# Ethereum Tutorial @ EPISTAR

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本教程為根據實際於 Windows 10 64bit 的環境下，建置以太坊私有鏈( Private Ethereum network )為目標所撰寫。

## 1. Install

### 1.1 Geth 1.8.12 for Windows 64-bit

https://ethereum.github.io/go-ethereum/downloads/

```
$ geth version
Geth
Version: 1.8.12-stable
Git Commit: 37685930d953bcbe023f9bc65b135a8d8b8f1488
Architecture: amd64
Protocol Versions: [63 62]
Network Id: 1
Go Version: go1.10.3
Operating System: windows
GOPATH=C:\Users\22404
GOROOT=C:\tools\go
```

### 1.2 Solidity v0.4.24

https://github.com/ethereum/solidity/releases

```
$ solc --version
solc, the solidity compiler commandline interface
Version: 0.4.24+commit.6ae8fb59.Windows.msvc
```

## 2. Steps

### 2.1 Create Blockchain Account for Private Network

```
$ geth account new --datadir .eth-test
Address: { abb67ca6a4549dc15fa5ad95ca85bef49c277f33 }
```

*Pass:730*

## 2.2 Create Private Blockchain Network

```
$ geth --datadir .eth-test init genesis.json
```

檔名:genesis.json

```
{
   "config": {
            "chainId": 88888,
            "homesteadBlock": 0,
            "eip155Block": 0,
            "eip158Block": 0
      },
   "alloc"          : {" abb67ca6a4549dc15fa5ad95ca85bef49c277f33 ":
{ "balance":"4000000000000000000"}},
   "coinbase"     : "0x0000000000000000000000000000000000000000",
   "difficulty" : "0x20000",
   "extraData"   : "",
   "gasLimit"     : "0x2fefd8",
   "nonce"          : "0x0000000000000042",
   "mixhash"       :
"0x0000000000000000000000000000000000000000000000000000000000000000",
   "parentHash" :
"0x0000000000000000000000000000000000000000000000000000000000000000",
   "timestamp"   : "0x00"
}
```

## 2.3 Compile Smart Contract

### 2.3.1 Smart Contract Source Code – the greeter

檔名:HelloEPISTAR.sol

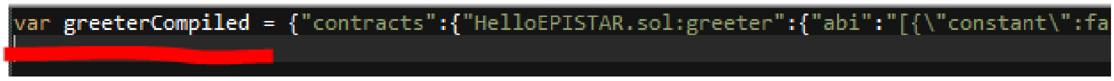
```
pragma solidity ^0.4.8;
contract mortal {
/* Define variable owner of the type address*/
address owner;
/* this function is executed at initialization and sets the owner of the contract */
function mortal() { owner = msg.sender; }
/* Function to recover the funds on the contract */
function kill() { if (msg.sender == owner) suicide(owner); }
}
contract greeter is mortal {
/* define variable greeting of the type string */
string greeting;
/* this runs when the contract is executed */
function greeter(string _greeting) public {
greeting = _greeting;
}
/* main function */
function greet() constant returns (string) {
return greeting;
}
}
```

### 2.3.2 Compile HelloEPISTAR

```
$ solc --bin HelloEPISTAR.sol > HelloEPISTAR.bin
$ solc --abi HelloEPISTAR.sol > HelloEPISTAR.abi
$ solc --abi HelloEPISTAR.sol > HelloEPISTAR.interface
$ solc --combined-json abi,bin,interface HelloEPISTAR.sol > HelloEPISTAR.js
```

**edit HelloEPISTAR.js**

add **var greeterCompiled** = in the begining



```
var greeterCompiled = {"contracts":{"HelloEPISTAR.sol:greeter":{"abi":"[{\"constant\":fa
```

## 2.4 Launch Ethereum Node Process

```
$ geth --mine --minerthreads=1 --datadir .eth-test --networkid 88888 --nodiscover
--maxpeers 0 console 2>> .eth-test.log --dev.period 1
```

*Welcome to the Geth JavaScript console!*

*instance: Geth/v1.8.12-stable-37685930/windows-amd64/go1.10.3*
*coinbase: 0x3d07c09d41908f8b064f6e4480ad725e25ada63f*

```
at block: 0 (Thu, 01 Jan 1970 08:00:00 CST)
  datadir: C:\Users\22404\BC\.eth-private
  modules: admin:1.0 debug:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 txpool:1.0
web3:1.0

>
```

## 2.5 Submit Smart Contract

### 2.5.1 Unlock Account to submit SM

```
> web3.fromWei(eth.accounts[0],"ether")
> primary = eth.accounts[0]
> personal.unlockAccount(primary)
```

```
Unlock account 0xabb67ca6a4549dc15fa5ad95ca85bef49c277f33
Passphrase:
true
>
```

### 2.5.2 Submit Compiled Smart Contract

```
> loadScript("HelloEPISTAR.js");
> var _greeting = "Hello EPISTAR!" ;
> var greeterContract =
web3.eth.contract(JSON.parse(greeterCompiled.contracts["HelloEPISTAR.sol:greeter"].ab
i));
> var greeter = greeterContract.new(_greeting, {from: eth.accounts[0], data:"0x" +
greeterCompiled.contracts["HelloEPISTAR.sol:greeter"].bin, gas: 1000000},
function(e, contract){
if(!e) {
if(!contract.address) {
console.log("Contract transaction send: TransactionHash: " +
contract.transactionHash + " waiting to be mined...");
} else {
console.log("Contract mined! Address: " + contract.address);
}
}
})
```

```
Contract transaction send: TransactionHash:
0x77ef75160561eee412d53434b2dd30652105b4e7ca431372cf857bc9a3efbaf6 waiting
to be mined...
undefined
> Contract mined! Address: 0x1d5e79eeb75d88de18ff941d2741a06b2cff04f4
```

## 2.6 Execute Smart Contract

```
> greeter.greet()
"Hello EPISTAR!"
```

## 2.7 Miner Address

查看當前節點下，是否有帳戶存在

```
>personal.listAccounts
["0xabb67ca6a4549dc15fa5ad95ca85bef49c277f33"]
```

執行設置miner地址

```
>miner.setEtherbase(eth.accounts[0])
True
```

查詢餘額

```
> web3.fromWei(eth.getBalance(eth.coinbase));
5755.04
```

查詢當前的區塊數

```
> eth.blockNumber
8040.04
```