

# DevTips

Conflux

Tip

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# Week 1 - 7.4

## Day1 - CFX

CFX    Conflux    Drip    GDrip

- Drip    1 CFX = 10<sup>18</sup> Drip
- Gdrip    1 CFX = 10<sup>9</sup> GDrip,    1 GDrip = 10<sup>9</sup> Drip

1 uCFX = 10<sup>12</sup> Drip (    ) uCFX

GDrip    1-100 GDrip

## Day2 - EpochNumber Tag

Epoch	RPC	hex number	EpochNumber	Epoch Tag
• earliest	Epoch,	Epoch 0		
• latest_checkpoint	checkpoint Epoch			
• latest_finalized	PoS finalized Epoch	Epoch	Epoch	
• latest_confirmed	PoW confirmed Epoch	Epoch	Epoch	, !
• latest_state	Epoch, RPC	epochNumber	tag	
• latest_mined	Epoch			

Conflux    5 epoch

latest\_state - latest\_confirmed    40-50 Epoch. latest\_state - latest\_finalized    400-600 Epoch.

## Day3

Conflux    3000w gas,    1420    CFX

## Day4 Transaction

Conflux    gas    1500w    gas    data    200k

## Day5 Conflux

Conflux    Core    0.5s    Epoch 1s    5-10s    40-50s

# Week2-7.11

## Day1 Conflux Core 155

Conflux Core 155

- storageLimit
- epochHeight

(RLP )

status Conflux Core receipt status

- 0 -
- 1 -
- 2 or null -

## Day2 Conflux Core

Conflux

- user -
- contract -
- builtin -
- null -

base32 verbose

CFX:TYPE.USER:AATD0WZV4F7F6J33KH5E182Z4NSCSP59VYE32H4YZ6

CIP-37

## Day3 Gas Explained

Gas <https://ethgas.io/cn/index.html>

## Day4 Conflux Gas

# Day5 Web3

[Library of web3](#)   Alex Phan   Web3

# Week3-7.18

## Day1 - Java-solidity

java-conflux-sdk web3j. , java solidity . :

[https://github.com/web3j/web3j/blob/master/abi/src/main/java/org/web3j/abi/datatypes/AbiTypes.java#~:text=public%20static%20Class%3C%3F%20extends%20Type%3E%20getType\(String%20type%2C%20boolean%20primitives\)](https://github.com/web3j/web3j/blob/master/abi/src/main/java/org/web3j/abi/datatypes/AbiTypes.java#~:text=public%20static%20Class%3C%3F%20extends%20Type%3E%20getType(String%20type%2C%20boolean%20primitives))

## Day2 - Java-conflux-sdk hexstring byte[]

java-conflux-sdk call hexstring byte[]

web3j Numeric [https://github.com/web3j/web3j/blob/master/abi/src/main/java/org/web3j/abi/datatypes/AbiTypes.java#~:text=public%20static%20Class%3C%3F%20extends%20Type%3E%20getType\(String%20type%2C%20boolean%20primitives\)](https://github.com/web3j/web3j/blob/master/abi/src/main/java/org/web3j/abi/datatypes/AbiTypes.java#~:text=public%20static%20Class%3C%3F%20extends%20Type%3E%20getType(String%20type%2C%20boolean%20primitives))

```
String hexstring = "xxxxxx"; //hexstring
byte[] test = Numeric.toHexStringToByteArray(hexstring);

String tmp = Numeric.toHexString(test);
```

## Day3 - account.call client.call

java-conflux-sdk client call nonce account.call

## Day4 - sdk rpc\_url

sdk client rpc\_url rpc\_url

URL		
http://127.0.0.1:12539		port toml
https://test.confluxrpc.com		
https://main.confluxrpc.com		
https://test.confluxrpc.org		
https://main.confluxrpc.org		

## Day5 - pos

conflux      pos      pos                      pos    java-conflux-sdk                      raw

https://wiki.conflux123.xyz/link/32#bkmrk-  
%E6%9C%89%E4%B8%80%E4%B8%AA%E6%AD%A3%E5%9C%A8%E8%BF%90%E8%A1%8C%E7  
%9A%84pos%E6%9C%AC%E5%9C%B0%E8%8A%82%E7%82%B9-  
%E5%9C%A8%E6%9C%AC%E5%9C%B0%E8%B0%83

# Week4 - 7.25

## Day1 - PoW

Conflux

cfx\_getConfirmationRiskByHash

15%

1e-8

0.000001%

RPC

6	1	10%	6	0.1%
---	---	-----	---	------

```
// Request
curl -X POST --data ' {"jsonrpc": "2.0", "method": "cfx_getConfirmationRiskByHash", "params": [ "0x3912275cf09f8982a69735a876c14584dae95078762090c5d32fdf0dbec0647c"], "id": 1} ' -H "Content-Type: application/json" localhost:12539

// fix64          2**256-1          1e-8
{
  "jsonrpc": "2.0",
  "result": "0x2af31dc4611873bf3f70834acdae9f0f4f534f5d60585a5f1c1a3ced1b",
  "id": 1
}
```

## Day2 -

cfx\_getConfirmationRiskByHash

51%

PoWPos

RPC	cfx_getStatus	latestFinalized	PoS	Epoch	Epoch
		PoS	400	Conflux Scan	

```
// Request
curl -X POST --data ' {"jsonrpc": "2.0", "method": "cfx_getStatus", "id": 1} ' -H "Content-Type: application/json" localhost:12539

// Result
```

```

{
  "jsonrpc": "2.0",
  "result": {
    "bestHash": "0x7bbb518ec0b8671a60e9c98619137b0d52522a9ef9490c9b4c23c30f178312f8",
    "chainId": "0x405",
    "ethereumSpaceChainId": "0x406",
    "networkId": "0x405",
    "epochNumber": "0x2fa1a24",
    "blockNumber": "0x70a7fda",
    "pendingTxNumber": "0x83b",
    "latestCheckpoint": "0x2f91bc0",
    "latestConfirmed": "0x2fa19e1",
    "latestState": "0x2fa1a20",
    "latestFinalized": "0x2fa1854" //      PoS      Epoch
  },
  "id": 1
}

```

## Day3 - EpochNumber

```

cfx_getStatus REpochNumber ConfluxContext ConfluxContext epochNumber(), posHeight(),
finalizedEpochNumber()

```

```

ConfluxContext CFX: TYPE. BUILT IN: AAEJUAAAAAAAAAAAAAAAAAAAAAAAAAAAU5XA6TK73 /
CFXTEST: TYPE. BUILT IN: AAEJUAAAAAAAAAAAAAAAAAAAAAAAAAAAU2XPKD3X      abi metadata

```

```

pragma solidity >=0.4.15;

contract ConfluxContext {
  /** Query Functions */
  /**
   * @dev get the current epoch number
   * @return the current epoch number
   */
  function epochNumber() public view returns (uint256) {}
  /**
   * @dev get the height of the referred PoS block in the last epoch
   * @return the current PoS block height
   */
}

```



```

    */
    function posHeight() public view returns (uint256) {}
    /**
     * @dev get the epoch number of the finalized pivot block.
     * @return the finalized epoch number
     */
    function finalizedEpochNumber() public view returns (uint256) {}
}

```

## Day4 - gasUsed gasLimit

SDK R `cfx_estimateGasAndCollateral` `estimate` `estimate.gasUsed` `estimate.gasLimit`  
`estimate.gasUsed` `63/tx` `tx.gasLimit` `estimate.gasUsed` `estimate.gasLimit`  
`tx.gasLimit` `estimate.gasUsed` `4/3` `gasUsed`;

`gasUsed` `tx.gasLimit * 1/4` `tx.gasLimit` `gasUsed * 4/3` `gasUsed` Gas

```

// Request
curl -X POST --data
'{"method": "cfx_estimateGasAndCollateral", "id": 1, "jsonrpc": "2.0", "params": [{"from": "cfx: type. u
ser: aarc9abycue0hhzggyrr53m6cxdedgccrmmmybjgh4xg", "to": "cfx: type. contract: acc7uawf5ubtnmezvhu9dh
c6sghea0403y2dgpypfjp", "data": "0x", "gasPrice": "0x2540be400", "nonce": "0x0"}]}' -H "Content- Type:
application/json" localhost:12539

// Result
{
  "jsonrpc": "2.0",
  "result": {
    "gasLimit": "0x6d60", // 21000 * 4/3
    "gasUsed": "0x5208", // 21000
    "storageCollateralized": "0x80"
  },
  "id": 1
}

```

## Day5 - EpochHeight

Conflux

EpochHeight

-100000 < currentEpochNumber - tx.epochHeight < 100000

EpochHeight

EpochNumber

EpochNumber

100000

Epoch

100000

28

# Week5 - 8.1

## Day1

Conflux Core Space

### Conflux Core Space

Conflux Core Space

1. Hex    0x1defad05b632ba2cef7ea20731021657e20a7596
2. Base32    Hex    CFX: TYPE. USER: AAKPBX01FZM1XP89CB7URF6YVYXH3GGX5E9HZ07B38

- [CIP-37](#)
- [Conflux](#)

## Day2

Base32                      Base32

### Base32

#### Base32

Base32      5bit              Base32      `0b000000"( 16      "0x00")      "a"

0x00~0x1f <==> abcdefghjkmnpqrstuvwxyz0123456789

### Base32

1. Network-prefix :              cfx              cfxtest
2. Address type : TYPE. XXX
3. Payload :    Hex                      base32

4. Checksum : 8

CFX: TYPE. USER: AAKPBX01FZM1XP89CB7URF6YVYXH3GGX5E9HZ07B38

| | | --- Checksum

```
| | | --- Payload
```

— — —

| . . .

Base32	Hex
--------	-----

Base32	Hex
--------	-----

# Base32

Hex

conflux

Base32

- CIP-37
- Conflux

# Day3

eSpace

Conflux v2.0

eSpace

## Core Space

Metamask      eSpace

espce

Image not found or type unknown

- eSpace

# Day4

Core Space      eSpace

1. Core Space base32 decode bytes
2. bytes keccak
3. 20 bytes hex

- Core Space      eSpace

# Day5

# Core Space

- AdminControl: 0x088800000000000000000000000000000000
- SponsorWhitelistControl: 0x088800000000000000000000000000000001
- Staking: 0x0888000000000000000000000000000000000002
- ConfluxContext: 0x0888000000000000000000000000000000000004
- PoSRegister: 0x0888000000000000000000000000000000000005
- CrossSpaceCall: 0x0888000000000000000000000000000000000006



# Week6- PoS

## Day1 PoS

- Conflux PoS15%
1.

Conflux

Staking

CFX

PoSRegister

PoS
2.

PoS Pool

CFX

## Day2 PoS

- PoS

1
- PoS

256

hash
- PoS

= 1000 CFX

PoS CFX

1000
- PoS

Stake

PoS

14
- PoS

300
- PoS

6

## Day3 PoS PoW finalized

- PoS

pivotDecision

PoW pivot chain

hash

PoS

Revert
- PoW

posReference

PoW

PoS
- PoW

finalized
1.

cfx\_getStatus

latestFinalized

finalized
2.

cfx\_epochNumbe

latest\_finalized

number

finalized

## Day4 ForceRetire

- PoS

PoS

PoS

1

PoS
- hardfork

2.1.0

forceRetire

PoS

# Day5 PoS

Conflux PoS	Conflux	1.3	16.6%
-------------	---------	-----	-------

1.

