SmartContracts in HyperLedger Fabric in GoLang

Based on

Uses docker to create a network with two peers on two different organizations and an orderer

```
./network.sh up
```
starts the declared docker services

```
./network.sh createChannel -c
torbennakamoto
```
Can then be used to create a channel

HyperLedger Sample contains a demo application
that <u>in theory</u> can be run in different languages
– in practice, not so much

```
./network.sh deployCC -c torbennakamoto -ccn basic -ccp ../asset-transfer-basic/chaincode-
typescript -ccl typescript

peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com –tls
... -c '{"function":"InitLedger","Args":[]}'
```

Does not work

HyperLedger Sample contains a demo application
that <u>in theory</u> can be run in different languages
– in practice, not so much

```
→ test-network peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile "${PWD}/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscac
erts/tlsca.example.com-cert.pem" -C torbennakamoto -n basic --peerAddresses localhost:7051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt" --peer
Addresses localhost:9051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt" -c '{"function":"InitLedger","Args":[]}'

Error: endorsement failure during invoke. response: status:500 message:"error in simulation: failed to execute transaction 544cf815330499e5cad4f0a35afd1b6c415edb454c43c94c64139d3f45d5c847: could not launch chaincod
e basic_1.0:5a1647b8039aea0501ec446a0a0abc95f54c5584c9b9fb82688302d143f32c49: chaincode registration failed: container exited with 1"
```

```
./network.sh deployCC -c torbennakamoto -ccn basic -ccp ../asset-transfer-basic/chaincode-
typescript -ccl typescript

peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com –tls
... -c '{"function":"InitLedger","Args":[]}'
```

Does not work

The GoLang Way ☹

```go
func (s *SmartContract) InitLedger(ctx contractapi.TransactionContextInterface) error {
    parties := []Party{
        {Municipality: "Odense", Party: "Konservativ", Symbol: "C", Votes: 0},
        {Municipality: "Odense", Party: "Socialdemokratiet", Symbol: "A", Votes: 0},
        {Municipality: "Odense", Party: "Venstre", Symbol: "V", Votes: 0},
        {Municipality: "Odense", Party: "Socialistisk Folkeparti", Symbol: "F", Votes: 0},
        {Municipality: "Odense", Party: "Radikale", Symbol: "B", Votes: 0},
        {Municipality: "Odense", Party: "Enhedslisten", Symbol: "OE", Votes: 0},
        {Municipality: "Odense", Party: "Nye Borgerlige", Symbol: "D", Votes: 0},
        {Municipality: "Odense", Party: "Dansk Folkeparti", Symbol: "O", Votes: 0},
        {Municipality: "Odense", Party: "Liberaterne", Symbol: "J", Votes: 0},
        {Municipality: "Odense", Party: "Liberal Alliance", Symbol: "I", Votes: 0},
        {Municipality: "Odense", Party: "Veganerpartiet", Symbol: "G", Votes: 0},
        {Municipality: "Odense", Party: "Kristen Demokraterne", Symbol: "K", Votes: 0},
        {Municipality: "Odense", Party: "Alternativet", Symbol: "AA", Votes: 0},
    }

    return nil
}
```

(Why nil and not null?)

The GoLang Way ☹


```
Attempting to Query committed status on peer0.org1, Retry after 3 seconds.
+ peer lifecycle chaincode querycommitted --channelID torbennakamoto2 --name basic
+ res=0
Committed chaincode definition for chaincode 'basic' on channel 'torbennakamoto2':
Version: 1.0, Sequence: 1, Endorsement Plugin: escc, Validation Plugin: vscc, Approvals: [Org1MSP: true, Org2MSP: true]
Query chaincode definition successful on peer0.org1 on channel 'torbennakamoto2'
Using organization 2
Querying chaincode definition on peer0.org2 on channel 'torbennakamoto2'...
Attempting to Query committed status on peer0.org2, Retry after 3 seconds.
+ peer lifecycle chaincode querycommitted --channelID torbennakamoto2 --name basic
+ res=0
Committed chaincode definition for chaincode 'basic' on channel 'torbennakamoto2':
Version: 1.0, Sequence: 1, Endorsement Plugin: escc, Validation Plugin: vscc, Approvals: [Org1MSP: true, Org2MSP: true]
Query chaincode definition successful on peer0.org2 on channel 'torbennakamoto2'
Chaincode initialization is not required
➜  test-network
```

