Hyperledger Mentorship Project Presentation

November 2021

Operate Blockchain Network in an Efficient Way

- **Introduction**
  - **Name**: Yuanmao Zhu
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  - **University:** University of Alberta, Canada
  - **Mentor(s):** Baohua Yang, Qiang Xu
  - **Hyperledger Project**: Hyperledger Cello

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- **Project Description**:
  - Create a practical operational system equipped with distributed functionality to manage a large blockchain network.
    - Build blockchain network.
    - Connect blockchain network among multiple organizations.
  - Help these users who don’t have blockchain background manage a large blockchain network with multiple organizations and nodes.
  - Tools used to build this system include
    - Python, Django,
    - JavaScript,React,
    - and Docker.

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- **Project Objectives**:
  - Obj 1: Design and implement a visual interface dashboard to build and operate Fabric networks.
  - Obj 2: Build a connection between the web application and the network.
  - Obj 3: Ability to create Fabric channels and join organizations to the channel.

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- **Project Deliverables:**
  - Deliverable 1: Miscellaneous PRs for fixing small bugs and errors.
    - Fix #256 api-engine syntax error by zhuyuanmao · Pull Request #257 · hyperledger/cello (github.com)
    - Fix #264: fix swagger api doc loading error. by zhuyuanmao · Pull Request #265 · hyperledger/cello (github.com)
    - Fix #290 Can not get JWT token from obtain_jwt_token view by zhuyuanmao · Pull Request #296 · hyperledger/cello (github.com)
    - Download binary files in docker image building process. by zhuyuanmao · Pull Request #337 · hyperledger/cello (github.com)
    - Change Fabric nodes naming by zhuyuanmao · Pull Request #347 · hyperledger/cello (github.com)
    - Correct the org field name and remove unused fields by zhuyuanmao · Pull Request #348 · hyperledger/cello (github.com)
  - Deliverable 2: Build a connection between the web application and Fabric network.
    - Add ports number mapping feature when the agent creates nodes. by zhuyuanmao · Pull Request #339 · hyperledger/cello (github.com)
    - Create a docker network by zhuyuanmao · Pull Request #345 · hyperledger/cello (github.com)
  - Deliverable 3: Implement Fabric channel create/edit/view API endpoints.
    - Channel endpoints by zhuyuanmao · Pull Request #272 · hyperledger/cello (github.com)
    - Refactor channel creating and channel cmd. by zhuyuanmao · Pull Request #346 · hyperledger/cello (github.com)
    - Refactor configtx and configtxgen by zhuyuanmao · Pull Request #344 · hyperledger/cello (github.com)
    - Implement channel creating operation with peer channel cli. by zhuyuanmao · Pull Request #328 · hyperledger/cello (github.com)
    - Add channel updating operation by zhuyuanmao · Pull Request #307 · hyperledger/cello (github.com)

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- **Project Execution & Accomplishments**:
  - Create a web application that allows users to build a Fabric network.
  - Create a Fabric channel and Join organizations to the Channel which can communicate with two or more specific network members.
  - Unfortunately, I spent a lot of time on previous deliverables and the visual interface of Channel part wasn’t finished.
  - This was my first blockchain related project, and I learned a lot from this project from concept to practice. Overall I found expanding on my knowledge of fabric blockchain and web development.
  - it was also the most challenging along with understanding how to utilize fabric-tools and configure fabric network.

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- **Recommendations for future work:**
  - Finishing visual interface part of the channel for this application.
  - Using fabric-python SDK to perform the operations of fabric network.

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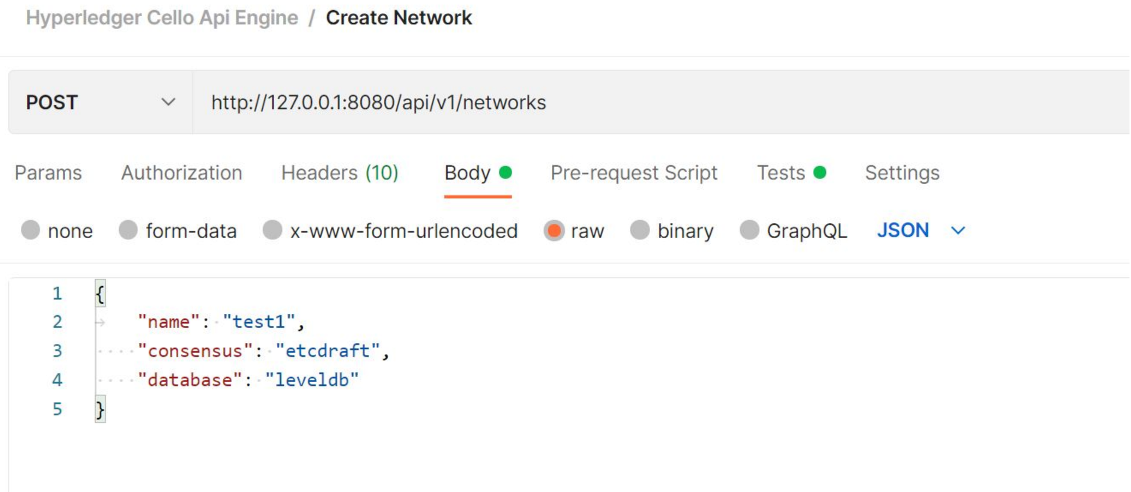
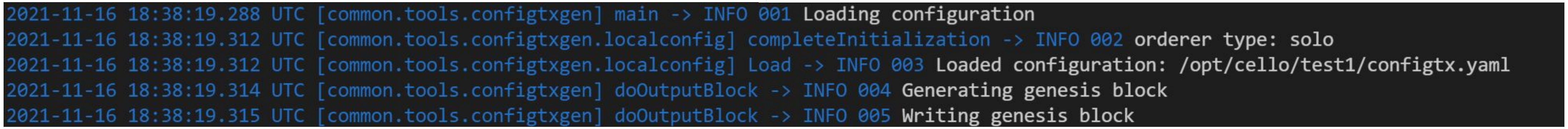
- **Project Output or Results:** Build and connect a Fabric network.
  - Send network data to Create Network endpoint.
  - Generate configtx.yaml.
  - Store data in database.
  - Use fabric-tools to create it.

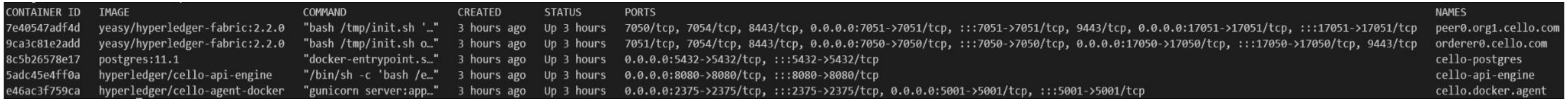


POST http://127.0.0.1:8080/api/v1/networks

```
{
    "name": "test1",
    "consensus": "etcdraft",
    "database": "leveldb"
}
```



```
2021-11-16 18:38:19.288 UTC [common.tools.configtxgen] main -> INFO 001 Loading configuration
2021-11-16 18:38:19.312 UTC [common.tools.configtxgen.localconfig] completeInitialization -> INFO 002 orderer type: solo
2021-11-16 18:38:19.312 UTC [common.tools.configtxgen.localconfig] Load -> INFO 003 Loaded configuration: /opt/cello/test1/configtx.yaml
2021-11-16 18:38:19.314 UTC [common.tools.configtxgen] doOutputBlock -> INFO 004 Generating genesis block
2021-11-16 18:38:19.315 UTC [common.tools.configtxgen] doOutputBlock -> INFO 005 Writing genesis block
```



```
CONTAINER ID   IMAGE                           COMMAND                  CREATED       STATUS       PORTS                                                                                                                                   NAMES
7e40547adf4d   yeasy/hyperledger-fabric:2.2.0  "bash /tmp/init.sh '…"   3 hours ago   Up 3 hours   7050/tcp, 7054/tcp, 8443/tcp, 0.0.0.0:7051->7051/tcp, :::7051->7051/tcp, 9443/tcp, 0.0.0.0:17051->17051/tcp, :::17051->17051/tcp   peer0.org1.cello.com
9ca3c81e2add   yeasy/hyperledger-fabric:2.2.0  "bash /tmp/init.sh o…"   3 hours ago   Up 3 hours   7051/tcp, 7054/tcp, 8443/tcp, 0.0.0.0:7050->7050/tcp, :::7050->7050/tcp, 0.0.0.0:17050->17050/tcp, :::17050->17050/tcp, 9443/tcp   orderer0.cello.com
8c5b26578e17   postgres:11.1                   "docker-entrypoint.s…"   3 hours ago   Up 3 hours   0.0.0.0:5432->5432/tcp, :::5432->5432/tcp                                                                                               cello-postgres
5adc45e4ff0a   hyperledger/cello-api-engine    "/bin/sh -c 'bash /e…"   3 hours ago   Up 3 hours   0.0.0.0:8080->8080/tcp, :::8080->8080/tcp                                                                                               cello-api-engine
e46ac3f759ca   hyperledger/cello-agent-docker  "gunicorn server:app…"   3 hours ago   Up 3 hours   0.0.0.0:2375->2375/tcp, :::2375->2375/tcp, 0.0.0.0:5001->5001/tcp, :::5001->5001/tcp                                                    cello.docker.agent
```

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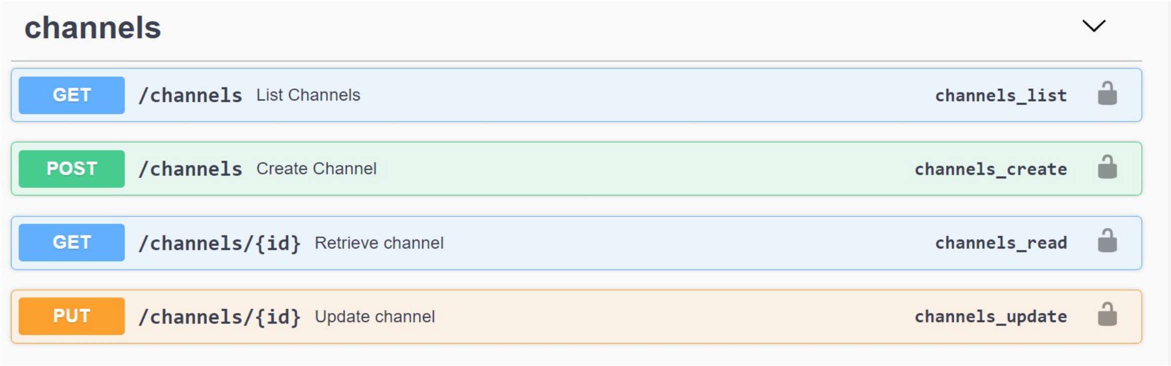
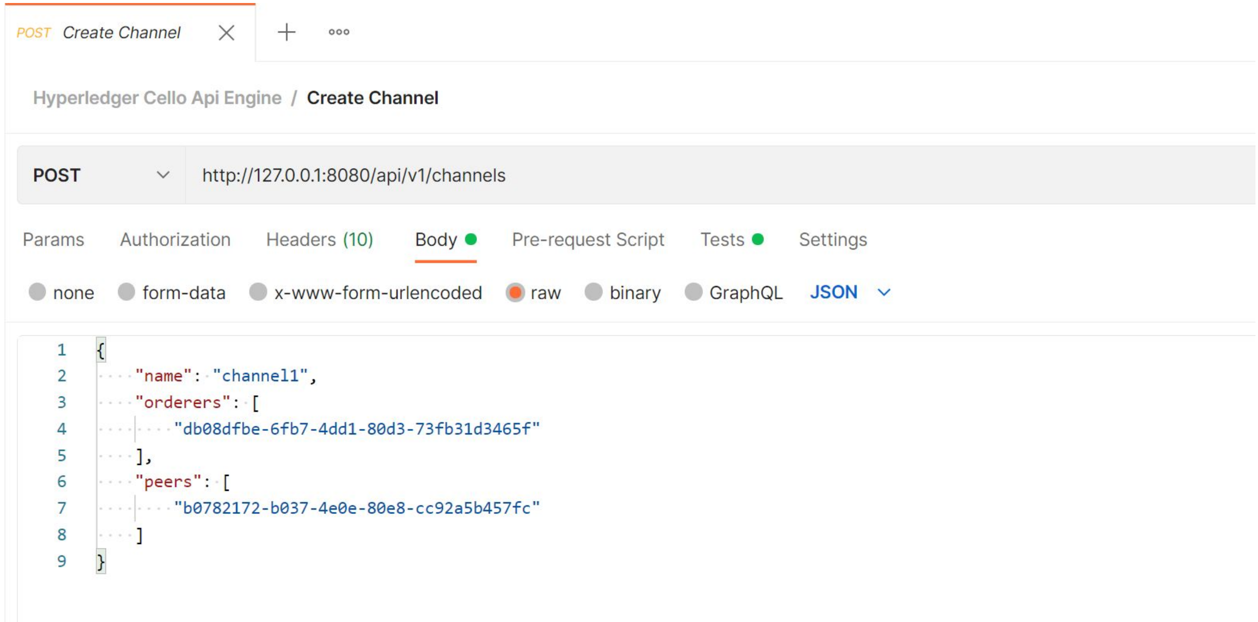
- **Project Output or Results:** Create a Fabric channel and Join organizations.
  - ○ Send the new channel data.
  - ○ Regenerate configtx.yaml
  - ○ Use fabric-tools to perform this.



channels

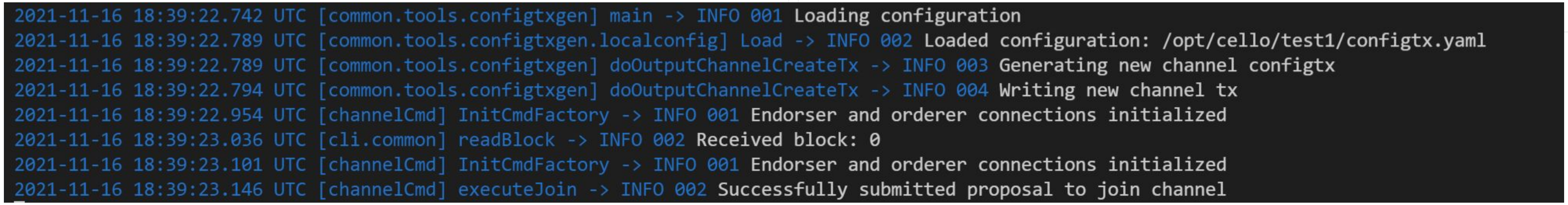
GET	`/channels` List Channels	channels_list	🔒
POST	`/channels` Create Channel	channels_create	🔒
GET	`/channels/{id}` Retrieve channel	channels_read	🔒
PUT	`/channels/{id}` Update channel	channels_update	🔒



POST http://127.0.0.1:8080/api/v1/channels

○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary ○ GraphQL JSON

```json
{
    "name": "channel1",
    "orderers": [
        "db08dfbe-6fb7-4dd1-80d3-73fb31d3465f"
    ],
    "peers": [
        "b0782172-b037-4e0e-80e8-cc92a5b457fc"
    ]
}
```



```
2021-11-16 18:39:22.742 UTC [common.tools.configtxgen] main -> INFO 001 Loading configuration
2021-11-16 18:39:22.789 UTC [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /opt/cello/test1/configtx.yaml
2021-11-16 18:39:22.789 UTC [common.tools.configtxgen] doOutputChannelCreateTx -> INFO 003 Generating new channel configtx
2021-11-16 18:39:22.794 UTC [common.tools.configtxgen] doOutputChannelCreateTx -> INFO 004 Writing new channel tx
2021-11-16 18:39:22.954 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2021-11-16 18:39:23.036 UTC [cli.common] readBlock -> INFO 002 Received block: 0
2021-11-16 18:39:23.101 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2021-11-16 18:39:23.146 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

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- **Insights Gained:**
  - How to search a large codebase.
  - Gained blockchain knowledge.

- **Advice:**
  - Learn from existing resource and tutorials.
  - Attention to detail and Dive deep.

THANK YOU!