4%
2.

(totalCirculate) - - - 0
3.

PoS (totalStake)

0.04 \*

*totalCirculate* / *totalStake*

PoS

PoS

PoW

PoS



# Week7-8.15

## Day1 CIP23 EIP712

hex

EIP712

conflu

- message conf \x19Conflux Signed Message: \n \x19Ethereum Signed Message: \n
- EIP712domain CIP23domain
- CIP23domainchainId

## Day2 CIP23

- :  
encode(message :  $8^n$ ) = "\x19Conflux Signed Message:\n" || len(message) || message  
where len(message) is the non-zero-padded ascii-decimal encoding of the number of bytes in message.
- encode(domainSeparator :  $2^{56}$ , message : ) = "\x19\x01" || domainSeparator ||  
hashStruct(message) where domainSeparator and hashStruct(message) are defined below.

conflux-sdk

sdk

java-sdk

```
package conflux.web3j.crypto;

import org.junit.jupiter.api.Test;
import org.web3j.utils.Numeric;

import java.io.IOException;

import static org.junit.jupiter.api.Assertions.assertEquals;

public class SignDataTests {

    //cfx_signTypedData_v4
```

```

@Test
public void testSignValidStructure() throws IOException {
    StructuredDataTests t = new StructuredDataTests();

    // TypedData
    String msg = t.getResource(
        "build/resources/test/"
        + "structured_data_json_files/ValidStructuredData.json");

    // msg
    StructuredDataEncoder dataEncoder = new StructuredDataEncoder(msg);
    // msghash
    org.web3j.crypto.Sign.SignatureData sign =
org.web3j.crypto.Sign.signMessage(dataEncoder.hashStructuredData(), SampleKeys.KEY_PAIR,
false);
    assertEquals(

"0x371ef48d63082d3875fee13b392c5b6a7449aa638921cb9f3d419f5b6a817ba754d085965fb3a041c3b178d3ae3
798ea322ae74cb687dd699b5f6045c7fe47a91c",
        Numeric.toHexString(sign.getR()) + Numeric.toHexStringNoPrefix(sign.getS()) +
Numeric.toHexStringNoPrefix(sign.getV()));
    }

    //personal_sign
    @Test
    public void testSignAnyMessage() throws IOException {
        String message = "v0G9u7huK4mJb2K1";
        // msg msghash
        org.web3j.crypto.Sign.SignatureData sign =
Sign.signPrefixedMessage(message.getBytes(), SampleKeys.KEY_PAIR);
        assertEquals(

"0xbb0ee8492623f2ef6ed461ea638f8b5060b191a1c8830c93d84245f3fb27e20a755e24ff60fe76482dd4377a0ae
f036937ef88537b2d0fdd834a54e76ecafadc1c",
        Numeric.toHexString(sign.getR()) + Numeric.toHexStringNoPrefix(sign.getS()) +
Numeric.toHexStringNoPrefix(sign.getV()));
    }
}

```

# Day3 cip23

cip23

sdk

java-sdk

sdk

```
package conflux.web3j.crypto;

import org.junit.jupiter.api.Test;
import org.web3j.crypto.*;
import org.web3j.crypto.Sign;
import org.web3j.utils.Numeric;

import java.io.IOException;
import java.util.Arrays;

import static org.junit.jupiter.api.Assertions.assertEquals;

public class ECTest {

    private String getAddress() {
        return Numeric.prependHexPrefix(Keys.getAddress(getPubKey()));
    }

    private String getPubKey() {
        return SampleKeys.KEY_PAIR.getPublicKey().toString();
    }

    @Test
    public void testSignAndRecoverMessage() {
        String message = "v0G9u7huK4mJb2K1";

        byte[] msgHash = conflux.web3j.crypto.Sign.getConfluxMessageHash(message.getBytes());

        Sign.SignatureData sign =
conflux.web3j.crypto.Sign.signPrefixedMessage(message.getBytes(), SampleKeys.KEY_PAIR);
        // recover,
        String recoverAddress = conflux.web3j.crypto.Sign.recoverSignature(sign, msgHash,
```

```

getAddress());
    assertEquals(recoverAddress, getAddress());
}

// fluent                recover
@Test
public void testRecoverTyped() throws IOException {
    StructuredDataTests t = new StructuredDataTests();
    String msg = t.getResource(
        "build/resources/test/"
            + "structured_data_json_files/ValidStructuredData.json");
    StructuredDataEncoder dataEncoder = new StructuredDataEncoder(msg);

    //                fluent
    String signature =

"0x371ef48d63082d3875fee13b392c5b6a7449aa638921cb9f3d419f5b6a817ba754d085965fb3a041c3b178d3ae3
798ea322ae74cb687dd699b5f6045c7fe47a91c";

    //
    byte[] signatureBytes = Numeric.hexStringToByteArray(signature);
    byte v = signatureBytes[64];
    if (v < 27) {
        v += 27;
    }

    Sign.SignatureData sd =
        new Sign.SignatureData(
            v,
            (byte[]) Arrays.copyOfRange(signatureBytes, 0, 32),
            (byte[]) Arrays.copyOfRange(signatureBytes, 32, 64));
    // //getAddress()        fluent
    String recoverAddress = conflux.web3j.crypto.Sign.recoverSignature(sd,
dataEncoder.hashStructuredData(), getAddress());
    assertEquals(recoverAddress, getAddress());
}

//    testSignAndRecoverMessage()
@Test
public void testSignAndRecoverTyped() throws IOException {

```

```

StructuredDataTests t = new StructuredDataTests();
String msg = t.getResource(
    "build/resources/test/"
        + "structured_data_json_files/ValidStructuredData.json");
StructuredDataEncoder dataEncoder = new StructuredDataEncoder(msg);
Sign.SignatureData sign = Sign.signMessage(dataEncoder.hashStructuredData(),
SampleKeys.KEY_PAIR, false);

    String recoverAddress = conflux.web3j.crypto.Sign.recoverSignature(sign,
dataEncoder.hashStructuredData(), getAddress());
    assertEquals(recoverAddress, getAddress());
}
}

```

recover()

```

public static String recoverSignature(SignatureData sd, byte[] data, String address) {
    String addressRecovered = null;

    // Iterate for each possible key to recover
    for (int i = 0; i < 4; i++) {
        BigInteger publicKey =
            org.web3j.crypto.Sign.recoverFromSignature(
                (byte) i,
                new ECDSASignature(
                    new BigInteger(1, sd.getR()), new BigInteger(1,
sd.getS()),
                    data);

        if (publicKey != null) {
            addressRecovered =
Numeric.prependHexPrefix(Keys.getAddress(publicKey.toString()));

            if (addressRecovered.equals(address)) {
                break;
            }
        }
    }

    return addressRecovered;
}

```

```
}
```

[https://github.com/web3j/web3j/blob/7dea3d99c5bdbfcc03aaeaa8575fb0c9a9a771ab/crypto/src/main/java/org/web3j/crypto/Sign.java#:~:text=public%20static%20BigInteger%20recoverFromSignature\(int%20recId%2C%20ECDSASignature%20sig%2C%20byte%5B%5D%20message\)%20%7B](https://github.com/web3j/web3j/blob/7dea3d99c5bdbfcc03aaeaa8575fb0c9a9a771ab/crypto/src/main/java/org/web3j/crypto/Sign.java#:~:text=public%20static%20BigInteger%20recoverFromSignature(int%20recId%2C%20ECDSASignature%20sig%2C%20byte%5B%5D%20message)%20%7B)

<https://wiki.conflux123.xyz/link/60#bkmrk-%E5%90%88%E7%BA%A6%E9%AA%8C%E7%AD%BE>

# Day4 fluent

java-sdk test

sdksprovidersdkprecurefluent

cfx

eth

fluent

personal\_sign

console

```
conflux
  .request({
    method: 'personal_sign',
    params: [
      'v0G9u7huK4mJb2K1', ' <your_address>' ]})
```

fluent



```

> conflux
  .request({
    method: 'personal_sign',
    params: [
      'v0G9u7huK4mJb2K1', 'cfxtest:aajb342mw5kzad6pjkdz0wxx0tr54nfupbu6yaj49' ])
< Promise {<pending>}
  ▶ [[Prototype]]: Promise
  [[PromiseState]]: "fulfilled"
  [[PromiseResult]]: "0x7e4216720b40f8d7f2cda70433d4a94f3926635517cd5691c778e38eae87236759ddf7c53ec55c5463f8e966ebd5a32c2dbe1061e95afcb64ef3a8187badcb00"

```

cfx\_signTypedData\_v4

console

```

conflux
  .request({
    method: 'cfx_signTypedData_v4',
    params: [
      '<your_address>',
      {
        "types": {
          "CIP23Domain": [
            {
              "name": "name",
              "type": "string"
            },
            {
              "name": "version",
              "type": "string"
            },
            {
              "name": "chainId",
              "type": "uint256"
            },
            {
              "name": "verifyingContract",
              "type": "address"
            }
          ],
          "Person": [
            {
              "name": "name",
              "type": "string"
            }
          ]
        }
      }
    ]
  })

```

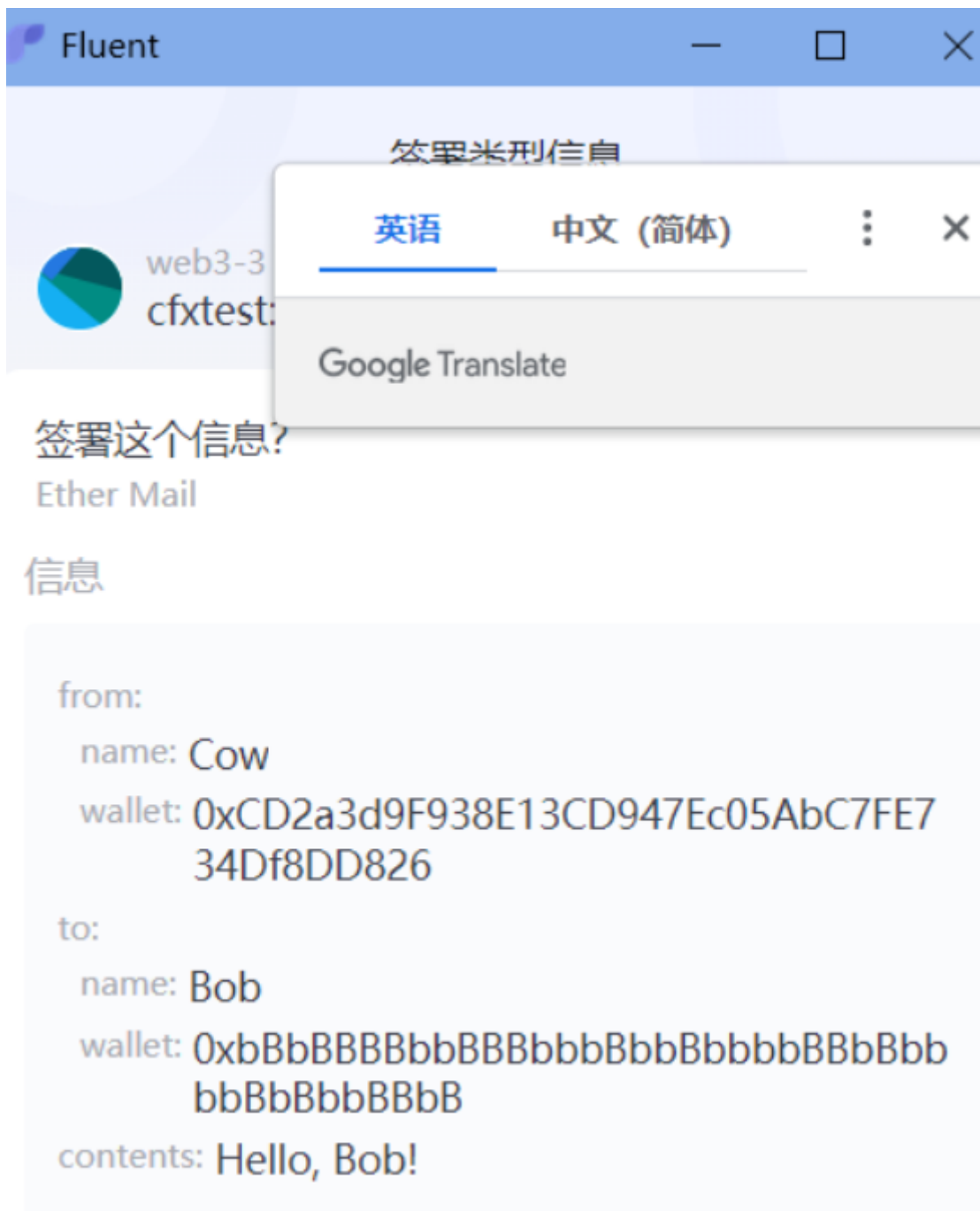
```

        "name": "wallet",
        "type": "address"
    }
],
"Mail": [
    {
        "name": "from",
        "type": "Person"
    },
    {
        "name": "to",
        "type": "Person"
    },
    {
        "name": "contents",
        "type": "string"
    }
]
},
"primaryType": "Mail",
"domain": {
    "name": "Ether Mail",
    "version": "1",
    "chainId": 1,
    "verifyingContract": "0xCcCCccccCCCCcCCCCcCcCccCcCCcCcccccccC"
},
"message": {
    "from": {
        "name": "Cow",
        "wallet": "0xCD2a3d9F938E13CD947Ec05AbC7FE734Df8DD826"
    },
    "to": {
        "name": "Bob",
        "wallet": "0xbBbBBBBbbBBBbbbBbbBbbbbBBbBbbbbBbBbbBBbB"
    },
    "contents": "Hello, Bob!"
}
}
}
})

