

SAP Customer Experience

Monitoring Tool for CCv2 Long Running Deployments

Xiaoqing Sun, SAP Hybris Product Support L2
Dec 10, 2019

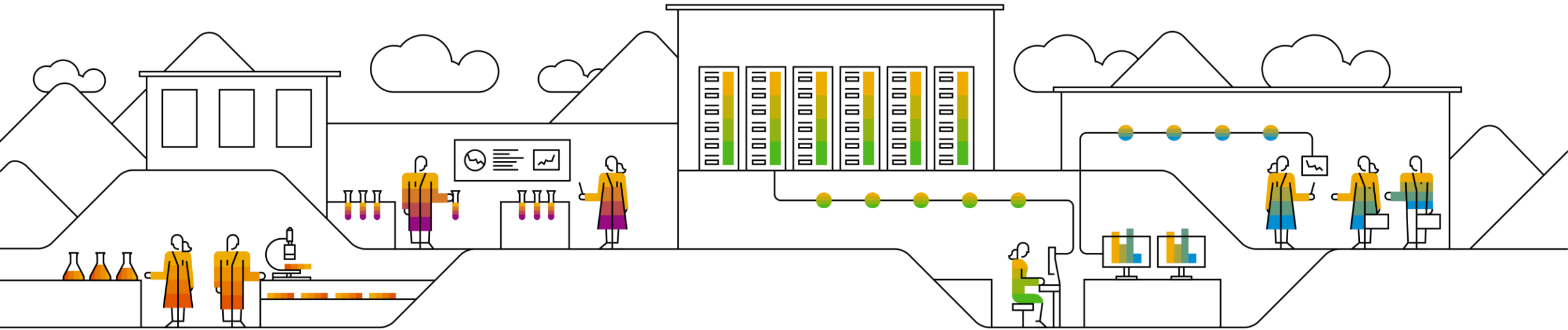
INTERNAL

CONTENTS

- Project Requirements
- DEMO
- About Realization
- More to do
- Q&A

PART I

Project Requirements



Model-T CCv2 Deployemnts

■ Wiki Page

<https://wiki.hybris.com/display/modelt/Model-T+Landscape+-+Dashboard#Model-TLandscape-Dashboard-PROD>

■ Model-T Links

<https://ae.prodweu.model-t.cc.commerce.ondemand.com/#/>

<https://ae.prodaue.model-t.cc.commerce.ondemand.com/#/>

PROD → Deployment Trail	Automation Engine				
	Region	Version	Link	Logs	Monitoring
	WEU	1910.7	Automation Engine - WestEurope	Kibana	Dynatrace
	AUE	1910.7	Automation Engine - AustralianEast	Kibana	
	USE	1910.7	Automation Engine - USEast	Kibana	
	CAC	1910.7	Automation Engine - CanadaCentral	Kibana	
	CNE2	1910.7	Automation Engine - ChinaEast2	Kibana	Dynatrace
Cloud Portal					
Version		Link		Logs	
version: 1910.7		<ul style="list-style-type: none">Cloud Portal - With Akamai CDN (cached)Cloud Portal - Without CDN (uncached)		Kibana	

Model-T CCv2 Deployments

SAP Hybris (v) Model-T

Version: 1910.7

I354995

SAP

Home » Deployments

Home

Customers

Processes

Deployments

Application Definitions

Deployments

Filter by status:

Filter by duration:

> 45 mins

Filter by customers:

BASF SE

Kooperativa Forbundet KF økonomisk forening x

Brake Bros Limited x

E-SERVICES S.r.l. x

BASF SE x

12_09_master_1 → d1

Commerce Cloud va0084: master, 2019-12-09 16:37

Mode: initialize

Deployed by: S0017687384

1 h 49 m

2019-12-10 00:26

✓

ecr-ws-develop-sprints_v2.14.4.0 → d4

Commerce Cloud va0084: tag/tag_v2.14.4.0, 2019-12-09 22:01

Mode: offline_update

Deployed by: I347467

59 m

2019-12-09 22:46

✓

ecr-ws-develop-sprints_v2.14.3.0 → d4

Commerce Cloud va0084: tag/tag_v2.14.3.0, 2019-12-07 00:40

Mode: offline_update

Deployed by: I347467

1 h 11 m

2019-12-07 01:17

✗

develop-v1.0.14.b0 → s1

Commerce Cloud va0084: v1.0.14, 2019-12-05 22:24

Mode: offline_update

Deployed by: S0020086764

59 m

2019-12-06 04:23

✓

11_29_staging_1_Sprint25_Fix4 → s1

Commerce Cloud va0084: staging, 2019-12-06 00:29

Mode: offline_update

Deployed by: S0017687384

1 h 34 m

2019-12-06 02:18

✓

develop-v1.0.14.b0 → d2

Commerce Cloud va0084: v1.0.14, 2019-12-05 22:24

Mode: offline_update

Deployed by: S0020086764

1 h 22 m

2019-12-06 00:35

✓

ecr-ws-develop-s2_v2.12.6.0 → s2

Commerce Cloud va0084: tag/tag_v2.12.6.0_s2, 2019-12-04 23:59

Mode: offline_update

Deployed by: I347467

1 h 7 m

2019-12-05 01:21

✗

ecr-ws-develop-sprints_v2.14.0.0 → d4

Commerce Cloud va0084: tag/tag_v2.14.0.0, 2019-12-02 20:25

Mode: offline_update

Deployed by: I347467

57 m

2019-12-03 19:32

✗

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MT Maintenance - KPI's pipeline and reports

■ Wiki Page

<https://wiki.hybris.com/pages/viewpage.action?spaceKey=modelt&title=MT+Maintenance+-+KPI%27s+pipeline+and+reports>

■ Github

<https://github.tools.sap/COPS/modelt-az-report-pipeline>

<https://github.tools.sap/COPS/modelt-az-report-repository>

■ Slack Channel

#ec-modelt-kpis (<https://sap-cx.slack.com/messages/CJ7E18VMH>)



kpi-status APP 11:20 PM

KPI reports have been updated for the following records:

Record changed for SQL select-23 and REGION weu

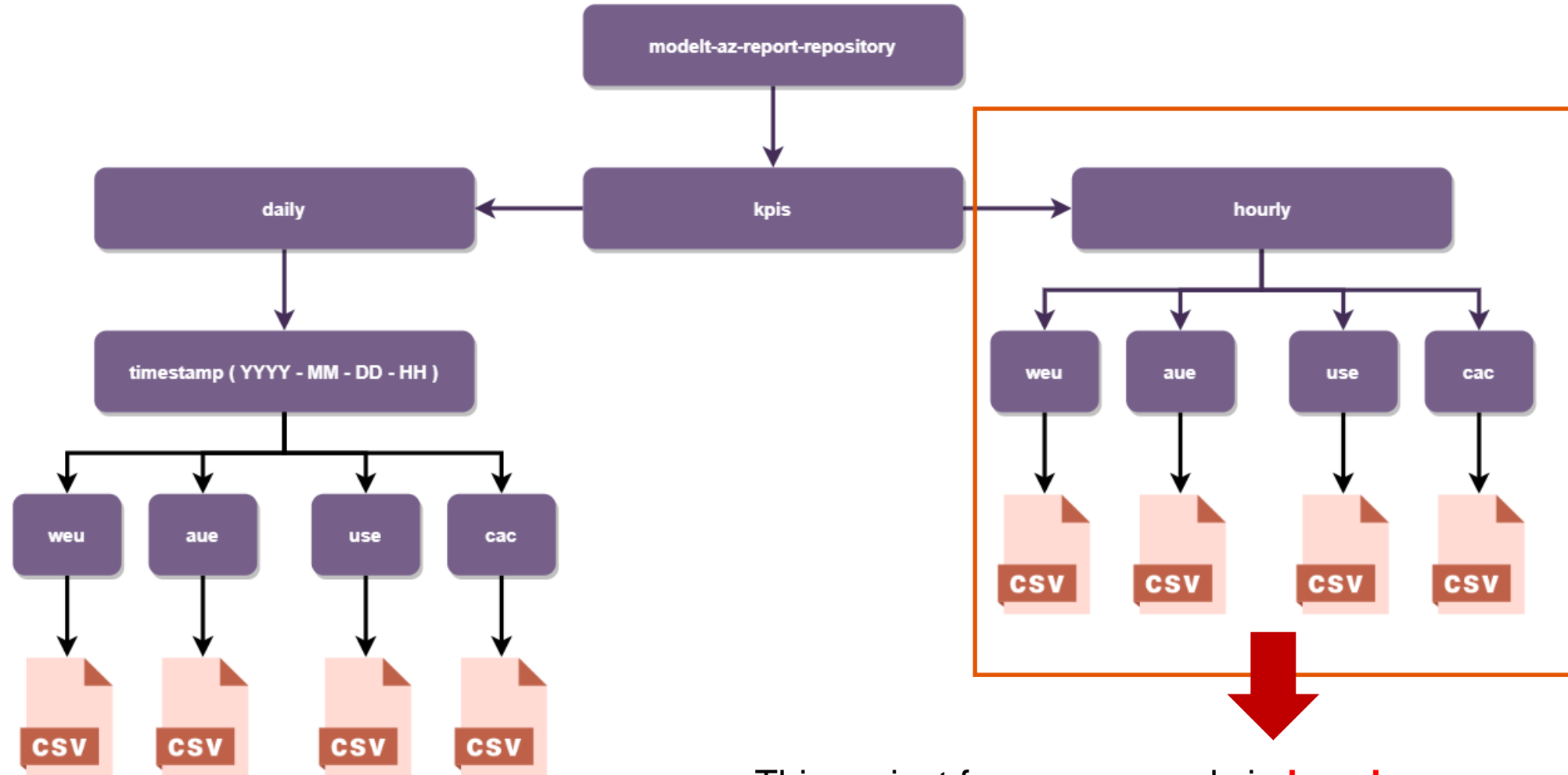
KPI reports have been updated for the following records:

Record changed for SQL select-27 and REGION aue

KPI reports have been updated for the following records:

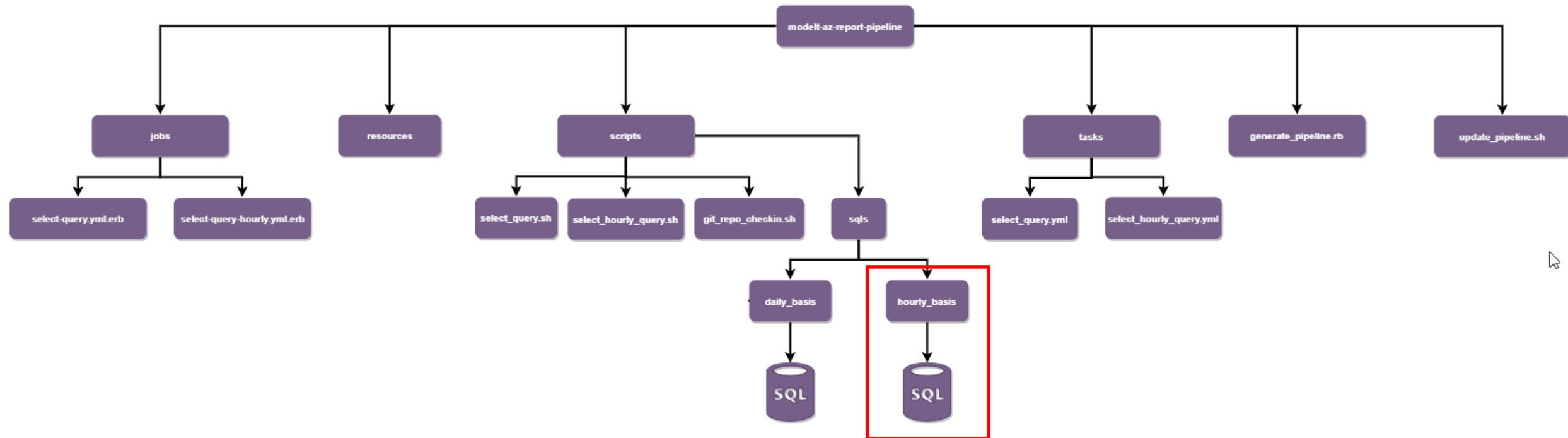
Record changed for SQL select-27 and REGION use

KPI's Reports Structure



This project focus on records in **hourly query select-27** for ccv2 long running deployments.

KPI's Pipeline



KPI's Pipeline -- hourly query select-27

22 lines (21 sloc) | 722 Bytes

RawBlameHistory

```
1  select
2  c.id as customer_id,
3  c.code as customer_code,
4  c.name as customer_name,
5  d.environment_id as env_id,
6  e.code as env_code,
7  e.name as env_name,
8  d.id as deployment_id,
9  d.failed_deployment as failed_deployment,
10 a.start_time_ as deployment_started,
11 getdate() as time_queried,
12 datediff(mi, a.start_time_, getdate()) as already_running_in_minutes
13 from deployment d, environment e, customer c, project p, ACT_HI_PROCIINST a
14 where
15 d.environment_id = e.id
16 and e.environment_space_id = p.id
17 and p.customer_id = c.id
18 and d.process_id = a.PROC_INST_ID_
19 and a.end_time_ is null
20 and datediff(mi, a.start_time_, getdate()) > 45
21 and c.code in ('cbc6kqzcb6', 'cmgii8vaud', 'cp71rq08w', 'ch4ravjw6', 'caybp6bc')
```

KPI's Pipeline -- hourly query select-27

- How much running time could be identified as long?

2700 s = **45 min**

- Specific customers in query select-27

【WEU】	cbc6kqzcb6	Kooperativa Forbundet KF økonomisk forening
【WEU】	cmgii8vaud	Brake Bros Limited
【WEU】	cp71rq08w	E-SERVICES S.r.l.
【WEU】	ch4ravjwt6	BASF SE
【AUE】	caybp6bc	Jebsen and Jessen SEA Pte Ltd

select-27.csv

AutoSave Off C:\Users\I354995\Desktop\vt-co select-27.csv - Excel Sun, Xiaoqing

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

Clipboard Font Alignment Protection Number Styles Cells Editing

Share Comments

A1 customer_id

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	customer_id	customer_id	customer_id	env_id	env_code	env_name	deployme	failed_dep	deployme	time_quer	already_running_in_minutes						
2	-----				-----												
3																	
4	(0 rows affected)																
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	

select-27 100%

select-27.csv – Github History

COPS / modelt-az-report-repository

Unwatch 1

Unstar 2

Fork 0

<> Code

Issues 0

Pull requests 0

Projects 0

Wiki

Insights

Updated snapshot and restore with new records.

Browse files

master

I349914 committed 10 hours ago

1 parent cd74f66

commit ab7ad38ed21b39351005f7a1c41bf676885bc914

Showing 1 changed file with 1 addition and 1 deletion.

Unified Split

2 kpis/hourly/weu/select-27.csv

@@ -1,5 +1,5 @@

1 1 customer_id,customer_code,customer_name,env_id,env_code,env_name,deployment_id,failed_deployment,deployment_started,time_queried,

2 2 -----,-----,-----,-----,-----,-----,-----,-----,-----,

3 - 73,cp71rq08w,E-SERVICES S.r.l.,429,d1,d1,40239,0,2019-12-09 16:26:49.4590000,2019-12-09 17:14:55.683,48

3 + 73,cp71rq08w,E-SERVICES S.r.l.,429,d1,d1,40239,0,2019-12-09 16:26:49.4590000,2019-12-09 18:00:38.760,94

4 4

5 5 (1 rows affected)

0 comments on commit ab7ad38

Write Preview

AA B i “ <> ↻ ⋮ ⋮ ✓ @ 📌 ↶

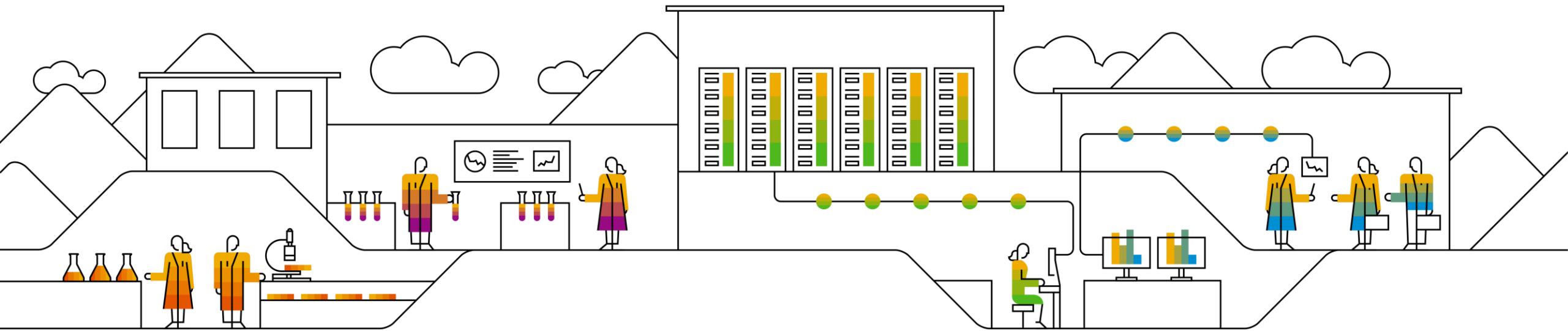
Leave a comment

Functionalities

- Catch and Record KPI's report changes of select-27.csv ----- save histories in local DB
 - Display real-time database records (in a table format) on localhost:8080
 - Pagination
 - Search
 - Sort
 - Export ALL data to csv (Download)
 - Send notification emails to CCv2 masters when select-27.csv got changed
- Email contains **updated report contents (in a git-diff like format)** and corresponding **Model-T links**

PART II

DEMO





LONG RUNNING DEPLOYMENT IN CCV2

Export ALL data to csv

Items per page

SET

SearchFilter all columns

^ #	^ Link	^ _id	^ DBTime	^ ChangedFile	^ ChangeType	^ CustomerID	^ CustomerCode	^ CustomerName	^ En
1	https://ae.prodweu.model-t.cc.commerce.ondemand.com/#!/deployment/39783	5de968716361e955685f99ff	Fri Dec 06 2019 04:28:31 GMT+0800 (GMT+08:00)	kpis/hourly/weu/select-27.csv	Delete	73	cp71rq08w	E-SERVICES S.r.l.	430
2	https://ae.prodweu.model-t.cc.commerce.ondemand.com/#!/deployment/39797	5de973ecd34ba038041e898e	Fri Dec 06 2019 05:17:31 GMT+0800 (GMT+08:00)	kpis/hourly/weu/select-27.csv	Delete	103	ch4ravjwt6	BASF SE	635

« Previous1Next »

GOTO

My Cluster

4 DBS 7 COLLECTIONS

HOST

localhost:27017

CLUSTER

Replica Set (rs0)

1 Node

EDITION

MongoDB 4.3.0-955-g2d3b6c1 Community

Filter your data

> admin

> config

> local

sap-cx

CCv2LongRunningDeplo... ..

sap-cx.CCv2LongRunni...

