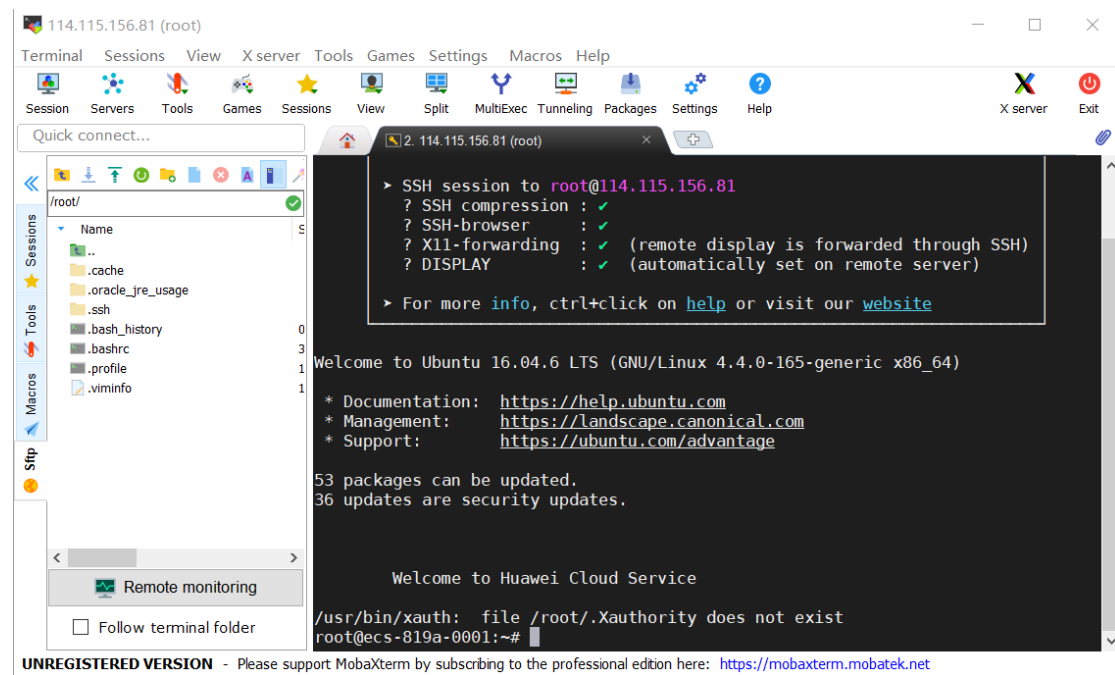


安装 MobaXterm 连接到服务器：



添加一个新用户

```
1 # adduser fabric
```

将此用户加入 sudo 用户组

```
1 # usermod -aG sudo fabric
```

切换为 fabric 用户，并进入用户目录

```
1 # su fabric
2 $ cd ~
```

```

root@ecs-819a-0001:~# adduser fabric
Adding user `fabric' ...
Adding new group `fabric' (1000) ...
Adding new user `fabric' (1000) with group `fabric' ...
Creating home directory `/home/fabric' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
Sorry, passwords do not match
passwd: Authentication token manipulation error
passwd: password unchanged
Try again? [y/N] y
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for fabric
Enter the new value, or press ENTER for the default
    Full Name []:
    Room Number []:
    Work Phone []:
    Home Phone []:
    Other []:
Is the information correct? [Y/n] y
root@ecs-819a-0001:~# usermod -aG sudo fabric
root@ecs-819a-0001:~# su fabric
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

fabric@ecs-819a-0001:/root$ sudo fabric
[sudo] password for fabric:
sudo: fabric: command not found
fabric@ecs-819a-0001:/root$ cd ~

```

安装 Node.js, npm, Docker, Docker Compose, Python

现在需要安装 Node.js, Docker 等软件, Hyperledger 提供了一个脚本, 可以用来自动安装。

下载并执行自动安装脚本

```

1 $ curl -O https://hyperledger.github.io/composer/latest/prereqs-ubuntu.sh
2 $ chmod u+x prereqs-ubuntu.sh
3 $ ./prereqs-ubuntu.sh

```

安装成功后, 会显示以下内容, 包括安装的软件名称及版本号。(后续版本可能会有变化。)

```

1 Installation completed, versions installed are:
2 Node: v8.11.1
3 npm: 5.8.0
4 Docker: Docker version 18.03.0-ce, build 0520e24
5 Docker Compose: docker-compose version 1.13.0, build 1719ceb
6 Python: Python 2.7.12
7 Please logout then login before continuing.

