



DESCA

**Decentralized
Supply Chain
Application**

powered by:



Semantic Blockchain: DESCAs

Semantic Supply Block Chain

By: Eng. Héctor Ugarte

Melting 3 Powerful concepts and technologies



By: Eng. Héctor Ugarte



The Semantic Web is an extension of the Web through standards by the World Wide Web Consortium (W3C) The standards promote common data formats and exchange protocols on the Web, most fundamentally the Resource Description Framework (RDF).

Source:

https://en.wikipedia.org/wiki/Semantic_Web

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Supply Chain Management

Supply chain management (SCM), the management of the flow of goods and services, involves the movement and storage of raw materials, of work-in-process inventory, and of finished goods from point of origin to point of consumption.

Source:

https://en.wikipedia.org/wiki/Supply_chain_management

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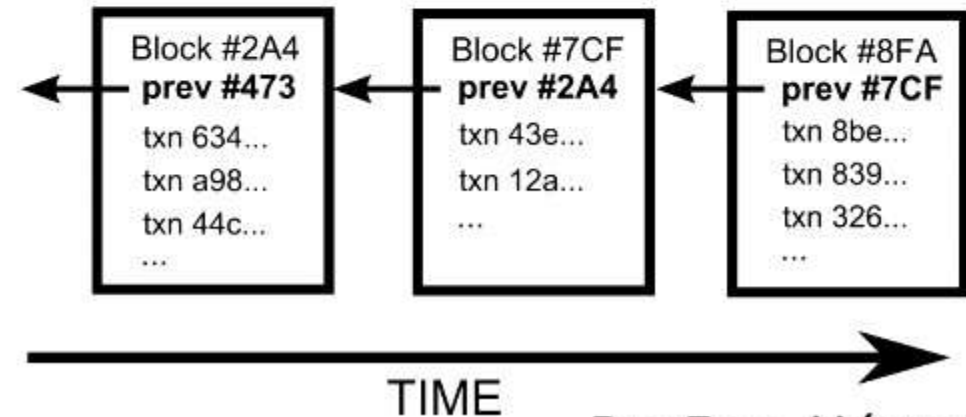
BlockChain



Block chain is a distributed database that maintains a continuously-growing list of data records secured from tampering and revision.

Source:

[https://en.wikipedia.org/wiki/Blockchain_\(database\)](https://en.wikipedia.org/wiki/Blockchain_(database))



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THE FRAMEWORK BEHIND IS SEMANTIC BLOCKCHAIN



Semantic Blockchain:

Semantic Blockchain is a distributed database that maintains a continuously-growing list of standardized data records, using generally Resource Description Framework (RDF), hardened against tampering and revision.

Source:

<https://semanticblockchain.wordpress.com/2016/07/29/what-the-heck-is-semantic-blockchain/>



So what is DeSCA?

DeSCA. **A prototype** that merge the 3 technologies:

- **Semantic Web.** Data is also replicated on RDF format and stored on IPFS or in the blockchain.
- **Supply Chain Management.** Using the blockchain principles, a basic SCM system is implemented on top of the blockchain.
 - **Blockchain.** The chosen technology is Ethereum.

DeSCA screenshots:

An administrator
register new users

Only this new users and the
administrator can make use
of the system

The screenshot displays the DeSCA web application interface. The top navigation bar includes a logo, a user profile icon, and links for 'Administrator', 'User', 'New Account', and 'Settings'. The left sidebar features the DeSCA logo and two buttons: 'Manage Users' and 'Show Provenance'. The main content area is divided into three sections: 'Contract Information' with a 'Contract Address' field and a warning message; 'Credentials' with an 'Account' dropdown and a 'Password' field with a warning message; and 'Manage Users' with fields for 'Public key', 'Name', 'Job Title', 'Company', 'Role', and 'Active?' (radio buttons for 'Yes' and 'No').

Contract Information

Contract Address

WARNING! You are not connected to any contract!

Credentials

Account

Please select your account

Password

WARNING! You did not insert a password!

Manage Users

Public key

Public key

Name

First Name

Job Title

Job Title

Company

Company

Role

Please select the role

Active?

Yes

No

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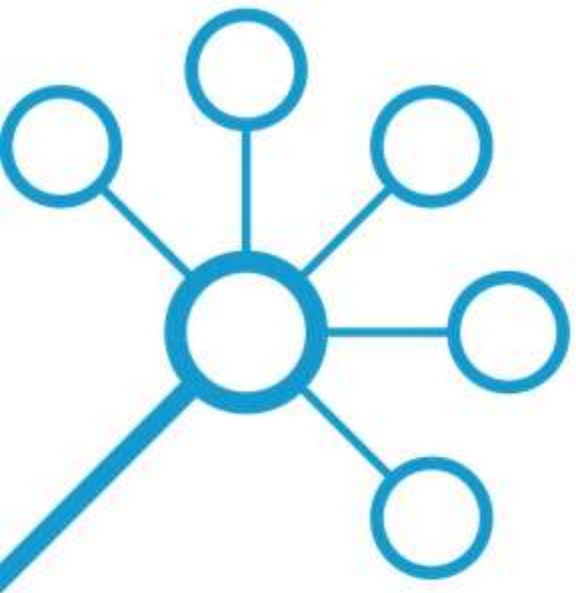
DeSCA screenshots:

A register user can
Register new Items

Every new item has an
Initial owner (creator) and
can be transferred to other
registered users.

The screenshot displays the DeSCA web application interface. At the top, a navigation bar includes the DeSCA logo, user roles (Administrator, User), and links for 'New Account' and 'Settings'. The main content area is divided into three sections: 'Contract Information' (light blue), 'Credentials' (light green), and 'New Item' (light grey). The 'Contract Information' section contains a 'Contract Address' field with a warning message: 'WARNING! You are not connected to any contract!'. The 'Credentials' section has an 'Account' dropdown menu with the text 'Please select your account' and a 'Password' field with a warning message: 'WARNING! You did not insert a password!'. The 'New Item' section contains several input fields: 'Item Name' (text), 'Code' (text), 'Decimals' (text), 'Total Supply' (text), 'Description' (text), and 'RDF Data' (text). A sidebar on the left contains a 'New Item' button and links for 'Transfer Item' and 'Show Provenance'.

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RDF Data Resource Description Framework

Public key

Name

Job Title

Company

Role

Active? ☒ Yes ☐ No

RDF Data

Location of RDF data

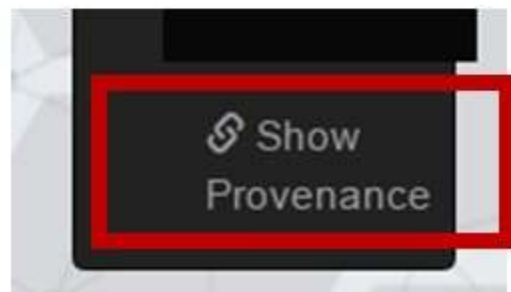
[Register User](#)

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PROVENANCE

- It is possible to track the provenance of Items

“Provenance is a record that describes the people, institutions, entities, and activities involved in producing, influencing, or delivering a piece of data or a thing”



Source: Moreau, Luc. Missier, \Prov-dm: The prov data model."

Ethereum Management (Create accounts, Unlock accounts)

- GETH

```
at block: 117098 (Thu, 20 Aug 2015 23:44:17 EEST)
modules: admin:1.0 db:1.0 debug:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 shh:1.0 txpool:1.0 web3:1.0
> 10820 23:58:38.269671 13812 downloader.go:2781 Block synchronisation started
10820 23:58:42.411908 13812 chain_manager.go:6601 imported 0 block(s) <0 queue
d 1 ignored> including 0 txs in 1.363078s. #117098 [fc6af5c5 / fc6af5c5]
10820 23:58:42.441909 13812 chain_manager.go:6601 imported 9 block(s) <0 queue
d 0 ignored> including 1 txs in 29.0017ms. #117107 [3c6814fb / c8eff7b9]
10820 23:58:51.031401 13812 chain_manager.go:6601 imported 29 block(s) <0 queue
ed 0 ignored> including 1 txs in 77.0044ms. #117136 [72058693 / 7bf06765]
10820 23:58:56.248699 13812 chain_manager.go:6601 imported 1 block(s) <0 queue
d 0 ignored> including 0 txs in 11.0007ms. #117137 [436d175d / 436d175d]
10820 23:58:57.945796 13812 chain_manager.go:6601 imported 1 block(s) <0 queue
d 0 ignored> including 0 txs in 10.0005ms. #117138 [72270f654746da22639a7a0c97dd97a7050b9e252391996a]
10820 23:59:19.912052 13812 chain_manager.go:6601 imported 1 block(s) <0 queue
d 0 ignored> including 0 txs in 10.0005ms. #117139 [72270f654746da22639a7a0c97dd97a7050b9e252391996a]
10820 23:59:19.944054 13812 chain_manager.go:6601 imported 1 block(s) <0 queue
d 0 ignored> including 0 txs in 10.0005ms. #117140 [05bef30ef572370f654746da22639a7a0c97dd97a7050b9e252391996a]
10820 23:59:19.997057 13812 downloader.go:2541 Block synchronisation started
unloading canceled (requested)
10820 23:59:47.445627 13812 chain_manager.go:6601 imported 1 block(s) <0 queue
d 0 ignored> including 0 txs in 14.0008ms. #117141 [05bef30ef572370f654746da22639a7a0c97dd97a7050b9e252391996a]
```

New Account

Password



Choose a password

This will create a new account on the Geth client. The account is handled by Geth, not by this ÐApp. Be careful remembering your personal password.

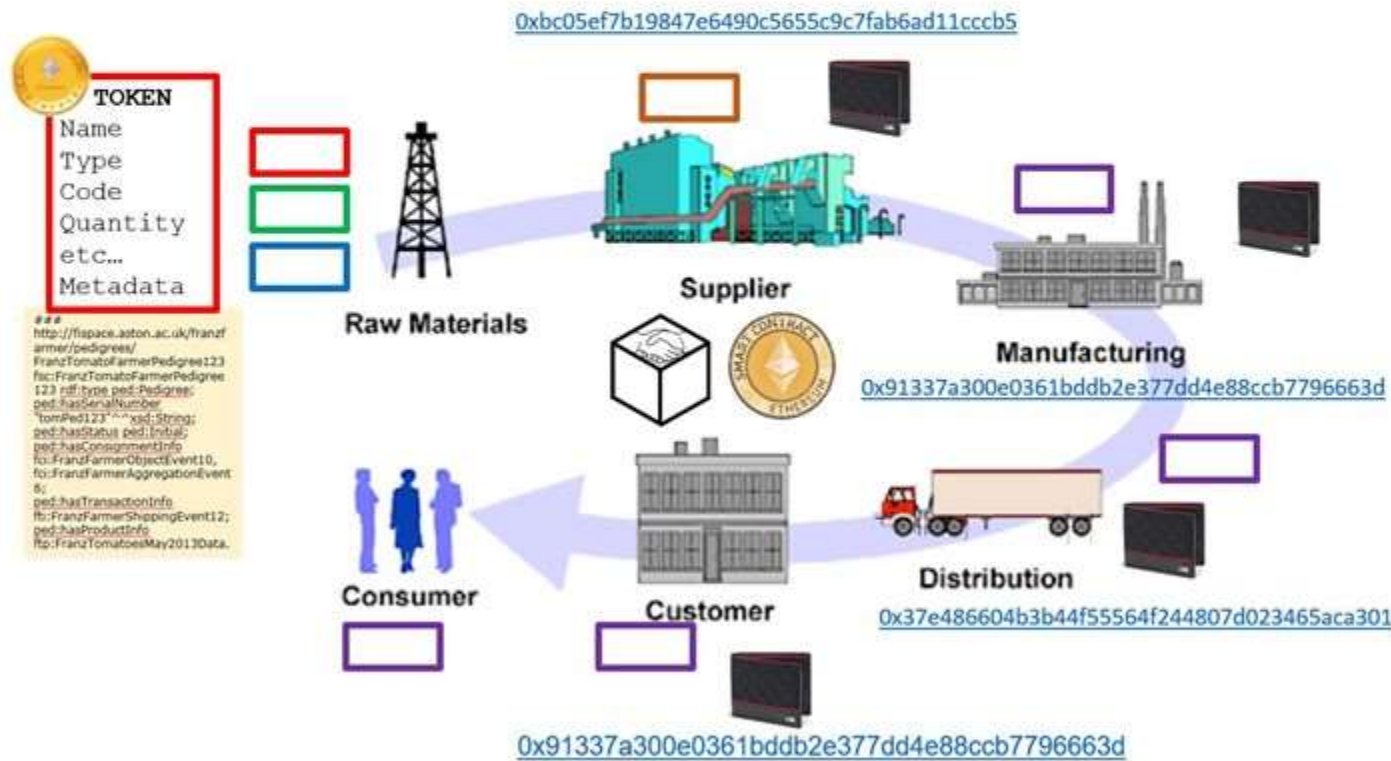
Create +

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General Process



ethereum



Based on an image taken from: W. Vorhies, "Predictive Analytics in the Supply Chain"
<http://www.datasciencecentral.com/profiles/blogs/predictive-analytics-in-the-supply-chain>

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Semantic Supply Block Chain

- Smart Contract

“Pieces of code, stored on the Ethereum blockchain”



```
contract SupplyChain {
    address public owner;
    uint public nextItemId = 0;

    struct User {
        string name;
        string jobTitle;
        string company;
        string role;
        bool active;
        string refData;
    }

    struct Item {
        string name;
        string code;
        uint8 decimals;
        uint256 totalSupply;
        string description;
        string refData;
        mapping (address => uint256) balanceOf;
    }

    mapping (address => User) public users;
    mapping (uint256 => Item) public items;

    event Transfer(address _from, address _to, uint _id, uint256 _value);
    event Register(address _userAddress, string _name, string _role);
    event Creation(uint _nextItemId, string _name, uint256 _totalSupply, address _ownerRole, string _type);
    event NewItemNormal(uint _nextItemId, string _name, string _code, uint8 _decimals, uint256 _totalSupply, string _description);
    event NewItemDivide(uint _nextItemId, string _name, string _code, uint8 _decimals, uint256 _totalSupply, string _description, uint _id, uint256 _quantity);
    event NewItemMerge(uint _nextItemId, string _name, string _code, uint8 _decimals, uint256 _totalSupply, string _description, uint _id1, uint _id2, uint256 _quantity1, uint256 _quantity2);

    function SupplyChain() {
        owner = msg.sender;
    }

    function newItemNormal(string _name, string _code, uint8 _decimals, uint256 _totalSupply, string _description, string _refData) {
        items[nextItemId] = Item({
            name: _name,
            code: _code,
            decimals: _decimals,
            totalSupply: _totalSupply,
            description: _description,
            refData: _refData
        });

        items[nextItemId].balanceOf[msg.sender] = _totalSupply;
        newItemNormal(nextItemId, _name, _code, _decimals, _totalSupply, _description);
        Creation(nextItemId, _name, _totalSupply, msg.sender, "Normal");
        nextItemId++;
    }
}
```

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More

- Twitter: <https://twitter.com/hectugaroj>
- Blog: <https://semanticblocks.wordpress.com/>