Documents

sap-cx.CCv2LongRunningDeployment

DOCUMENTS 2 TOTAL SIZE 1.2KB AVG. SIZE 592B INDEXES 1 TOTAL SIZE 36.0KB AVG. SIZE 36.0KB

Documents

Aggregations

Schema

Explain Plan

Indexes

Validation

FILTER

OPTIONS

FIND

RESET

...

INSERT DOCUMENT

VIEW

LIST

TABLE

Displaying documents 1 - 2 of 2

<


>

C

```
_id: ObjectId("5de968716361e955685f99ff")
DBTime: "Fri Dec 06 2019 04:28:31 GMT+0800 (GMT+08:00)"
ChangedFile: "kpis/hourly/weu/select-27.csv"
ChangeType: "Delete"
CustomerID: "73"
CustomerCode: "cp71rq08w"
CustomerName: "E-SERVICES S.r.l."
EnvID: "430"
EnvCode: "s1"
EnvName: "s1"
DeploymentID: "39783"
FailedDeployment: "0"
DeploymentStarted: "2019-12-05 18:18:00.6850000"
TimeQueried: "2019-12-05 19:42:27.560"
AlreadyRunningInMinutes: "84"
Link: "https://ae.prodweu.model-t.cc.commerce.ondemand.com/#!/deployment/3978..."
DeleteTime: "Fri Dec 06 2019 05:16:31 GMT+0800 (GMT+08:00)"
```

```
_id: ObjectId("5de973ecd34ba038041e898e")
DBTime: "Fri Dec 06 2019 05:17:31 GMT+0800 (GMT+08:00)"
ChangedFile: "kpis/hourly/weu/select-27.csv"
ChangeType: "Delete"
CustomerID: "103"
CustomerCode: "ch4ravjw6"
CustomerName: "BASF SE"
EnvID: "635"
EnvCode: "s1"
EnvName: "s1"
DeploymentID: "39797"
FailedDeployment: "0"
DeploymentStarted: "2019-12-05 20:23:47.9320000"
TimeQueried: "2019-12-05 21:14:49.750"
AlreadyRunningInMinutes: "51"
```



 Reply  Reply All  Forward



2019/12/9 (周一) 16:00

cc2longdeploy@163.com

【LONG RUNNING DEPLOYMENT DETECTED IN CCV2】 【New File Created】 /modelt-az-report-repository/kpis/hourly/cac/select-27.csv

To Sun, Xiaoqing

【TIME】

Mon Dec 09 2019 16:00:00 GMT+0800 (GMT+08:00)

【CHANGED FILE】

kpis/hourly/cac/select-27.csv

【CHANGE TYPE】

New File Created

【REGION】




CAC

【 FILE CONTENT】

+customer_id,customer_code,customer_name,env_id,env_code,env_name,deployment_id,failed_deployment,deployment_started,time_queried,already_running_in_minutes

+-----,-----,-----,-----,-----,-----,-----,-----,-----,-----,-----

<https://ae.prodcaac.model-t.cc.commerce.ondemand.com/#!/deployment/----->

 Reply  Reply All  Forward



2019/12/6 (周五) 4:29

15801790092@163.com

【LONG RUNNING DEPLOYMENT DETECTED IN CCV2】 【File Updated】 /modelt-az-report-repository/kpis/hourly/weu/select-27.csv

To Sun, Xiaoqing

【TIME】

Fri Dec 06 2019 04:28:30 GMT+0800 (GMT+08:00)

【CHANGED FILE】

kpis/hourly/weu/select-27.csv


【CHANGE TYPE】

File Updated

【UPDATED FILE CONTENT】

customer_id,customer_code,customer_name,env_id,env_code,env_name,deployment_id,failed_deployment,deployment_started,time_queried,already_running_in_minutes

+73,cp71rq08w,E-SERVICES S.r.l.,430,s1,s1,39783,0,2019-12-05 18:18:00.6850000,2019-12-05 19:42:27.560,84

 Reply  Reply All  Forward

2019/12/9 (周一) 15:55



cc2longdeploy@163.com

【LONG RUNNING DEPLOYMENT DETECTED IN CCV2】 【File Updated】 /modelt-az-report-repository/kpis/hourly/weu/select-27.csv

To Sun, Xiaoqing

【TIME】

Mon Dec 09 2019 15:55:12 GMT+0800 (GMT+08:00)

【CHANGED FILE】

kpis/hourly/weu/select-27.csv

【CHANGE TYPE】

File Updated

【REGION】

WEU

【UPDATED FILE CONTENT】

customer_id,customer_code,customer_name,env_id,env_code,env_name,deployment_id,failed_deployment,deployment_started,time_queried,already_running_in_minutes

-103,ch4ravjwt6,BASF SE,635,s1,s1,39797,0,2019-12-05 20:23:47.9320000,2019-12-05 21:14:49.750,51

<https://ae.prodweu.model-t.cc.commerce.ondemand.com/#!/deployment/39797>

FileEditViewNavigateCodeRefactorRunToolsVCSWindowHelp

vt-coding-tasks [C:\Users\I354995\Desktop\vt-coding-tasks] - ...\backend.js [vt-coding-tasks] - WebStorm

vt-coding-tasks > backend.js

Angular CLI Server (vt-coding-tasks)

Terminal: Local x +

Project

vt-coding-tasks C:\Users\I354995\Desktop\vt-c

dist

e2e

modelt-az-report-repository

node_modules library root

server

routes

routes.js

src

app

posts

sortable-table

app.component.css

app.component.html

app.component.spec.ts

app.component.ts

app.module.ts

app-routing.module.ts

posts.service.spec.ts

posts.service.ts

assets

environments

favicon.ico

index.html

main.ts

polyfills.ts

SAP_scrn_R_60_29.png

styles.css

test.ts

.editorconfig

.gitignore

ABOUT.md

angular.json

config.js x

backend.js x

routes.js x

posts.service.ts x

posts.component.ts x

posts.conr

443

});

444

});

445

});

446

});

447

448

449

// Check for data changes

450

MongoClient.connect(DB_CONN_STR,

451

options: {

452

useNewUrlParser: true,

453

useUnifiedTopology: true,

454

auto_reconnect: true,

455

socketTimeoutMS: 360000,

456

keepAlive: 10000,

457

connectTimeoutMS: 360000

458

},

459

callback: function (err, db) {

460

if (err) console.log(err);

461

console.log("Database Connected! ---- TO GET DATA CHANGES\n");

462

var dbo = db.db(dbName: "sap-cx");

463

var collection = dbo.collection(name: "CCv2LongRunningDeployment");

464

// Define change stream

465

const changeStream = collection.watch();

466

// start listen to changes

467

changeStream.on(type: "change", fn: function (event) {

468

// console.log(JSON.stringify(event));

469

console.log(Date() + "\nGot Database change(s)!\n");

470

io.emit('DBChange', {status: 'Got MongoDB change!'});

471

//changeStream.close();

472

//-----NO db.close();-----

473

});

474

});

475

476

callback for scheduleJob() > callback for diff()

Terminal

g: Version Control

g: TODO

[object Object]

Tue Dec 10 2019 11:10:00 GMT+0800 (GMT+08:00)

Diff Schedule Rule is Running!

Local Copy is already existing!

[object Object]

Tue Dec 10 2019 11:20:00 GMT+0800 (GMT+08:00)

Diff Schedule Rule is Running!

Local Copy is already existing!

[object Object]

Tue Dec 10 2019 11:30:00 GMT+0800 (GMT+08:00)

Diff Schedule Rule is Running!

Local Copy is already existing!

[object Object]

Tue Dec 10 2019 11:40:00 GMT+0800 (GMT+08:00)

Diff Schedule Rule is Running!

Local Copy is already existing!

[object Object]

Tue Dec 10 2019 11:50:00 GMT+0800 (GMT+08:00)

Diff Schedule Rule is Running!

Local Copy is already existing!