```

退出并重新登录

请退出当前用户会话, 关闭客户端工具与 Ubuntu 的连接; 并重新以用户 fabric 登录 Ubuntu, 以使系统设置生效。

```
fabric@ecs-819a-0001:~$ curl -O https://hyperledger.github.io/composer/latest/prereqs-ubuntu.sh
```

% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Current
			Dload	Upload	Total	Spent	Left
100	4001	100	4001	0	0	999	0
					0:00:04	0:00:04	--:--:-- 999

```
fabric@ecs-819a-0001:~$ chmod u+x prereqs-ubuntu.sh
```

```
fabric@ecs-819a-0001:~$ ./prereqs-ubuntu.sh
```

```
Installing Hyperledger Composer prereqs for Ubuntu xenial
```

```
# Updating package lists
```

```
gpg: keyring `/tmp/tmp1nc7e52p/secring.gpg' created
```

```
gpg: keyring `/tmp/tmp1nc7e52p/pubring.gpg' created
```

```
gpg: requesting key E1DF1F24 from hkp server keyserver.ubuntu.com
```

```
gpg: /tmp/tmp1nc7e52p/trustdb.gpg: trustdb created
```

```
gpg: key E1DF1F24: public key "Launchpad PPA for Ubuntu Git Maintainers" imported
```

```
d
```

```
gpg: Total number processed: 1
```

```
gpg: imported: 1 (RSA: 1)
```

```
OK
```

```
Get:1 http://security.ubuntu.com/ubuntu xenial-security InRelease [109 kB]
```

```
Hit:2 http://archive.ubuntu.com/ubuntu xenial InRelease
```

```
Get:3 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial InRelease [23.8 kB]
```

```
Get:4 http://archive.ubuntu.com/ubuntu xenial-updates InRelease [109 kB]
```

```
Get:5 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial/main amd64 Packages [3,344 B]
```

```
Get:6 http://security.ubuntu.com/ubuntu xenial-security/universe Sources [114 kB]
```

```
Get:7 http://archive.ubuntu.com/ubuntu xenial-backports InRelease [107 kB]
```

```
Get:8 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial/main i386 Packages [3,340 B]
```

```
Get:9 http://security.ubuntu.com/ubuntu xenial-security/universe amd64 Packages [463 kB]
```

```
Get:10 http://archive.ubuntu.com/ubuntu xenial-updates/universe Sources [263 kB]
```

```
Get:11 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial/main Translation-en [2,432 B]
```

```
Get:12 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [1,055 kB]
```

```
Get:13 http://security.ubuntu.com/ubuntu xenial-security/universe i386 Packages [399 kB]
```

```
Get:14 http://archive.ubuntu.com/ubuntu xenial-updates/main i386 Packages [872 kB]
```

```
Get:15 http://archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages [769 kB]
```

```
Get:16 http://archive.ubuntu.com/ubuntu xenial-updates/universe i386 Packages [698 kB]
```

```
Fetchd 4,990 kB in 18s (274 kB/s)
```

```
Reading package lists... Done
```

```
# Installing Git
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-4.4.0-131 linux-headers-4.4.0-131-generic
  linux-headers-4.4.0-142 linux-headers-4.4.0-142-generic
  linux-image-4.4.0-131-generic linux-image-4.4.0-142-generic
  linux-image-extra-4.4.0-131-generic linux-image-extra-4.4.0-142-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  git-man libpcre2-8-0
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui gitk
  gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  libpcre2-8-0
The following packages will be upgraded:
  git git-man
2 upgraded, 1 newly installed, 0 to remove and 48 not upgraded.
Need to get 8,490 kB of archives.
After this operation, 16.5 MB of additional disk space will be used.
Get:1 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial/main amd64 git amd64 1:2.24.0-1~ppa0~ubuntu16.04.1 [6,630 kB]
Get:2 http://archive.ubuntu.com/ubuntu xenial/universe amd64 libpcre2-8-0 amd64 10.21-1 [165 kB]
Get:3 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial/main amd64 git-man all 1:2.24.0-1~ppa0~ubuntu16.04.1 [1,695 kB]
Fetched 8,490 kB in 40s (209 kB/s)
(Reading database ... 181266 files and directories currently installed.)
Preparing to unpack .../git_1%3a2.24.0-1~ppa0~ubuntu16.04.1_amd64.deb ...
Unpacking git (1:2.24.0-1~ppa0~ubuntu16.04.1) over (1:2.7.4-0ubuntu1.6) ...
Preparing to unpack .../git-man_1%3a2.24.0-1~ppa0~ubuntu16.04.1_all.deb ...
Unpacking git-man (1:2.24.0-1~ppa0~ubuntu16.04.1) over (1:2.7.4-0ubuntu1.6) ...
Selecting previously unselected package libpcre2-8-0:amd64.
Preparing to unpack .../libpcre2-8-0_10.21-1_amd64.deb ...
Unpacking libpcre2-8-0:amd64 (10.21-1) ...
Processing triggers for man-db (2.7.5-1) ...
Processing triggers for libc-bin (2.23-0ubuntu11) ...
Setting up libpcre2-8-0:amd64 (10.21-1) ...
Setting up git-man (1:2.24.0-1~ppa0~ubuntu16.04.1) ...
```

```

Downloading and installing node v8.16.2...
Downloading https://nodejs.org/dist/v8.16.2/node-v8.16.2-linux-x64.tar.xz...
##### 100.0%
Computing checksum with sha256sum
Checksums matched!
Now using node v8.16.2 (npm v6.4.1)
Creating default alias: default -> 8 (-> v8.16.2)
Now using node v8.16.2 (npm v6.4.1)
Reading package lists... Done
Building dependency tree
Reading state information... Done
apt-transport-https is already the newest version (1.2.32).
ca-certificates is already the newest version (20170717~16.04.2).
The following packages were automatically installed and are no longer required:
  linux-headers-4.4.0-131 linux-headers-4.4.0-131-generic
  linux-headers-4.4.0-142 linux-headers-4.4.0-142-generic
  linux-image-4.4.0-131-generic linux-image-4.4.0-142-generic
  linux-image-extra-4.4.0-131-generic linux-image-extra-4.4.0-142-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 48 not upgraded.
OK
deb [arch=amd64] https://download.docker.com/linux/ubuntu xenial stable
Hit:1 http://archive.ubuntu.com/ubuntu xenial InRelease
Get:2 https://download.docker.com/linux/ubuntu xenial InRelease [66.2 kB]
Hit:3 http://security.ubuntu.com/ubuntu xenial-security InRelease
Hit:4 http://archive.ubuntu.com/ubuntu xenial-updates InRelease
Get:5 https://download.docker.com/linux/ubuntu xenial/stable amd64 Packages [11.
6 kB]
Hit:6 http://archive.ubuntu.com/ubuntu xenial-backports InRelease
Hit:7 http://ppa.launchpad.net/git-core/ppa/ubuntu xenial InRelease
Fetched 77.9 kB in 1s (46.2 kB/s)
Reading package lists... Done
docker-ce:
  Installed: (none)
  Candidate: 5:19.03.4~3-0~ubuntu-xenial
  Version table:
    5:19.03.4~3-0~ubuntu-xenial 500
    500 https://download.docker.com/linux/ubuntu xenial/stable amd64 Package
s
    5:19.03.3~3-0~ubuntu-xenial 500
    500 https://download.docker.com/linux/ubuntu xenial/stable amd64 Package

