The Methods and Implementation of UUI Frontend Architecture

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15th Jan, 2020

Overview

- The frontend architecture methods applied in UUI
- The frontend architecture implementation of UUI
- The presentation of the frontend structure of UUI and the conclusion and suggestion of frontend architecture best practice

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The Frontend Architecture Methods Applied in UUI

Reasonable Project Structure

- A reasonable project structure can
  - Avoid the messy structure when there is lots of business files and make it easier to find the particular parts of codes and improve the development speed
  - Segregate the business and functional codes such as data model and http request methods to make the program '**safer**'
- A reasonable project structure should:
  - Take care of the project technology stack
  - Take care of the features of specific business

Component-based Architecture

- Common sense of modern framework
- Framework like Angular is already component-based
  - For a mature program, we need a more careful architecture. We have to extract the public components and make them easier to reuse.

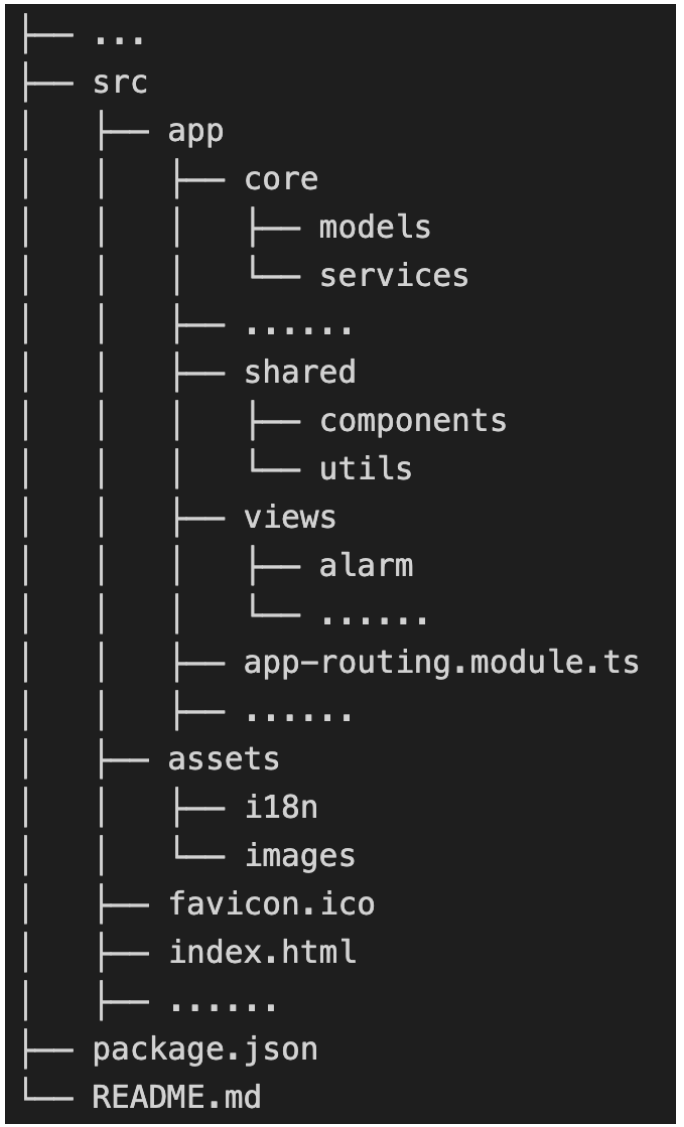
Frontend and Backend Separation

- This is the essential part of modern frontend development which includes advantages such as faster development and modularity.
- Thanks to Angular, the separate frontend and backend is already in embryo.
- For a modern frontend project, we have to support more capabilities to adapt the requirement of swift and separate development. Such as: *running individually*, *mocking interface* and *deploying independently*.

The Frontend Architecture Implementation of UUI

Reasonable Project Structure

- We refer to many articles and high-star Angular projects in Github. According to those best practices and the actual condition of our business, we build our project as the image:
- The core parts of our architecture are the *core*, *shared* and *views* folders
  - The *core* folder is the container of the core functional codes for the whole project such data models and http request methods.
  - The *shared* folder is the container for all the public components.
  - The *views* folder is the container of the business components which is the main part of development.



