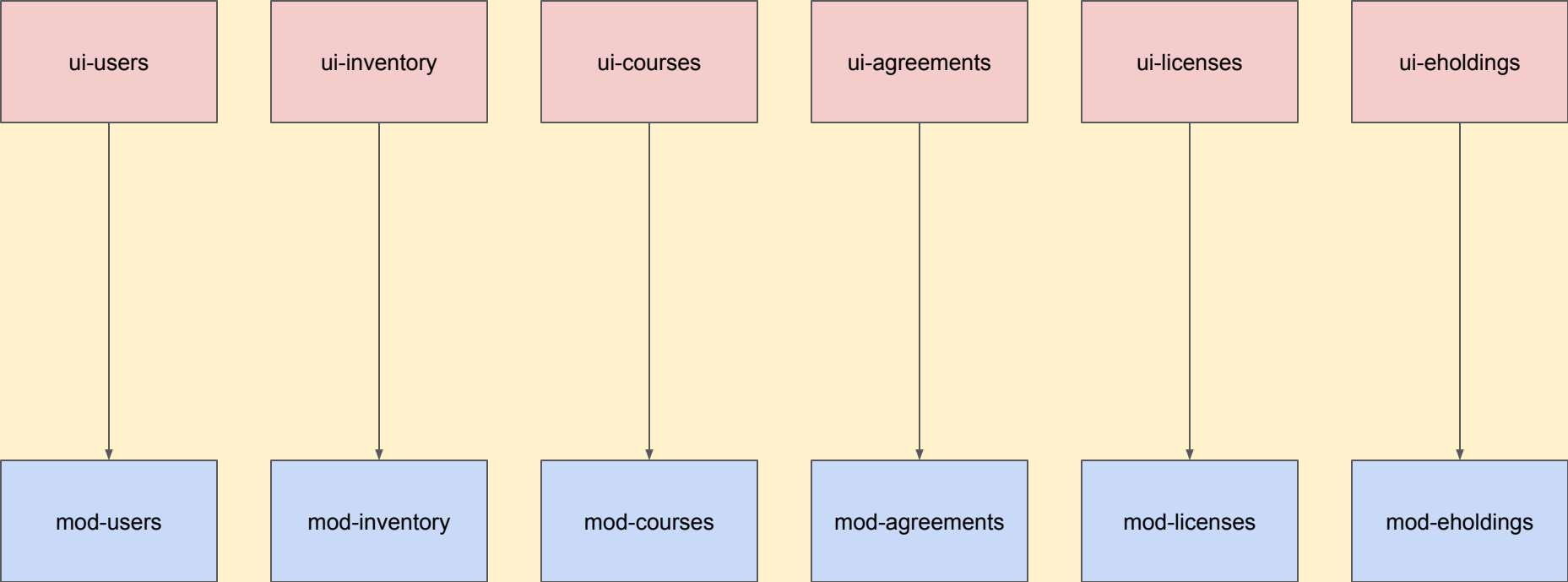


... etc.

The “modular monolith”



Flower release



# Flower releases

- Stable, tested, reliable
- But the result is that we usually have all and only the core set of modules



# Flower releases

- For good reasons, it's hard to get new code into a flower release



# Flower releases

- For good reasons, it's hard to get new code into a flower release
- Where is the flourishing ecosystem of competing apps from different providers?





# An aspirational scenario

- A library patron finds a useful FOLIO app in an app-store
- Hits an “I want this” button
- The FOLIO system’s administrator is notified
- Verifies that the app is satisfactory
- Installs and enables it
- It becomes available to the patron

# Result: a modular monolith

1. The base platform is too big to build custom FOLIO subsets on
2. There are technical difficulties in adding apps not in the
3. There is no way to package modules together
4. There is no way to certify the apps, such as internationalization
5. There is no way to install apps, or download them from
6. There is no way to discover apps that do exist
7. Installing apps (UI and backend modules) is cumbersome
8. There is no Okapi Console that can be used to enable/disable modules, etc.

**Don't read this**

**The Firefly team is exploring all these issues**



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# The Firefly team is exploring all these issues

- Index Data team:

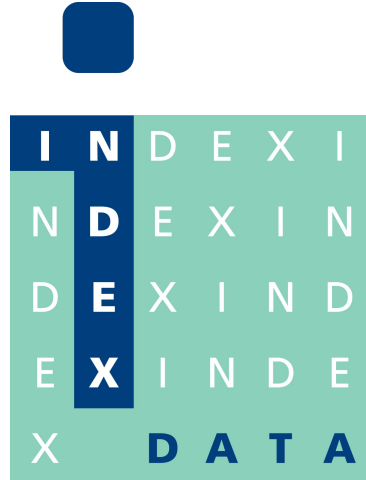
- Mike Taylor
- Wayne Schneider
- Jason Skomorowski
- David Crossley



# The Firefly team is exploring all these issues

- Index Data team:

- Mike Taylor
- Wayne Schneider
- Jason Skomorowski
- David Crossley



- With help from:

- Michal Kuklis (Cornell)
- Zak Burke (EBSCO)



# 1. Smaller, lighter base platform (backend)

- We often want to add modules, but we also want to pare down to a lean subset
- We want to be able to make lean standalone apps, e.g. checkin/checkout

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- At present the only platform supported by the OLF is platform-complete (which is what we use to build <https://folio-snapshot.dev.folio.org/>)
- This has 140 backend and edge modules, 29 UI apps, 30 UI and 18 UI plugins



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- This has 140 backend and edge modules, 29 UI apps, 30 UI and 18 UI plugins
- **We are working on a much smaller platform-minimal**

# 1. Smaller, lighter base platform (UI)

- Difficult because Stripes logs in with `mod-users-bl` instead of `mod-login`, and that pulls in many other modules
- We need to remove the hardwired concept of "service points" from Stripes

# 1. Smaller, lighter base platform (UI)

- Difficult because Stripes logs in with `mod-users-bl` instead of `mod-login`, and that pulls in many other modules
- We need to remove the hardwired concept of "service points" from Stripes
- **We have prototype code for a leaner approach to login**
- **We have a “handler” system that can assign service-points**

## 2. Remove unexamined assumptions in the code

- Historically, all Stripes packages had to be in the `@folio` namespace

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- Historically, all Stripes packages had to be in the @folio namespace
- **We have code to support UI modules in any namespace**

### 3. A way of packaging apps

- UI modules exist, and backend modules exist, but there is no app package.

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- UI modules exist, and backend modules exist, but there is no app package.
- **FAM format (FOLIO Application Metadata)**
- **JSON-based**

### 3. A way of packaging apps: FAM format

```
{  
  "name": "harvester-admin",  
  "version": "0.0.1"  
}
```



### 3. A way of packaging apps: FAM format

```
{  
  "name": "harvester-admin",  
  "version": "0.0.1",  
  "displayName": "Harvester admin",  
  "description": "Admin console for the Index Data Harvester"  
}
```

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```
{
  "name": "harvester-admin",
  "version": "0.0.1",
  "displayName": "Harvester admin",
  "description": "Admin console for the Index Data Harvester",
  "elements": [
    {
      "type": "ui",
      "required": true
    }
  ]
}
```

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```
{
  "name": "harvester-admin",
  "version": "0.0.1",
  "displayName": "Harvester admin",
  "description": "Admin console for the Index Data Harvester",
  "elements": [
    {
      "type": "ui",
      "required": true,
      "descriptor": "https://reg.indexdata.com/_/proxy/modules/indexdata_harvester-admin-0.1.0"
    }
  ]
}
```