```



message



# Day5 cip23 sdk

java-sdk js-sdk [cip23](#) [cip23js-sdk](#) [cip23](#)

go-sdk python-sdk cip23

# Week8-8.21

## 8.22 Epoch Number, Block Number Height Epoch Height

Conflux

epoch number

block number

height

epoch height

1. Epoch Number

Con

epoch

epoch

pivot

epoch

epoch number

epoch number

2. Block Number

epoch

block number

block number

block numebr

epoch number

block number

3. Height

height

height

epoch number

C D G

Height

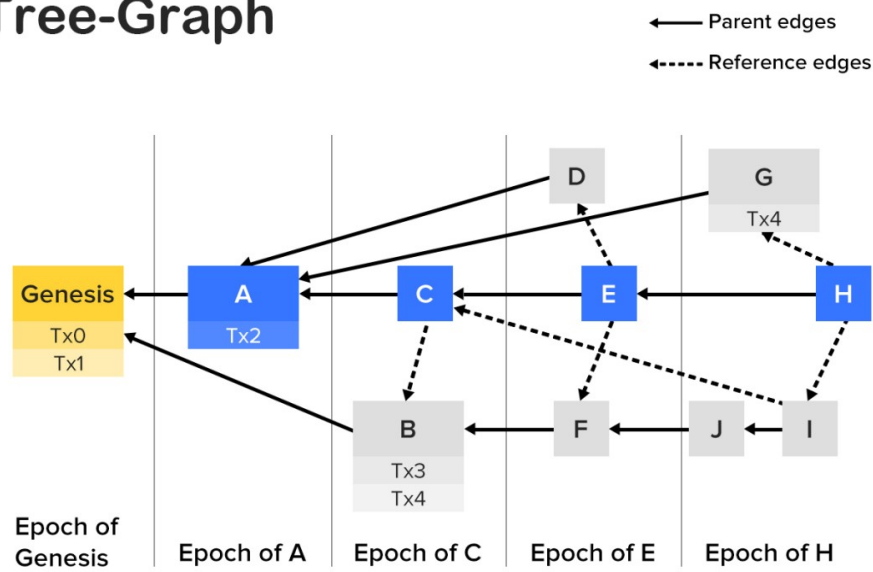
4. Epoch Height

epoch height

epoch number

EpochHeight

### Tree-Graph



## 8.23

Conflux	Collateral for storage
Conflux	64
	1/16 CFX

Conflux

## 8.24

## Conflux

```
setSponsorForCollateral(address contractAddr)
```

CFX

CFX

## 8.25 Staking CFX

## Conflux

## Staking

CFX CFX

CFX

1. POSPOS
2. CIP-94 On-chain DAO Vote for Chain Parameters

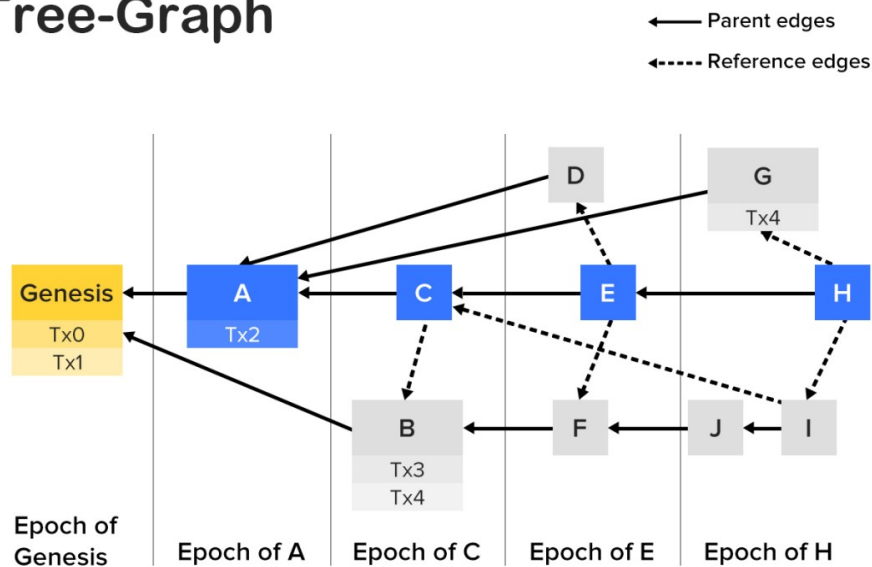
## 8.26 Pivot RPC

## Pivot

## Conflux

Conflux    RPC

## Pivot



1. `cfx_getStatus` `cfx_getBestBlockHash` `cfx_getStatus` `bestHash` `epoch` `Pivot`  
`cfx_getBestBlockHash`

```
// getStatus
{
  "jsonrpc": "2.0",
  "result": {
    "bestHash": "0xe4bf02ad95ad5452c7676d3dfc2e57fde2a70806c2e68231c58c77cdda5b7c6c",
    "chainId": "0x1",
    "networkId": "0x1",
```

```

    "blockNumber": "0x1a80325",
    "epochNumber": "0xaf28ab",
    "latestCheckpoint": "0xada520",
    "latestConfirmed": "0xaf2885",
    "latestState": "0xaf28a7",
    "latestFinalized": "0x2a420c",
    "ethereumSpaceChainId": "0x22b9",
    "pendingTxNumber": "0x0"
  },
  "id": 1
}

```

2. `cfx_getBlocksByEpoch`    RPC    Epoch    blockNumber    Pivot    .

```

// Result
{
  "jsonrpc": "2.0",
  "result": [
    "0x618e813ed93f1020bab13a1ab77e1550da6c89d9c69de837033512e91ac46bd0",
    "0x0f6ac81dcbc612e72e0019681bcec32254a34bd29a6bbab91e5e8dc37ecb64d5",
    "0xad3238c00456adfbf847d251b004c1e306fe637227bb1b9917d77bd5b207af68",
    "0x0f92c2e796be7b016d8b74c6c270fb1851e47fabaca3e464d407544286d6cd34",
    "0x5bcc2b8d2493797fcadf7b80228ef5b713eb9ff65f7cdd86562db629d0caf721",
    "0x7fcdc6fff506b19a2bd72cd3430310915f19a59b046759bb790ba4eeb95e9956",
    "0xf4f33ed08e1c625f4dde608eeb92991d77fff26122bab28a6b3a2037511dcc83",
    "0xa3762adc7f066d5cb62c683c2655be3bc3405ff1397f77d2e1dbeff2d8522e00",
    "0xba7588476a5ec7e0ade00f060180cadb7430fd1be48940414baac48c0d39556d",
    "0xe4dc4541d07118b598b2ec67bbdaa219eb1d649471fe7b5667a0001d83b1e9b6",
    "0x93a15564544c57d6cb68dbdf60133b318a94439e1f0a9ccb331b0f5a0aaf8049" // pivot
  ],
  "id": 1
}

```

3. `cfx_getBlockByHashWithPivotAssumption`    RPC(`cfx_getBlockByHash`)    RPC  
       1 blockHash 2 assumedPivotHash 3 epochNumber    blockHash    RPC



```
results =  
muticall.aggregate(usdt_address,["0x70a082310000000000000000000000000000000000000000000000000000000016c85f8a7985d1a49b99e097d0  
b4217c5b5995f0","0x70a08231000000000000000000000000000000000000000000000000000000001c989a6229119edcda2088c9fc0bef9666a49b05"])
```

- abi

ABI

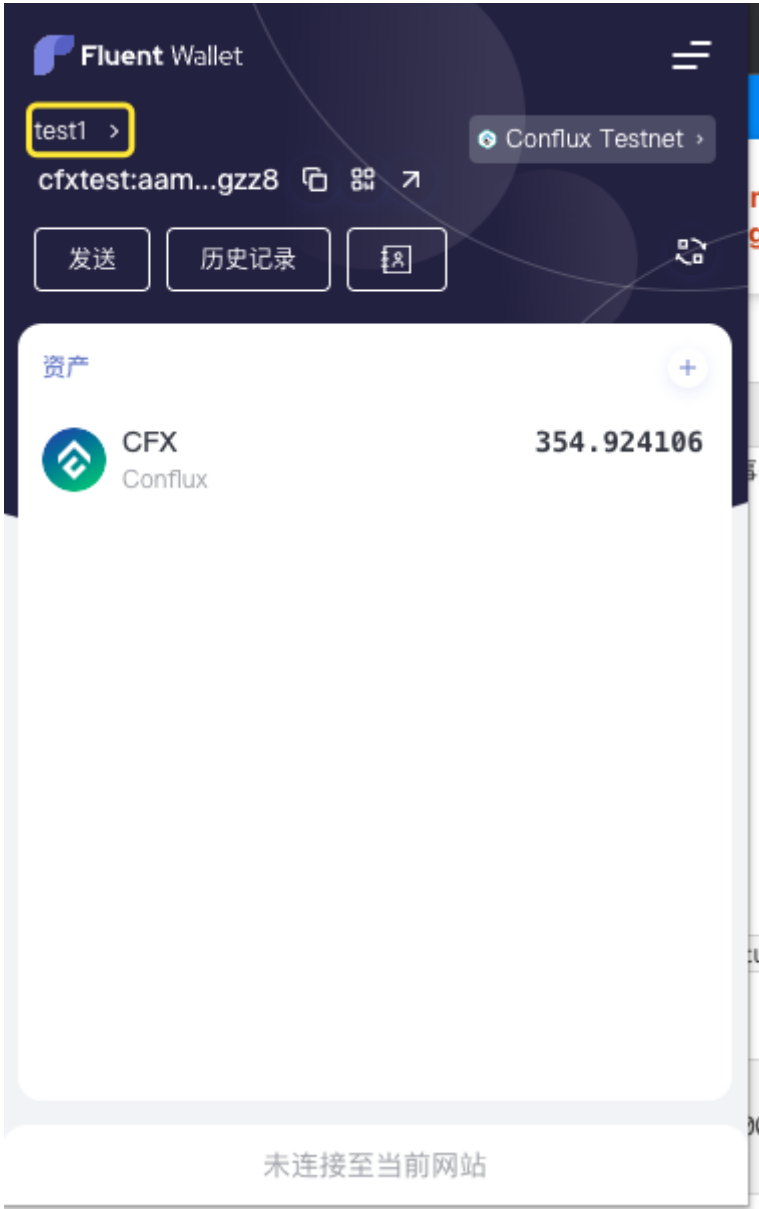
SDK

sdk

# Day4 Fluent - Fluent

## 1. Fluent




Fluent



"+"