Component-based Architecture - overview

- To apply this method, we extract the components from the original codes and make the business codes more 'pure'.
  - We extract the *dumb* components which are just responsible for presenting something to the DOM
  - We don't extract those components that are responsible for keeping track of state and caring about how the program works which are called *smart* components
  - Things will be different if other framework such as *react* is used, and we just take advantage of Angular.

Component-based Architecture - Pie Component

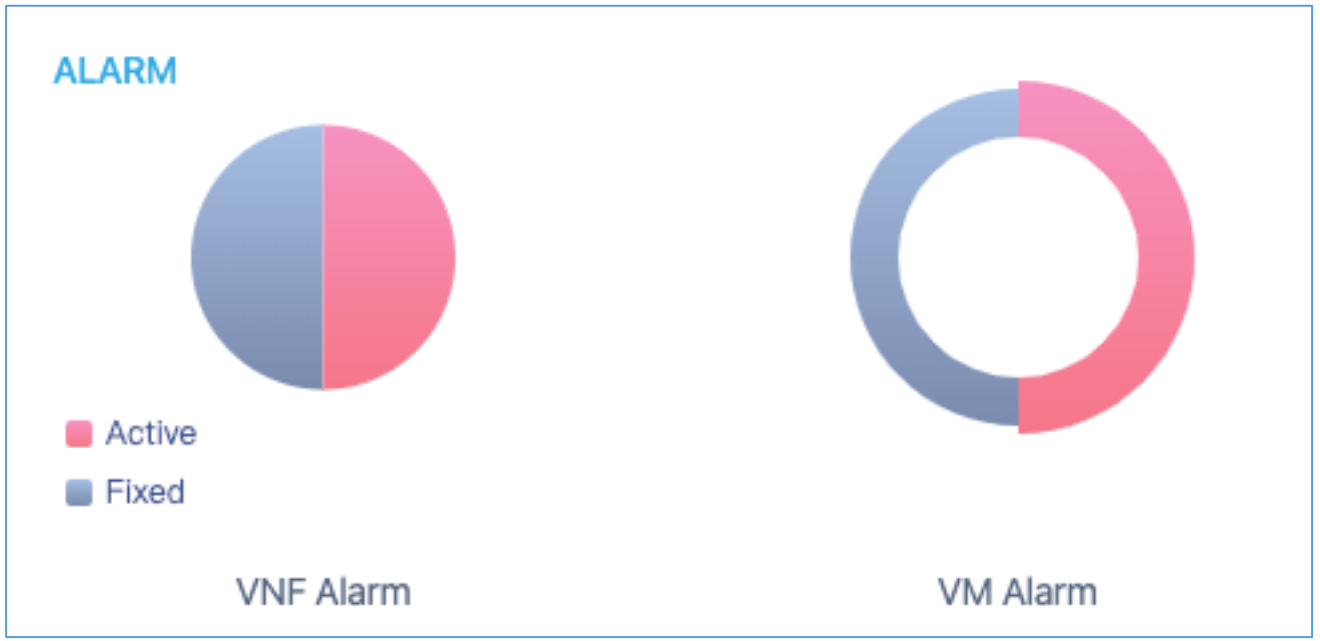
```
<div
  echarts
  [initOpts]="initOpts"
  [options]="barOption"
  [merge]="updateOption"
  (chartInit)="chartInit($event)"
>
  Bar Chart
</div>
```

```
ngOnInit() {
  this.initOpts = {
    renderer: 'canvas',
    height: this.initData.height,
    width: this.initData.width,

  };
  this.barOption = {
    tooltip: this.initData.option.tooltip,
    grid: this.initData.option.grid,
    xAxis: this.initData.option.xAxis,
    yAxis: this.initData.option.yAxis,
    series: this.initData.option.series
  }
}
```

```
<app-pie [initData]="alarmChartInit" [chartData]="alarmChartData"></app-pie>
```

```
this.alarmChartData = {
  series: [{
    data: [{ name: "Active", value: data[0] }, { name: "Fixed", value: data[1] }]
  }]
};
```



Frontend and Backend Separation – mock data

- The goal of mock data scheme:
  - Build the ‘one command start’ system to start the project in mock environment
  - Separate the business codes and the mock data codes to make the mock data module an independent one
  - Swift development
- Difficulties:
  - Some original API paths consist of variable which makes it impossible to be mocked by the local data files
  - The RESTful standard allows one single API path to hold several different request methods: POST, GET, DELETE, PUT
- Solutions:
  - Use the ‘rewrite’ middleware to rewrite specific API paths
  - Create the ‘routes.js’ file to list the API paths which need to be rewrote
  - Use the interface interception system to transfer all kinds of request to GET method