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```
{
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  "version": "0.0.1",
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  "elements": [
    {
      "type": "ui",
      "required": true,
      "descriptor": "https://reg.indexdata.com/_/proxy/modules/indexdata_harvester-admin-0.1.0",
      "url": "https://repository.folio.org/repository/npm-folio/@indexdata/harvester-admin"
    }
  ]
}
```

### 3. A way of packaging apps: FAM format

```
{
  "name": "harvester-admin",
  "version": "0.0.1",
  "displayName": "Harvester admin",
  "description": "Admin console for the Index Data Harvester",
  "elements": [
    {
      "type": "ui",
      "required": true,
      "descriptor": "https://reg.indexdata.com/_/proxy/modules/indexdata_harvester-admin-0.1.0",
      "url": "https://repository.folio.org/repository/npm-folio/@indexdata/harvester-admin"
    },
    {
      "type": "backend",
      "required": true,
      "descriptor": "https://reg.indexdata.com/_/proxy/modules/mod-harvester-admin-0.1.0-SNAPSHOT",
      "url": "ghcr.io/indexdata/mod-harvester-admin:v0.1.0-SNAPSHOT.7"
    }
  ]
}
```

## 4. A way of certifying apps

- We need to know who published the app and is taking responsibility for it

## 4. A way of certifying apps

- We need to know who published the app and is taking responsibility for it
- We also want to know who has made claims about
  - UX design
  - internationalization
  - accessibility
  - security
  - *etc.*

## 4. A way of certifying apps

```
{  
  "name": "harvester-admin",  
  "version": "0.0.1",  
  "displayName": "Harvester admin",  
  "description": "Admin console for the Index Data Harvester",  
  "elements": [...]  
}
```



## 4. A way of certifying apps

```
{
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  "version": "0.0.1",
  "displayName": "Harvester admin",
  "description": "Admin console for the Index Data Harvester",
  "elements": [...],
  "certified": [
    {
      "type": "published",
      "certifier": "indexdata.com",
    }
  ]
}
```

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```
{
  "name": "harvester-admin",
  "version": "0.0.1",
  "displayName": "Harvester admin",
  "description": "Admin console for the Index Data Harvester",
  "elements": [...],
  "certified": [
    {
      "type": "published",
      "certifier": "indexdata.com",
      "signature": "1a2b3c4d5e6f7g8h9i0j"
    }
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## 4. A way of certifying apps

```
{
  "name": "harvester-admin",
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  "certified": [
    {
      "type": "published",
      "certifier": "indexdata.com",
      "signature": "1a2b3c4d5e6f7g8h9i0j"
    },
    {
      "type": "ux",
      "certifier": "samhaeng.com",
      "signature": "1234567890abcdefghij"
    }
  ]
}
```

## 5. A place to upload apps and their components

An app consists of several parts:

- The FAM file
- Module descriptors for UI and backend modules
- NPM packages for UI modules
- Docker containers for backend modules

They all need to go somewhere.

# 5. A place to upload apps: FAM files

FAM files in GitHub repositories

e.g. <https://github.com/MikeTaylor/example-folio-app-source>

main  
1 branch  
0 tags

Go to file  
Add file  
Code

About

MikeTaylor Link to another-folio-app-source 9f001e0 on 15 Jul 3 commits

apps	Rename	last month
README.md	Link to another-folio-app-source	last month

README.md

## example-folio-app-source

An example of a FOLIO app source, to be read by `mod-app-store`. See also [another-folio-app-source](#).

All app files are in the `apps` directory, and are in the FOLIO Application Metadata (FAM) format.

An example of a FOLIO app source

Readme

0 stars

1 watching

0 forks

Releases

No releases published  
[Create a new release](#)

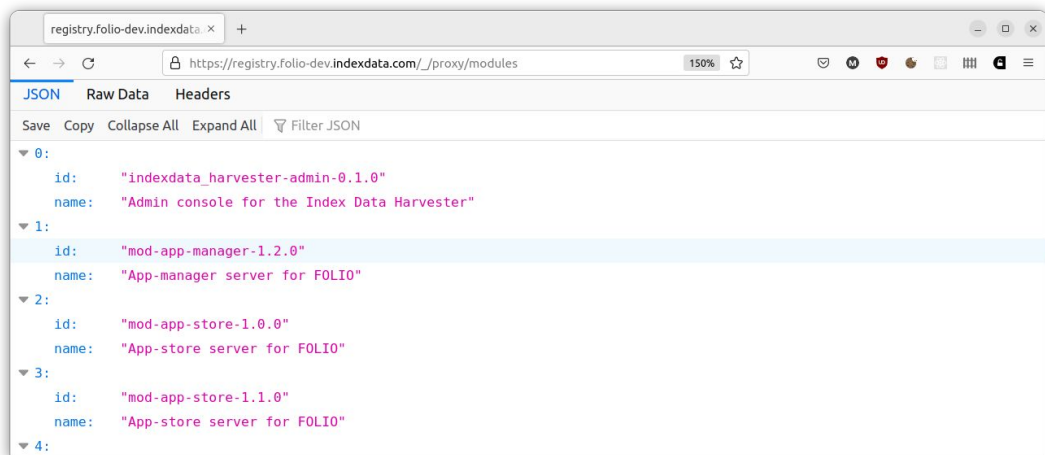
Packages

No packages published  
[Publish your first package](#)

# 5. A place to upload apps: module descriptors

Module descriptors in publicly accessible Okapi instances:

- The FOLIO project's registry at : <https://folio-registry.dev.folio.org/>
- Index Data's registry at <http://registry.folio-dev.indexdata.com>
- Any other registry that anyone stands up



# 5. A place to upload apps: NPM packages

NPM packages in any NPM registry:

- The FOLIO NPM registry (where core modules live)
- The global NPM registry
- Any other registry that anyone stands up

@indexdata/harvester-admin

0.1.0 • Public • Published a month ago

 [Readme](#)

 [Explore](#) BETA

 7 Dependencies

 0 Dependents

 1 Versions

 [Settings](#)

## ui-harvester-admin

This software is distributed under the terms of the Apache License, Version 2.0. See the file "[LICENSE](#)" for more information.

### Overview

This is a Stripes UI modules providing an administrative interface to the Index Data Harvester by communicating with `mod-harvester-admin`.


#### Install

```
> npm i @indexdata/harvester-admin
```

#### Repository

 [github.com/indexdata/ui-harvester-admin](https://github.com/indexdata/ui-harvester-admin)

#### Homepage

 [github.com/indexdata/ui-harvester-ad...](https://github.com/indexdata/ui-harvester-admin)

 Weekly Downloads

# 5. A place to upload apps: Docker containers

Docker containers in any Docker registry:

- DockerHub
- FOLIO's DockerHub mirror
- GitHub packages at <https://ghcr.io>
- Any other registry that anyone stands up

mod-app-manager / v1.2.0

 **v1.2.0**

sha256:b5924a85e4ff33d69bda9aaec49a5396019601e99394edfa5a42c0077


 Pull image from the command line:

```
$ docker pull ghcr.io/miketaylor/mod-app-manager:v1.2.0
```

 Use as base image in Dockerfile:

```
FROM ghcr.io/miketaylor/mod-app-manager:v1.2.0
```

## Details

 mod-app-manager

 MikeTaylor

 MikeTaylor/mod-app-manager 

 14 days ago

 Apache-2.0



## 5. Where should you upload your artifacts?

- We at Index Data have made our own choices
- Yours may be different, and that's fine.
- We don't want an Index Data monolith,  
parallel with the existing FOLIO monolith
- We want an ecosystem populated by many actors



## 6. Towards an app-store

- Anyone can publish FAM files, but how can they be discovered?

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- Anyone can publish FAM files, but how can they be discovered?
- **We have a prototype mod-app-manager**
- **Its configuration stores details about GitHub repositories**
- **It can return all the FAM files from all those repositories**

## 6. Towards an app-store

We have a primitive mod-app-manager UI in a branch of the Developer Console

App manager

Applications

Sources

Sources

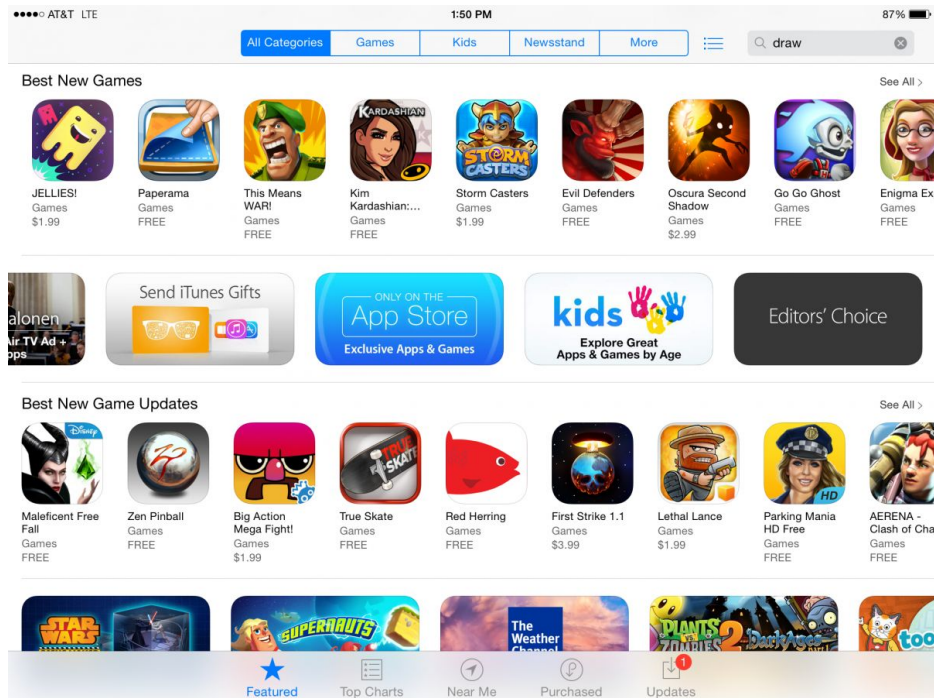
+ New

Owner	Repo	GitHub token	Actions
<div>owner</div> <div>Please fill this in to continue</div>	<div>repo</div>	<div>token</div>	<div>Cancel</div> <div>Save</div>
MikeTaylor	example-folio-app-source	ghp_rRdblxBnPeriUnerZ1bVM s7zWnyuHG0kQqp8	<div></div> <div></div>
MikeTaylor	another-folio-app-source	ghp_rRdblxBnPeriUnerZ1bVM s7zWnyuHG0kQqp8	<div></div> <div></div>

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This is the beginning of an app-store that can be used in several ways

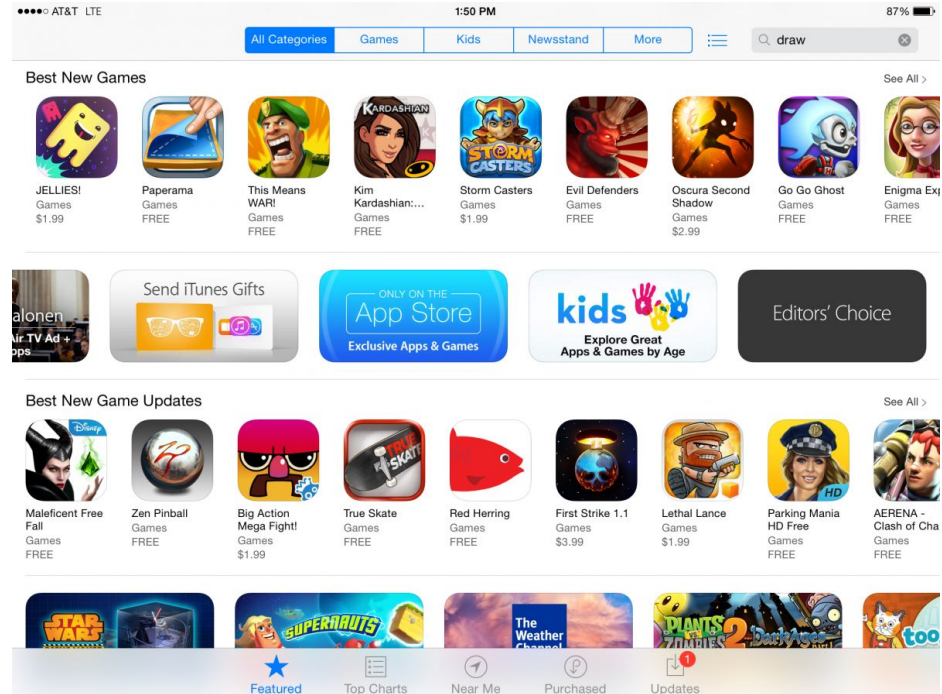
- Platform administrators:
  - Add and deploy apps



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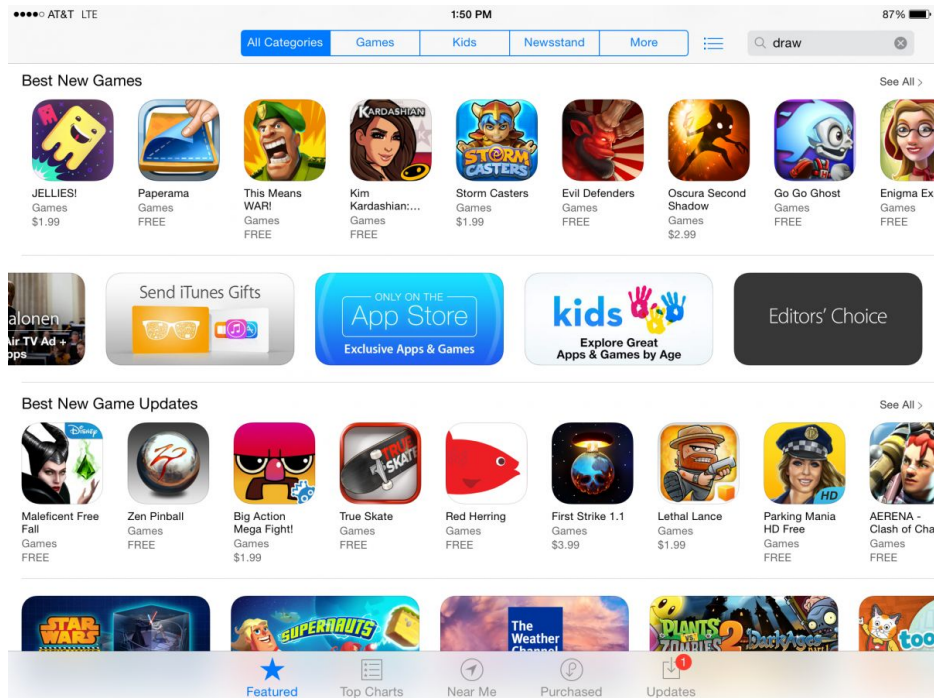
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- Tenant administrators
  - Enable and disable apps



# 6. Towards an app-store

This is the beginning of an app-store that can be used in several ways

- Platform administrators:
  - Add and deploy apps
- Tenant administrators
  - Enable and disable apps
- Users
  - Make installation requests



# 7. Installing apps

Installation and deployment are specialist processes involving devops time



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**We have a script, `folioctl`, which takes sub-commands like `yarn`**

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Installation and deployment are specialist processes involving devops time

**We have a script, `folioctl`, which takes sub-commands like `yarn`**

**`folioctl add-app somename.fam`**

- **Reads a FAM file**
- **Inserts the module descriptors of all elements**
- **Deploys backend modules**

# 7. Installing apps

Installation and deployment are specialist processes involving devops time

We have a script, `folioctl`, which takes sub-commands like `yarn`

`folioctl add-app somename.fam`

- Reads a FAM file
- Inserts the module descriptors of all elements
- Deploys backend modules
- Does not *yet* rebuild the front-end bundle

# 7. Installing apps

Different FOLIO operators handle deployment differently

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Different FOLIO operators handle deployment differently

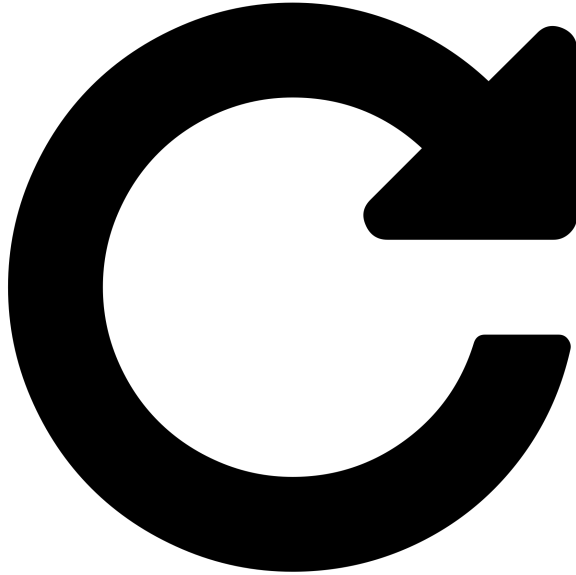
**foliocl add-app** uses a simple deployment-plugin API

- There is currently an **okapi** plugin using Okapi's deployment mechanism
- We are working on a **flux** plugin for Kubernetes
- Others are possible, e.g. Docker Swarm

# 7. Installing apps

Ian Ibbotson's scenario from yesterday:

- quickly getting iterating code in front of users



## 7. Installing apps

- We will build `mod-folioctl`, a FOLIO module that can do these things
- Then we can make a UI to allow all this to be done within FOLIO itself

# 8. The Okapi console

- Prototype is currently hidden in Developer Settings

Okapi console

Configuration

Environment

Modules

Interfaces

☐ UI modules

☒ Backend modules

☐ Edge modules

☒ Other modules

☒ Restrict to latest?

☐ Show description?

67 of 131 modules

Module	Version	URL	Enabled?
<a href="#">indexdata_harvester-admin</a>	0.1.0		<input type="checkbox"/>
<a href="#">mod-agreements</a>	5.1.0-SNAPSHOT.438	http://10.0.2.15:9191	<input checked="" type="checkbox"/>
<a href="#">mod-app-manager</a>	1.2.0	http://10.0.2.15:9194, http://10.0.2.15:9195, http://10.0.2.15:9196	<input checked="" type="checkbox"/>
<a href="#">mod-audit</a>	2.3.0-SNAPSHOT.116	http://10.0.2.15:9169	<input checked="" type="checkbox"/>
<a href="#">mod-authtoken</a>	2.10.0-SNAPSHOT.104	http://10.0.2.15:9131	<input checked="" type="checkbox"/>
<a href="#">mod-calendar</a>	1.14.0-SNAPSHOT.126	http://10.0.2.15:9148	<input checked="" type="checkbox"/>



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- We want the barrier-to-entry to be very low, while retaining quality stamps
- We want a functioning ecosystem with competition
- We want FOLIO to grow well beyond the initial community



# More on FOLIO as an open platform

Taylor, Michael P. 2021. Modularity in FOLIO: Principles, Techniques and Tools.  
*International Journal of Librarianship* **6(2)**:3-12. doi:10.23974/ijol.2021.vol6.2.208  
[tinyurl.com/folio-mod](https://tinyurl.com/folio-mod)

# FOLIO modularity in practice

Seamless deployment of modules from multiple sources



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