```

```
# Installing Docker
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-4.4.0-131 linux-headers-4.4.0-131-generic
  linux-headers-4.4.0-142 linux-headers-4.4.0-142-generic
  linux-image-4.4.0-131-generic linux-image-4.4.0-142-generic
  linux-image-extra-4.4.0-131-generic linux-image-extra-4.4.0-142-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce-cli pigz
Suggested packages:
  mountall
The following NEW packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce docker-ce-cli pigz
0 upgraded, 6 newly installed, 0 to remove and 48 not upgraded.
Need to get 85.3 MB of archives.
After this operation, 384 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu xenial/universe amd64 pigz amd64 2.3.1-2
[61.1 kB]
Get:2 https://download.docker.com/linux/ubuntu xenial/stable amd64 containerd.io
amd64 1.2.10-3 [19.9 MB]
Get:3 http://archive.ubuntu.com/ubuntu xenial/universe amd64 aufs-tools amd64 1:
3.2+20130722-1.1ubuntu1 [92.9 kB]
Get:4 http://archive.ubuntu.com/ubuntu xenial/universe amd64 cgroupfs-mount all
1.2 [4,970 B]
Get:5 https://download.docker.com/linux/ubuntu xenial/stable amd64 docker-ce-cli
amd64 5:19.03.4~3-0~ubuntu-xenial [42.4 MB]
Get:6 https://download.docker.com/linux/ubuntu xenial/stable amd64 docker-ce amd
64 5:19.03.4~3-0~ubuntu-xenial [22.8 MB]
Fetched 85.3 MB in 44s (1,933 kB/s)
Selecting previously unselected package pigz.
(Reading database ... 183174 files and directories currently installed.)
Preparing to unpack .../pigz_2.3.1-2_amd64.deb ...
Unpacking pigz (2.3.1-2) ...
Selecting previously unselected package aufs-tools.
Preparing to unpack .../aufs-tools_1%3a3.2+20130722-1.1ubuntu1_amd64.deb ...
Unpacking aufs-tools (1:3.2+20130722-1.1ubuntu1) ...
Selecting previously unselected package cgroupfs-mount.
Preparing to unpack .../cgroupfs-mount_1.2_all.deb ...
```

```
# Installing Docker-Compose
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload    Total   Spent    Left   Speed
100 617      0 617    0     0    440      0 --:--:--  0:00:01 --:--:--  440
100 8079k 100 8079k    0     0 22701      0 0:06:04 0:06:04 --:--:-- 13911
Reading package lists... Done
Building dependency tree
Reading state information... Done
unzip is already the newest version (6.0-20ubuntu1).
The following packages were automatically installed and are no longer required:
  linux-headers-4.4.0-131 linux-headers-4.4.0-131-generic
  linux-headers-4.4.0-142 linux-headers-4.4.0-142-generic
  linux-image-4.4.0-131-generic linux-image-4.4.0-142-generic
  linux-image-extra-4.4.0-131-generic linux-image-extra-4.4.0-142-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 48 not upgraded.

Installation completed, versions installed are:

Node:          v8.16.2
npm:           6.4.1
Docker:        Docker version 19.03.4, build 9013bf583a
Docker Compose: docker-compose version 1.13.0, build 1719ceb
Python:        Python 2.7.12

Please logout then login before continuing.
```


