



BarterMachine

Getting Started Tutorial

Steps:

1. Install Metamask and create wallet
2. Create Metamask accounts for users
3. Get free test ethers and ERC20 tokens from faucets
4. Make deposit and create BarterMachine accounts
5. Enter orders (bids)
6. Submit solution and receive reward
7. Miscellaneous Topics: Deposit/withdraw ENS, ERC721, Circular Economy

BarterMachine highlights ...

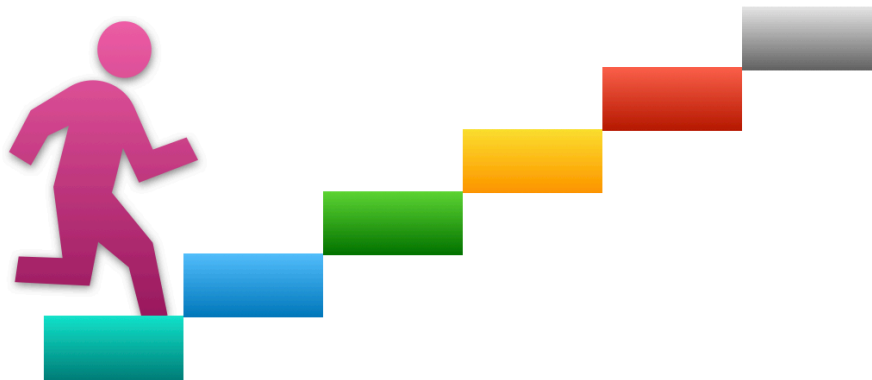
- BarterMachine is a distributed exchange (DEX). It runs on Ethereum blockchains and needs no central server.
- The most general many-to-many bid pattern is supported (current exchanges only provide pair trading).
- It is completely autonomous and is designed to be used by crowds. It's not controlled by anyone.
- Bartering solutions (exchange cycles/circulations/hypercycles/hypercirculations) can be submitted by anyone. The excess tokens resulting from the exchange are fully granted to the solution provider as a reward. This provides incentive mechanism for submitting solutions.
- Currently, it can be used to barter Ether, ERC20, ERC721 tokens and ENS names (Ropsten .eth domain only).
- BarterMachine is Circular Economy friendly as it can allow you to trade used products represented by tokens.

Disclaimer

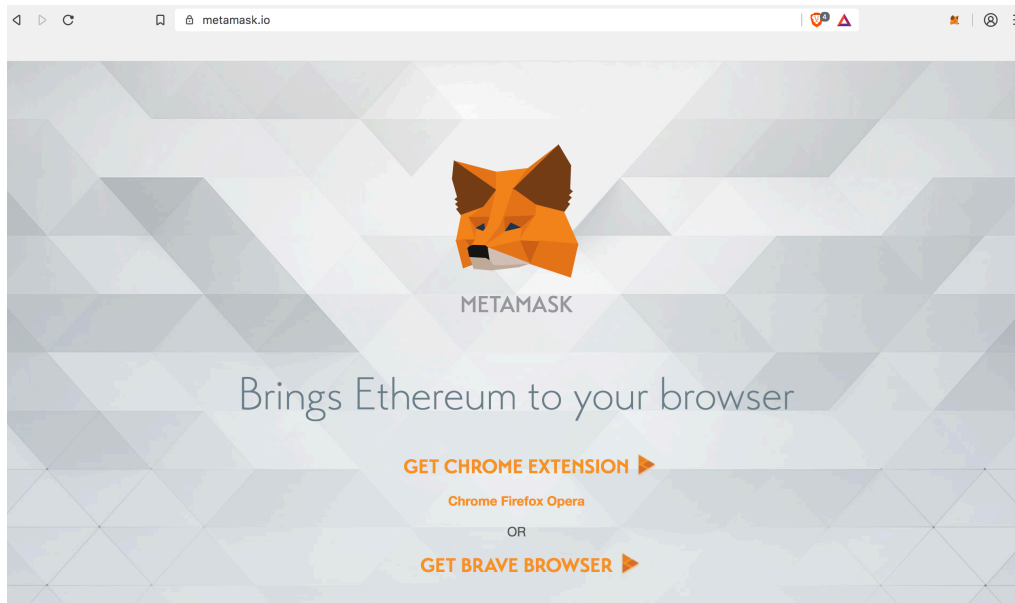
- Currently, BarterMachine is made available ONLY on Ropsten Ethereum test network for testing purposes. Do not deposit anything that may be valuable to you into BarterMachine.
- It is provided “as is” as part of an academic research work. Use it at your own risk.