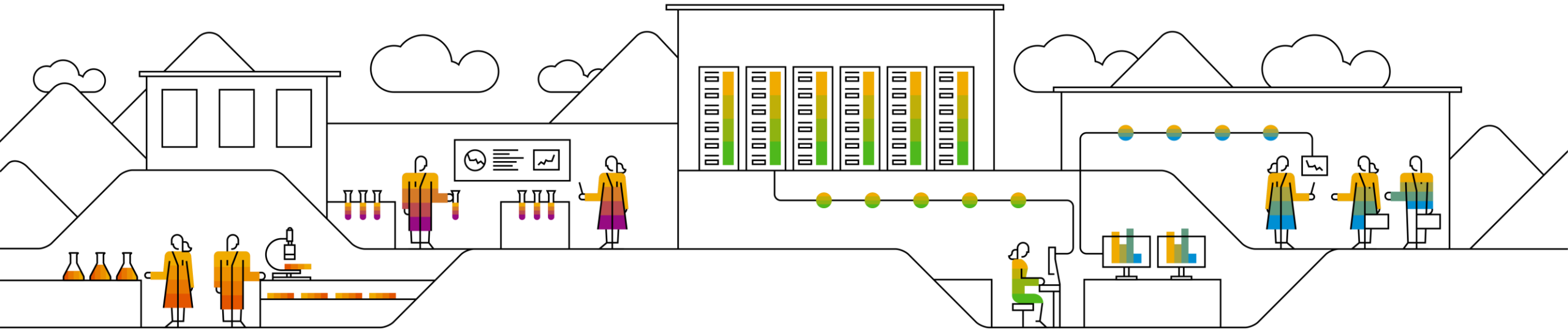
[object Object]

1 Event Log

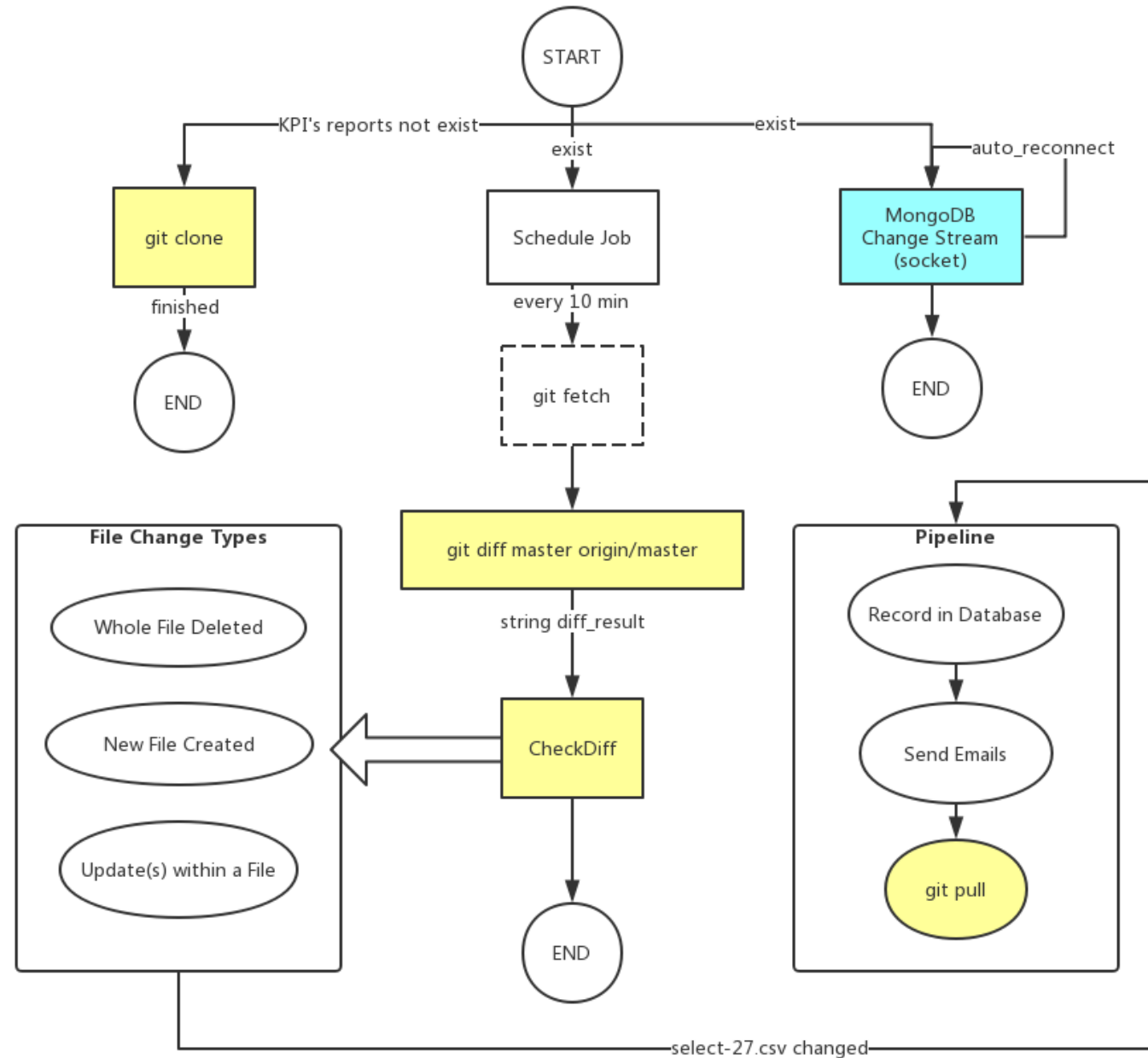
438:34 CRLF UTF-8 EditorConfig Git: master

PART III

About Realization



Backend Pipeline



Frontend Realization

- Node.js Express Middleware /routes

JSON data returned from MongoDB could be seen on <http://localhost:8080/routes/posts>

- app.module.ts

Contains Express Router Configuration

- posts.service.ts

JSON to frontend array & sort data based on webpage sortable table settings

- posts.component.ts

- Realize webpage table pagination / search / download csv
- Catch websocket message emitted from MongoDB change stream, then refresh all data

- Sortable Table Component

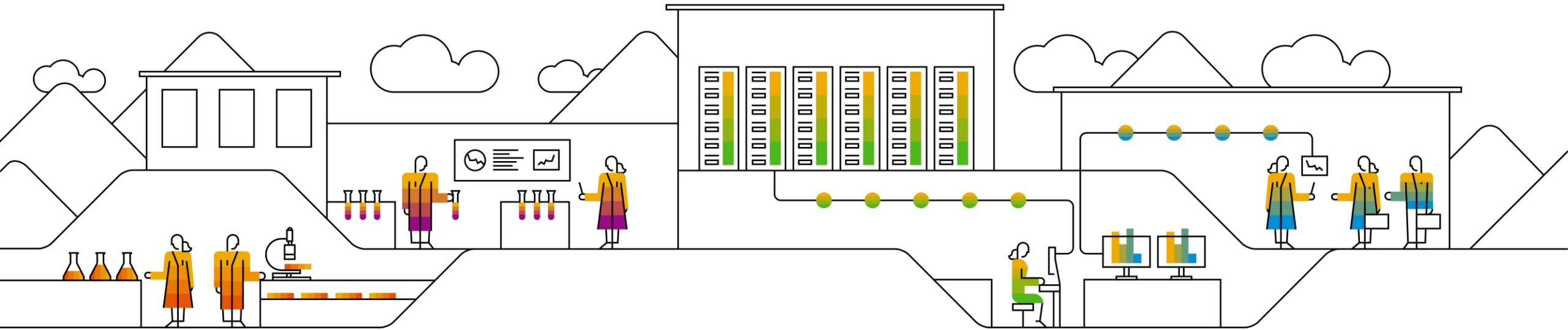
Realize webpage sortable table (sortable columns)

- posts.component.html & posts.component.css

HTML & CSS with Bootstrap v4.0.0

PART IV

More TODO



Suggestions for future improvements

- Change to a stable USER & PASS in backed.js to provide Auth to access KPI's reports on Github

<https://github.tools.sap/COPS/modelt-az-report-repository>

```
4  const USER = 'I354995';
5  const PASS = '43a4b431c7dc948abba63a3b7edaf7da5102563e';
```

- Change Nodemailer sender email (currently 163) to SAP's SMTP server in order to support bulk mail delivering and get rid of some SMTP error codes

FYI, [24 Apply SMTP Server & Send Mail in SAP Cloud Foundry](#)



```
1  module.exports = {
2    email: {
3      host: 'smtp.163.com',
4      port: 465,
5      user: 'ccv2longdeploy@163.com',
6      pass: 'sapcxpsl2',
7    },
8    recipient: [
9      { emailAddress: '1249881412@qq.com' },
10     { emailAddress: 'xiaoqing.sun@sap.com' },
11     /*{ emailAddress: 'tao.jiang02@sap.com' },
12     { emailAddress: 'tao.jiang02@sap.com' }
13   ]
14 }
```

```
26
27 // node.js Email sender
28 const nodemailer = require('nodemailer');
29 const smtpTransport = require('nodemailer-smtp-transport');
30 const config = require('./config');
31 const transport = nodemailer.createTransport(smtpTransport({
32   pool: true,
33   host: config.email.host,
34   port: config.email.port,
35   secure: true,
36   auth: {
37     user: config.email.user,
38     pass: config.email.pass
39   }
40 }));
```

163 SMTP Error Code

- 421 Too many connections
- 554 Message failed
- Error: Connection closed

See doc [企业退信的常见问题?](#)

Suggestions for future improvements

- Possibility of encountering “MongoNetworkError: connection timed out” after MongoDB Change Streams (socket) running for a long time.

```
449 // Check for data changes
450 MongoClient.connect(DB_CONN_STR,
451   options: {
452     useNewUrlParser: true,
453     useUnifiedTopology: true,
454     auto_reconnect: true,
455     socketTimeoutMS: 360000,
456     keepAlive: 10000,
457     connectTimeoutMS: 360000
458   },
459   callback: function (err, db) {
460     if (err) console.log(err);
461     console.log("Database Connected! ---- TO GET DATA CHANGES\n");
462     var dbo = db.db( dbName: "sap-cx");
463     var collection = dbo.collection( name: "CCv2LongRunningDeployment");
464     // Define change stream
465     const changeStream = collection.watch();
466     // start listen to changes
467     changeStream.on( type: "change", fn: function (event) {
468       // console.log(JSON.stringify(event));
469       console.log(Date() + "\nGot Database change(s)!\n");
470       io.emit('DBChange', {status: 'Got MongoDB change!'});
471       //changeStream.close();
472       //-----NO db.close();-----
473     });
474   });
475
476
```

Current solution needs testing:

Please verify if the Node.js MongoClient connect option “**auto_reconnect**” works fine in this scenario.