Frontend and Backend Separation – mock data

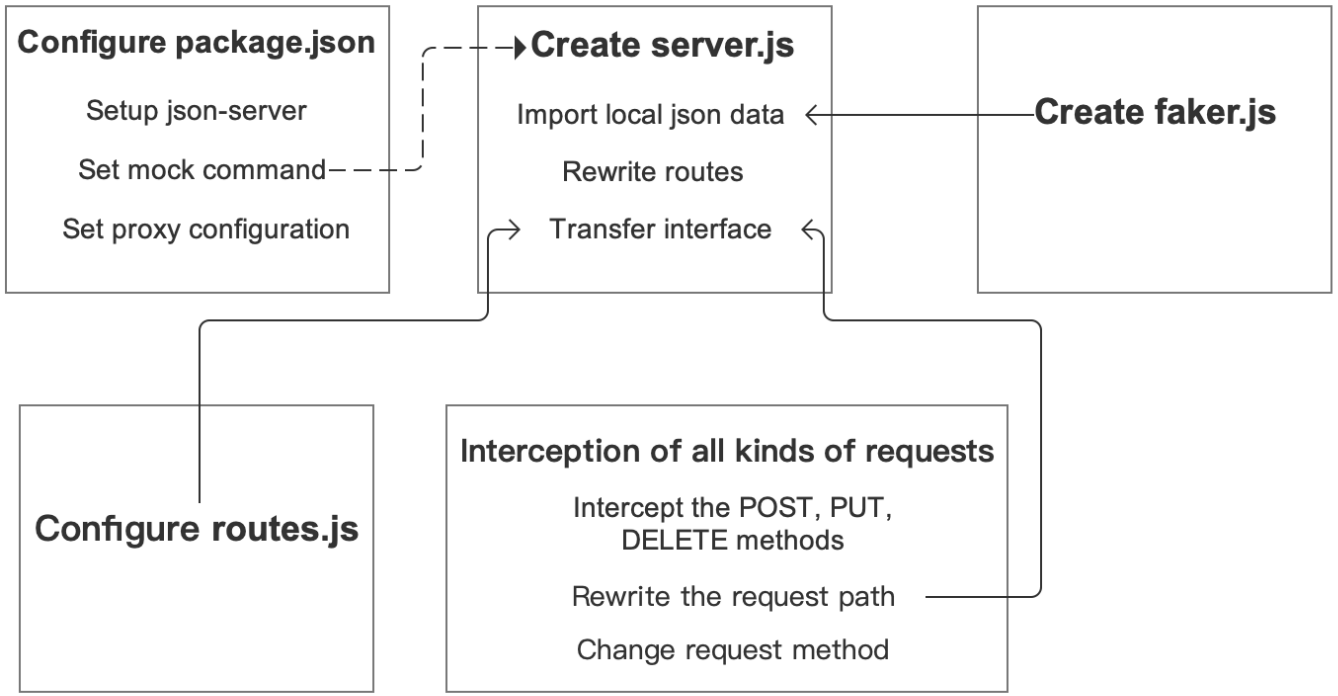
Goals

One Command Startup

Separation of Mock and Business Codes

Agile Development

Configuration



Solutions

Customize Request Routes

Interface Interception

Frontend and Backend Separation – mock data

routes.js

```
"/uui-lcm/customers/:customer/service-subscriptions": "/serviceType",
"/uui-lcm/serviceNumByServiceType/:customer": "/CustomersColumn",
```

package.json

```
"mockproxy": "ng serve --proxy-config localproxy.conf.json",
"mockconfig": "node ./src/app/mock/server.js --port 3002",
"mock": "npm run mockconfig | npm run mockproxy",
```

```
server.post(`${baseUrl}/*`, (req, res, next) => {
    const prefix = req.url.replace(baseUrl, "");
    req.url = `${baseUrl}/POST${prefix}`;
    req.method = 'GET';
    next();
})
server.put(`${baseUrl}/*`, (req, res, next) => {
    const prefix = req.url.replace(baseUrl, "");
    req.url = `${baseUrl}/PUT${prefix}`;
    req.method = 'GET';
    next();
})
```

server.js – data interception

```
home: _.times(10, function (n) {
    return {
        id: n,
        name: faker.name.findName(),
        phone: faker.phone.phoneNumber(),
        address: faker.address.streetAddress(),
        avatar: faker.internet.avatar()
    }
}),
language: { language: faker.random.locale() }
```