Flawlessly deployed to the blockchain
and approved by both peers

Vote function

Tediously many checks ☹, but ends up working regardless

Caps votes to the maximal amount of eligible people


```go
func (s *SmartContract) Vote(ctx contractap
(*Party, error) {
    partyJson, err := ctx.GetStub().GetStat
    if err != nil {
        return nil, fmt.Errorf("failed to r
    }

    if partyJson == nil {
        return nil, fmt.Errorf("The party w
    }

    var party Party
    err = json.Unmarshal(partyJson, &party)

    if err != nil {
        return nil, err
    }

    voteCount, err := CurrentVoteCount(ctx)
    if err != nil {
        return nil, fmt.Errorf("Unable to get current vote count, try again later please.")
    }

    if voteCount+votes > 166_955 { // https://www.kmdvalg.dk/kv/2021/K84733461.htm
        return nil, fmt.Errorf("votes would exceed municipality eligible")
    }

    party.Votes += votes

    partyJson, jsonErr := json.Marshal(party)
    if jsonErr != nil {
        return nil, jsonErr
    }

    ctx.GetStub().PutState(symbol, partyJson)

    return &party, nil
}
```
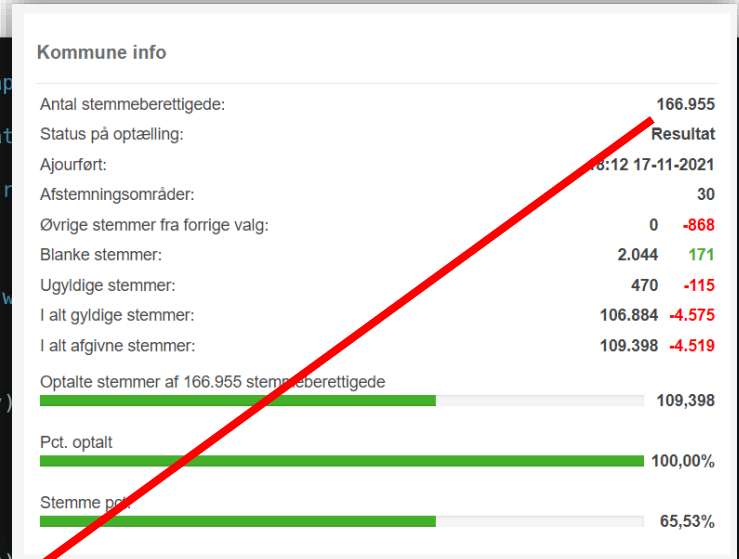
Querying the ledger

```
2021-11-17 19:36:26.685 CET [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200
→ test-network peer chaincode query -C torbennakamoto2 -n voting -c '{"Args":["GetAllParties"]}' | jq
[
  {
    "Municipality": "Odense",
    "Symbol": "A",
    "Party": "Socialdemokratiet",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "AA",
    "Party": "Alternativet",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "B",
    "Party": "Radikale",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "C",
    "Party": "Konservativ",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "D",
    "Party": "Nye Borgerlige",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "F",
    "Party": "Socialistisk Folkeparti",
    "Votes": 0
  },
  {
    "Municipality": "Odense",
    "Symbol": "G",
```

Voting for a party

```
→ test-network
peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile "${PWD}/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.examp
le.com-cert.pem" -C torbennakamoto2 -n voting --peerAddresses localhost:7051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt" --peerAddresses loca
lhost:9051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt" -c '{"function":"Vote","Args":["V", "33"]}'
2021-11-17 21:27:30.291 CET [chaincodeCmd] chaincodeInvokeOrQuery -> INFO 001 Chaincode invoke successful. result: status:200 payload:"{\"Municipality\":\"Odense\",\"Symbol\":\"V\",\"Party\":\"Venstre\",\"Votes\":
3}"
```

```
→ test-network peer chaincode query -C torbennakamoto2 -n voting -c '{"Args":["GetAllParties"]}' | jq ".[12]"
{
  "Municipality": "Odense",
  "Symbol": "V",
  "Party": "Venstre",
  "Votes": 33
}
```

No Obvious Cheating Allowed

```
→ test-network
peer chaincode invoke -o localhost:7050 --ordererTLSHostnameOverride orderer.example.com --tls --cafile "${PWD}/organizations/ordererOrganizations/example.com/orderers/orderer.example.com/msp/tlscacerts/tlsca.examp
le.com-cert.pem" -C torbennakamoto2 -n voting --peerAddresses localhost:7051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org1.example.com/peers/peer0.org1.example.com/tls/ca.crt" --peerAddresses loca
lhost:9051 --tlsRootCertFiles "${PWD}/organizations/peerOrganizations/org2.example.com/peers/peer0.org2.example.com/tls/ca.crt" -c '{"function":"Vote","Args":["J", "1000000000"]}'
Error: endorsement failure during invoke. response: status:500 message:"Votes would exceed municipality eligible"
```

```
... '{"function":"Vote","Args":["J", "1000000000"]}'
Error: endorsement failure during invoke. response: status:500 message:"Votes would exceed municipality
eligible"
```