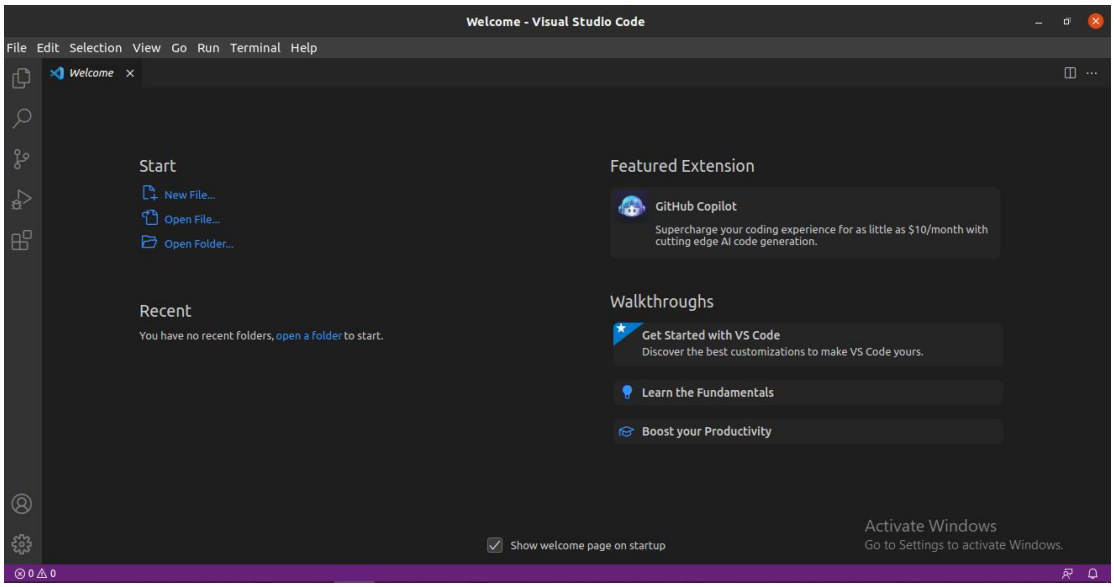
Task: Build a hyperledger fabric using IBM Blockhain platform.

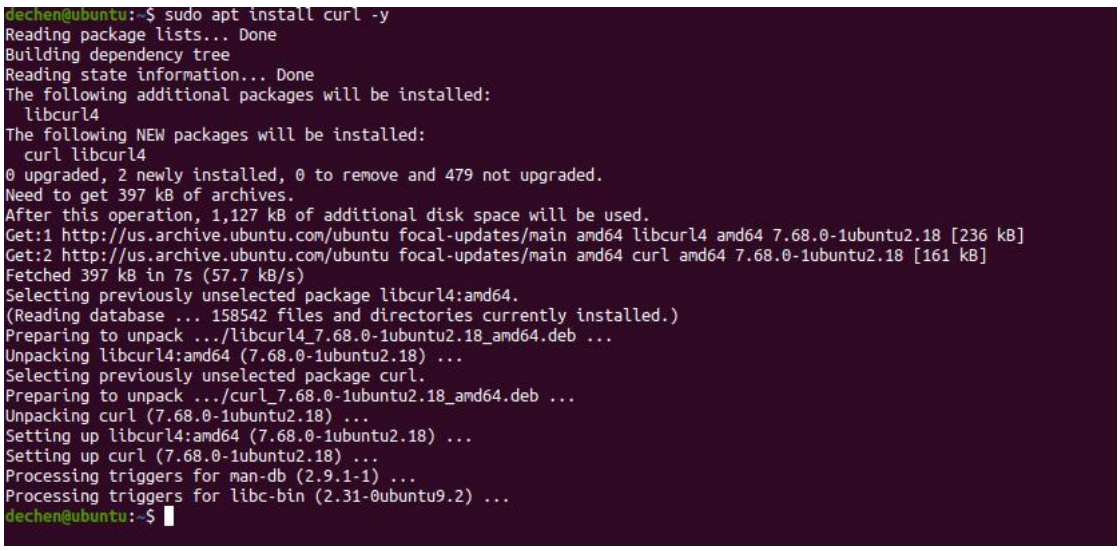
Installing the Prerequisites

Installing Visual studio code



Installing the Dependencies

- Curl:



- Docker:

```
dechen@ubuntu:~$ curl -fsSL https://get.docker.com -o get-docker.sh
dechen@ubuntu:~$ chmod +x get-docker.sh
dechen@ubuntu:~$ ./get-docker.sh
# Executing docker install script, commit: a8a6b338bdfedd7ddefb96fe3e7fe7d4036d945a
+ sudo -E sh -c apt-get update -qq >/dev/null
+ sudo -E sh -c DEBIAN_FRONTEND=noninteractive apt-get install -y -qq apt-transport-https ca-certificates curl >
/dev/null
+ sudo -E sh -c mkdir -p /etc/apt/keyrings && chmod -R 0755 /etc/apt/keyrings
+ sudo -E sh -c curl -fsSL "https://download.docker.com/linux/ubuntu/gpg" | gpg --dearmor --yes -o /etc/apt/keyr
ings/docker.gpg
gpg: WARNING: unsafe ownership on homedir '/home/dechen/.gnupg'
+ sudo -E sh -c chmod a+r /etc/apt/keyrings/docker.gpg
+ sudo -E sh -c echo "deb [arch=amd64 signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker.com/linux/
ubuntu focal stable" > /etc/apt/sources.list.d/docker.list
+ sudo -E sh -c apt-get update -qq >/dev/null
+ sudo -E sh -c DEBIAN_FRONTEND=noninteractive apt-get install -y -qq docker-ce docker-ce-cli containerd.io dock
er-compose-plugin docker-ce-rootless-extras docker-buildx-plugin >/dev/null
```

```
+ sudo -E sh -c docker version
Client: Docker Engine - Community
 Version:           23.0.3
 API version:       1.42
 Go version:        go1.19.7
 Git commit:        3e7cbfd
 Built:             Tue Apr  4 22:06:10 2023
 OS/Arch:           linux/amd64
 Context:           default

Server: Docker Engine - Community
 Engine:
  Version:          23.0.3
  API version:      1.42 (minimum version 1.12)
  Go version:       go1.19.7
  Git commit:       59118bf
  Built:            Tue Apr  4 22:06:10 2023
  OS/Arch:          linux/amd64
  Experimental:     false
 containerd:
  Version:          1.6.20
  GitCommit:        2806fc1057397dbaeefbea0e4e17bddfbd388f38
 runc:
  Version:          1.1.5
  GitCommit:        v1.1.5-0-gf19387a
 docker-init:
  Version:          0.19.0
  GitCommit:        de40ad0

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To run Docker as a non-privileged user, consider setting up the
Docker daemon in rootless mode for your user:

    dockerd-rootless-setuptool.sh install

Visit https://docs.docker.com/go/rootless/ to learn about rootless mode.


To run the Docker daemon as a fully privileged service, but granting non-root
users access, refer to https://docs.docker.com/go/daemon-access/

WARNING: Access to the remote API on a privileged Docker daemon is equivalent
         to root access on the host. Refer to the 'Docker daemon attack surface'
         documentation for details: https://docs.docker.com/go/attack-surface/

================================================================================

dechen@ubuntu:~$
```

```
dechen@ubuntu:~$ rm get-docker.sh
dechen@ubuntu:~$ sudo usermod -aG docker $USER
dechen@ubuntu:~$ docker version
Client: Docker Engine - Community
 Version:           23.0.3
 API version:       1.42
 Go version:        go1.19.7
 Git commit:        3e7cbfd
 Built:             Tue Apr  4 22:06:10 2023
 OS/Arch:           linux/amd64
 Context:           default
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "h
ttp://%2Fvar%2Frun%2Fdocker.sock/v1.24/version": dial unix /var/run/docker.sock: connect: permission denied
dechen@ubuntu:~$
```