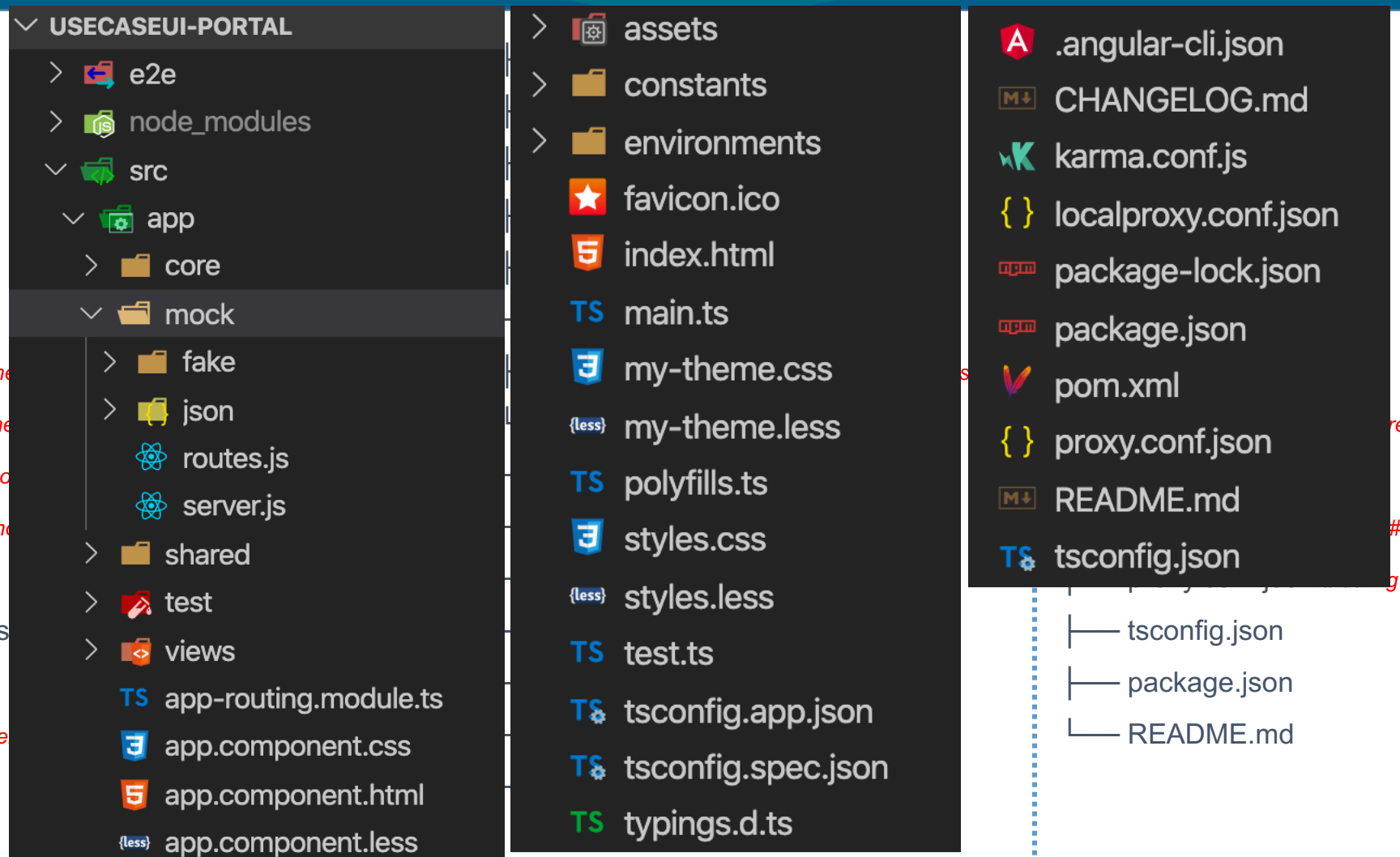
faker.js

- We have recorded the work about how we build up the mock scheme in detail. Click this wiki if you are interested.