Suggestions for future improvements

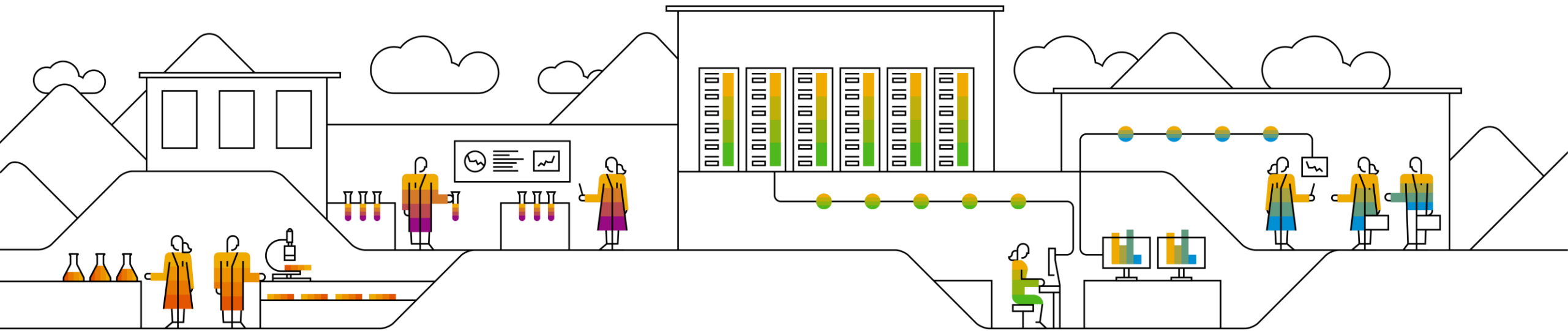
- Record updates appeared during the program's down time (either not running or crashed) might be missed. These histories are unable to be saved automatically in local database due to current git-diff method's limits.

=> Consider using **Commit IDs** in git-diff.

-

PART V

Q & A

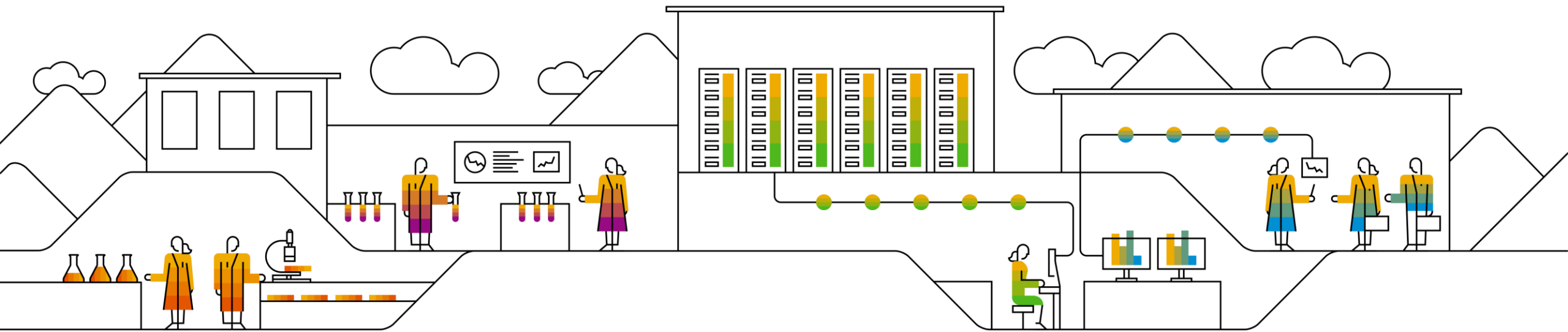


Thank you.

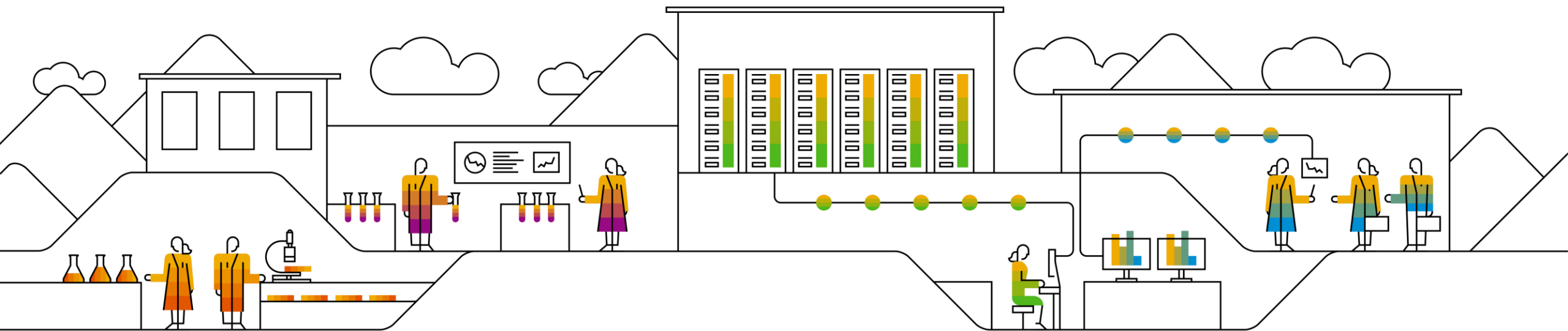
Xiaoqing Sun

Vocational Training SH Intern
SAP Commerce Cloud PS L2

APPENDIX



程序安装指南



ENVIRONMENT – on Windows 10

■ Backend

- Node.js v10.16.2
- Npm 6.9.0

■ Frontend

- Angular CLI 8.3.9
- TypeScript 3.5.3

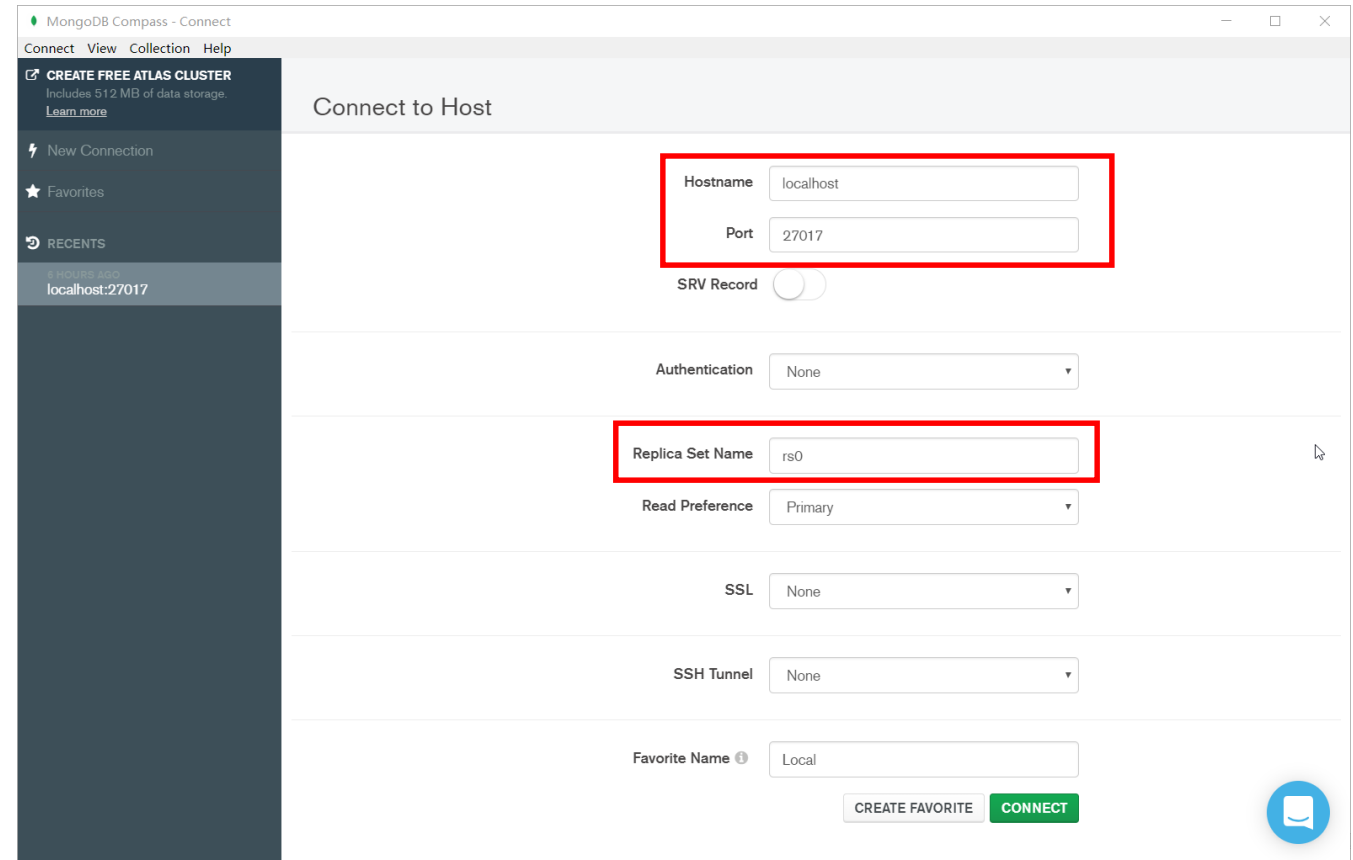
■ Local Database

- using **Replica Set** named “**rs0**”
- connect to **mongodb://localhost:27017**
- Database Name: **sap-cx**
- Collection Name: **CCv2LongRunningDeployment**

- MongoDB v4.3.0-955-g2d3b6c1

(git version: 2d3b6c1615163cabd1b49363000eb0322b88c0d2)

- MongoDB Compass 1.19.12



The screenshot shows the 'MongoDB Compass - Connect' window. The 'Connect to Host' section is highlighted with a red box, containing the 'Hostname' field set to 'localhost' and the 'Port' field set to '27017'. Below this, the 'Replica Set Name' field is also highlighted with a red box and set to 'rs0'. Other fields include 'Authentication' (None), 'Read Preference' (Primary), 'SSL' (None), 'SSH Tunnel' (None), and 'Favorite Name' (Local). At the bottom right, there are 'CREATE FAVORITE' and 'CONNECT' buttons.