test1 >

Conflux Testnet 

cfxtest:aam...gzz8   

## 我的账户

 搜索



test1

354.924106 CFX







## 新增账户

### 创建账户



#### 新的助记词

生成一组新的助记词并需备份

### 导入账户



#### 导入助记词

助记词是一组由空格分隔的词组



#### 导入私钥

填写明文私钥



#### 硬件钱包

连接你的 Ledger 钱包



## 导入助记词

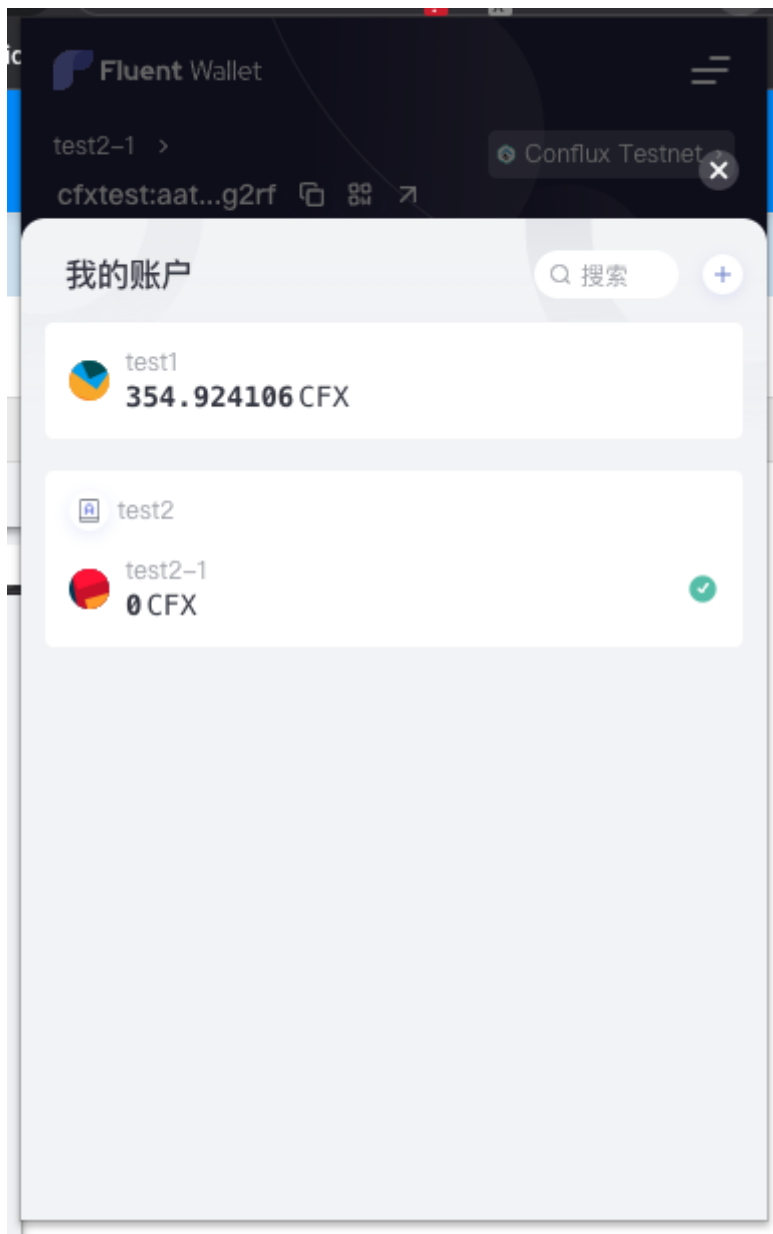
助记词账户组

test2|

导入助记词

urban  
pool'

导入



Fluent

Conflux

## Day5 Fluent

1. Fluent                      conflux ethereum                      derive path

- Conflux                      dervie `m' /44' /60' /0' /0`
- Ethereum                      dervie `m' /44' /503' /0' /0`


2. Fluent                      Fluent

Fluent

← 返回

 账户管理

 网络管理

 已授权的网站

 高级选项

 关于

🔒 锁定



## 高级选项

### 优先连接



在连接至 DApp 时，Fluent 将会作为默认钱包

### 显示测试网络



开启后，可在网络列表中展示测试网络

# Week10-NFT

NFT

NFT NFT

NFT

EIP

## Day1 - ERC721

ERC-721 NFT , CryptoKit token ID token

```
interface ERC721 /* is ERC165 */ {  
    // events  
    event Transfer(address indexed _from, address indexed _to, uint256 indexed _tokenId);  
    event Approval(address indexed _owner, address indexed _approved, uint256 indexed  
_tokenId);  
    event ApprovalForAll(address indexed _owner, address indexed _operator, bool _approved);  
  
    function balanceOf(address _owner) external view returns (uint256);  
    function ownerOf(uint256 _tokenId) external view returns (address);  
    function safeTransferFrom(address _from, address _to, uint256 _tokenId, bytes data) external  
payable;  
    function safeTransferFrom(address _from, address _to, uint256 _tokenId) external payable;  
    function transferFrom(address _from, address _to, uint256 _tokenId) external payable;  
    function approve(address _approved, uint256 _tokenId) external payable;  
    function setApprovalForAll(address _operator, bool _approved) external;  
    function getApproved(uint256 _tokenId) external view returns (address);  
    function isApprovedForAll(address _owner, address _operator) external view returns (bool);  
}
```

1. transferFrom
2. safeTransferFrom
3. approve
4. setApprovalForAll

1. balanceOf
2. ownerOf
3. getApproved
4. isApprovedForAll

ERC721

1. metadata
- 2.
- 3.
- 4.

## Day2 ERC1155

ERC1155 ERC20 , token ERC721 tokenId

ERC1155 mint

```
interface ERC1155 /* is ERC165 */ {
    event TransferSingle(address indexed _operator, address indexed _from, address indexed
    _to, uint256 _id, uint256 _value);
    event TransferBatch(address indexed _operator, address indexed _from, address indexed _to,
    uint256[] _ids, uint256[] _values);
    event ApprovalForAll(address indexed _owner, address indexed _operator, bool _approved);
    event URI(string _value, uint256 indexed _id);

    function safeTransferFrom(address _from, address _to, uint256 _id, uint256 _value, bytes
    calldata _data) external;
    function safeBatchTransferFrom(address _from, address _to, uint256[] calldata _ids,
    uint256[] calldata _values, bytes calldata _data) external;
    function balanceOf(address _owner, uint256 _id) external view returns (uint256);
    function balanceOfBatch(address[] calldata _owners, uint256[] calldata _ids) external view
    returns (uint256[] memory);
    function setApprovalForAll(address _operator, bool _approved) external;
    function isApprovedForAll(address _owner, address _operator) external view returns (bool);
}
```

## Day3 ERC2981

ERC2981 NFT NFT NFT ERC721 ERC1155 token.

royaltyInfo

tokenId

```
interface IERC2981 is IERC165 {  
    function royaltyInfo(  
        uint256 _tokenId,  
        uint256 _salePrice  
    ) external view returns (  
        address receiver,  
        uint256 royaltyAmount  
    );  
}
```

## Day4 SBT

SBT

Token

NFT

KYC

SBT

EIP

EIP-4973

EIP-5114

ERC721S

Solv Protocol

EIP-3525

SBT -

## Day5 ERC3525

“ ”

ERC-3525

ERC-1155

-

NFT



# Week11-9.13

```
conflux \ConfluxContext, PoSRegister, CrossSpaceCall, ParamsControl
```

# Day1 ConfluxContext

[illegible]

abi :

```
// SPDX-License-Identifier: MIT
pragma solidity >=0.4.15;

interface ConfluxContext {
    /** Query Functions */
    /**
     * @dev get the current epoch number
     * @return the current epoch number
     */
    function epochNumber() external view returns (uint256);
    /**
     * @dev get the height of the referred PoS block in the last epoch
     * @return the current PoS block height
     */
    function posHeight() external view returns (uint256);
    /**
     * @dev get the epoch number of the finalized pivot block.
     * @return the finalized epoch number
     */
    function finalizedEpochNumber() external view returns (uint256);
}
```

java sdk

```
public static void test(String contractAddr, String caller) throws Exception {
    Cfx cfx = Cfx.create("https://test.confluxrpc.com");
    Account acc = Account.create(cfx, caller);
    Address address = new Address(contractAddr);
    String hash = acc.call(address, "epochNumber");
    cfx.waitForReceipt(hash);
    Optional<Receipt> receipt = cfx.getTransactionReceipt(hash).sendAndGet();
    if (receipt.isPresent()) {
        ....
    } else {
        ....
    }
}
```

# Day2 PoSRegister

## PoSRegister

PoS

- `register` - pos pos
- `increaseStake` - pos
- `retire` - pos
- `getVotes` - vote
- `identifierToAddress` - pos pow
- `addressToIdentifier` - pow pos

```
0x0880000000000000000000000000000000000000000000000005
```

abi

```
// SPDX-License-Identifier: MIT
pragma solidity >=0.5.0;

interface PoSRegister {
```

```

/**
 * @dev Register PoS account
 * @param identifier - PoS account address to register
 * @param votePower - votes count
 * @param blsPubKey - BLS public key
 * @param vrfPubKey - VRF public key
 * @param blsPubKeyProof - BLS public key's proof of legality, used to against some
attack, generated by conflux-rust fullnode
 */
function register(
    bytes32 identifier,
    uint64 votePower,
    bytes calldata blsPubKey,
    bytes calldata vrfPubKey,
    bytes[2] calldata blsPubKeyProof
) external;

/**
 * @dev Increase specified number votes for msg.sender
 * @param votePower - count of votes to increase
 */
function increaseStake(uint64 votePower) external;

/**
 * @dev Retire specified number votes for msg.sender
 * @param votePower - count of votes to retire
 */
function retire(uint64 votePower) external;

/**
 * @dev Query PoS account's lock info. Include "totalStakedVotes" and "totalUnlockedVotes"
 * @param identifier - PoS address
 */
function getVotes(bytes32 identifier) external view returns (uint256, uint256);

/**
 * @dev Query the PoW address binding with specified PoS address
 * @param identifier - PoS address
 */
function identifierToAddress(bytes32 identifier) external view returns (address);

```

```

/**
 * @dev Query the PoS address binding with specified PoW address
 * @param addr - PoW address
 */
function addressToIdentifier(address addr) external view returns (bytes32);

/**
 * @dev Emitted when register method executed successfully
 */
event Register(bytes32 indexed identifier, bytes blsPubKey, bytes vrfPubKey);

/**
 * @dev Emitted when increaseStake method executed successfully
 */
event IncreaseStake(bytes32 indexed identifier, uint64 votePower);

/**
 * @dev Emitted when retire method executed successfully
 */
event Retire(bytes32 indexed identifier, uint64 votePower);
}

```

[posRegister](#)

[java-examples](#)

# Day3 CrossSpaceCall

Conflux      core space   espace   core spa CrossSpaceCall      space

- createEVM - espace
- transferEVM - espace
- callEVM - espace
- staticCallEVM - espace
- withdrawFromMapped - espace      token
- mappedBalance -
- mappedNonce -      nonce



core space

espace

java-sdk

```
public String getMappedEVMSpaceAddress() {
    String hexAddr = this.getHexAddress();
    hexAddr = hexAddr.substring(2, hexAddr.length());
    byte[] t = Hash.sha3(Numeric.toHexStringToByteArray(hexAddr));

    byte[] mappedBuf = new byte[20];

    System.arraycopy(t, t.length - 20, mappedBuf, 0, 20);

    return Keys.toChecksumAddress("0x" + BaseEncoding.base16().encode(mappedBuf));
}
```

# Day4 ParamsControl

ParamsControl CIP-94

- `readVote` -
- `castVote` -
- `readVote` - espace token
- `currentRound` -
- `totalVotes` -

```
0x08880000000000000000000000000000000000000006
```

abi

```
// SPDX-License-Identifier: MIT
```

```
pragma solidity >=0.8.0;
```

```
interface ParamsControl {
    struct Vote {
        uint16 topic_index;
        uint256[3] votes;
    }
}
```

```
/** Query Functions */
```

```

/**
 * @dev cast vote for parameters
 * @param vote_round The round to vote for
 * @param vote_data The list of votes to cast
 */
function castVote(uint64 vote_round, Vote[] calldata vote_data) external;

/**
 * @dev read the vote data of an account
 * @param addr The address of the account to read
 */
function readVote(address addr) external view returns (Vote[] memory);

/**
 * @dev Current vote round
 */
function currentRound() external view returns (uint64);

/**
 * @dev read the total votes of given round
 * @param vote_round The vote number
 */
function totalVotes(uint64 vote_round) external view returns (Vote[] memory);

event CastVote(uint64 indexed vote_round, address indexed addr, uint16 indexed
topic_index, uint256[3] votes);
event RevokeVote(uint64 indexed vote_round, address indexed addr, uint16 indexed
topic_index, uint256[3] votes);
}

```

JS

v2 ~ V1

# Week12 Contract address

## 9.20 Conflux create2

Conflux create2

Conflux

create2Conflux

hex

```
# Web3.py
# from web3 import Web3
from conflux_web3 import Web3

# salt bytes32
def compute_address_using_salt(salt: bytes, bytecode_hash: bytes, deployer: HexAddress):
    core_part = Web3.solidityKeccak(
        ["bytes1", "address", "bytes32", "bytes32"],
        ["0xff", deployer, salt, bytecode_hash]
    )
    return "0x8" + core_part.hex()[-39:]
```

## 9.21 Conflux

Conflux create2 nonce

create2

Confluxhex

```
# Web3.py
# from web3 import Web3
from conflux_web3 import Web3

def compute_address_using_nonce(nonce: int, bytecode_hash: bytes, deployer: HexAddress):
    core_part = Web3.solidityKeccak(
        ["bytes1", "address", "bytes32", "bytes32"],
        ["0x00", deployer, nonce.to_bytes(32, "little"), bytecode_hash]
    )
    return "0x8" + core_part.hex()[-39:]
```

## 9.22 Create2Factory

Conflux CIP-31 Create2Factory

0x8a3a92281df6497105513b18543fd3b60c778e40 create2



## 9.23 Conflux OppenZeppelin Clones, Create2

OppenZeppelin Clones Create2 minimal proxy create2 [confluxOppenZeppelinClones.sol](#),  
[Create2.sol](#)

# Week13 - 9.26

## Day1

Conflux Core Space

(CFS)

CFS

= \* 1CFX /1024KB 1CFX

mint ERC20

```
pragma solidity ^0.8.0;
contract MinimalERC20 {
    mapping(address => uint256) public balances;

    function mint(address account, uint256 amount) public {
        balances[account] += amount;
    }
}
```

a balance 0 balaa mint(a,10) a balance balances a value 10 address uint256 32  
64\*1CFX/1024=0. 0625CFX

## Day2 Keystore

keystore

keystore

APP ZIP RAR

keystore 4

- KDF Scrypt 123456 AES-128-CTR S
- S AES-128-CTR
- 2 cyphertext
- cyphertext S SHA3

keystore

- 123456 KDF Scrypt S'
- S = S'
- S' AES-128-CTR

keystore

```
{
  "version": 3,
  "id": "7d5d99c8- f455- 49aa- 8b89- 6c795a7cdd46",
  "address": "7c52e508c07558c287d5a453475954f6a547ec41",
  "crypto": {
    "kdf": "scrypt",
    "kdfparams": {
      "dklen": 32,
      "salt": "a4f9677eaf6f72394da51e16695899ad3e9b4f2228ad4eca5ef2a5c36093fe12",
      "n": 262144,
      "r": 8,
      "p": 1
    },
    "cipher": "aes-128-ctr",
    "ciphertext": "d89df5ef74f51ae485308e6dce8991dd80674e111f8073f9efa52cb2dd6eca3f",
    "cipherparams": {
      "iv": "6b064c5b09a154d9877d3a07e610a567"
    },
    "mac": "30949eb085ce342a6a488fd51fa5e3231e45f7515efa10c19ea0d46270c73f06"
  }
}
```

JSON keystore App 123456 keystore

keystore

id	uuid
address	keystore
crypto	
kdf	Key Derivation Function , Script
kdfparams	Script
cypher	AES-128-CTR
cyphertext	
cypherparams	AES-128-CTR
mac	cyphertext keystore

[go-conflux-sdkjs-conflux-sdkjava-conflux-sdk](#)      [keystore](#)      [sdk](#)

- 1. <https://ethbook.abyteahead.com/ch2/keystore.html>

# Day3 Conflux

Dapp Conflux

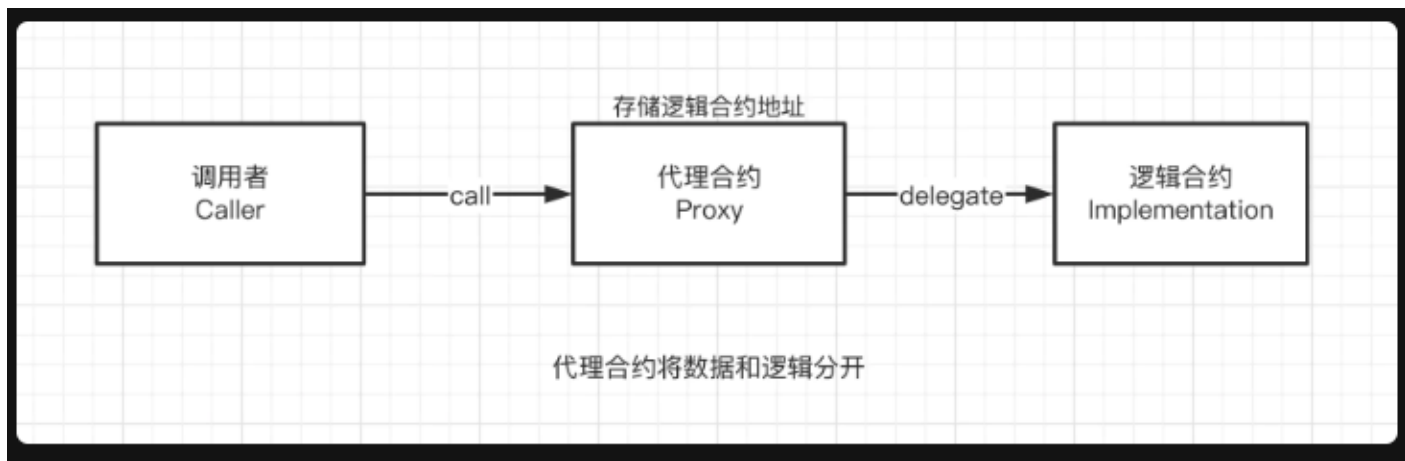
- [hardhat-conflux](#)
- [Conflux-Truffle](#)
- [Conflux ChainIDE](#)
- [Conflux studio](#)
- [Conflux Studio Web](#)

Tools

# Day4

Solidity      immutable

- 
- bug      gas



Proxy delegate

- 
- gas

# Day5 -EIP1167

EIP1167

gas

[openzeppelin](#) [clone](#)

1. <https://eips.ethereum.org/EIPS/eip-1167>
2. <https://mirror.xyz/xyyme.eth/mmUAYWFLfcHGCEfg8903SweY3SI-xIACZNDXOJ3twz8>

# Week14-

## Day1 -

- 4C 16G (fullnode 700G archivenode 1.5T)
- Linux
- 100-500G

## Day2 -

Catch-up mode catch-up mode false

cfxc core::syn - Catch-up mode: false, latest epoch: 56218274 missing\_bodies: 0

Catch-up mode latest epoch

Statistics: StatisticsInner inserted\_block\_count inserted\_header\_count inserted\_block\_count  
activated\_block\_count processed\_block\_count

2022-10-11T22:00:32.918557596+08:00 INFO IO Worker #1 cfxcore::sta - Statistics:  
StatisticsInner { sync\_graph: SyncGraphStatistics { inserted\_block\_count: 198117,  
inserted\_header\_count: 371367 }, consensus\_graph: ConsensusGraphStatistics {  
inserted\_block\_count: 136125, activated\_block\_count: 371361, processed\_block\_count: 371366 } }

## Day3 -

- 1.
- 2.
3. bootnode peer

4. ,

5. pow pos

## Day4 -

Err value: PKCS#8 cryptographic error

pos\_key , pos\_key

failed to start full client: Os { code: 6, kind: Uncategorized, message: "No such device or address" }

Docker daemon dev\_pos\_private\_key\_encryption\_password "

## Day5 - pos\_key

p(pos\_config/pos\_key, pos\_db/secure\_storage.json

# Week15 - 10.17

java-sdk

~

```
public static void pubsub() throws ConnectException {
    WebSocketService wsService = new WebSocketService("wss://test.confluxrpc.com/ws",
false);
    wsService.connect();
    Cfx cfx = Cfx.create(wsService);

    // add the filter
    BigInteger cur = cfx.getEpochNumber().sendAndGet();
    // construct the filter parameter
    LogFilter filter = new LogFilter();

    // filter details
    // filter.setFromEpoch(Epoch.numberOf(cur));
    // filter.setToEpoch(Epoch.numberOf(cur.add(new BigInteger("20"))));
    // // To filter address
    // List<Address> toFilterAddress = new ArrayList<Address>();
    // toFilterAddress.add(new
Address("cfxtest:aajb342mw5kzad6pjkkdz0wxx0tr54nfwpbu6yaj49"));
    // filter.setAddress(toFilterAddress);

    // subscribe epoch events
    // Flowable<EpochNotification> events1 = cfx.subscribeEpochs();
    // Disposable disposable1 = events1.subscribe(event -> {
    // // You can get the detail through getters
    // System.out.println(event.getParams().getResult().getEpochNumber());
    // System.out.println("epoch");
    // });
    // disposable1.dispose();
}
```



```

// subscribe newHeads events
cfx.subscribeNewHeads().subscribe(event -> {
    // You can get the detail through getters
    System.out.println(event.getParams().getResult().getEpochNumber());
}, error -> {
    error.printStackTrace();
});

// subscribe log events
//      cfx.subscribeLogs(filter).subscribe(event -> {
//          // You can get the detail through getters
//          System.out.println(event.getParams().getResult().getLogIndex());
//      }, error -> {
//          error.printStackTrace();
//      });
}

```

conflux-java sdk   web3j batch request   Batch RPC   tip

```

public static void test() throws Exception{
    Cfx t = Cfx.create("https://test.confluxrpc.com");
    Web3j client = Web3j.build(new HttpService("https://test.confluxrpc.com"));
    Account acc = Account.create(t, "fjkaldsdjfasxjvzlkxjczxlkjfas"); //replace with your
private key or to export the account from the keystore.
    Account.Option option = new Account.Option();
    RawTransaction tx = option.buildTx(t, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wxx0tr54nfwpbu6yaj49"), acc.getPoolNonce(), new
Address("cfxtest: aar9up0wsbg7w7f0g5tyc4hbwb2wa5wf7emmk94znd"), null);
    RawTransaction tx1 = option.buildTx(t, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wxx0tr54nfwpbu6yaj49"),
acc.getPoolNonce().add(BigInteger.ONE), new
Address("cfxtest: aar9up0wsbg7w7f0g5tyc4hbwb2wa5wf7emmk94znd"), null);
    RawTransaction tx2 = option.buildTx(t, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wxx0tr54nfwpbu6yaj49"),
acc.getPoolNonce().add(BigInteger.TWO), new
Address("cfxtest: aar9up0wsbg7w7f0g5tyc4hbwb2wa5wf7emmk94znd"), null);
    RawTransaction tx3 = option.buildTx(t, new

```

```

Address("cfxtest: aajb342mw5kzad6pjjdkz0wxx0tr54nfwpbu6yaj49"),
acc.getPoolNonce().add(BigInteger.valueOf(3)), new
Address("cfxtest: aar9up0wsbgtw7f0g5tyc4hbwb2wa5wf7emmk94znd"), null);

tx.setValue(BigInteger.valueOf(100));
String signedTx = acc.sign(tx);
String signedTx1 = acc.sign(tx1);
String signedTx2 = acc.sign(tx2);
String signedTx3 = acc.sign(tx3);

BatchResponse resp = client.newBatch()
    .add(t.sendRawTransaction(signedTx))
    .add(t.sendRawTransaction(signedTx1))
    .add(t.sendRawTransaction(signedTx2))
    .add(t.sendRawTransaction(signedTx3))
    .send();

System.out.println(resp.getResponses().get(0).getResult());
}

```

web3j client -> rawtransaction -> web3jclient batch ->

java-sdk nonce

web3j client -> rawtransaction -> web3jclient batch

## ERC20

```

public static void batchTx() throws Exception {
    String addr = "cfxtest: acffj2hwbrwbsxuk56jne9913xvmwj5g4u7syhbfr2";
    Cfx cfx = Cfx.create("https://test.confluxrpc.com");
    Web3j client = Web3j.build(new HttpService("https://test.confluxrpc.com"));
    Account acc = Account.create(cfx, "fjkaldsdjfasxjvzlkxjczxlkjfas"); //replace with
your own private key.
    BigInteger amount = BigInteger.valueOf(100);
    String data = call(new Address(addr), "transfer", new

```

```

Address("cfxtest: aar9up0wsbg7f0g5tyc4hbw2wa5wf7emmk94znd").getABIAddress(), new
    Uint256(amount));

    Account.Option option = new Account.Option();
    RawTransaction tx = option.buildTx(cfx, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wx0tr54nfwpbu6yaj49"), acc.getPoolNonce(), new
Address(addr), data);

    RawTransaction tx1 = option.buildTx(cfx, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wx0tr54nfwpbu6yaj49"),
acc.getPoolNonce().add(BigInteger.ONE), new Address(addr), data);

    RawTransaction tx2 = option.buildTx(cfx, new
Address("cfxtest: aajb342mw5kzad6pjkdz0wx0tr54nfwpbu6yaj49"),
acc.getPoolNonce().add(BigInteger.TWO), new Address(addr), data);

    String signedTx = acc.sign(tx);
    String signedTx1 = acc.sign(tx1);
    String signedTx2 = acc.sign(tx2);

    BatchResponse resp = client.newBatch()
        .add(cfx.sendRawTransaction(signedTx))
        .add(cfx.sendRawTransaction(signedTx1))
        .add(cfx.sendRawTransaction(signedTx2))
        .send();

    System.out.println(resp.getResponses().get(0).getResult());

}

public static String call(String method, Type<?>... inputs) throws Exception {

    Function function = new Function(method, Arrays.asList(inputs),
Collections.emptyList());

    String data = FunctionEncoder.encode(function);

    return data ;
}

```

&

call    request    `DecodeUtil.decode`    batch    rawdata

```
public static void queryInfo() throws Exception{
    Cfx t = Cfx.create("https://test.confluxrpc.com");
    Web3j client = Web3j.build(new HttpService("https://test.confluxrpc.com"));

    BatchResponse resp = client.newBatch()
        .add(t.getBestBlockHash())
        .add(t.getBalance(new
Address("cfxtest: aajb342mw5kzad6pjkkdz0wxx0tr54nfwpbu6yaj49")))
        .add(t.getEpochNumber())
        .send();

    System.out.println(Numeric.decodeQuantity(resp.getResponses().get(2).getResult().toString()));
    System.out.println(resp.getResponses().get(0).getResult().toString());

    System.out.println(Numeric.decodeQuantity(resp.getResponses().get(1).getResult().toString()));
}

// ERC20
public static void batchQueryContract() throws Exception {
    String addr = "cfxtest: acffj2hwbrwbsxuk56jne9913xvmwj5g4u7syhbfr2";
    Cfx cfx = Cfx.create("https://test.confluxrpc.com");
    Web3j client = Web3j.build(new HttpService("https://test.confluxrpc.com"));
    ContractCall call = new ContractCall(cfx, new Address(addr));

    ContractCall call1 = new ContractCall(cfx, new Address(addr));
    ContractCall call2 = new ContractCall(cfx, new Address(addr));
    ContractCall call3 = new ContractCall(cfx, new Address(addr));

    BatchResponse resp = client.newBatch()
        .add(call.call("name"))
        .add(call1.call("symbol"))
```

```

        .add(call2.call("totalSupply"))
        .add(call3.call("decimals"))
        .send();

    String name = DecodeUtil.decode(resp.getResponses().get(0).getResult().toString(),
    Utf8String.class);

    String symbol = DecodeUtil.decode(resp.getResponses().get(1).getResult().toString(),
    Utf8String.class);

    BigInteger decimals =
    DecodeUtil.decode(resp.getResponses().get(3).getResult().toString(), Uint8.class);

    BigInteger totalSupply =
    DecodeUtil.decode(resp.getResponses().get(2).getResult().toString(), Uint256.class);


    System.out.println(name);
    System.out.println(symbol);
    System.out.println(decimals);
    System.out.println(totalSupply);
}

```

# ERC4907

ERC4907 ERC721

ERC721

NFT

NFT

ERC4907

ERC4907

ERC4907

User owner owner NFT ERC4907 owner user

ERC4907 user Nexpire

1. A            A    NFT
2. A        NFT
3. B                            B                    NFT A                    NFT            B
4.        A        NFT

```
interface IERC4907 {

    // Logged when the user of an NFT is changed or expires is changed
    /// @notice Emitted when the `user` of an NFT or the `expires` of the `user` is changed
    /// The zero address for user indicates that there is no user address
    event UpdateUser(uint256 indexed tokenId, address indexed user, uint64 expires);

    /// @notice set the user and expires of an NFT
    /// @dev The zero address indicates there is no user
    /// Throws if `tokenId` is not valid NFT
    /// @param user The new user of the NFT
    /// @param expires UNIX timestamp, The new user could use the NFT before expires
    function setUser(uint256 tokenId, address user, uint64 expires) external;

    /// @notice Get the user address of an NFT
    /// @dev The zero address indicates that there is no user or the user is expired
    /// @param tokenId The NFT to get the user address for
    /// @return The user address for this NFT
    function userOf(uint256 tokenId) external view returns(address);

    /// @notice Get the user expires of an NFT
    /// @dev The zero value indicates that there is no user
    /// @param tokenId The NFT to get the user expires for
    /// @return The user expires for this NFT
    function userExpires(uint256 tokenId) external view returns(uint256);
}
```

The userOf(uint256 tokenId) function MAY be implemented as pure or view.

The userExpires(uint256 tokenId) function MAY be implemented as pure or view.

The setUser(uint256 tokenId, address user, uint64 expires) function MAY be implemented as public or external.

The `UpdateUser` event **MUST** be emitted when a user address is changed or the user expires is changed.

The `supportsInterface` method **MUST** return `true` when called with `0xad092b5c`.

[EIP-4907](#)

# Week16: 10.24 - 10.28

## python-sdk

python-conflux `python-conflux-sdk` `web3.py`

API `3.8 <= python version <= 3.10`

```
python -m venv venv
source ./venv/bin/activate
pip install conflux-web3
```

### 10.24 python-conflux-sdk: Base32Address

Conflux `Base32` `Base32Address` `str` `==` `__eq__`) [Base32Address](#)

```
>>> from cfx_address import Base32Address
>>> address = Base32Address("0x1ecde7223747601823f7535d7968ba98b4881e09", network_id=1)
' cfxtest: aatp533cg7d0agbd87kz48nj1mpnkca8be1rz695j4'
>>> address_ = Base32Address(address, network_id=1029, verbose=True)
>>> address_
' CFX: TYPE. USER: AATP533CG7D0AGBD87KZ48NJ1MPNKCA8BE7GGP3VPU'
>>> isinstance(address_, str)
True
>>> address_ == ' cfxtest: aatp533cg7d0agbd87kz48nj1mpnkca8be1rz695j4'
True
>>> [
...     address.address_type,
...     address.network_id,
...     address.hex_address,
...     address.verbose_address,
...     address.abbr,
...     address.mapped_evm_space_address,
...     address.eth_checksum_address,
... ]
['user', 1, '0x1ecde7223747601823f7535d7968ba98b4881e09',
```



```
' CFXTEST: TYPE. USER: AATP533CG7D0AGBD87KZ48NJ1MPNKCA8BE1RZ695J4', ' cfxtest: aat...95j4',  
' 0x349f086998cF4a0C5a00b853a0E93239D81A97f6', ' 0x1ECdE7223747601823f7535d7968Ba98b4881E09' ]
```

python-conflux-sdk(conflux-web3) `Base32Address`

`str` / `Base32Address`

```
>>> from conflux_web3 import Web3  
>>> w3 = Web3(Web3.HTTPProvider("https://test.confluxrpc.com"))  
>>> miner = w3.cfx.get_block_by_epoch_number("latest_mined")["miner"]  
>>> miner.address_type  
'user'
```

## 10.25 python-conflux-sdk: wallet

web3.py `construct_sign_and_send_raw_middleware` `send_transaction`

```
# `web3.py`      `construct_sign_and_send_raw_middleware`  
from web3 import Web3, EthereumTesterProvider  
w3 = Web3(EthereumTesterProvider)  
from web3.middleware import construct_sign_and_send_raw_middleware  
from eth_account import Account  
acct = Account.create('random string')  
w3.middleware_onion.add(construct_sign_and_send_raw_middleware(acct))  
w3.eth.default_account = acct.address  
legacy_transaction = {  
    'to': Account.create('another random string'),  
    'value': 22,  
    'gasPrice': 123456, # optional - if not provided, gas_price_strategy (if exists) or  
    eth_gasPrice is used  
}  
w3.eth.send_transaction(legacy_transaction)
```

python-conflux-sdk `conflux_web3.middleware` `construct_sign_and_send_raw_middleware`)

```
from conflux_web3 import Web3  
from cfx_account import LocalAccount  
w3 = Web3(Web3.HTTPProvider("https://test.confluxrpc.com"))  
acct: LocalAccount = w3.account.create("random string")  
  
w3.cfx.default_account = acct  
# default_account      LocalAccount  
# w3.wallet.add_account(acct)
```

```
# w3.cfx.default_account = acct.address

#           from
#   from       w3.cfx.default_account       from
transaction = {
    'to': w3.address.zero_address(network_id=1),
    'value': 22,
    'gasPrice': 10**9,
}
w3.cfx.send_transaction(transaction).executed()
```

```
# wallet         account
assert acct.address in w3.wallet
acct_ = w3.account.from_key("FILL YOUR SECRET KEY HERE")
w3.wallet.add_account(acct_)
assert (acct.address in w3.wallet) and (acct_ in w3.wallet)

transaction = {
    'to': w3.address.zero_address(network_id=1),
    'value': 22,
    'gasPrice': 10**9,
    'from': acct_.address
}
w3.cfx.send_transaction(transaction).executed()
```

## 10.26 python-conflux-sdk:

web3.py    wait\_for\_transaction\_receipt

Conflux

1. pending
2. mined
3. executed                      5 epoch
4. confirmed              PoW                      revert
5. finalized              PoS                      revert              5-10

python-conflux-sdk    wait\_till\_transaction\_mined, wait\_till\_transaction\_executed, wait\_till\_transaction\_executed, wait\_till\_transaction\_confirmed, wait\_till\_transaction\_finalized

API                      sdk                      API

```
from conflux_web3 import Web3
w3 = Web3(Web3.HTTPProvider("https://test.confluxrpc.com"))
```

```
acct = w3.account.create("random string")
w3.cfx.default_account = acct

transaction = {
    'to': w3.address.zero_address(network_id=1),
    'value': 22,
    'gasPrice': 10**9,
}
tx_hash = w3.cfx.send_transaction(transaction)

tx_hash.mined()
tx_hash.executed()
tx_hash.confirmed()
tx_hash.finalized()
```

## 10.27 python-conflux-sdk: contract name

python-conflux-sdk `name`, `abi`, `bytecode`, `address`

```
from conflux_web3 import Web3
w3 = Web3(Web3.HTTPProvider("https://test.confluxrpc.com"))
acct = w3.account.create()
w3.default_account = acct

# CFX
faucet = w3.cfx.contract(name="Faucet")
assert faucet.address == "cfxtest:acejjfa80vj06j2jgtz9pngkv423fhkuxj786kjr61"
faucet.functions.claimCfx().transact().executed()

# ERC20
erc20_factory = w3.cfx.contract(name="ERC20")
contract_address = (erc20_factory.constructor(name="Coin", symbol="C", initialSupply=10**18)
                    .transact()
                    .executed()["contractCreated"])

# ERC20
erc20_instance = erc20_factory(contract_address)
erc20_instance.functions.transfer(w3.cfx.address.zero_address(network_id=1),
100).transact().executed()
```

# Week 17 - 10.31

## Day1 - EIP1967

delegatcall

EIP-1967

```
=>
bytes32(uint256(keccak256("eip1967.proxy.implementation") - 1))

event Upgraded(address indexed implementation);

=> beacon
bytes32(uint256(keccak256("eip1967.proxy.beacon") - 1))

event BeaconUpgraded(address indexed beacon);

=> admin
bytes32(uint256(keccak256("eip1967.proxy.admin") - 1))

event AdminChanged(address indexed previousAdmin, address newAdmin);
```

hash slot

slot

EIP1967 <https://eips.ethereum.org/EIPS/eip-1967>

## Day2 - ERC1967Proxy

ERC1967Proxy EIP1967 openzeppelin

[EIP1967 Slot](#) [ERC1967Proxy](#)

FUNCTIONS

```
constructor( _logic, _data)
```

```
_implementation()
```

## ERC1967UPGRADE

```
_getImplementation()
```

```
_upgradeTo( newImplementation)
```

```
_upgradeToAndCall( newImplementation, data, forceCall)
```

```
_upgradeToAndCallUUPS( newImplementation, data, forceCall)
```

```
_getAdmin()
```

```
_changeAdmin( newAdmin)
```

```
_getBeacon()
```

```
_upgradeBeaconToAndCall( newBeacon, data, forceCall)
```

## PROXY

```
_delegate( implementation)
```

```
_fallback()
```

```
fallback()
```

```
receive()
```

```
_beforeFallback()
```

## EVENTS

```
ERC1967UPGRADE
```

```
Upgraded( implementation)
```

```
AdminChanged( previousAdmin, newAdmin)
```

BeaconUpgraded( beacon)

# Day3 - Transparent Proxy

Openzeppelin

Transparent Proxy

EIP1967Proxy

- 1.
2. “admin cannot fallback to proxy t

ProxyAdmin

[https://docs.openzeppelin.com/contracts/4.x/api/proxy#transparent\\_proxy](https://docs.openzeppelin.com/contracts/4.x/api/proxy#transparent_proxy)

# Day4 - UUPS Proxy

upgradeTo( address newImpl)

Box

```
contract Box {
    uint256 private _value;

    function store(uint256 value) public { /*..*/ }

    function retrieve() public view returns (uint256) { /*..*/ }
}

contract BoxProxy {

    function _delegate(address implementation) internal virtual { /*..*/ }

    function getImplementationAddress() public view returns (address) { /*..*/ }
```

```

    fallback() external { /*..*/ }

    // Upgrade logic in Proxy contract
    upgradeTo(address newImpl) external {
        // Changes stored address of implementation of contract
        // at its slot in storage
    }
}

```

# UUPS Proxy

UUPS      EIP1822      UUPS      Transparent      Pro

UUPS      OpenZeppelin UUPSUpgradeable

```

contract Box is UUPSUpgradeable {
    uint256 private _value;

    function store(uint256 value) public { /*..*/ }

    function retrieve() public view returns (uint256) { /*..*/ }

    // Upgrade logic in Implementation contract
    upgradeTo(address newImpl) external {
        // Changes stored address of implementation of contract
        // at its slot in storage
    }
}

contract BoxProxy {

    function _delegate(address implementation) internal virtual { /*..*/ }

    function getImplementationAddress() public view returns (address) { /*..*/ }

    fallback() external { /*..*/ }

}

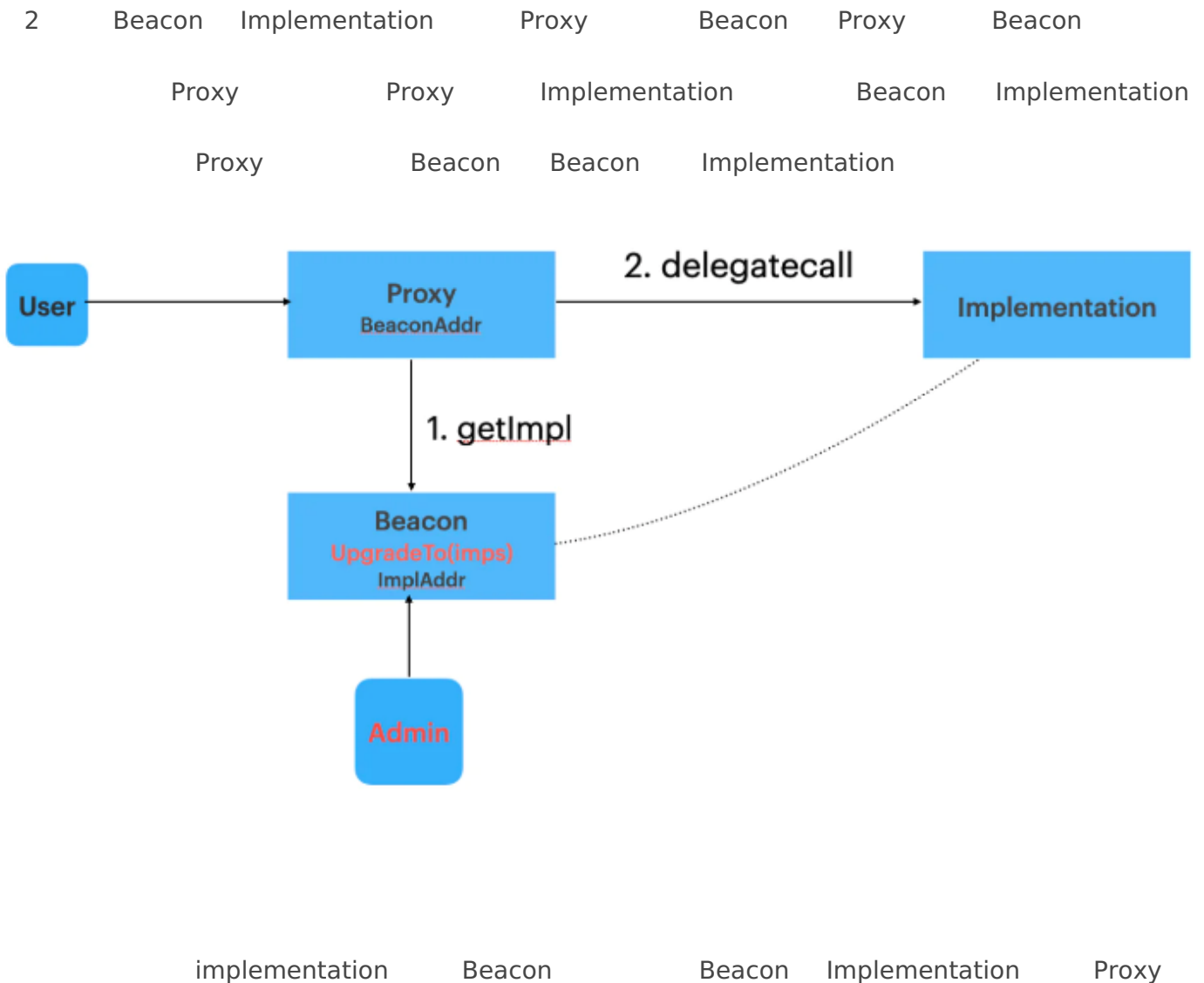
```

UUPS

UUPS

1. <https://learnblockchain.cn/article/4257>
2. <https://docs.openzeppelin.com/contracts/4.x/api/proxy#UUPSUpgradeable>

## Day5 - Beacon



1. <https://docs.openzeppelin.com/contracts/4.x/api/proxy#beacon>
2. [https://mirror.xyz/rbtree.eth/qDSQvenBZ\\_TWqZLUTlxiXVlhKQzPygRyv88EMFWxJro](https://mirror.xyz/rbtree.eth/qDSQvenBZ_TWqZLUTlxiXVlhKQzPygRyv88EMFWxJro)



# Week18-Conflux

## Day1 Shuttleflow

Shuttleflow Conflux Conflux Core EVM ETH BSC, Bitcoin, Huobi Heco

## Day2 ConfluxHub Space Bridge

Space Bridge Conflux Space Space bridge, CFX ERC20 Bridge Core C

## Day3 ConfluxHub BSC-eSpace Bridge

Bridge CFX BSC eSpace

## Day4 multichain

## Day5 celer bridge

## Day6 meson

meson Core eSpace

# Week19- 11.14

## Day1 Java-Solidity-

The basic types in `solidity` such as the `uint256`, `bytes`, `byte32[]` can be shown in the following.