Step 1

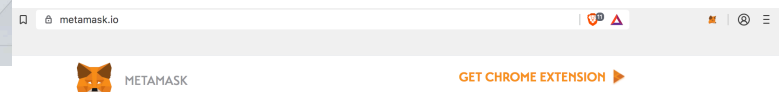
Install Metamask and
create wallet



1. Visit <https://metamask.io/>



2. Install extension

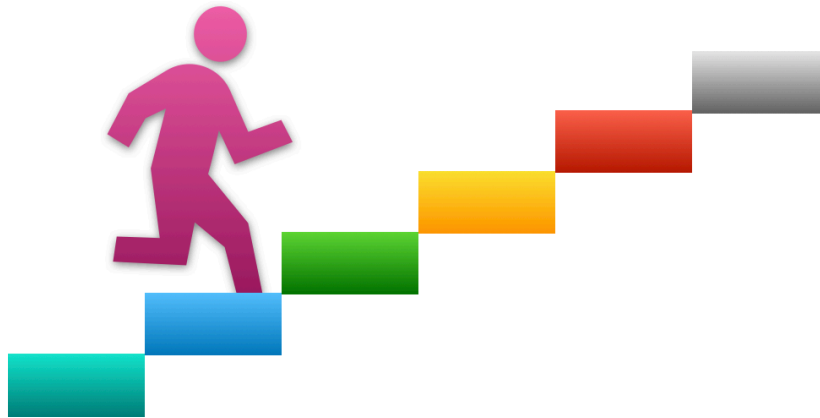


3. Watch [video](#) on how to use Metamask

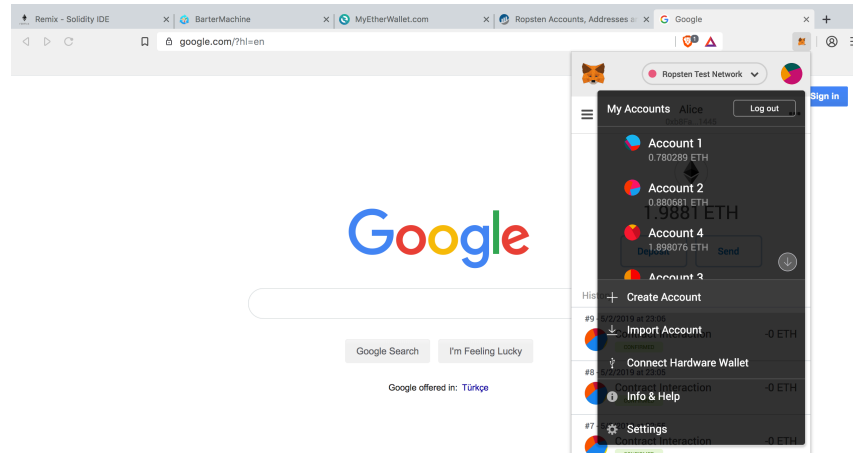


Step 2

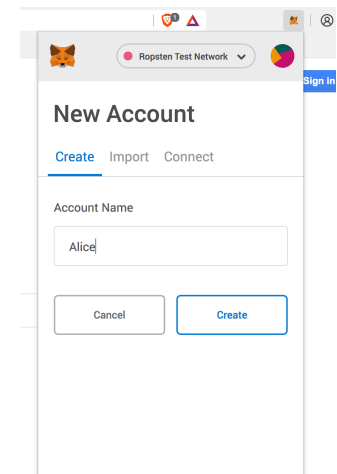
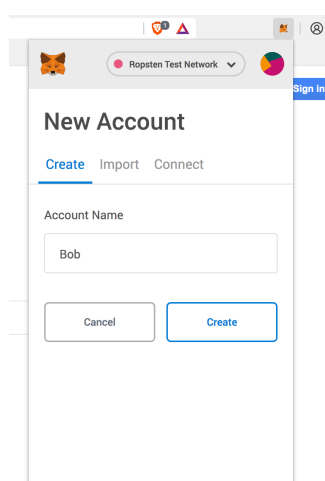
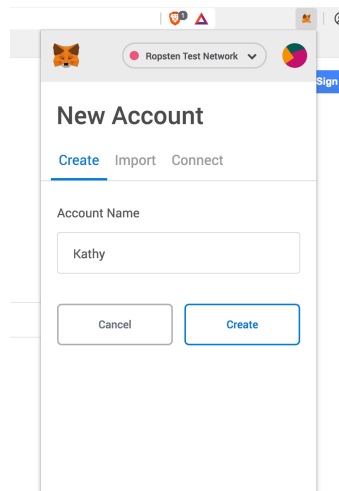
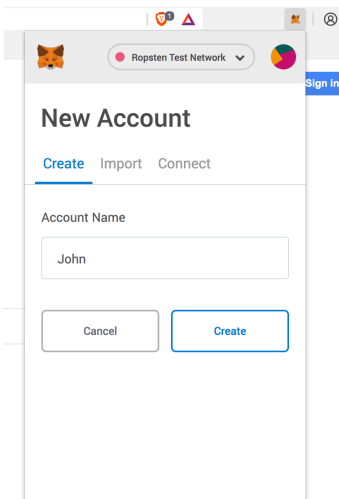
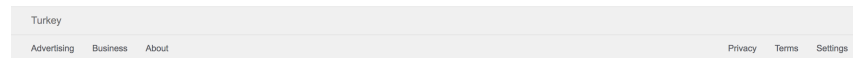
Create accounts for
John, Kathy, Bob and Alice



Create Ethereum accounts for John, Kathy, Bob and Alice. (Please note that normally these users will have their own separate Metamask accounts on their own computers and create their Ethereum accounts on their own Metamask. But for this tutorial, for convenience, we create them under the same Metamask account.)



1. Select Create Account

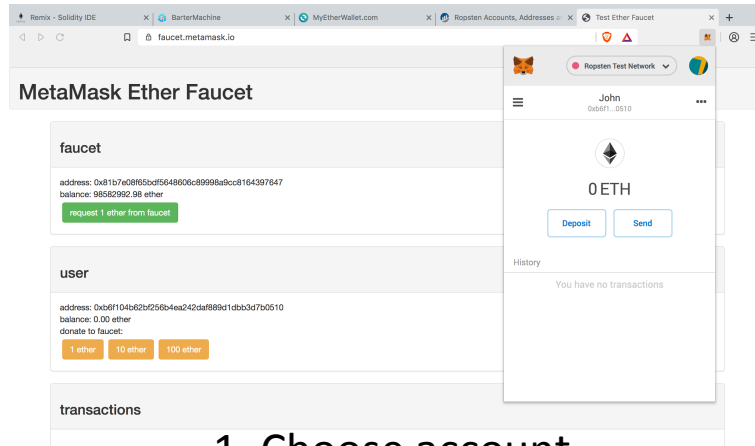


Step 3

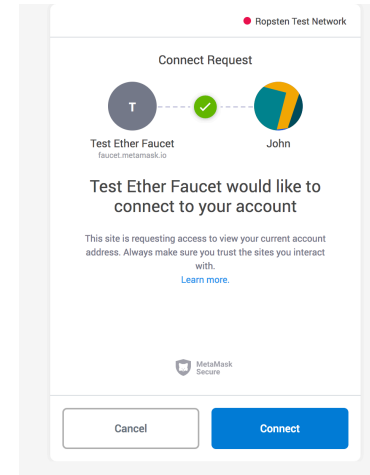
Get free test ethers and tokens from faucets



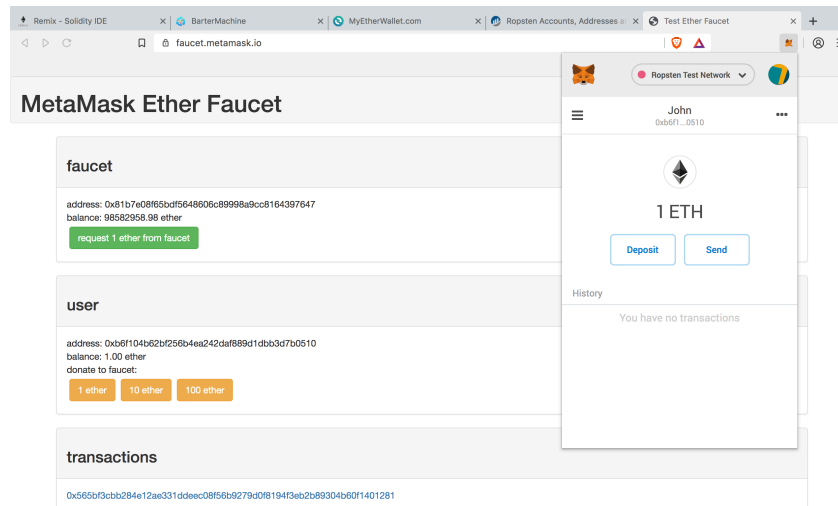
- For each person, **you should first get free ether** for the Ropsten network by visiting <https://faucet.metamask.io/>



1. Choose account

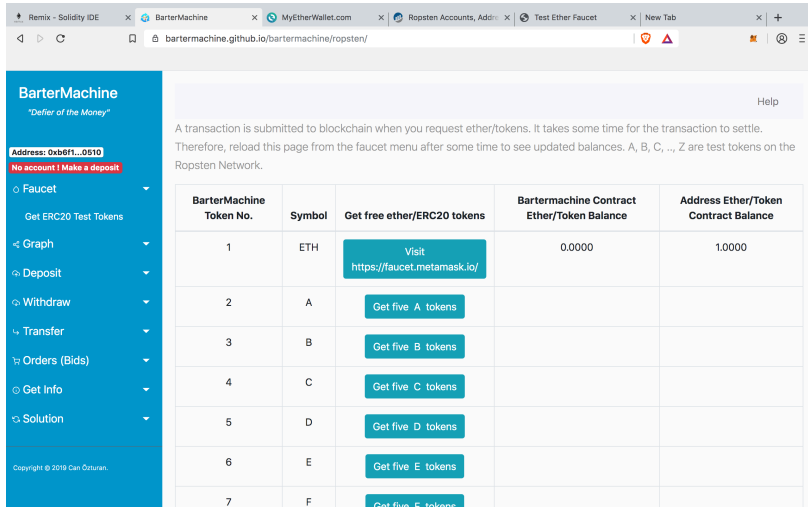


2. If asked, connect account

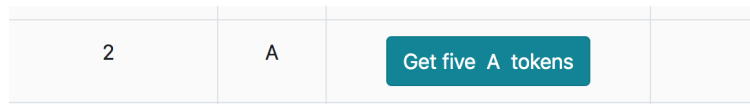


3. Request ether

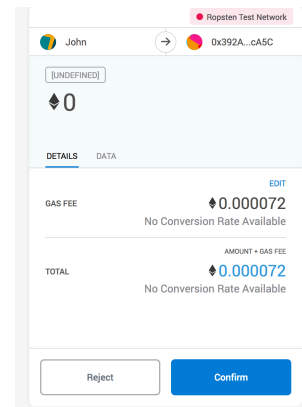
- For each person, you should get free ERC20 tokens on the Ropsten network by visiting :
<https://bartermachine.github.io/bartermachine/ropsten/>



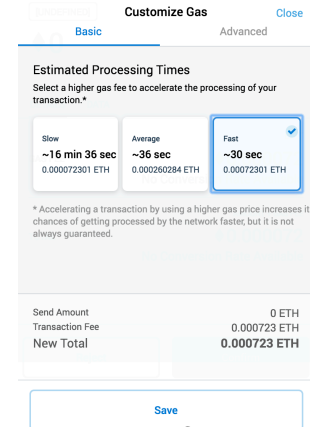
1. Choose Faucet => Get Free ERC20 Tokens



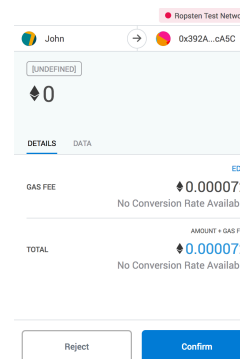
2. Click on Get five A tokens



3. Click Edit



4. Choose fast and save



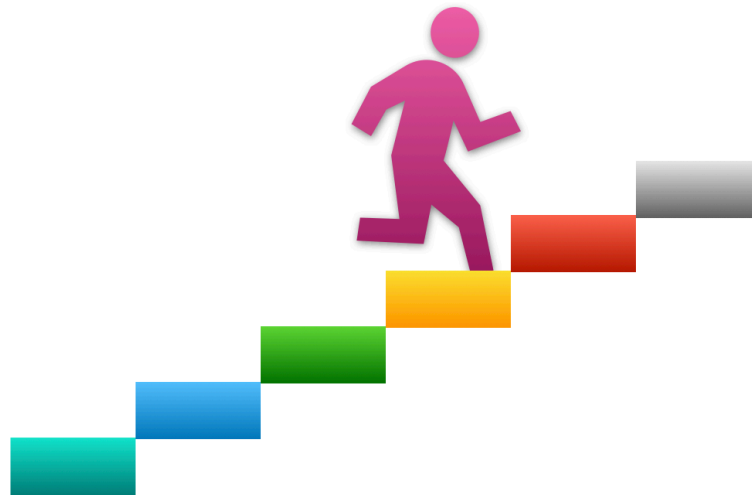
5. Click Confirm and wait for transaction confirmation

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance	Address Ether/Token Contract Balance
1	ETH	Visit https://faucet.metamask.io/	0.0000	0.9995
2	A	Get five A tokens		5

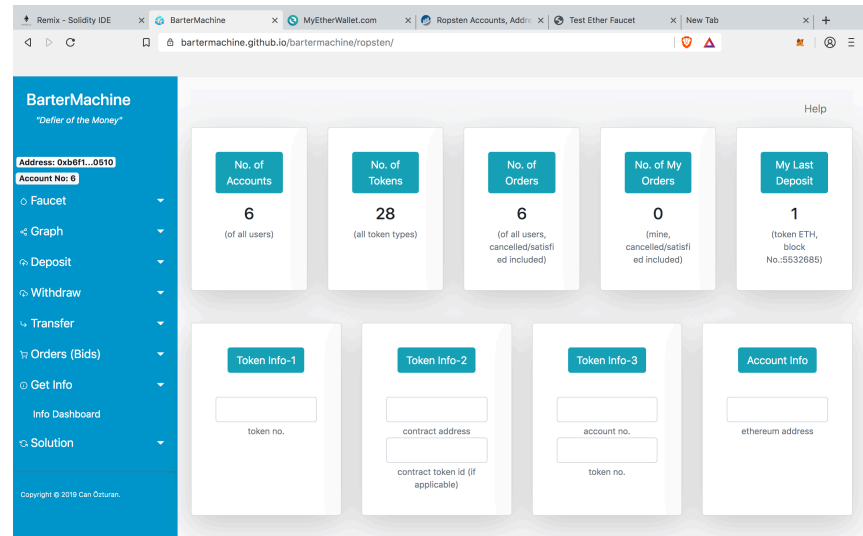
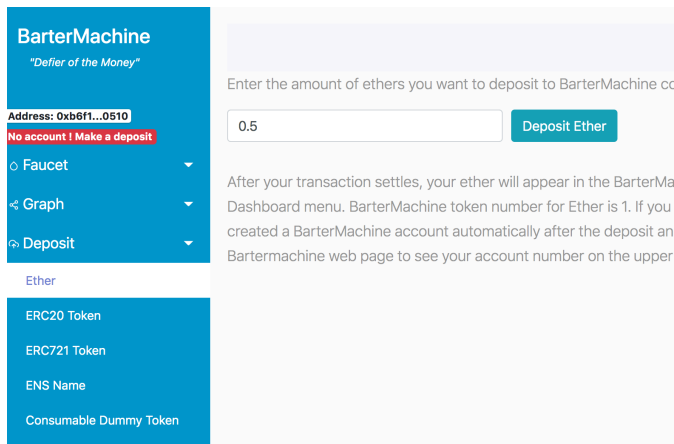
6. Click Faucet => Get Free ERC20 Tokens again to see the updated balances

Step 4

Make deposit and create
account at BarterMachine



- One BarterMachine account can be associated with a single Ethereum Address and vice versa. In order to create a BarterMachine account, you have to deposit either Ether, ERC20 or ERC721 or ENS name.
- The first deposit made from the account automatically creates the BarterMachine account.
- An account is identified by a positive number.
- When you make a deposit, please make a note of the token number of what you deposited. In order to save on Ethereum gas (transaction) costs, BarterMachine stores minimal information. Account token balances and bids are stored, but the **list** of tokens of an account is not stored. It is your responsibility to store/track this information yourself (perhaps by writing it on paper, or in a file or by using some wallet tool at the client side).
- Get Info => Info Dashboard => My Last Deposit gives you the last token number (a positive number) deposited by you. Record this number.



1. Deposit Ether from Deposit => Ether menu, submit transaction on Metamask and wait for confirmation.

2. Click Get Info => Info Dashboard => My Last Deposit (If you do not see you account number, reload the web page until you see it).

• Depositing tokens

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance	Address Ether/Token Contract Balance
1	ETH	Visit https://faucet.metamask.io/	0.8000	0.1971
2	A	Get five A tokens		5

1. John's balance (before)

BarterMachine
"Defer of the Money"

Address: 0xb6f1...0510
Account No: 6

- Faucet
- Graph
- Deposit
- Ether
- ERC20 Token

Help

To deposit your ERC20 fungible tokens, first, you should approve token transfer in the token contract. A transaction will be submitted for approval through the Metamask. Wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address: 0x392a12bc0113fb1f298a0bafaf6a18f1039dca5c 3 Approve

Second, perform deposit to the Bartermachine contract. Again, wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address: 0x392a12bc0113fb1f298a0bafaf6a18f1039dca5c token quantity Deposit

2. Approve 3 A tokens transfer to BarterMachine

BarterMachine
"Defer of the Money"

Address: 0xb6f1...0510
Account No: 6

- Faucet
- Graph
- Deposit
- Ether
- ERC20 Token
- ERC721 Token
- ENS Name
- Consumable Dummy Token
- Withdraw

Help

To deposit your ERC20 fungible tokens, first, you should approve token transfer in the token contract. A transaction will be submitted for approval through the Metamask. Wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address: 0x392a12bc0113fb1f298a0bafaf6a18f1039dca5c 3 Approve

Second, perform deposit to the Bartermachine contract. Again, wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address: 0x392a12bc0113fb1f298a0bafaf6a18f1039dca5c 3 Deposit

Afterwards, your token(s) will appear in the BarterMachine contract and can be queried using Get Info => Info Dashboard menu. If you did not deposit any token or ether before, you will be created a BarterMachine account automatically after the deposit and assigned an account number. A token contract is uniquely identified by the token contract address or the BarterMachine assigned token number. Token symbols are not stored in BarterMachine, since the same symbol may be used by multiple token contracts. If someone has already deposited token from a token contract into BarterMachine, the same token number will be used. Otherwise, a new token number will be generated.

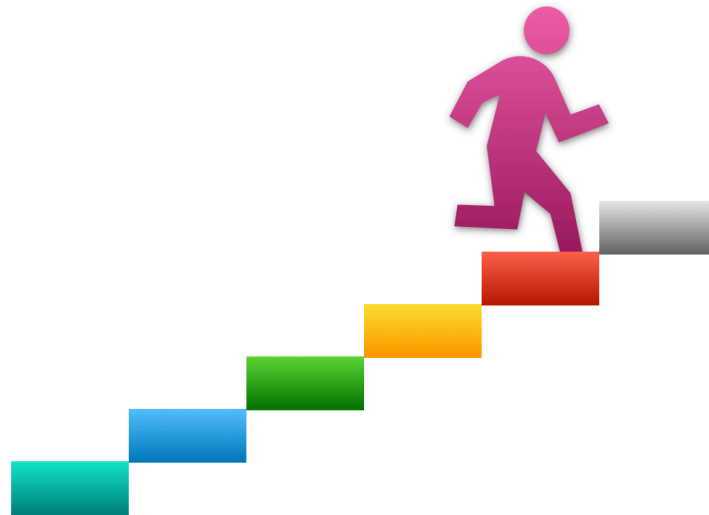
3. Deposit 3 A tokens into BarterMachine

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance	Address Ether/Token Contract Balance
1	ETH	Visit https://faucet.metamask.io/	0.8000	0.1963
2	A	Get five A tokens	3	2

4 John's balance (after)

Step 5

Enter orders (bids)



- We will assume the following balances in BarterMachine :

John:

- owns 0.8 Ether
- owns 3 A tokens

bids

$A(3) + \text{ETH}(0.5) \Rightarrow B(1)$

$\text{ETH}(0.5) \Rightarrow C(1)$

Kathy:

- owns 3 B tokens

bids

$B(1) \Rightarrow A(1) + C(1)$

Bob:

owns 4 C tokens

Bids

$C(1) \Rightarrow A(1) + \text{ETH}(0.3)$

Alice:

- owns 1 D token

- will not submit bids.
- will submit a solution.

John

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.8000
2	A	Get five A tokens	3

1. John's balance

BarterMachine
"Defier of the Money"

Address: 0xb6f1...0510
Account No: 6
Faucet

Give: A(3) + ETH(0.5) ⇨ Get: B(1) Enter Order

2. John enter bid

BarterMachine
"Defier of the Money"

Address: 0xb6f1...0510
Account No: 6
Faucet

Give: ETH(0.5) ⇨ Get: C(1) Enter Order

3. John enters bid

Address: 0xb6f1...0510
Account No: 6
Faucet
Get ERC20 Test Tokens
Graph
Deposit
Withdraw

Live orders (bids) are listed below. To cancel an order, click the trash icon next to the order number and confirm the transaction in Metamask. It will take some time for the transaction to settle on the blockchain. Click the menu item again to see the most up-to-date list after the transaction settles.

ETH(0.5) => C(1)	8	🗑
ETH(0.5) + A(3) => B(1)	7	🗑

4. John list bids

Kathy

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.0000
2	A	Get five A tokens	
3	B	Get five B tokens	3

1. Kathy's balance

BarterMachine
"Deffer of the Money"

Address: 0x82ab...44a0
Account No: 7
Faucet

Give: \Rightarrow Enter Order
Get

2. Kathy enters bid

Address: 0x82ab...44a0
Account No: 7
Faucet
Get ERC20 Test Tokens

Live orders (bids) are listed below. To cancel an order, click the trash icon next to the order number and confirm the transaction in Metamask. It will take some time for the transaction to settle on the blockchain. Click the menu item again to see the most up-to-date list after the transaction settles.

B(1) => A(1) + C(1) 9

3. Kathy lists bids

Bob

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.0000
2	A	Get five A tokens	
3	B	Get five B tokens	
4	C	Get five C tokens	4

1. Bob's balance

The screenshot shows the BarterMachine interface with the following details:

- Header: BarterMachine "Defier of the Money"
- Address: 0x0836...740d
- Account No: 8
- Navigation: Faucet, Get ERC20 Test Tokens
- Form: "Give" field contains C(1), "Get" field contains A(1) + ETH(0.3), and an "Enter Order" button.

2. Bob enters bid

The screenshot shows the BarterMachine interface with the following details:

- Header: BarterMachine "Defier of the Money"
- Address: 0x0836...740d
- Account No: 8
- Navigation: Faucet, Get ERC20 Test Tokens, Graph
- Text: "Live orders (bids) are listed below. To cancel an order, click the trash icon next to the order number and confirm the transaction in Metamask. It will take some time for the transaction to settle on the blockchain. Click the menu item again to see the most up-to-date list after the transaction settles."
- Form: A bid entry field containing "C(1) => ETH(0.3) + A(1)" and a trash icon.

3. Bob lists bids

Bid Graph (1)

Remix - Solidity IDE x BarterMachine x MyEtherWallet.com x Ropsten Accounts, / x Test Ether Faucet x New Tab x New Tab x +

bartermachine.github.io/bartermachine/ropsten/

BarterMachine
"Defier of the Money"

Address: 0x82ab...44a0
Account No: 7

Faucet
Graph

Live orders

Satisfied orders

Deposit
Withdraw
Transfer
Orders (Bids)
Get Info
Solution

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7-10 Draw1 Draw2 Draw3

Enter bid numbers or ranges separated by commas, e.g. 1,2,5-7

The diagram is a bid graph with nodes A, B, C, ETH, 7, 8, 9, and 10. Nodes A, B, C, and ETH are yellow squares, while nodes 7, 8, 9, and 10 are white circles. Blue arrows represent positive edges, and red arrows represent negative edges. The weights are as follows:

- A to B: 1 (blue)
- A to 7: 3 (blue)
- A to 9: -1 (red)
- B to 7: -1 (red)
- C to 7: 0.5 (blue)
- C to 8: -1 (red)
- C to 10: 1 (blue)
- ETH to 7: 0.5 (blue)
- ETH to 8: 0.5 (blue)
- ETH to 10: -0.3 (red)
- 7 to 9: -1 (red)
- 8 to 10: -1 (red)
- 9 to 10: -1 (red)

Bid Graph (2)

Remix - Solidity IDE x BarterMachine x MyEtherWallet.com x Ropsten Accounts, / x Test Ether Faucet x New Tab x New Tab

bartermachine.github.io/bartermachine/ropsten/

BarterMachine
"Defier of the Money"

Address: 0x82ab...44a0
Account No: 7

Faucet
Graph

Live orders

Satisfied orders

Deposit
Withdraw
Transfer
Orders (Bids)
Get Info
Solution

Copyright © 2019 Can Özturan.

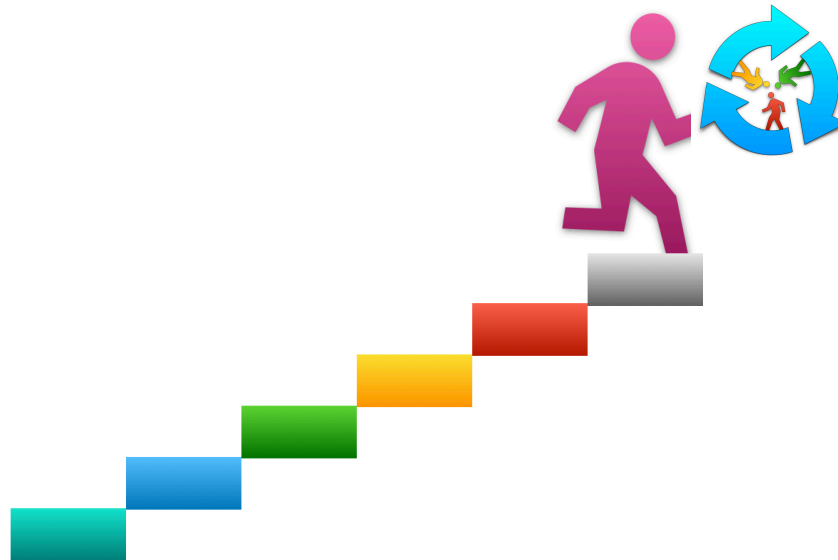
7-10 Draw1 Draw2 Draw3

Enter bid numbers or ranges separated by commas, e.g. 1,2,5-7

The diagram illustrates a bid graph with nodes and edges. Nodes on the left (ETH, A, B, C) and right (ETH', A', B', C') are yellow boxes. Nodes 7, 8, 9, 10 are grey circles. Blue arrows represent bids: ETH to 7 (0.5), ETH to 8 (0.25), A to 8 (0.25), B to 9 (1), C to 10 (1). Red arrows represent flows: 7 to ETH' (-1), 8 to A' (-1), 8 to B' (-0.3), 9 to A' (-1), 9 to C' (-1), 10 to C' (-1). A central white node has dashed arrows pointing to all other nodes.

Step 7

Submit solution and receive reward

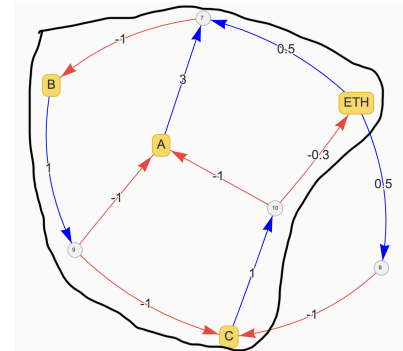


Alice (Solution Finder and Reward Receiver)

Address: 0x6bee...c823
Account No: 9

Therefore, reload this page from the faucet menu after some time to see updated balances. A, B, C, Ropsten Network.

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.0000
2	A	Get five A tokens	
3	B	Get five B tokens	
4	C	Get five C tokens	
5	D	Get five D tokens	1



1. Alice's balance (before)

2. Alice finds solution bids: 7,9,10
(note, this is found by client software)

BarterMachine
"Defier of the Money"

Address: 0x6bee...c823
Account No: 9

Solution

7,9,10

solution

hash

Check Hash (optional steps)

Lock or Unlock (optional steps)

Submit

Solution OK (tentatively).

Submit Solution

Address: 0x6bee...c823
Account No: 9

Therefore, reload this page from the faucet menu after some time to see updated balances. A, B, C, Ropsten Network.

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.2000
2	A	Get five A tokens	1
3	B	Get five B tokens	
4	C	Get five C tokens	
5	D	Get five D tokens	1

3. Alice clicks 'Submit' to send solution bids: 7,9,10
(note you can optionally check solution before submission)

4. Alice's balance after receiving 0.2 ETH and 1 A token reward.

Balances of John, Kathy and Bob after bartering by submitting solution bids 7,9,10

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.3000
2	A	Get five A tokens	
3	B	Get five B tokens	1
4	C	Get five C tokens	
5	D	Get five D tokens	

John

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.0000
2	A	Get five A tokens	1
3	B	Get five B tokens	2
4	C	Get five C tokens	1
5	D	Get five D tokens	

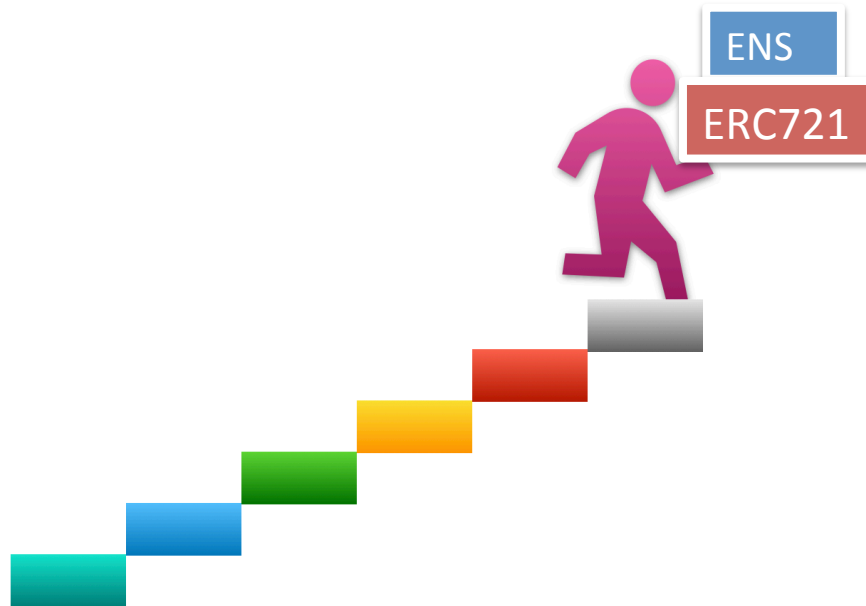
Kathy

BarterMachine Token No.	Symbol	Get free ether/ERC20 tokens	Bartermachine Contract Ether/Token Balance
1	ETH	Visit https://faucet.metamask.io/	0.3000
2	A	Get five A tokens	1
3	B	Get five B tokens	
4	C	Get five C tokens	3
5	D	Get five D tokens	

Bob

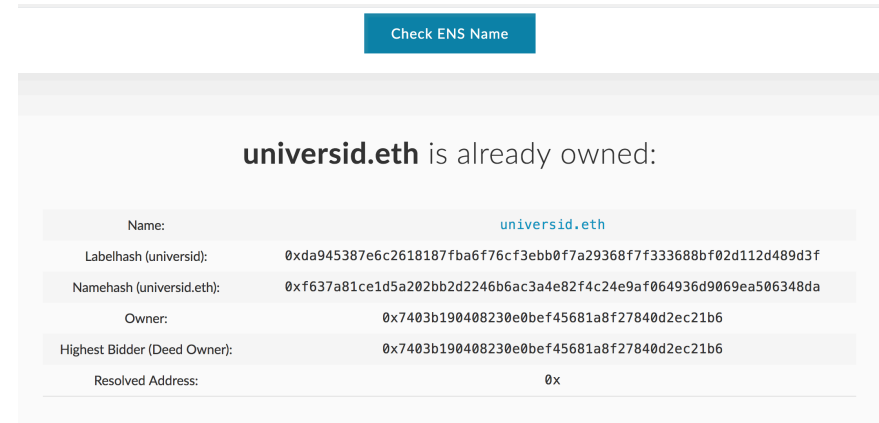
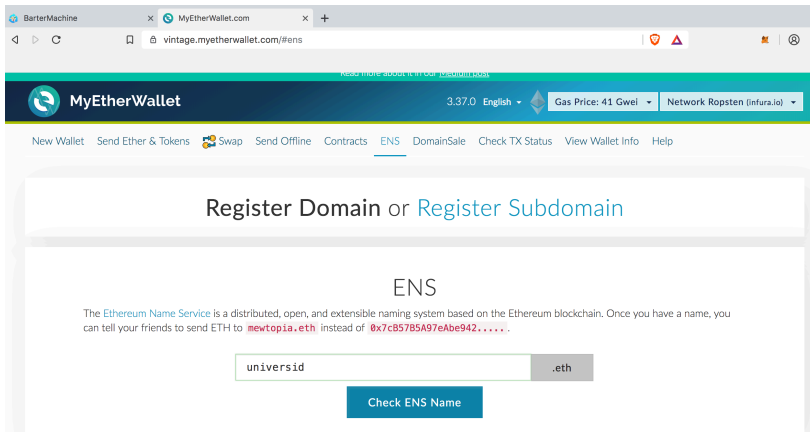
Step 7

Miscellaneous Topics: Deposit/Withdraw ENS, ERC721



ENS Name

You can deposit ENS name into BarterMachine. Once it is in BarterMachine and assigned a token number, it can be traded just like any other token. In this example, we will deposit and trade Ropsten universid.eth ENS name.