安装 Composer

Hyperledger Composer 是一个开放的开发框架、工具集，可以帮助人们更容易地开发、部署区块链应用。它支持 Fabric，并提供 Javascript SDK。我们可以通过 npm 来安装它的一系列组件。

安装 Composer 命令行工具 CLI

```
1 | $ npm install -g composer-cli
2 | $ npm view composer-cli version
3 | 0.19.1
```

当前，其版本为：0.19.1。

我们之后许多操作（安装、部署、管理）都将通过 Composer CLI 完成。

因为之前的 Node.js 是通过 nvm 安装的（请参考：prereqs-ubuntu.sh），并在这里使用了“-g”选项，所以默认设置下安装的 node modules 文件可以在这里找到：

~/nvm/versions/node/v8.11.1/lib/node_modules

报错 TAT:

```
fabric@ecs-819a-0001:~$ npm install -g composer-cli
npm WARN engine composer-cli@0.20.9: wanted: {"node":>=8,"npm":>=5} (current: {"node":4.2.6,"npm":3.5.2})
npm WARN deprecated composer-cli@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:yargs - resolveWit
npm WARN engine composer-wallet-inmemory@0.20.9: wanted: {"node":>=8,"npm":>=5} (current: {"node":4.2.6,"npm":3.5.2})
npm WARN deprecated composer-wallet-inmemory@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-wallet-filessystem@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-report@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-documentation@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:yargs - resolveWit
npm WARN deprecated composer-client@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:yargs - resolveWit
npm WARN deprecated composer-common@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:yargs - resolveWit
npm WARN deprecated composer-admin@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:yargs - 200
loadDep:composer-connecto
npm WARN deprecated composer-connector-hlvi@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
loadDep:composer-connecto
npm WARN deprecated composer-connector-proxy@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated core-js@2.3.0: core-js@2.6.8 is no longer maintained. Please, upgrade to core-js@3 or at least to actual version of core-js@2.
loadDep:temp - resolveWit
loadDep:temp - resolveWit
loadDep:tar-stream - 200
npm WARN deprecated hoek@4.2.1: This version has been deprecated in accordance with the hapi support policy (hapi.im/support). Please upgrade to the latest version to get the best features, bug fixes, and security patches. If you are unable to upgrade at this time, paid support is available for older versions (hapi.im/commercial).

```

重新安装 node 及 npm 继续报错:

```
fabric@ecs-819a-0001:~$ npm -v
/usr/local/lib/node_modules/npm/bin/npm-cli.js:85
    let notifier = require('update-notifier')({pkg})
    ^^^

SyntaxError: Block-scoped declarations (let, const, function, class) not yet supported outside strict mode
    at exports.runInThisContext (vm.js:53:16)
    at Module.compile (module.js:374:25)
    at Object.Module._extensions..js (module.js:417:10)
    at Module.load (module.js:344:32)
    at Function.Module._load (module.js:301:12)
    at Function.Module.runMain (module.js:442:10)
    at startup (node.js:136:18)
    at node.js:966:3
fabric@ecs-819a-0001:~$ npm install -g composer-cli
/usr/local/lib/node_modules/npm/bin/npm-cli.js:85
    let notifier = require('update-notifier')({pkg})
    ^^^

SyntaxError: Block-scoped declarations (let, const, function, class) not yet supported outside strict mode
    at exports.runInThisContext (vm.js:53:16)
    at Module.compile (module.js:374:25)
    at Object.Module._extensions..js (module.js:417:10)
    at Module.load (module.js:344:32)
    at Function.Module._load (module.js:301:12)
    at Function.Module.runMain (module.js:442:10)
    at startup (node.js:136:18)
    at node.js:966:3
```

参考网站中的评论：<https://segmentfault.com/a/1190000007542620>

<https://blog.csdn.net/zkt286468541/article/details/81022967>

然后就悲剧了。。因为node版本过低 而npm却升级了导致npm起不了了

```
1 $sudo npm install -g n
2
3 /usr/local/lib/node_modules/npm/bin/npm-cli.js:79
4     let notifier = require('update-notifier')({pkg})
5         ^^^^^^^
6 SyntaxError: Unexpected identifier
7     at Module._compile (module.js:439:25)
8     at Object.Module._extensions..js (module.js:474:10)
9     at Module.load (module.js:356:32)
10    at Function.Module._load (module.js:312:12)
11    at Function.Module.runMain (module.js:497:10)
12    at startup (node.js:119:16)
13    at node.js:902:3
```

在网上找了很久 终于找到了解答<https://segmentfault.com/a/1190000007542620>

过程

1.先将刚刚升级的npm移除 在/usr/local/lib/node_modules目录下

```
1 $ sudo mv npm/ /tmp/usr_local_lib_node_modules_npm
```

2.使用npm安装n 再通过n来安装稳定版本

```
1 $sudo npm install -g n
2 npm http GET https://registry.npmjs.org/n
3 npm http 304 https://registry.npmjs.org/n
4 /usr/local/bin/n -> /usr/local/lib/node_modules/n/bin/n
5 n@2.1.12 /usr/local/lib/node_modules/n
```

```
1 $sudo n stable
2
3     install : node-v10.6.0
4     mkdir   : /usr/local/n/versions/node/10.6.0
5     fetch    : https://nodejs.org/dist/v10.6.0/node-v10.6.0-linux-x64.tar.gz
6     ##### 100.0%
7     installed : v10.6.0
```

好了 终于把npm和node升级完了 kong-dashborad也能正常跑了!

```
fabric@ecs-819a-0001:/usr/local/lib/node_modules$ sudo mv npm/ /tmp/usr_local_lib_node_modules_npm
fabric@ecs-819a-0001:/usr/local/lib/node_modules$ sudo npm install -g n
/usr/local/bin/n -> /usr/local/lib/node_modules/n/bin/n
/usr/local/lib
└─ n@6.1.0

fabric@ecs-819a-0001:/usr/local/lib/node_modules$ sudo n stable

installing : node-v12.13.0
mkdir      : /usr/local/n/versions/node/12.13.0
fetch       : https://nodejs.org/dist/v12.13.0/node-v12.13.0-linux-x64.tar.gz
installed   : v12.13.0 (with npm 6.12.0)
```


继续安装：

安装 Composer

Hyperledger Composer 是一个开放的开发框架、工具集，可以帮助人们更容易地开发、部署区块链应用。它支持 Fabric，并提供 Javascript SDK。我们可以通过 npm 来安装它的一系列组件。

安装 Composer 命令行工具 CLI

```
1 | $ npm install -g composer-cli
2 | $ npm view composer-cli version
3 | 0.19.1
```

当前，其版本为：0.19.1。

我们之后许多操作（安装、部署、管理）都将通过 Composer CLI 完成。

因为之前的 Node.js 是通过 nvm 安装的（请参考：prereqs-ubuntu.sh），并在这里使用了“-g”选项，所以默认设置下安装的 node modules 文件可以在这里找到：

~/.nvm/versions/node/v8.11.1/lib/node_modules

报错：

```
fabric@ecs-819a-0001:~/usr/local/lib/node_modules$ npm install -g composer-cli
npm WARN deprecated composer-cli@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-wallet-inmemory@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-wallet-filestorage@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-client@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-documentation@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-report@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-common@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated composer-connector-proxy@0.20.9: Hyperledger Composer has been deprecated. Please see the README for more details: https://github.com/hyperledger/composer/blob/master/README.md
npm WARN deprecated core-js@2.3.0: core-js@<2.6.8 is no longer maintained, Please, upgrade to core-js@3 or at least to actual version of core-js@2.
npm WARN deprecated hook@4.2.1: This version has been deprecated in accordance with the hapi support policy (hapi.im/support). Please upgrade to the latest version of the library.
npm WARN deprecated json3@3.3.2: Please use the native JSON object instead of JSON 3
npm WARN checkPermissions Missing write access to /usr/local/lib/node_modules
npm ERR! Unsupported engine for fabric-ca-client@1.2.1: wanted: {"node": ">=8.9.0", "npm": ">=5.5.1"} (current: {"node": "12.13.0", "npm": "6.12.0"})
npm ERR! Unsupported engine for fabric-client@1.2.1: wanted: {"node": ">=8.9.0", "npm": ">=5.5.1"} (current: {"node": "12.13.0", "npm": "6.12.0"})
npm ERR! Not compatible with your version of node/npm: fabric-client@1.2.1
npm ERR! code EACCES
npm ERR! syscall access
npm ERR! path /usr/local/lib/node_modules
npm ERR! errno -13
npm ERR! Error: EACCES: permission denied, access '/usr/local/lib/node_modules'
npm ERR!   [Error: EACCES: permission denied, access '/usr/local/lib/node_modules'] {
npm ERR!     stack: "Error: EACCES: permission denied, access '/usr/local/lib/node_modules'",
npm ERR!     errno: -13,
npm ERR!     code: 'EACCES',
npm ERR!     syscall: 'access',
npm ERR!     path: '/usr/local/lib/node_modules'
npm ERR!   }
npm ERR! The operation was rejected by your operating system.
npm ERR! It is likely you do not have the permissions to access this file as the current user
npm ERR! If you believe this might be a permissions issue, please double-check the
npm ERR! permissions of the file and its containing directories, or try running
npm ERR! the command again as root/Administrator.

npm ERR! A complete log of this run can be found in:
npm ERR!   /home/fabric/.npm/_logs/2019-11-07T02_17_19_937Z-debug.log
fabric@ecs-819a-0001:~/usr/local/lib/node_modules$ https://github.com/hyperledger/composer/blob/master/README.mdhttps://github.com/hyperledger/composer/blob/master/README.md
```

安装参考资料：<https://www.ibm.com/developerworks/cn/cloud/library/cl-lo-hyperledger-fabric-study-notes1/index.html>

以下为 CSDN 博主「陶辉」的原创文章，阅读这篇文章使我更加了解了区块链和 fabric，故记录在此，原文链接：https://blog.csdn.net/russell_tao/article/details/80459698

什么是区块链呢？我很喜欢《区块链技术进阶与实战》一书中对它的定义：区块链是一种按照时间顺序将数据区块以顺序相连的方式组合成的一种链式数据结构。如果觉得有点抽象，那么我们再来看看下面的图 2。

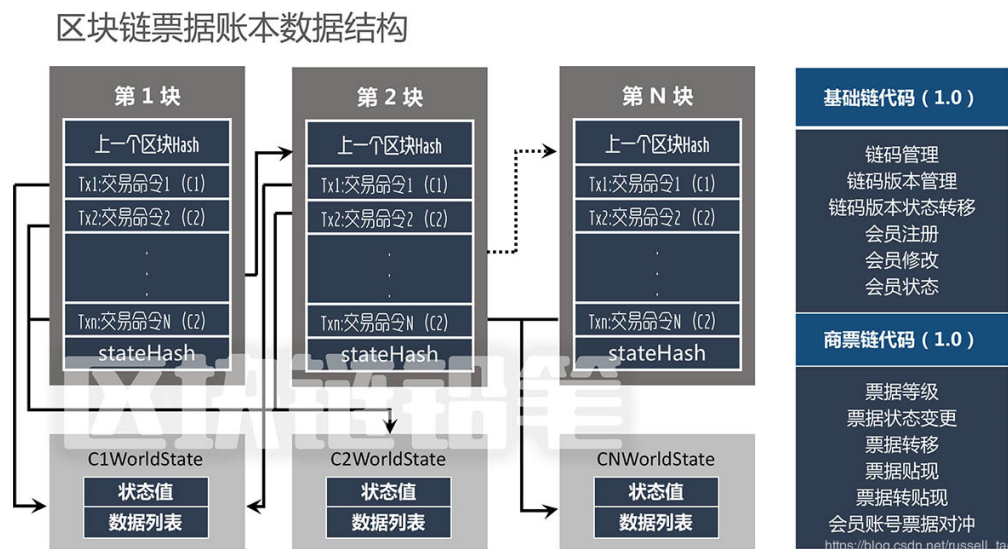


图 2-区块链数据结构示意

图 2 中就是账本，它由多个区块构成了一个有时序的链表，而每个区块里含有多条交易 transaction（缩写为 tx）构成的链表。图 2 下方有一个 WorldState 世界状态，这其实是为了提升性能用的。比如，key1 共交易了 10000 次，为了获取它的当前状态值，需要正向执行这 10000 次交易，这就得不偿失了。如果这 1 万次交易里，每次新交易执行完，都同步更新一个数据库（在 fabric 里用的是 levelDB），这样查询当前状态时，只需要查询该数据库即可，如图 3 所示。

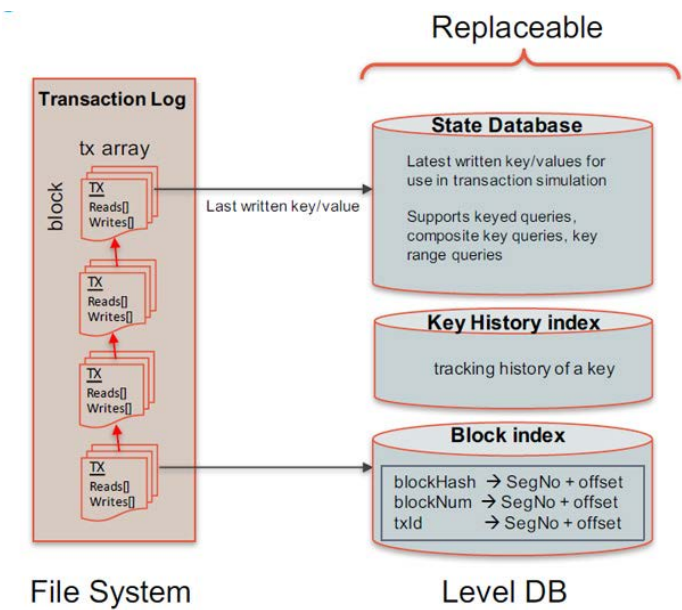


图 3-fabric levelDB 状态数据库

图 3 中，区块链帐本是在 FileSystem 文件系统中保存的，而 Level DB 存放世界状态。

1.2 智能合约 smart contract

区块链的发展过程中，一般 1.0 时代就是数字货币时代，代表是比特币，而 2.0 时代就是智能合约（现在是 3.0 时代，各种联盟链即为代表）。

智能合约是运行在区块链上的模块化、可重用的自动执行脚本，有了它我们就可以完成复杂的业务逻辑，例如同一个区块链上有多份合约，而每份合约可以约定不同的参与者（企业或者相关方）。也可以指定每份合约里每个子命令做一批特定的事，大家可以把它想象成关系数据库里的事务。如图 4 所示，我们可以在合约里指定允许哪些企业的节点可以参与到交易流程中来（在 fabric 里这叫共识策略）。在 fabric 中，智能合约叫做 chaincode，它有 6 个状态，如下所示：Install → Instantiate → invocable → Upgrade → Deinstall → Uninstall。实际上智能合约就是一段代码，fabric 官方认可的是 GO 语言。首先我们需要把合约代码上传到区块链上，这一步的状态就叫 Install。

接着，需要做初始化操作。比如，现在的数据是存放在 mysql 中的，那么上线时需要用 Instantiate 把数据迁移至链上，这也算初始化。初始化后，chaincode 就进入 invocable 可调用状态了。通用我们可以通过 CLI 命令行或者程序里用 SDK 调用合约（v1.1 前还有 RestApi 调用，现已放弃）。联盟链由于跨多家企业、多个地区甚至国家，很难使得合约保持一致的版本，因此，每个合约都有版本号。而版本升级时，就是 Upgrade 状态。最后两个状态对应着合约下链。智能合约可以在供应链等较复杂的业务场景下起到很大的作用。

1.3

我们来总结下区块链，它主要是为了解决社会上的信任问题而存在的，为此，它付出了沉重的性能、可用性代价。它怎么做到的呢？通过 4 点实现：1、数据到处存放；2、操作记录不可更改；3、传输数据可信；4、业务脚本约束。

那么，这个信任问题的解决，带来了 2 个非功能性的约束：数据一致性和可用性。其中可用性包括两点：1、交易在可接受的时间内达成。比如比特币的分叉就会造成严重问题。2、吞吐量达标。而比特币每秒只能有 7 次交易，这显然太低了。

2.1 开发概念

fabric 联盟链的开发人员主要分为三类：底层是系统运维，负责系统的部署与维护；其次是组织管理人员，负责证书、MSP 权限管理、共识机制等；最后是业务开发人员，他们负责编写 chaincode、创建维护 channel、执行 transaction 交易等，如下面的图 11 所示。



图 11-fabric 技术人员的分层

fabric 大致分为底层的网络层、权限管理模块、区块链应用模块，通过 SDK 和 CLI 对应用开发者提供服务，如下面的图 12 所示。

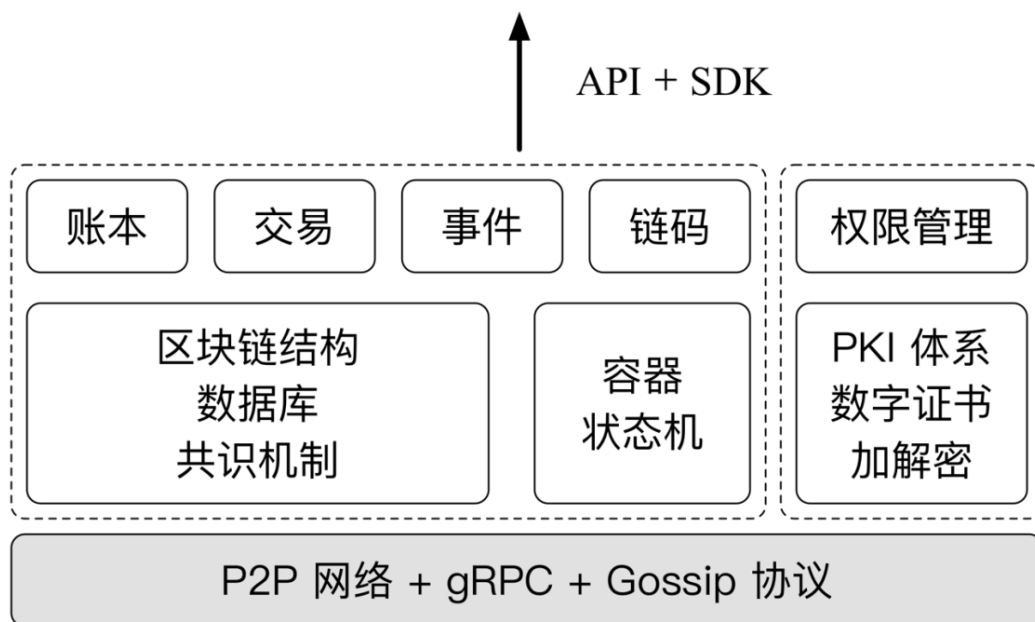


图 12-fabric 开发模块图