Solidity Type	web3j.abi type	conflux-java-sdk Type	Example
uintxxx	Uintxxx	BigInteger	new Uint256(new BigInteger("111"))
address	Address	Address(cfx:xxxx)	new org.web3j.abi.Address(new Address("xxxxx"))
bool	Bool	Boolean	new Bool(true)
string	Utf8String	String	new Utf8String("heyman")
bytesxx	Bytesxx	byte[]	new Bytes32("111".getBytes())
bytes	DynamicBytes	byte[]	new DynamicBytes("111".getBytes())
Static Array (address[2])	StaticArray2		new StaticArray2<>(org.web3j.abi.datatypes.Address.class, xxx)
Dynamic Array (address[])	DynamicArray		new DynamicArray<>(org.web3j.abi.datatypes.Address.class, xxx)

```
struct Foo {  
    Address[] addresses;  
}
```

```

public static class BasicAddressesStruct extends DynamicStruct {
    public List<org.web3j.abi.datatypes.Address> addr;

    public BasicAddressesStruct(List<org.web3j.abi.datatypes.Address> addr) {
        super(new
org.web3j.abi.datatypes.DynamicArray<org.web3j.abi.datatypes.Address>(addr));
        this.addr = addr;
    }

    public BasicAddressesStruct(DynamicArray<org.web3j.abi.datatypes.Address> addr) {
        super(addr);
        this.addr = addr.getValue();
    }
}

```

bytes[], string

DynamicStruct

StaticStruct

## Day2 Decode

hexstring

hexstring

```
contractCall.callAndGet(Utf8String.class,"text", node, key)
```

java-sdk posRegist getVotes

TupleDecoder hexstring decode

```

BigInteger[] res = new BigInteger[2];

String rawData = this.call("getVotes", new
Bytes32(Numeric.hexStringToByteArray(identifier))).sendAndGet();
rawData = Numeric.cleanHexPrefix(rawData);
TupleDecoder decoder = new TupleDecoder(rawData);
res[0] = decoder.nextUint256();

```

```
res[1] = decoder.nextUint256();
```

decoder    address bytes    decode

web3j FunctionReturnDecoder    decode

```
String rawData = this.call("getVotes", new
Bytes32( Numeric.toHexStringToByteArray( identifier))). sendAndGet();

List outputParameters = new ArrayList<TypeReference<Type>>();
outputParameters.add( new TypeReference<Uint256>() {});
outputParameters.add( new TypeReference<Uint256>() {});

List<Type> list = FunctionReturnDecoder.decode(rawData, outputParameters);
```

## Day3      decode

```
struct price{
    Uint256 base
    Uint256 premium
}
```

```
public static class Price extends StaticStruct {
    public BigInteger base;
    public BigInteger premium;

    public Price(Uint256 base, Uint256 premium) {
        super(base, premium);
        this.base = base.getValue();
        this.premium = premium.getValue();
    }
}
```

price

Uint256

StaticStruct

DynamicStruct

[illegible]

# Day4

Web3j `DynamicArray` `StaticArray`

```
//struct BasicAddresses{
//    address[] addr;
//}

String hash = account.call(opt, contract_address, "write", basicAddresses);
```

MethodSignature	signature	methodid	encode	rawdata
-----------------	-----------	----------	--------	---------

```
methodid      methodid rawdata
```

web3j DefaultFunctionEncoder.java encodeFunction

```
@Override
public String encodeFunction(final Function function, String signature) {
    String methodId = buildMethodId(signature);
    final StringBuilder result = new StringBuilder(methodId);

    return encodeParameters(parameters, result);
}

// methodSignature      ( )      ( xxx)   writeBasicAddressesStruct(( address[]))

public static String buildMethodId(final String methodSignature) {
    final byte[] input = methodSignature.getBytes();
    final byte[] hash = Hash.sha3(input);
```

```
return Numeric.toHexString(hash).substring(0, 10);  
}
```

Function

```
Function f = new Function(  
    "writeBasicAddressesStruct",  
    Arrays.asList(struct),  
    Collections.emptyList()  
);
```

rawdata

```
String hash = acc.callWithData(new Address(addr), t);
```

## Day5 web3j

web3j web3j cc java.lang.UnsupportedOperationException: Array types must be wrapped  
in a TypeReference

<https://github.com/web3j/web3j/issues/1726>

web3j bug

# Week 20 11.28

## 11.28 HD Wallet

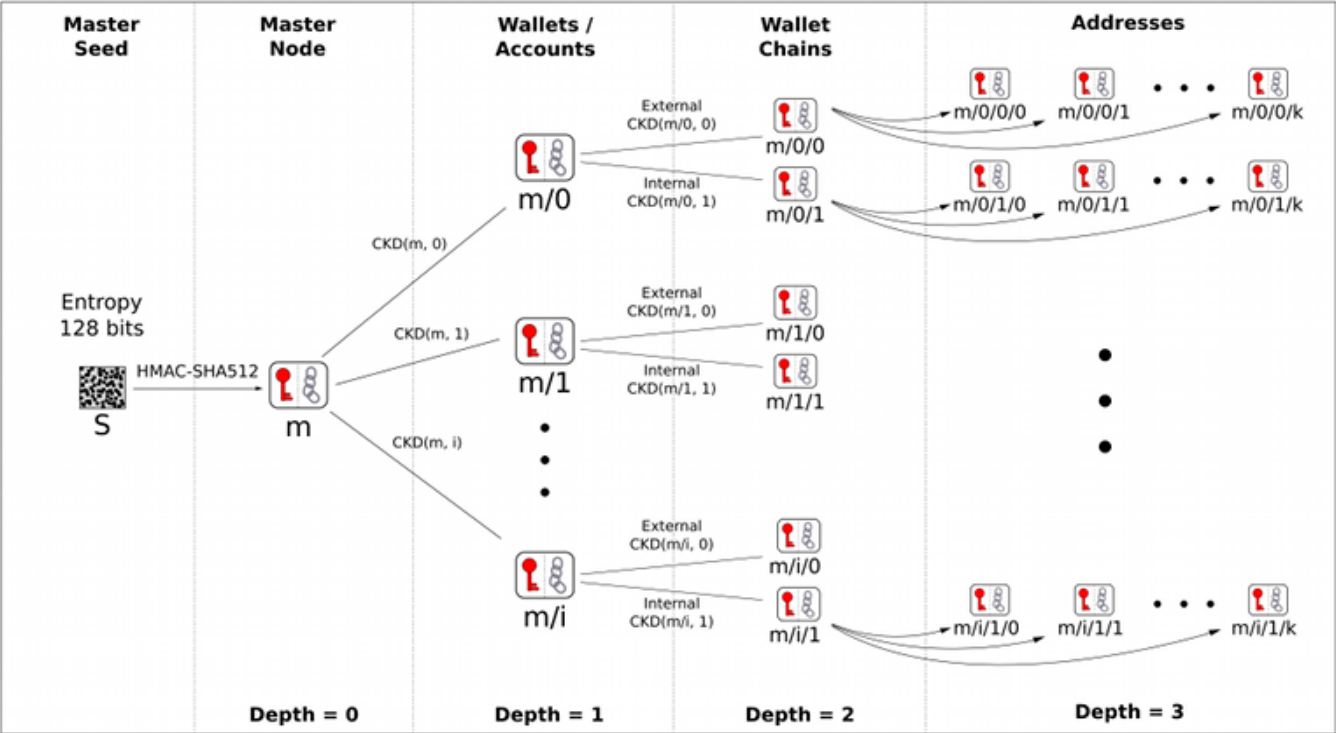
BIP-32 HD Wallet / Hierarchical Deterministic BIP-44

m / purpose' / coin\_type' / account' / change / address\_index

coin\_type coin\_type 0 60 Conflux 503

HD Wallet BIP-32 Master Seed 128bit 512bit

### BIP 32 - Hierarchical Deterministic Wallets



Child Key Derivation Function ~  $CKD(x,n) = \text{HMAC-SHA512}(x_{\text{Chain}}, x_{\text{PubKey}} || n)$

## 11.29 HD Wallet

HD HD Master Seed " " fluent, meta

```
DK = PBKDF2(PRF, Password, Salt, c, dkLen)
```

5 BIP39

- PRF BIP-39 HMAC-SHA512
- Password PBKDF2 BIP-39 Master Seed utf-8
- Salt mnemonic 123456 mnemonic + mnemonic123456
- c BIP-39 2048.
- dkLen BIP-39 512

HD Wallet Master Seed HD Master Seed

# 11.30

BIP-39

- 2048
- 12

nurse silk fiber machine jelly reduce coffee language fox forum cause team

204nurse 1212 10010111100 12 (12\*11=)132bit 132 128

1. ENT bit E 128<=ENT<=256 os.urandom python

2. ENT 56 ENT/32 ENT=128 4

3. 3/32\*ENT

## 12.1 Keystore

Keystore Keystore

```
{
  "version": 3,
  "id": "db029583- f1bd- 41cc- aeb5- b2ed5b33227b",
  "address": "1cad0b19bb29d4674531d6f115237e16afce377c",
  "crypto": {
    "ciphertext": "3198706577b0880234ecbb5233012a8ca0495bf2cfa2e45121b4f09434187aba",
```



```

    "cipherparams": {"iv": "a9a1f9565fd9831e669e8a9a0ec68818"},
    "cipher": "aes-128-ctr",
    "kdf": "scrypt",
    "kdfparams": {
      "dklen": 32,
      "salt": "3ce2d51bed702f2f31545be66fa73d1467d24686059776430df9508407b74231",
      "n": 8192,
      "r": 8,
      "p": 1,
    },
    "mac": "cf73832f328f3d5d1e0ec7b0f9c220facf951e8bba86c9f26e706d2df1e34890",
  },
}

```

ciphertext
cipher
cipherparams
kdf
kdfparams

keystore

SDK
 [Keystore](#)
 Keystore

## 12.2

random
pyrandom.random
java.util.random
[wintermute](#)

SDK
 /dev/urandom
/dev/random

Linux

SDK

```

extra_key_bytes = text_if_str(to_bytes, extra_entropy)
key_bytes = keccak(os.urandom(32) + extra_key_bytes)

```

/dev/urandom
urandom
u
"
/dev/random
/dev/urandom
/dev/urandom
/dev/random
/dev/urandom
/dev/random

```

with open("/dev/random", 'rb') as f:
    print(f.read(32).hex())

```