1. To display information about the ENS name, Visit <https://vintage.myetherwallet.com/#ens> to see the Deed owner of name “universid”

2. Note the **Deed Owner** and the **labelhash**. **Deed Owner** will deposit the name into BarterMachine.

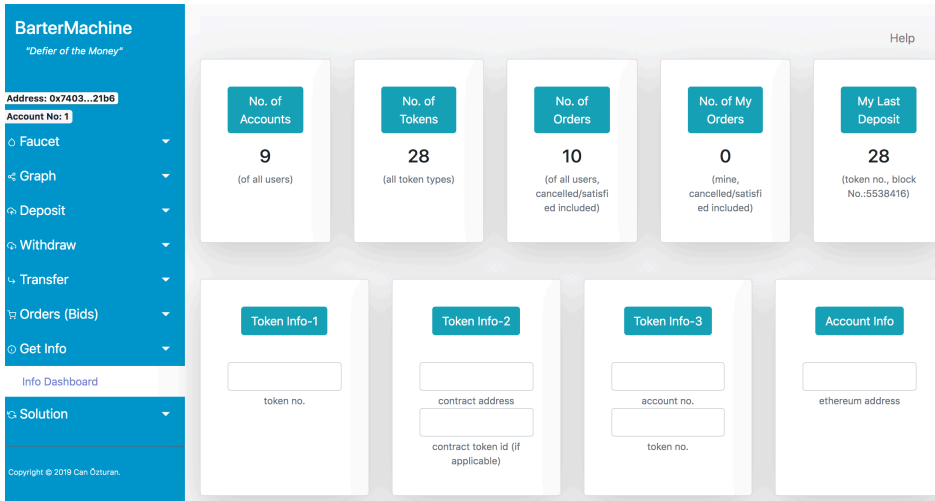
ENS Name Deposit

1. Visit BarterMachine Deposit => ENS Name. Enter registrar address and labelhash of ENS name. Click Transfer. (This transfers deed ownership to BarterMachine).

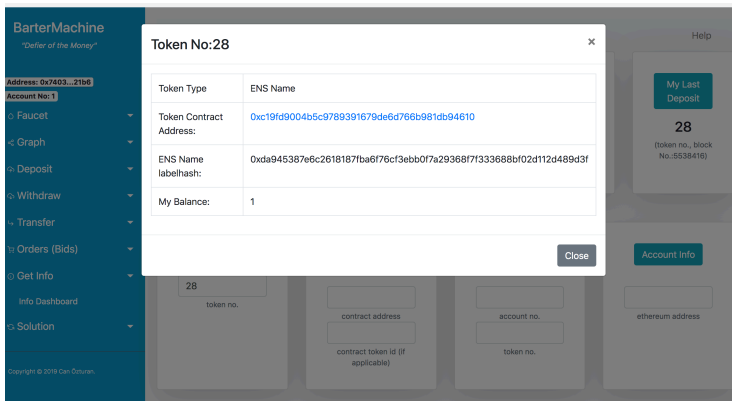
2. After the transfer transaction, now Click Deposit. Wait for transaction to complete.

Worried ?: When you transfer name ownership to BarterMachine, only you can deposit, because BarterMachine checks to make sure previous owner is you !!!

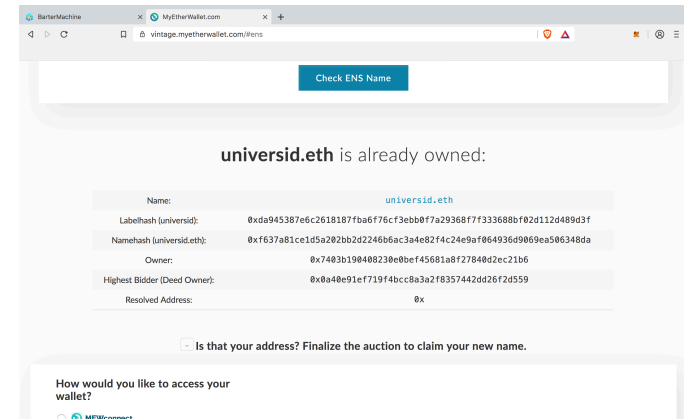
ENS Name Deposit



1. Go to Get Info => Info Dashboard and make a note of the My Last Deposit token number. Token number 28 represents the ENS name universid

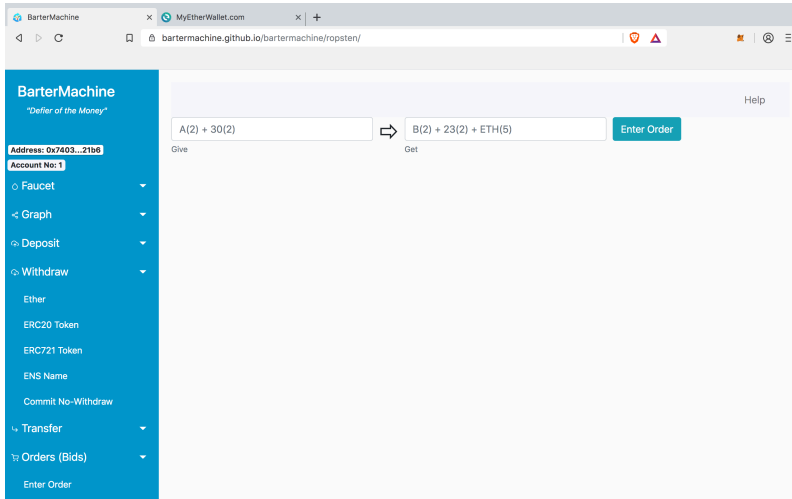


2. More detailed info can be obtained by entering 28 in Token-Info1 box.



3. MyEtherwallet shows the BarterMachine as the deed owner. BarterMachine contract has recorded you as the owner and only you can trade/transfer and withdraw it.

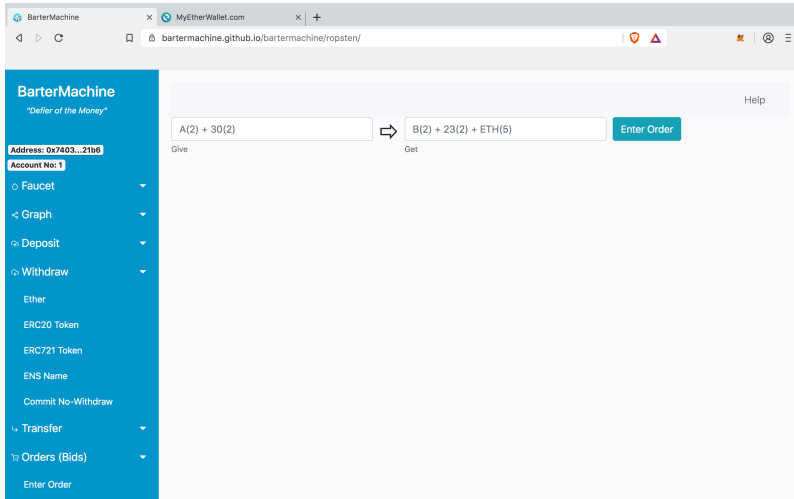
ENS Name Trade



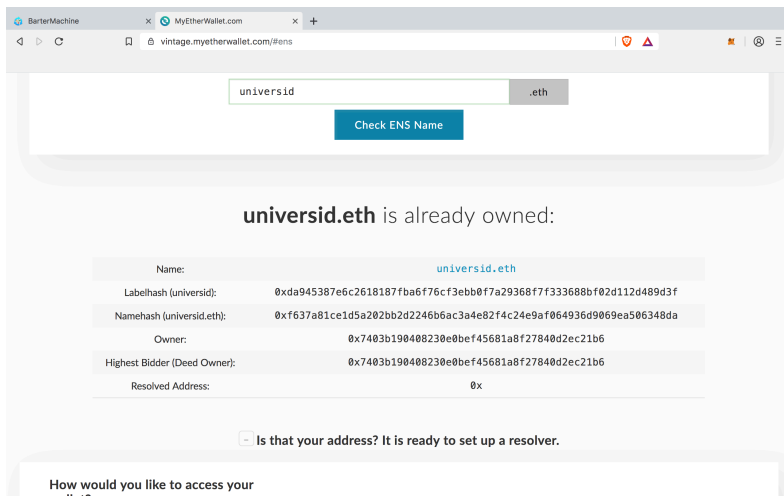
1. Go to Orders(Bids) => Enter Order and enter
 $28(1) \Rightarrow \text{ETH}(1) + \text{A}(1)$

This will mean you want to give your name and in return get 1 ETH and 1 A token.

ENS Name Withdraw



1. Assuming you did not trade it and you are still the owner, go to Withdraw => ENS Name and enter token number 28 and click withdraw.



2. Check the deed ownership on the myetherwallet.com.
<https://vintage.myetherwallet.com/#ens>

ERC721 Deposit/Withdraw

The screenshot shows the BarterMachine interface with the 'Deposit' menu selected. The main content area contains the following text and form fields:

To deposit your ERC721 non-fungible tokens, first, you should approve token transfer in the ERC721 token contract. A transaction will be submitted for approval through the Metamask. Wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address*

Second, perform deposit to the Bartermachine contract. Again, wait for the transaction to settle in the blockchain (you will get Metamask transaction completed notification).

Token Contract Address*

Afterwards, your token will appear in the BarterMachine contract and can be queried using Get Info => Info Dashboard menu. If you did not deposit any token or ether before, you will be created a BarterMachine account automatically after the deposit and assigned an account number. An ERC721 token is uniquely identified by (token contract address, token id) pair or the BarterMachine assigned token number. Token symbols are not stored in BarterMachine, since the same symbol may be used by multiple token contracts. If someone has already deposited the ERC721 token before into BarterMachine, the same token number will be used. Otherwise, a new token number will be generated.

1. For deposit use :
Deposit/ERC721 menu.

The screenshot shows the BarterMachine interface with the 'Withdraw' menu selected. The main content area contains the following text and form fields:

To withdraw your ERC721 non-fungible token (i.e. establish your ownership again in the ERC721 token contract), enter its BarterMachine token number.

Token No.*

After the transfer transaction settles down, please check your ERC721 token contract balance. If the transaction fails, check whether you committed no-withdraw.

2. For withdrawal use:
Withdrawal/ERC721 menu

Circular Economy

- BarterMachine can contribute to the Circular Economy vision by providing a worldwide collaborative circularity pattern discovery and settlement engine:

European Commission delivers Circular Economy Plan, March 4, 2019 :

https://ec.europa.eu/commission/news/commission-delivers-circular-economy-action-plan-2019-mar-04_en

Circular Economy expert (A. Lemille) :

https://www.huffpost.com/entry/circular-economy-20_b_9376488 is calling for

*“... finance-as-you-access, **bartering**-as-you-need or alternative means of exchange that will flourish away from a standardised monetary format...”*

EASAC's Circular Economy commentary:

https://easac.eu/fileadmin/Reports/Easac_15_CE_web_corrected.pdf

“Underlying the barriers to shifting from a linear to a circular economy is the failure of current pricing systems to fully integrate all costs (including social and environmental costs), which means that pricing systems are failing to transmit the necessary information to inform individual decisions.”

“One of the main stumbling blocks for achieving circularity is the lack of product take-back schemes and industrial infrastructure...”

*“...significant opportunities: ... * In the consumption phase. Collaborative consumption models based on lending, **swapping**, **bartering** and renting products; and product service systems to get more value out of underutilised assets or resources (for example cars, tools, lodging).”*

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"... Finally, we would like to remark that some economists may object to bartering saying that it is not an efficient market mechanism. However, if bartering is studied from a computer science perspective and efficient algorithms and software are designed for it, then we believe that a serious barter economy will develop and compete with monetary economy."

Quoted from the paper: Resource Bartering in Data Grids, Scientific Programming, Volume 12, Issue 3, Pages 155-168, 2004, ([pdf](#))