- **Docker-compose** – version 1.2.5

```
dechen@ubuntu:~$ sudo apt install docker-compose
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python3-attr python3-cached-property python3-distutils python3-docker python3-dockerpty python3-docopt
  python3-importlib-metadata python3-jsonschema python3-lib2to3 python3-more-itertools
  python3-pkg-resources python3-pyrsistent python3-setuptools python3-texttable python3-websocket
  python3-zipp
Suggested packages:
  python-attr-doc python-jsonschema-doc python-setuptools-doc
Recommended packages:
  docker.io
The following NEW packages will be installed:
  docker-compose python3-attr python3-cached-property python3-distutils python3-docker python3-dockerpty
  python3-docopt python3-importlib-metadata python3-jsonschema python3-lib2to3 python3-more-itertools
  python3-pyrsistent python3-setuptools python3-texttable python3-websocket python3-zipp
The following packages will be upgraded:
  python3-pkg-resources
1 upgraded, 16 newly installed, 0 to remove and 476 not upgraded.
Need to get 1,123 kB of archives.
After this operation, 6,157 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-pkg-resources all 45.2.0-1ubuntu0
.1 [130 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-cached-property all 1.5.1-4 [10.9 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-websocket all 0.53.0-2ubuntu1 [32.3 k
B]
Get:4 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-docker all 4.1.0-1 [83.8 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-dockerpty all 0.4.1-2 [11.1 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-docopt all 0.6.2-2.2ubuntu1 [19.7 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-attr all 19.3.0-2 [33.9 kB]
Get:8 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-lib2to3 all 3.8.10-0ubuntu1~20.04
 [76.3 kB]
Get:9 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-distutils all 3.8.10-0ubuntu1~20.
04 [141 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-setuptools all 45.2.0-1ubuntu0.1
 [330 kB]
Get:11 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-more-itertools all 4.2.0-1build1 [39.4 k
B]
Get:12 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-zipp all 1.0.0-1 [5,312 B]
Get:13 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-importlib-metadata all 1.5.0-1 [9,992 B]
Get:14 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-pyrsistent amd64 0.15.5-1build1 [52.1 kB
]
Get:15 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-jsonschema all 3.2.0-0ubuntu2 [43.1 kB]
Get:16 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 python3-texttable all 1.6.2-2 [11.0 kB]
Get:17 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 docker-compose all 1.25.0-1 [92.7 kB]
Fetched 1,123 kB in 10s (116 kB/s)
```

```
dechen@ubuntu:~$ docker-compose version
docker-compose version 1.25.0, build unknown
docker-py version: 4.1.0
CPython version: 3.8.5
OpenSSL version: OpenSSL 1.1.1f  31 Mar 2020
dechen@ubuntu:~$
```

- Build Essentials:

```
dechen@ubuntu:~$ sudo apt install build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu cpp-9 dpkg-dev fakeroot g++ g++-9 gcc gcc-10-base
  gcc-9 gcc-9-base libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan5
  libatomic1 libbinutils libc-dev-bin libc6 libc6-dbg libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0
  libctf0 libdpkg-perl libfakeroot libgcc-9-dev libgcc-s1 libgomp1 libitm1 liblsan0 libquadmath0
  libstdc++-9-dev libstdc++6 libtsan0 libubsan1 linux-libc-dev make manpages-dev
Suggested packages:
  binutils-doc gcc-9-locales debian-keyring g++-multilib g++-9-multilib gcc-9-doc gcc-multilib autoconf
  automake libtool flex bison gcc-doc gcc-9-multilib glibc-doc bzr libstdc++-9-doc make-doc
The following NEW packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential dpkg-dev fakeroot g++ g++-9 gcc gcc-9
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan5 libatomic1 libbinutils
  libc-dev-bin libc6-dev libcrypt-dev libctf-nobfd0 libctf0 libfakeroot libgcc-9-dev libitm1 liblsan0
  libquadmath0 libstdc++-9-dev libtsan0 libubsan1 linux-libc-dev make manpages-dev
The following packages will be upgraded:
```