ENVIRONMENT – on Ubuntu 16.04 LTS

■ Backend

- Node.js v12.13.1
- Npm 6.12.1

■ Frontend

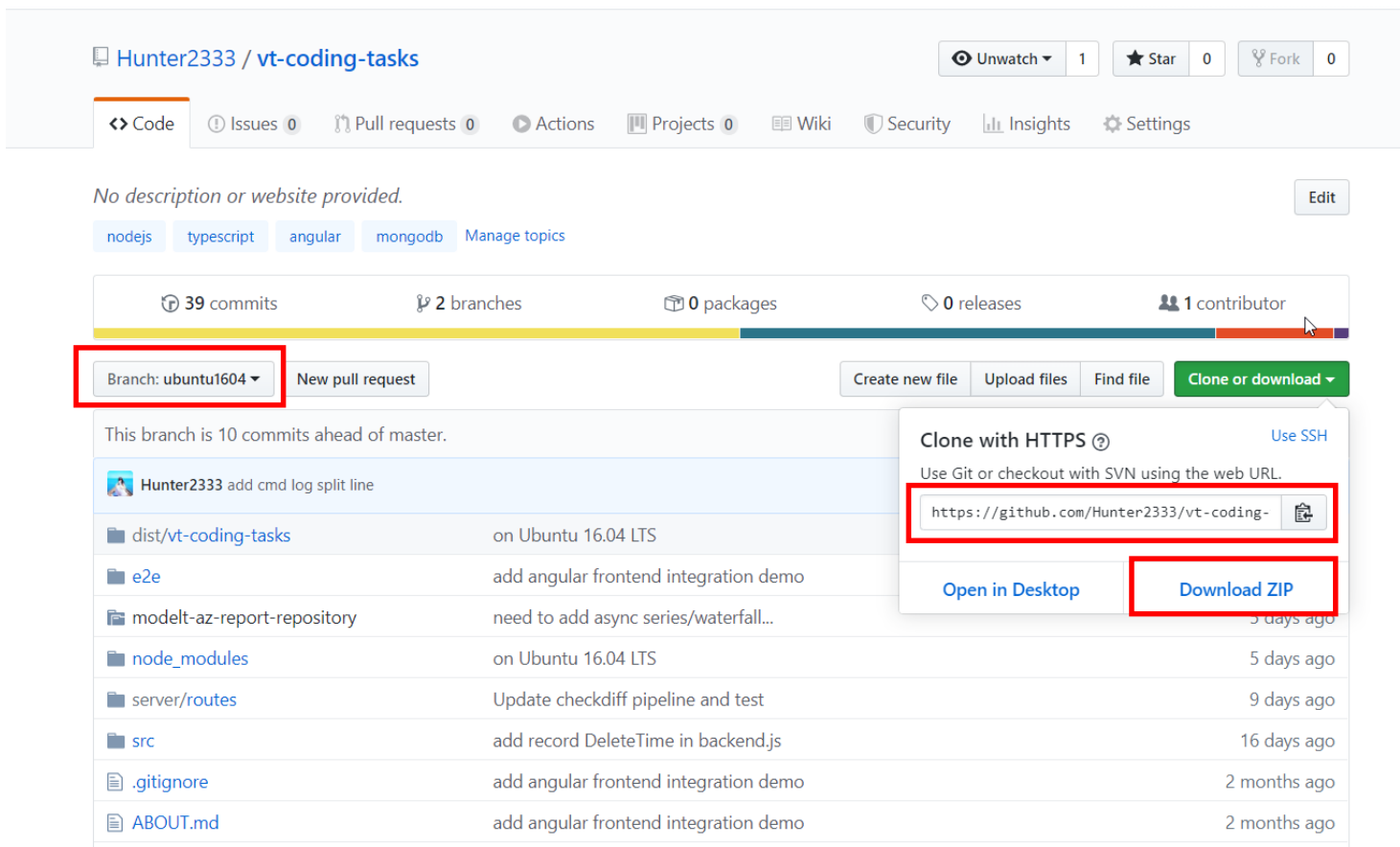
- Angular CLI 8.3.9

■ Local Database

- using **Replica Set** named “rs0”
- connect to **mongodb://localhost:27017**
- Database Name: **sap-cx**
- Collection Name: **CCv2LongRunningDeployment**
- MongoDB v4.2.2
(require **v3.6 or later** versions)
- MongoDB Compass 1.20.1

Ubuntu 16.04 LTS 上的程序安装指南

- git clone <https://github.com/Hunter2333/vt-coding-tasks.git>
- cd 项目文件夹路径
- git pull origin **ubuntu1604**



首先，在 Terminal 中输入以上命令，将正确的项目文件克隆至本地

注意：

此处及后续进行的操作都是基于远程的 **ubuntu1604 分支**，而不是默认的 master 分支！

Ubuntu 16.04 LTS 上的程序安装指南

参考以下链接中给出的步骤，安装 Node.js 和 npm，并将二者升级至**最新稳定版本**

- <https://blog.csdn.net/cgs1999/article/details/89703649>
- https://blog.csdn.net/weixin_34408624/article/details/88738222

安装程序所需版本的 Angular CLI 脚手架

- `npm install -g @angular/cli@8.3.9` (-g 为全局安装)
- `ng version` (查看版本，验证是否安装成功)

通过以下链接下载安装 chrome

- <http://www.ubuntuchrome.com/>

通过以下链接下载安装适用于 Ubuntu 64-bit (14.04+) 系统的 MongoDB 可视化管理工具 Compass

- <https://www.mongodb.com/download-center/compass>

Ubuntu 16.04 LTS 上的程序安装指南

参考以下官方手册中给出的步骤，安装 MongoDB 4.2

不可以直接 `sudo apt install mongodb`！因为必须保证 MongoDB 版本是 3.6+，否则未提供 Change Stream 功能

- <https://docs.mongodb.com/manual/tutorial/install-mongodb-on-ubuntu/>

- 查看版本：`mongo --version`

- MongoDB 其他常用指令：<https://www.jianshu.com/p/250ce85d2b2e>

- 常见安装错误&解决方案：

<https://www.cnblogs.com/Horace-blogs/p/11341209.html>

<https://www.cnblogs.com/maocaoliu/p/3287318.html>

<https://askubuntu.com/questions/921753/failed-to-start-mongod-service-unit-mongod-service-not-found>

Ubuntu 16.04 LTS 上的程序安装指南

MongoDB安装完成后，初始化名为“**rs0**”的 Replica Set，请参考官方手册相关内容：

- <https://docs.mongodb.com/manual/administration/replica-set-deployment/>
- <https://docs.mongodb.com/manual/tutorial/deploy-replica-set/>
- <https://docs.mongodb.com/manual/tutorial/convert-standalone-to-replica-set/>

以及如下可能用到的教程来修改**配置文件/etc/mongod.conf**：

- <https://www.cnblogs.com/hiddenfox/p/mongodb-install-config-replica-set.html>

新建文件，输入如下内容并另存为“**run_mongodb_rs**”：

- `sudo mongod --port 27017 --dbpath 上一步初始化为replica set的数据库存放路径 --replSet rs0 --bind_ip localhost`

在该文件目录下打开终端，键入“**sh run_mongodb_rs**”，即可以 Replica Set 方式启动 MongoDB

运行 MongoDB Compass，设置 **Hostname: localhost**, **Port: 27017**, **Replica Set Name: rs0**，成功建立连接后，即可利用该图形界面工具查看并管理 MongoDB 数据库