The Presentation of the Frontend Structure of UUI and the Conclusion and Suggestion of Frontend Architecture

The Presentation of The Frontend Architecture of UUI - Project Structure

```
├── src
│   ├── app
│   │   ├── core
│   │   │   ├── models
│   │   │   └── services
│   │   ├── mock
│   │   │   ├── fake # containe
│   │   │   ├── json # containe
│   │   │   ├── routes.js # co
│   │   │   └── server.js # mo
│   │   ├── shared
│   │   │   ├── components
│   │   │   └── utils
│   │   ├── views # containe
│   │   │   ├── alarm
│   │   │   └── .....
```



recorder of all the important changes

config for mock server proxy

g for server proxy

```
│   ├── tsconfig.json
│   ├── package.json
│   └── README.md
```

The Presentation of The Frontend Architecture of UUI – use case in Frankfurt Release

- To support the use cases of 5G Slicing business, we develop CSMF and NSMF portal to provide customers and operators with functions such as creating service, activing/de-activing/terminating slicing and monitoring service.
  - CSMF is a portal that provides service for customers. So we have developed a new system to support functions such as creating orders, managing slicing order, managing slicing business and monitoring slicing business
  - NSMF is a portal that provides service for operators. Since the original UUI project aims to provide service to the network operators, we merge NSMF portal into the original system.

Create Slicing Business Order

* Slicing Business Name:
* Max Number of UEs:
* Data Rate Downlink (Mbps):
* Latency:
* Data Rate Uplink (Mbps):
* Resource Sharing Level: Shared / Non-shared
* Mobility: Stationary
* Use Interval (Month):
* Area: Province / City / District / Street

Cancel | Submit

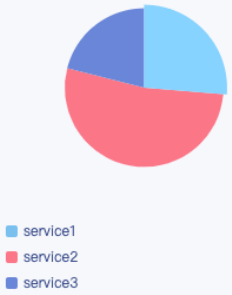
Use case ui

- Home
- Customer
- Services
- Package Management
- Network Topology
- Monitor
  - 5G Slicing

Slicing business Monitor

Select Time

Slicing Use Traffic



Number Of Online Users

Slicing Total Bandwidth

Service Instance Id	Service Instance Name	Service Type	S-NSSAI	Status
23edd22b-a0b2-449f-be87-d094159b9265	slicing-01-eMBB	eMMB	1-010101	activated
23edd22b-a0b2-449f-be87-d094159b9266	slicing-01-eMBB	eMMB	1-010101	activated
23edd22b-a0b2-449f-be87-d094159b9267	slicing-01-eMBB	eMMB	1-010101	activated
23edd22b-a0b2-449f-be87-d094159b9270	slicing-01-eMBB	eMMB	1-010101	activated
23edd22b-a0b2-449f-be87-d094159b9271	slicing-01-eMBB	eMMB	1-010101	deactivated
23edd22b-a0b2-449f-be87-d094159b9272	slicing-01-eMBB	eMMB	1-010101	deactivated
23edd22b-a0b2-449f-be87-d094159b9273	slicing-01-eMBB	eMMB	1-010101	deactivated
23edd22b-a0b2-449f-be87-d094159b9274	slicing-01-eMBB	eMMB	1-010101	activated
23edd22b-a0b2-449f-be87-d094159b9275	slicing-01-eMBB	eMMB	1-010101	deactivated

Detail

Related Slicing Business L

Service Instance Id

23edd22b-a0b2-449f-be8

23edd22b-a0b2-449f-be8

Related Slicing NSSI List :

Service Instance Id

NSSI-C-001-HDBNJ-NSSI

NSSI-C-001-HDBNJ-NSSI

46da8cf8-0878-48ac-

The Conclusion and Suggestion of Frontend Architecture

- reasonable project structure
  - Build reasonable project structure to make the project safer, clear and easy to develop
- component-based architecture
  - Angular is component-based and most all the components can be created by Angular-cli
  - Dumb component can be used in Angular framework to avoid useless work and make the structure more clear
- frontend and backend separation
  - Mock data scheme which we have built has made the frontend project totally divided from the backend and once both sides have decided the data structure, the frontend can develop without the data support of backend which is the true meaning of frontend and backend separation

Thanks