- Node Js:

```
dechen@ubuntu:~$ curl -fsSL https://deb.nodesource.com/setup_16.x | sudo -E bash -

## Installing the NodeSource Node.js 16.x repo...


## Populating apt-get cache...

+ apt-get update
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Hit:4 https://download.docker.com/linux/ubuntu focal InRelease
Get:5 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Fetched 336 kB in 3s (103 kB/s)
Reading package lists... Done

## Confirming "focal" is supported...

+ curl -sLf -o /dev/null 'https://deb.nodesource.com/node_16.x/dists/focal/Release'

## Adding the NodeSource signing key to your keyring...

+ curl -s https://deb.nodesource.com/gpgkey/nodesource.gpg.key | gpg --dearmor | tee /usr/share/keyrings/nodes
ource.gpg >/dev/null
gpg: WARNING: unsafe ownership on homedir '/home/dechen/.gnupg'
```

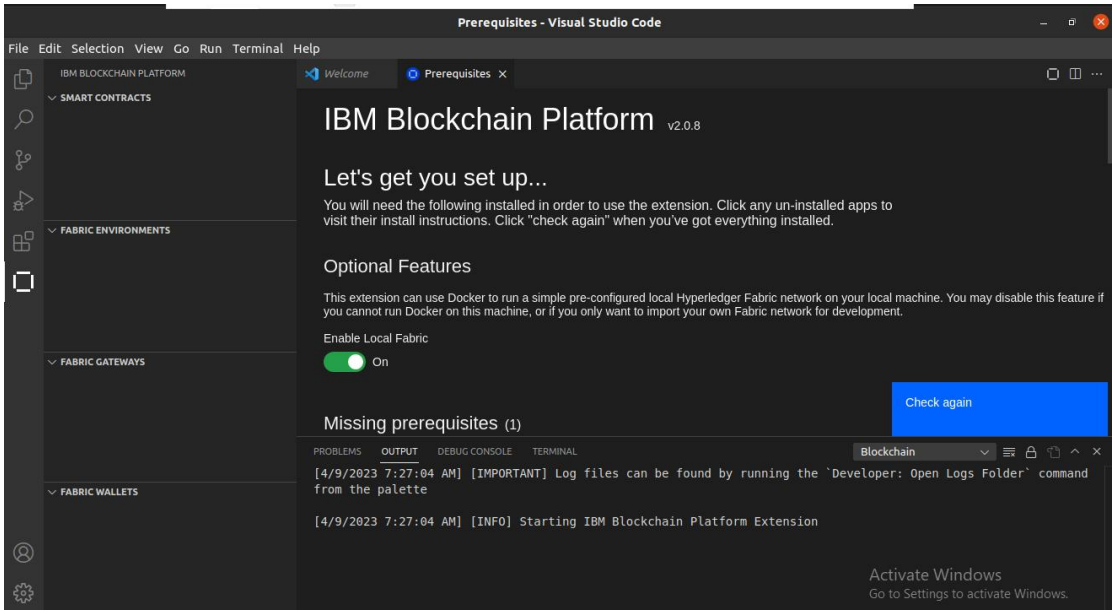
```
dechen@ubuntu:~$ sudo apt install -y nodejs
Reading package lists... Done
Building dependency tree
Reading state information... Done
nodejs is already the newest version (16.19.1-deb-1nodesource1).

0 upgraded, 0 newly installed, 0 to remove and 466 not upgraded.
dechen@ubuntu:~$
dechen@ubuntu:~$ node -v
v16.19.1
```

- Npm version:

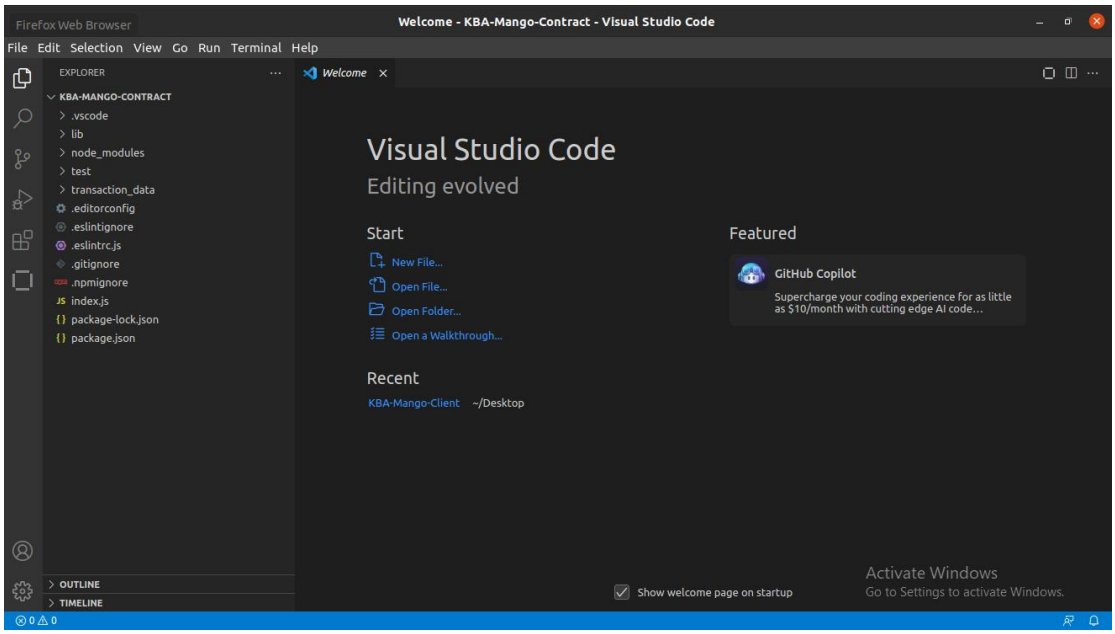
```
dechen@ubuntu:~$ npm -v
8.19.3
dechen@ubuntu:~$
```

IBM Blockchain Platform extension

Installing IBM Blockchain Platform extension in VS code



Creating a new Smart Contract project:

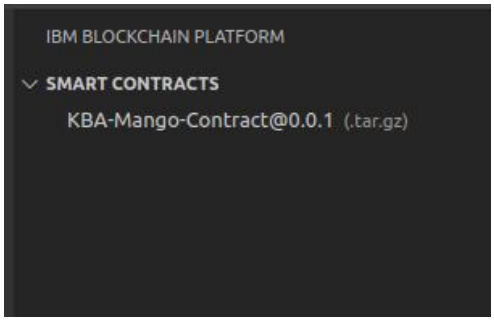


Code:

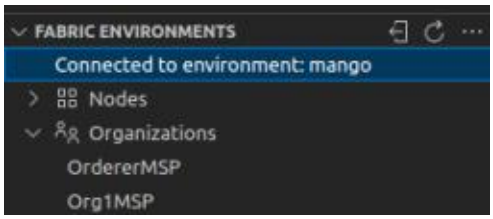
```
/*
 * SPDX-License-Identifier: Apache-2.0
 */

'use strict';

const { Contract } = require('fabric-contract-api');

class MangoContract extends Contract {

    async mangoExists(ctx, mangoId) {
        const buffer = await ctx.stub.getState(mangoId);
        return (!!buffer && buffer.length > 0);
    }

    async createMango(ctx, mangoId, value) {
        const exists = await this.mangoExists(ctx, mangoId);
        if (exists) {
            throw new Error(`The mango ${mangoId} already exists`);
        }
        const asset = {
            ID: mangoId,
            BatchNumber: batchNumber,
            Producer: producer,
            OwnedBy: producer,
            Quantity: quantity,
            Price: price,
         };
        const buffer = Buffer.from(JSON.stringify(asset));
        await ctx.stub.putState(mangoId, buffer);
    }

    async readMango(ctx, mangoId) {
        const exists = await this.mangoExists(ctx, mangoId);
        if (!exists) {
            throw new Error(`The mango ${mangoId} does not exist`);
        }
        const buffer = await ctx.stub.getState(mangoId);
        const asset = JSON.parse(buffer.toString());
        return asset;
    }
```

```
    async updateMango(ctx, mangoId, newValue) {
        const exists = await this.mangoExists(ctx, mangoId);
        if (!exists) {
            throw new Error(`The mango ${mangoId} does not exist`);
        }
        const asset = {
            BatchNumber: batchNumber,
            Producer: producer,
            OwnedBy: owner,
            Quantity: quantity,
            Price: price,
         };
        const buffer = Buffer.from(JSON.stringify(asset));
        await ctx.stub.putState(mangoId, buffer);
    }

    async deleteMango(ctx, mangoId) {
        const exists = await this.mangoExists(ctx, mangoId);
        if (!exists) {
            throw new Error(`The mango ${mangoId} does not exist`);
        }
        await ctx.stub.deleteState(mangoId);
    }

}

module.exports = MangoContract;
```