Ubuntu 16.04 LTS 上的程序安装指南

之前的步骤都成功配置完后，尝试编译并运行程序：

- `cd 项目文件夹`
- `sudo npm run build`

若未报错，说明环境已搭建完成（若报错，请根据错误提示寻求解决方案，有可能是需要卸载项目中的某些npm包并重新安装）

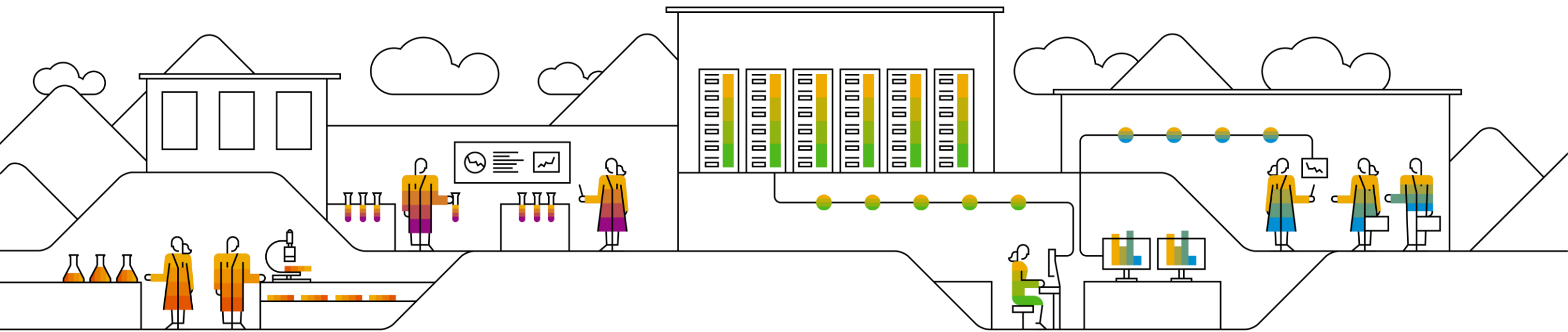
第一次运行项目，将执行 `git clone`，需要较长时间克隆 `modelt-az-report-repository` 到项目目录下，克隆完成会在终端输出“finished”并终止程序

后续再次运行即可启动监控 `hourly select-27.csv` 文件变更的功能

打开 chrome 浏览器，地址栏键入 **localhost:8080** 即可访问程序前端页面

键入 **localhost:8080/routes/posts** 即可通过中间件 `routes` 查看后端数据库返回给前端的所有裸数据（JSON array 形式）

程序自定义配置指南



部署在 Ubuntu 16.04 LTS 上的项目说明

■ 项目路径

~/Documents/vt-coding-tasks/

■ MongoDB (Replica Set) 启动命令文件

~/Documents/run_mongodb_rs.

■ MongoDB 配置文件路径

/etc/mongod.conf

■ MongoDB Replica Set 数据库存放路径

/var/lib/mongodb

■ MongoDB Log 日志文件存放路径

/var/log/mongodb/mongod.log

■ 临时发信邮箱

账号: ccv2longdeploy@163.com

密码: HybrisPSL2

验证手机: Xiaoqing Sun 的手机号

SMTP授权码: sapcxpsl2

程序访问 modelt-az-report-repository 的 Github Auth 配置

<https://github.tools.sap/COPS/modelt-az-report-repository>

/项目目录/backend.js, Line 4-12

```
backend.js ×
1 // Github Auth
2 const fs = require("fs");
3 const readline = require("readline");
4 const USER = 'I354995';
5 const PASS = '43a4b431c7dc948abba63a3b7edaf7da5102563e';
6 // const USER = 'I314119';
7 // const PASS = '339f7a55781e7d54e99752f3f2a82d3f91a9aa96';
8 const FOLDER = 'modelt-az-report-repository';
9 const REPO = 'github.tools.sap/COPS/';
10 const git = require('simple-git');
11 //const git = require('simple-git/promise');
12 const remote = `https://${USER}:${PASS}@${REPO}${FOLDER}`;
```

MongoDB 连接配置

/项目目录/backend.js, Line 16

```
14 // Database Connection
15 const MongoClient = require('mongodb').MongoClient;
16 const DB_CONN_STR = "mongodb://localhost:27017/sap-cx";
```

/项目目录/backend.js: 三个连接并更改数据库的函数

```
98 // ONLY for recording select-27.csv updates in DB
99 // Whole File created
100 function recordInDB_file_created(file, str) {...}
173
174 // ONLY for recording select-27.csv updates in DB
175 // Whole File deleted
176 function recordInDB_file_deleted(file) {...}
210
211 // ONLY for recording select-27.csv updates in DB
212 // File modified
213 function recordInDB_file_modified(file, str) {...}
```

/项目目录/backend.js: Change Stream 相关

```
462 // Check for data changes
463 MongoClient.connect(DB_CONN_STR,
464 {
465   useNewUrlParser: true,
466   useUnifiedTopology: true,
467   auto_reconnect: true,
468   socketTimeoutMS: 360000,
469   keepAlive: 10000,
470   connectTimeoutMS: 360000
471 },
472 function (err, db) {
473   if (err) console.log(err);
474   console.log("Database Connected! ---- TO GET DATA CHANGES\n");
475   var dbo = db.db("sap-cx");
476   var collection = dbo.collection("CCv2LongRunningDeployment");
477   // Define change stream
478   const changeStream = collection.watch();
479   // start listen to changes
480   changeStream.on("change", function (event) {
481     // console.log(JSON.stringify(event));
482     console.log(Date() + "\nGot Database change(s)!\n");
483     io.emit('DBChange', {status: 'Got MongoDB change!'});
484     //changeStream.close();
485     //-----NO db.close();-----
486   });
487 });
```

MongoDB 连接配置

/项目目录/server/routes/routes.js, Line 4, Line 12-23

```
backend.js × posts.component.ts × routes.js × config.js ×
1  const express = require("express");
2  const router = express.Router();
3  const MongoClient = require('mongodb').MongoClient;
4  const DB_CONN_STR = "mongodb://localhost:27017/sap-cx";
5
6  router.get('/', (req, res) => {
7    res.send('It works!');
8  });
9
10 router.get('/posts', (req, res) => {
11   // Get initial data collection
12   MongoClient.connect(DB_CONN_STR, {useNewUrlParser: true, useUnifiedTopology: true}, function (err, db) {
13     if (err) {res.status(500).send(err);}
14     console.log("Database Connected! ---- TO GET ALL DATA AS JSON\n");
15     var dbo = db.db("sap-cx");
16     var collection = dbo.collection("CCv2LongRunningDeployment");
17     collection.find({}).toArray(async function(err, result) {
18       if (err) console.log(err);
19       //console.log(result);
20       await res.status(200).json(result);
21       db.close();
22     });
23   });
24 });
25
26 module.exports = router;
```

通知邮件发送配置

/项目目录/backend.js, Line 30-40

```
27 // node.js Email sender
28 const nodemailer = require("nodemailer");
29 const smtpTransport = require('nodemailer-smtp-transport');
30 const config = require('./config');
31 const transport = nodemailer.createTransport(smtpTransport({
32   pool: true,
33   host: config.email.host,
34   port: config.email.port,
35   secure: true,
36   auth: {
37     user: config.email.user,
38     pass: config.email.pass
39   }
40 }));
```

/项目目录/config.js

```
backend.js x posts.component.ts x config.js x
1 module.exports = {
2   email: {
3     host: 'smtp.163.com',
4     port: 465,
5     user: 'ccv2longdeploy@163.com',
6     pass: 'sapcxps12',
7   },
8
9   recipient: [
10    { emailAddress: 'xiaoqing.sun@sap.com' },
11    { emailAddress: 'tao.jiang02@sap.com' },
12    { emailAddress: 'carry.lin@sap.com' },
13    { emailAddress: 'winston.zhou@sap.com' },
14    { emailAddress: 'yuping.shi@sap.com' },
15    { emailAddress: 'timothy.li@sap.com' },
16    { emailAddress: 'qing.liu03@sap.com' },
17    { emailAddress: 'ireneusz.niedbala@sap.com' },
18    { emailAddress: 'simon.song@sap.com' },
19    { emailAddress: 'martin.hu@sap.com;' },
20    { emailAddress: 'lucas.xu@sap.com;' },
21    { emailAddress: 'fenghu.zhang@sap.com' },
22    { emailAddress: 'david.jiang01@sap.com' },
23    { emailAddress: 'john.jiang06@sap.com' },
24    { emailAddress: 'wallace.zhao@sap.com' },
25    { emailAddress: 'gerard.liu@sap.com' },
26  ]
27 }
```

通知邮件内容配置

/项目目录/backend.js, Line 69-70

```
68 // file change type
69 const ChangeType = ["New File Created", "Whole File Deleted", "File Updated"];
70 const FileContent = ["", "ORIGINAL", "UPDATED"];
```

/项目目录/backend.js, 发送邮件的函数, Line 327-348

```
327 function sendNotificationEmail(fileDir, changeTypeID, updated_file_content) {
328 //console.log('checkout ' + fileDir);
329 // new Email content
330 var emailContent = "【TIME】\n" + Date() + "\n-----\n\n"
331 + "【CHANGED FILE】\n " + fileDir + "\n-----\n\n"
332 + "【CHANGE TYPE】\n " + ChangeType[changeTypeID] + "\n-----\n\n"
333 + "【REGION】\n" + fileDir.split('/')[2].toUpperCase() + "\n-----\n\n"
334 + "【" + FileContent[changeTypeID] + " FILE CONTENT】\n" + updated_file_content;
335 for (var i = 0; i < config.recipient.length; i++) {
336 (function (i) {
337 transport.sendMail( data: {
338 from: config.email.user,
339 to: config.recipient[i].emailAddress,
340 subject: '【LONG RUNNING DEPLOYMENT DETECTED IN CCV2】【' + ChangeType[changeTypeID] + '】 /modelt-az-report-repository/' + fileDir,
341 text: emailContent
342 }, callback: function (err, res) {
343 console.log(err, res);
344 console.log("\n");
345 });
346 })(i);
347 }
348 }
```

Express 配置

/项目目录/backend.js, Line 46-52

```
42 // Start Server at Port 8080
43 // API for Frontend
44 const app = express();
45 const path = require("path");
46 const routes = require("../server/routes/routes");
47 app.use(express.static(path.join(__dirname, 'dist/vt-coding-tasks/')));
48 app.use("/routes", routes);
49 // Catch all other routes request and return it to the index
50 app.get('*', (req, res) => {
51   res.redirect('http://localhost:8080');
52 });
```

/项目目录/src/app/app.module.ts, Line 20-30

```
20 const Routes = [
21   {
22     path: '',
23     redirectTo: 'posts',
24     pathMatch: 'full'
25   },
26   {
27     path: 'posts',
28     component: PostsComponent
29   }
30 ];
```

/项目目录/server/routes/routes.js, Line 2, Line 6-10, Line 26

```
backend.js x routes.js x
1  const express = require("express");
2  const router = express.Router();
3  const MongoClient = require('mongodb').MongoClient;
4  const DB_CONN_STR = "mongodb://localhost:27017/sap-cx";
5
6  router.get('/', (req, res) => {
7    res.send('It works!');
8  });
9
10 router.get('/posts', (req, res) => {
11   // Get initial data collection
12   MongoClient.connect(DB_CONN_STR, {useNewUrlParser: true, useUnifiedTopology: true}, function (err, db) {
13     if (err) {res.status(500).send(err);}
14     console.log("Database Connected! ---- TO GET ALL DATA AS JSON\n");
15     var dbo = db.db("sap-cx");
16     var collection = dbo.collection("CCv2LongRunningDeployment");
17     collection.find({}).toArray(async function(err, result) {
18       if (err) console.log(err);
19       //console.log(result);
20       await res.status(200).json(result);
21       db.close();
22     });
23   });
24 });
25
26 module.exports = router;
```

Socket.io 配置

/项目目录/backend.js, Line 55-65

```
54 // Socket IO
55 const server = require("http").createServer(app);
56 const io = require("socket.io")(server);
57 server.listen( port: 8080, listeningListener: (req, res) => {
58   console.log(Date() + '\nRunning on port 8080\n');
59 });
60 io.on( type: 'connection', fn: (socket) => {
61   console.log(Date() + '\nNew connection!\n');
62   socket.on('disconnect', () => {
63     console.log(Date() + '\nOne disconnected!\n');
64   });
65 });
66 c.exec( command: 'start chrome http://localhost:8080');
```

/项目目录/backend.js: Change Stream 中, Line 483

```
462 // Check for data changes
463 MongoClient.connect(DB_CONN_STR,
464 {
465   useNewUrlParser: true,
466   useUnifiedTopology: true,
467   auto_reconnect: true,
468   socketTimeoutMS: 360000,
469   keepAlive: 10000,
470   connectTimeoutMS: 360000
471 },
472 function (err, db) {
473   if (err) console.log(err);
474   console.log("Database Connected! ---- TO GET DATA CHANGES\n");
475   var dbo = db.db("sap-cx");
476   var collection = dbo.collection("CCv2LongRunningDeployment");
477   // Define change stream
478   const changeStream = collection.watch();
479   // start listen to changes
480   changeStream.on("change", function (event) {
481     console.log(JSON.stringify(event));
482     console.log(Date() + "\nGot Database change(s)!\n");
483     io.emit('DBChange', {status: 'Got MongoDB change!'});
484     //changeStream.close();
485     //-----NO db.close();-----
486   });
487 });
```

Socket.io 配置

/项目目录/src/app/posts/posts.component.ts, Line 3, Line 12, Line 20-22

```
3 import * as io from 'socket.io-client';
4
5 @Component({
6   selector: 'app-posts',
7   templateUrl: './posts.component.html',
8   styleUrls: ['./posts.component.css'],
9 })
10 export class PostsComponent implements OnInit {
11
12   socket;
13   page = 1;
14   inputNumPerPage = '';
15   numPerPage = 5;
16   gotoPageNum = '';
17   posts: any = [];
18   csvData = '';
19
20   constructor(private PostService: PostsService) {
21     this.socket = io.connect( uri: 'http://localhost:8080');
22   }
```

/项目目录/src/app/posts/posts.component.ts, Line 131-134

```
129 ngOnInit() {
130   this.getData();
131   this.socket.on('DBChange', (msg) => {
132     console.log(msg.status);
133     this.getData();
134   });
135 }
136 }
```


Diff-Check-Pull 定时任务配置

/项目目录/backend.js, Line 3, Line 440-

```
433 // ----- MAIN -----
434 if (!fs.existsSync( path: './' + FOLDER)) {
435     git().clone(remote)
436     .exec(() => console.log('finished'));
437     //.catch((err) => console.error('failed: ', err));
438 }
439 // Start Git Fetch & Diff & Merge Schedule Task
440 const diff_rule = new schedule.RecurrenceRule();
441 //diff_rule.minute = [0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55];
442 diff_rule.minute = [0, 10, 20, 30, 40, 50];
443 //diff_rule.minute = [0, 20, 40];
444 //diff_rule.minute = [0, 30];
445 //const diff_rule = '30 * * * * *';
446 schedule.scheduleJob(diff_rule, function () {
447     // run on xx:xx:30 every minute
448     // run on xx:10 & xx:30 & xx:50 every hour
449     console.log("-----");
450     console.log(Date() + "\nDiff Schedule Rule is Running!");
451     //git.listRemote([], console.log.bind(console));
452     console.log("Local Copy is already existing!\n");
453     //git('./modelt-az-report-repository').fetch();
454     git( baseDir: './modelt-az-report-repository').diff( options: ["origin/master"], then: function (err, status) {
455         //console.log(status + "\n");
456         if (err) console.log(err);
457         checkDiff(status);
458     });
459 });
```

Frontend Realization

- Node.js Express Middleware /routes

JSON data returned from MongoDB could be seen on <http://localhost:8080/routes/posts>

- app.module.ts

Contains Express Router Configuration

- posts.service.ts

JSON to frontend array & sort data based on webpage sortable table settings

- posts.component.ts

- Realize webpage table pagination / search / download csv
- Catch websocket message emitted from MongoDB change stream, then refresh all data

- Sortable Table Component

Realize webpage sortable table (sortable columns)

- posts.component.html & posts.component.css

HTML & CSS with Bootstrap v4.0.0

前端页面 SAP LOGO -- 图床

源图片路径: /项目目录/src/SAP_scrn_R_60_29.png

图片链接 (图床) : <https://s2.ax1x.com/2019/10/22/KGGvVS.png>

/项目目录/src/app/posts/posts.component.html, Line 21

```
18 <body>
19   <!--HEADER-->
20   <header>
21     
22   </header>
```

CSS

/项目目录/src/app/posts/posts.component.html

/项目目录/src/app/posts/posts.component.css

Bootstrap 自定义样式配置

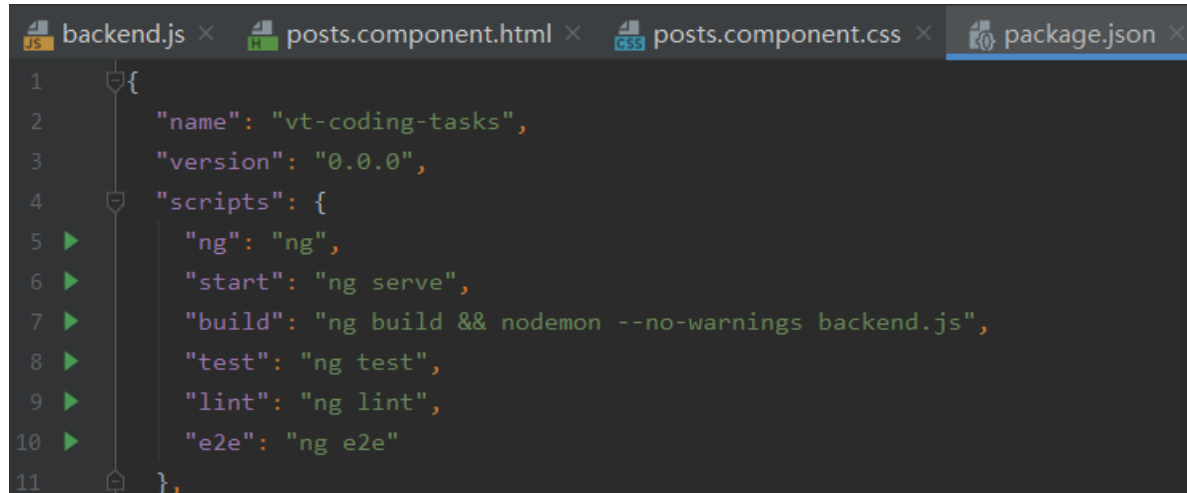
/项目目录/node_modules/bootstrap/dist/css/my-bootstrap.css (在 bootstrap.css 的基础上改动而成)

/项目目录/angular.json, Line 28 (如下)

```
26  "styles": [  
27    "src/styles.css",  
28    "./node_modules/bootstrap/dist/css/my-bootstrap.css",  
29    "./node_modules/font-awesome/css/font-awesome.css"  
30  ],
```

npm run (build) 等命令内容的自定义

/项目目录/package.json, Line 7



```
1  {
2    "name": "vt-coding-tasks",
3    "version": "0.0.0",
4    "scripts": {
5      "ng": "ng",
6      "start": "ng serve",
7      "build": "ng build && nodemon --no-warnings backend.js",
8      "test": "ng test",
9      "lint": "ng lint",
10     "e2e": "ng e2e"
11   },
12 }
```

END

Xiaoqing Sun

Vocational Training SH Intern
SAP Commerce Cloud PS L2