Packaging Smart Contract:

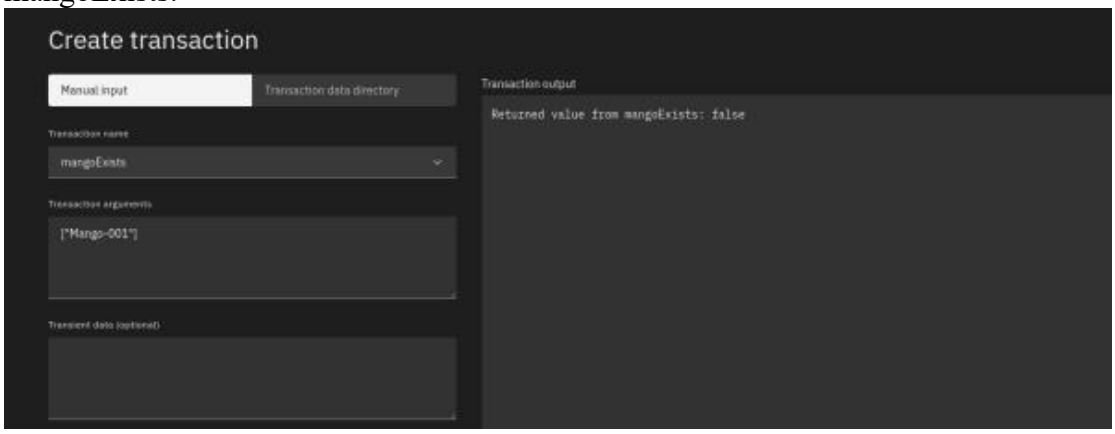


Deploying Smart Contract:

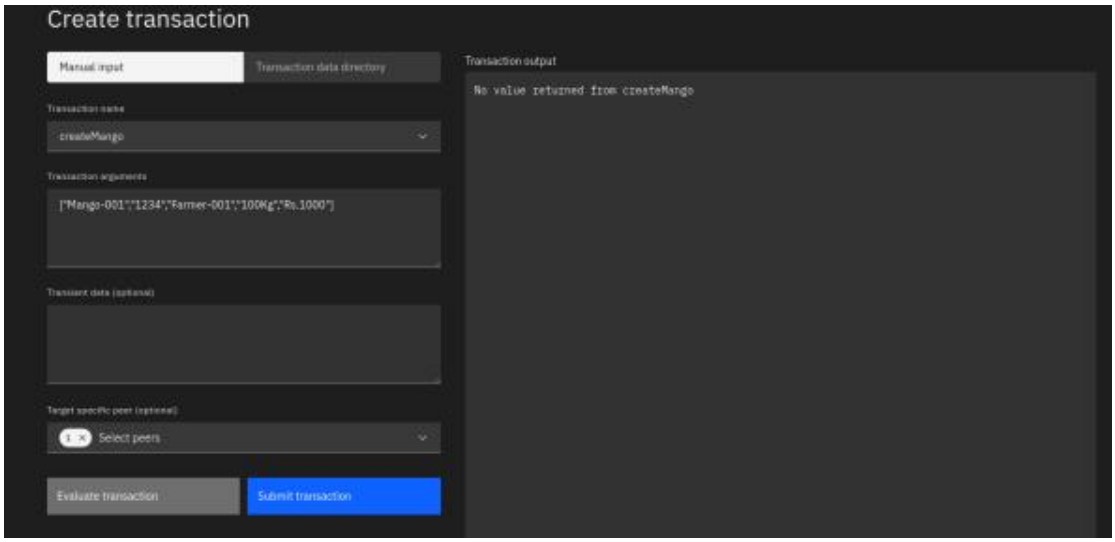


Making Transactions:

mangoExists:



createMango:



Readmango: